United States Department of Agriculture — Natural Resources Conservation Service

# Northeast Area News

MLRA Soil Survey Region 12 Winter 2004

## In this Issue



**Northeast Area News is published quarterly by the Major Land Resource Area 12 office (MO-12) in Amherst, MA.**

**Ideas, suggestions, and comments are welcome.**

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## Soil Survey Due for a Major Change

*By Bruce Thompson, MO-12 Team Leader*

How we publish soil surveys is due for a major change. The Quality Improvement Team (QIT) report is available and it states, "that in a few years we will be providing soils information to our customers by CD-ROM." Each state needs to send Terry Aho of Fort Collins a CD of one of their county soil surveys which shows how they would like to present soil survey data. Presently, when we finish a county project, we can provide 500 hard copies and up to 1000 CD's to the cooperators. As soon as the software is available and the look and feel for a CD package is determined, we will be phasing out hard copy soil surveys. This will require a change in the law; but it is assumed it will take place. ■

## The Theory of Soil Survey Evolution

*By Stephen Gourley, State Soil Scientist, Vermont*

Soil surveys by the USDA have been going on in the United States for several generations. Each new generation of soil scientists has developed many technologies that greatly improved the accuracy of soil surveys and the methods that are used to conduct soil surveys in the field.

When I first started mapping soils in 1976 I would listen — in shock — to the veterans who described how they did it in the olden days. I would shake my head at stories of how the early soil surveys were completed with plane tables and horse and buggy. How did they ever map soils without aerial photos and a stereoscope? How did they ever keep track of themselves in the woods? How could they make great looking maps with a quill pen and a French curve?

Over the last 28 years we have made many advances in the development of soil surveys, but it dawned on me the other day that I have become a veteran describing how much more difficult is was to map soils in the olden days.

New soil scientists will be shocked by stories of compiling soils with colored pencils and inking photos with Rapidograph pens. You did what with that dot grid, they will ask in awe? How did you ever keep from getting lost without a GPS unit, they will wonder? How did you ever locate bedrock without ground penetrating radar? You mean you actually dug holes — in the ground?

It may be that the soil scientists of the future will have it much easier and will churn out soil surveys 100 or 1000 times faster just by pushing buttons on their computers. But you know, when I think of all the long walks that I took in the woods from spring to fall when I was mapping soils, when my computer balks for the 3rd time this week, when 50 e-mails show up in one day, I think — I liked the old way better. ■

# MO Message — Highlights from the MO Leader's Meeting

*Bruce W. Thompson, MO-12 Team Leader*

The MO team leaders met in San Diego, CA during the week of January 26-30, 2004. Maury Mausbach, Deputy Chief for Soil Survey and Resource Assessment and Mike Golden, Soil Survey Division Director, were both able to attend the meeting, although major management items, such as reorganization and the budget had not been finalized for FY 2004. Maury said it will not be a good budget year because we are expected to pay for part of the reorganization and share in the cost of $4.337 million that will be used to build a GIS of Excellence facility on the campus of West Virginia University in Morgantown. It was announced that Chris Clark, a former Rhode Island soil scientist, will be the acting director of the GIS center.

**"I would like to thank the state soil scientists and the staff in MO-12 and Massachusetts for their excellent work and timeliness in producing the CRA map."**

Bruce Thompson
MO-12 Team Leader

Maury said that there will be three new technology centers as part of reorganization — one will be in Portland, one in Fort Worth, and the third in Raleigh or Greensboro, N.C. Obtaining the necessary space near Raleigh appears to be controlling the selection of the third location. The functions of the current institutes will be relocated to the three technical centers. It appears the Soil Quality Institute function will be located in the East. Maury said there will be soil scientists, maybe more than one, at each of the technology centers. The soil scientists will assist with the integration of the soils data into technology center programs. National Resources Inventory (NRI) will move its operations from the state ICCS locations and become part of the technology centers. A GS-14 will lead each of the NRI groups and will supervise four or five GS-13 specialists. The actual PSU analysis will be done by contractors. The technology center each will comprise 30 individuals, not counting the NRI staff.

Maury said the Conservation Security Program, a capped entitlement program at $41 million, will become the future of the agency. Initially, it will be set up for 7 to 12 watersheds and require that SSURGO exist for all counties that comprise the watershed. This will place high pressure on the SSURGO initiative in a lot of states. There is also a requirement that we have attribute data loaded in the Soil Data Mart by December 31, 2004 for all counties.

Maury said soil survey really did "outdo themselves" by creating the Common Resource Area (CRA) maps in the two-month deadline period set by the Chief. It may not be 100 percent what upper management wanted, but it is an excellent product. Therefore, I would like to thank the state soil scientists and staff in MO-12 and Massachusetts for their excellent work and timeliness in producing the map. Sharon Waltman assured me that all of the joins between states were accurate. Now, the resource conservationists can draft the necessary templates for useable practices.

There are several personnel changes taking place in the Soil Survey Division and the National Soil Survey Center. Dr. Carolyn Olson, National Leader, Soil Survey Investigations will be reassigned to the Soil Survey Division as an advisor to Mike Golden. She will work with personnel in Mexico and Canada and also have input on soil carbon. Maxine Levin will become a liaison to the Soil Survey Division. Mike will need to fill the program manger position and a soil analyst position similar to Jim Ware's position. Ken Lubich, coordinator for SSURGO, Digital Map Finishing (DMF), and publications is now on the division staff. There is also a vacancy for a MLRA Coordinator that Tom Calhoun held prior to his retirement. There are also several positions vacant in Lincoln such as research soil scientist, soil scientist for interpretations, and soil scientist for soil survey investigations.

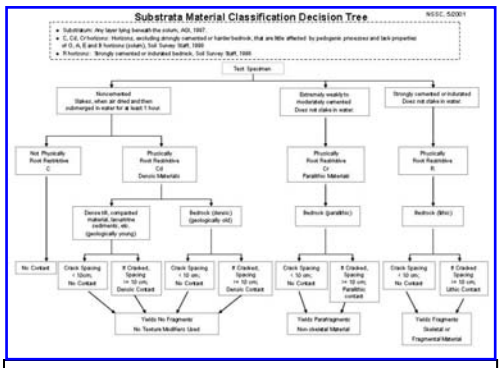
The state soil scientist's meeting originally scheduled for this fiscal year will not be held. The lateness of the budget and a budget decrease (about 8 percent less) resulted in the meeting being cancelled for this year. ■

# To Cr, or Not to Cr?

*By Al Averill, MO-12 Soil Data Quality Specialist*

Although my tenure as SDQS is thus far short, I've already seen a classification/soil description issue repeat itself in different states. For those of us who deal with weathered bedrock, I offer this — to at the most, insure consistency — or at the least, help clarify things in my own mind. One possible result however, is you'll conclude I'm out of my mind and have been in the cubicle and away from the field too long.

The issue: There is inconsistency regarding the application of the horizon suffix "r". I can understand why. The 1993 Soil Survey Manual (SSM) states, "used with C to indicate a root restrictive layer of soft bedrock or saprolite…, excavation difficulty is low or moderate." The 1998 and 2003 Keys to Soil Taxonomy tell us "r" indicates layers of weathered or soft rock that are moderately to extremely weakly cemented and excavation difficulty is low to high. The 2002 Field Book for Describing and Sampling Soils reads, "… weathered or soft bedrock (root restrictive saprolite or soft bedrock; partially consolidated sandstone, siltstone or shale; excavation difficulty classes are low to high.")




Substrata Material Classification Decision Tree — CTRL + Click on the above image to view the flowchart.

You may draw varied conclusions depending on the reference used. With the help of Bob Engel, soil classification guru from the National Soil Survey Center, I hope I've reached the correct ones. The bottom line is that weathered rock must be physically root restrictive to apply the suffix "r". What does "root restrictive" mean? It means roots cannot enter the layer except in cracks. In the case of weathered bedrock with extremely weakly to moderately cemented rupture resistance class, root restrictive is synonymous with paralithic materials.

This perhaps begs the question: if you describe a Cr layer within 50 cm of the mineral surface, are you indicating a paralithic contact and therefore placement in the shallow family? Maybe, maybe not. A Cr is not necessarily synonymous with a paralithic contact even though it indicates root restriction. For the layer to meet the definition of paralithic contact, cracks that roots can enter must be greater than 10 cm apart.

When describing weathered bedrock in a profile, please try to determine if the layer is root restrictive. If not root restrictive, then label it C (or 2C as the case may be) and describe it as "weathered bedrock." If yes, then label it Cr and try to determine if it would meet the definition for "paralithic contact." If the material is root restrictive, but cracks that roots can enter are less than 10 cm apart, then the layer is a non-paralithic contact Cr. If cracks are greater than 10 cm apart then the layer is a paralithic contact Cr. In some cases this assessment will not be straightforward. Lack of roots is not synonymous with root restriction and your best judgment interpretation will be based on careful evaluation of the overall characteristics of the materials.

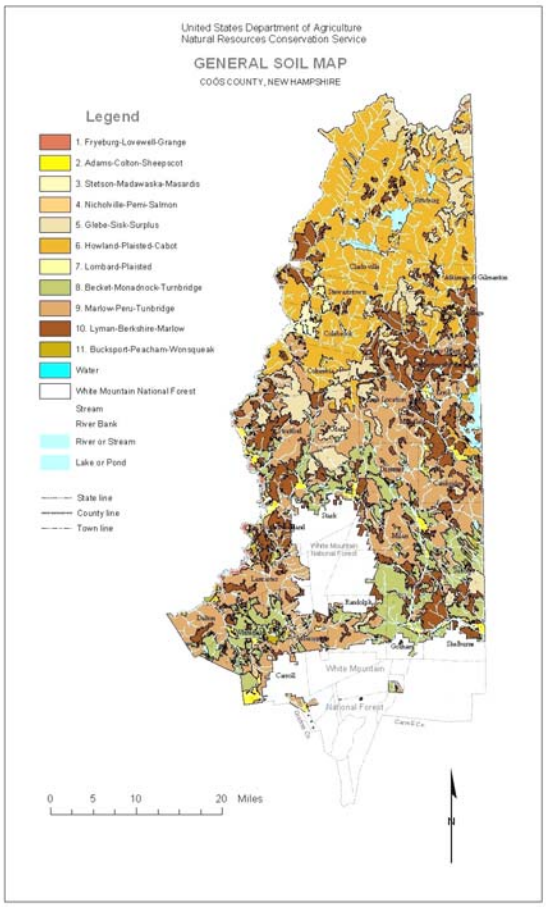
When documenting characteristics of weathered bedrock in addition to roots, structure, rock fragments, etc., please describe rupture resistance class (SSM pg. 174-175), excavation difficulty class (SSM pg. 184) and abundance of and distance between cracks if any.

Why, you may ask? Because, it can be difficult to evaluate and accurately classify some of these pedons based on the information conventionally included in the profile descriptions. Also, paralithic materials in the control section can be used to differentiate series. Present and future cubicle dwellers have to rely on what can be read on paper and interpreted. The more information, the greater the possibility will be for accurate interpretation and classification. ■

# General Soil Map for Coös County, New Hampshire
# Produced from detailed soils mapping using Arc/Info

*By Don Richard, Cartographer; and Tom Burke, Soil Scientist, New Hampshire*

The general soil map of a survey area shows general soil associations based on broad natural landscapes within the survey area. Each of these associations or general soil map units (GSMU) has a distinctive pattern of soils, relief, and drainage. Typically, a GSMU consists of two or more major soils and is named for the major soils although there may be many minor soils included in a particular GSMU.




When it came time to work on our general soil map for Coös County, the soil survey staff had a pretty good idea of the broad soil landscape relationships in our survey area (having completed the Order 2 and Order 3 mapping for the county). The survey area is nearly 1 million acres in size. We dug out an old, hand-colored general soil map that the initial party leader had produced and, armed with Arc/Info and our SSURGO soils data, we set out to produce a general soil map from the ground up. Our rationale was that using our SSURGO map unit polygons to help us delineate GSMU boundaries would be more accurate (and less tedious) than roughly eye-balling general soil associations from our more detailed soil maps.

Using Arc/Info to produce a general soil map from SSURGO soils data requires a series of consecutive steps. First, there must be a field in the .PAT file to hold the general soil map unit (GSMU) attribute for each SSURGO map unit polygon. If at this point we simply dissolved on this attribute, the resulting map would contain many small island map units within other general soil map units. To determine how to dissolve these units, a set of rules needs to first be developed by the soil scientist.

For Coös County, the soil scientist staff developed a rules matrix in an Excel spreadsheet based on our field experiences. Incorporating tiny polygons within a GSM unit (or letting them stand alone if there are many of the same type of tiny polygons nearby) involves knowledge of where inclusions are likely to occur on the landscape adjacent to the predominant soils. If, for example, a smaller unit of a bedrock controlled unit (such as Lyman-Berkshire-Marlow) is surrounded by an outwash unit (Adams-Colton-Sheepscot), that smaller unit is allowed to be dissolved into the bigger outwash unit since we have observed in the field that occasional rock outcrops do indeed pop up in outwash areas. By using our field knowledge, we were able to establish a set of rules for dissolving these small island map units.

Then, a minimum map unit size needs to be determined. For the Coös County General Soil Map a minimum map unit size of 150 acres produced good results. By using cursors within an AML macro program, each polygon less than or equal to 150 acres was selected for application of the rules. The basic

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processing scheme is to dissolve smaller map units into larger map units without violating the rules, until no map unit is less than the minimum acreage. To accomplish this, the attributes of the adjacent map units must be queried. This again is done by cursing through the records of the adjacent map units, calculating the total areas of similar general soil map units, determining the largest combined area, checking the rules, and then assigning the value of the GSMU accordingly. Several iterations of these procedures will result in most map units less than or equal to the minimum map unit size being dissolved into larger map units. The remainder will be the ones that could not dissolve without violating the rules. These map units are then assigned the attribute of the larger adjacent unit.

By combining Arc/Info software with detailed SSURGO soils data, we were able to come up with a general soil map that not only looks nice and is accurate, but captures major themes that might have been missed using the previous method of eye-balling. As an example, we initially had our very poorly drained Histosols lumped with our lacustrine soils. After looking at the initial general soil maps generated, we realized that there was enough broad acreage of very poorly drained Histosols to have its own GSMU. So, although we had a pretty good general idea of soils in our area, Arc/Info software allowed us to find another general soil map unit that we initially missed.

For more information, please contact Joe Homer, MLRA Soil Survey Project Leader (joseph.homer@nh.usda.gov) or Tom Burke, Soil Scientist (tom.burke@nh.usda.gov) in Lancaster, NH at (603)788-3818 or Don Richard, Cartographer (donald.richard@nh.usda.gov) in Concord, NH at (603)223-6028. ■

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## Only in Vermont
## Soil Surveys on CD-ROM

*By Stephen Gourley, State Soil Scientist, Vermont*

Recently I assisted Caroline Alves at the Barre Farm Show handing out soil survey information for the day. It was good to get out of the office and to catch on what Caroline had been working on.

We were handing out and demonstrating the new Washington County Soil Survey on CD-ROM. I was explaining the CD-ROM to an interested woman who I thought used soil surveys in a business. She listened intently and asked several relevant questions. When she asked to purchase a copy I told her that they were free as I handed her the copy.

As she turned to go she said to her friend, "Mabel, I'll have to get that new CD player at Best Buy that we looked at this morning."

I started to explain but couldn't think of what to say as she walked away. ■

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## George Washington Carver's Contribution to Soil Science

Did you know George Washington Carver's efforts to improve the economy of the South included the teaching of soil improvement and of diversification of crops? He discovered hundreds of uses for the peanut, the sweet potato, and the soybean and thus stimulated the culture of these crops. He devised many products from cotton waste and extracted blue, purple, and red pigments from local clay.

To learn more about other notable African-American scientists and inventors check out http://www.infoplease.com/spot/bhmpeople15.html. ■

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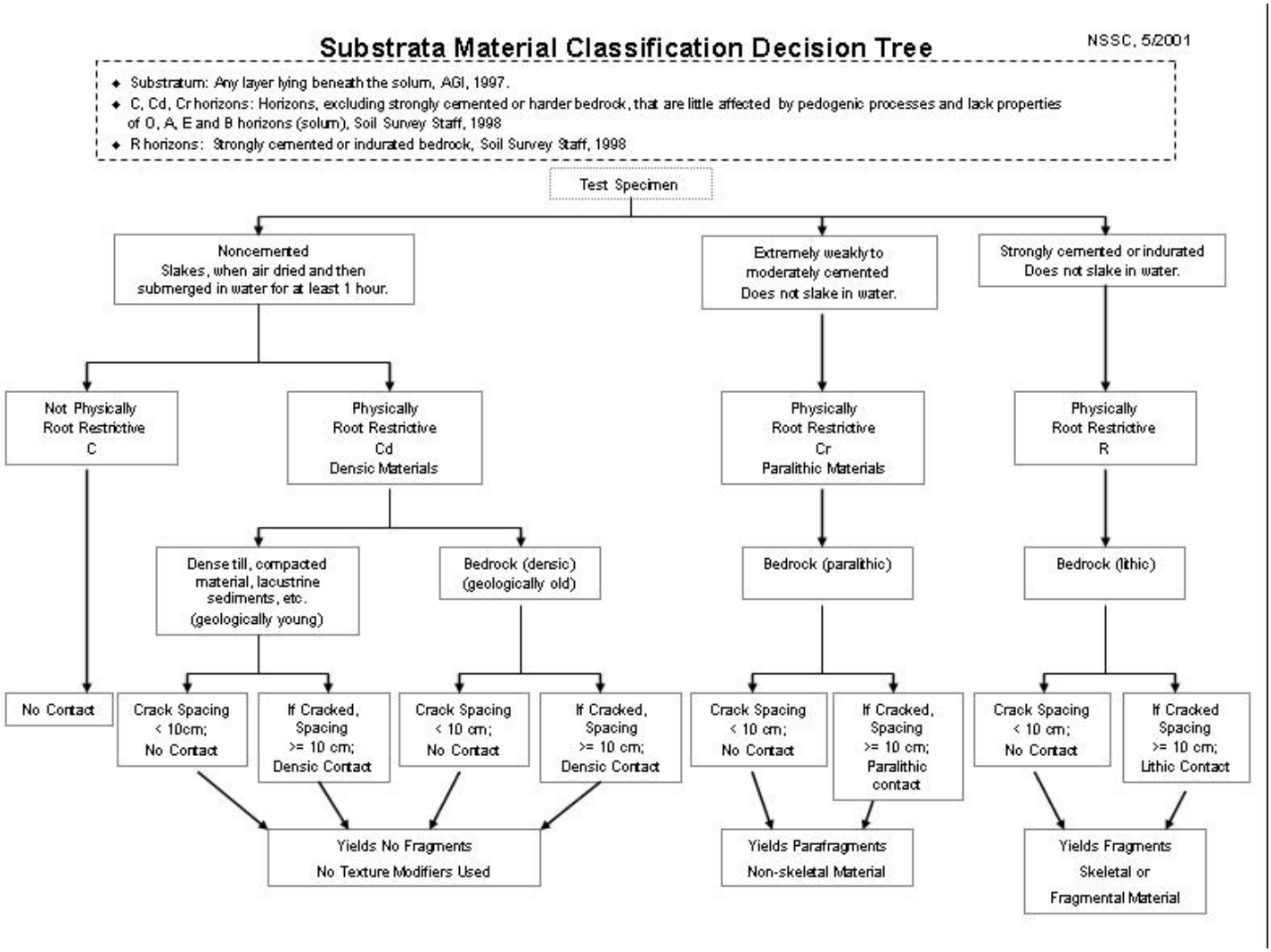


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