Mountain Views

Newsletter of the MLRA 6 Office, Lakewood, CO November, 2000

Greetings From Cam

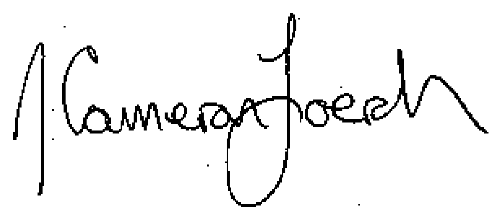
We are pleased to present another issue of *Mountain Views*. It is our hope that you will find the articles that follow informative, useful, enjoyable, and perhaps amusing.

As more and more of our soils resource data becomes available in digital formats, opportunities for utilizing the data to solve technical issues, create resource inventory maps, and assist with conservation planning are many. Throughout our region as well as the country, tools to gain access to the data have been developed and are being implemented. The Soils Data Viewer, which is an ArcView software application, is a module designed to provide easy access to digital soil survey geographical data (SSURGO) and soil interpretations. The Soils Data Viewer works with the Customer Service Toolkit and is used to create resource planning maps. The planned implementation for the Viewer is in USDA Service Centers that have digital soil survey information as well as digital orthophoto imagery. We are looking at ways to provide the Soil Data Viewer and digital soils data to customers in a CD-ROM format for use with their GIS systems.

The road to being able to deliver digital soils information to the public for their use in solving resource issues begins with the creation of a certifiable database. Yes, I am referring to "populating NASIS (National Soils Information System) data." The integrity and usefulness of the delivered product depends upon the initial efforts of the field soil scientist in creating the database. This is no small task and a lot of effort has gone into training as well as connection to the NASIS system.

Many hours of sweat go into describing and collecting enough soils resource data in order to make predictions on how the soil will react to the many uses it endures. The process to get from the initial soil observations to delivery of useful digital data on a CD is dependent upon the availability of a quality, reliable, and consistent soils property database.

I applaud the efforts of the field soil scientists and want to remind those who use soils resource information of the dedicated work that goes into delivering technical soils information that can be trusted.



In this issue:

Paramicaceous - A Flaky Taxonomic Break?

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Ever since the criteria for the paramicaceous mineralogy class came out, we have been debating about how to apply it in MO6. According to the NSSC Classification staff, “The paramicaceous class was established to include those soils that have properties resulting from significant mica and mica pseudomorph content, but they do not make the greater than 40 percent (by weight) limit. Low shear strength is still an important property of soils that meet the criteria of paramicaceous.”

Our question became, “If we indeed have these soils, are they mappable and are they significant to soil behavior and management?”

The first survey to face this issue was Rocky Mountain National Park. Mica was abundant in the Park and a decision had to be made. Based on numerous reference samples with grain-count data, Project Leader Lee Neve and I decided 40 to 70 percent mica by grain count should be considered paramicaceous. These soils were generally shallow or moderately deep and developed in colluvium or residuum from granite, gneiss, and schist (Silver Plume Formation). Very deep soils from till generally had less than 40 percent mica. Lab data supported this ‘rule of thumb’ and because of the correlation to soil depth and parent material, it seemed mappable. Soil series were correlated accordingly.

I will soon be testing this rule of thumb to see if it provides a meaningful separation for soil behavior. The National Soil Mechanics Lab has provided Atterberg limits on a dataset of mica soils from throughout Colorado that have mica grain-count data. Some of these samples also have experimental data for mica by weight. I hope a pattern will emerge that will indicate a mica content that has a significant effect on liquid limit or plasticity index. The objective is to add value to our soil surveys by correlating taxonomic classes (and thereby our soil maps) to practical soil interpretations.

New Scanner In GIS

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The Colortrac 3680

The GIS section has a new scanner! It has the capability to scan materials up to 36 inches wide, in color. Other options include scanning to several different image file formats as well as scanning straight to a specified printer or plotter. This tool will be a great addition in our ongoing efforts to fully automate NRCS data sources. For example, the soils folks in the field have the option of having their original field sheets scanned and transferred to CD for security copies. It will also allow the soils group to revitalize archaic copies of published soil surveys that are **so dang** old they’ve dwindled down to a single remaining copy.

The GIS section is excited to implement this technology in various mapping and cartographic applications such as scanning ongoing soil survey mapping!! In this example, field sheets could be scanned as they are compiled, allowing NRCS to provide soils data to local GIS users as quickly as possible. Other non-existing 24k data layers for Colorado could be scanned and vectorized for map finishing, Customer Service Tool kit, GIS projects, and other needs.

Establishing a Precedent

Melissa R. Trenchik, Soil Scientist, Woodland Park
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The soil survey team of Laura L. Craven and Melissa R. Trenchik is changing one image of soil science: the Woodland Park, Colorado team represents the only all-female soil survey team in MO6.

Laura and I have been working together on the Teller-Park Soil Survey since January of 1998. This is the first time in Laura's 17-year career that she has worked with another female soil scientist. During the past four years Colorado has seen a significant increase in the number of female soil scientists; in fact, a female soil scientist is on every Colorado soil survey project with a two-member team.

Laura Craven (left) and the author assisting the Colorado Springs FO with a dam sight.

The influx of women into the soils program is not confined to Colorado, but is occurring throughout the nation. I witnessed another precedent while attending Soil Correlation class this summer: 16 women and 14 men attended—for the first time in NRCS history, the females were in the majority at a soils class!

NRCS soil scientists are often teased for paying too much attention to detail and for getting too hung up on the numbers. Well, you all have a good reason to tease us, because I'll bet you won't find anyone who sweats the small stuff like Laura and I do. We are both striving to do the best job possible no matter what the task, and we always endeavor to learn as much as possible about our discipline. In our pursuit of excellence, we look for ways to promote professionalism. Therefore, we both are ARCPACS Certified Professional Soil Scientists (CPSSc). So the final precedent I would like to share is that we are the *only* ***all-female-all-professionally-certified*** NRCS soil survey crew in the country! This is a distinction of which we are rather proud: there are a total (male and female) of 1,343 CPSSc in the world, with only 137 female CPSSc, of which 21 are employed by NRCS.

As the culture of soil science changes from progressive soil surveys to update surveys and technical soil services, we all need to cultivate professionalism. In Colorado there are 31 Certified Professional Soil Scientists, but only 7 of those are NRCS employees.

I feel we are underrepresented in this arena, especially since NRCS is the lead agency for soils. As more private sector scientists delve into our area of expertise and maintain a greater number of Certified Professionals, we as NRCS employees are in danger of losing our credibility. The certification process is not all that difficult—the most painful part is sending in your exam fee!

If anyone is interested in obtaining their Certification, please contact me and I can give you the details.

MLRA Project Office Locations Proposed

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As part of a fiscal year 2001 Soil Survey Division initiative, all the MO offices around the country were asked to work together with the states they serve and to create a map indicating proposed locations for MLRA project offices. As you may remember, the Major Land Resources Area (MLRA) concept for conducting project soil surveys was adopted by the NRCS in 1995 as a result of the reinvention process.

The “MLRA Project Office” will be an important component of the Soil Survey Program of the future. The bottom line is having fewer and better-equipped project offices in lieu of maintaining the one- and two-person project offices. It is believed that it will be easier and more economical to install, maintain, and support the latest computers, communications, and GIS tools if fully equipped MLRA Project Offices are established. Other benefits include safe professional working environments, co-location opportunities with university or community colleges, a diffusion of political boundaries, and an enhanced ability to attract and maintain highly qualified staffs with an opportunity to employ specialists such as GIS experts, foresters, and range conservationists.

Illustration 1 shows the proposed locations within MO-6.

Other locations within Wyoming, Colorado, and New Mexico that are outside of the MO-6 boundary include:

Ft. Morgan, Colorado	MLRA 67
La Junta, Colorado	MLRA 69
Cortez, Colorado	MLRA 36
Greybull, Wyoming	MLRA 32
Torrington, Wyoming	MLRA 67
Buffalo, Wyoming	MLRA 58B
Grants, New Mexico	
Las Cruces, New Mexico	

The Lakewood MO-6 Board of Directors (State Conservationists) agreed to the following comments regarding the implementation of the proposed MLRA Project Offices:

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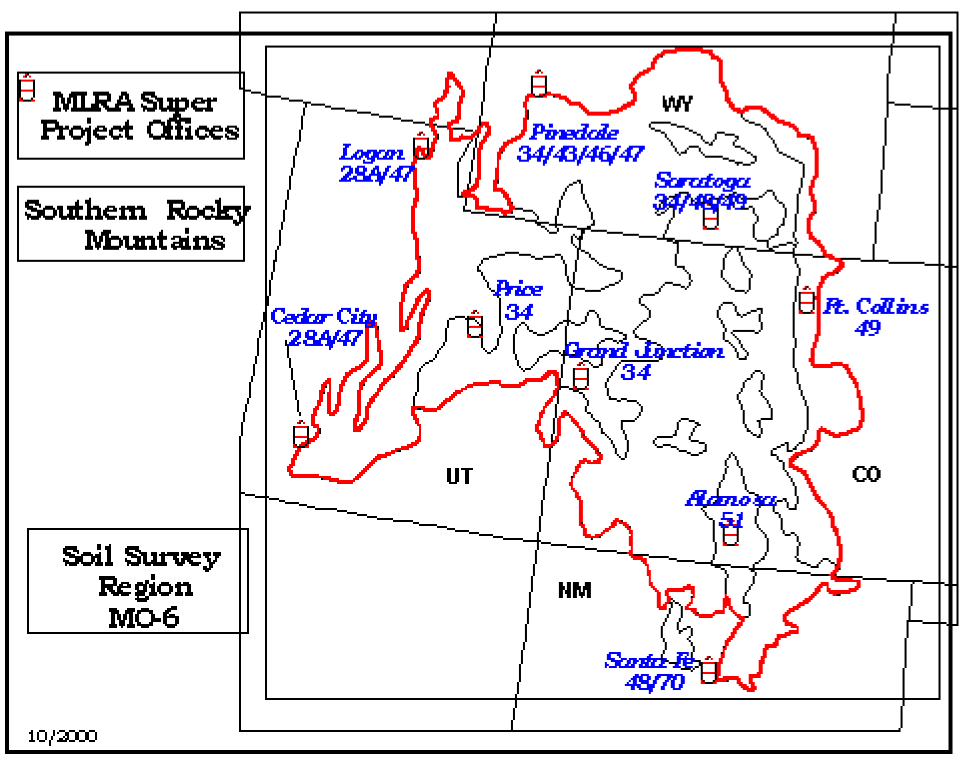

Illustration 1.—Proposed MLRA Super Project Offices

MLRA Project Office Locations Proposed

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1. The proposed number and locations of MLRA project offices are preliminary and represent our best thinking at this time.

2. The States served by MO6 support the MLRA concept and are committed to working together to achieve the objectives of the concept. However, states will implement the components of the concept, including number, location, and staffing of the offices when doing so is commensurate with good business management and will result in improved customer service within mission areas of the agency. A multi-disciplinary approach for technology delivery will be evaluated when establishing any MLRA project office.

3. Because of the size of the counties in some [illegible], it is not always practical to comb[illegible]veral counties from one central [illegible] combination of an MLRA hub office with connected satellite field offices where practical. Also, the life of a super MLRA project office in some areas may be shorter than the ideal concept.

4. There should be no national deadline for implementation of this concept.

The time is upon us to begin implementing the infrastructure and foundation that will allow us to grow and improve the Soils Resource Production and Delivery system of the future. It will not happen overnight and I foresee that each MLRA project office will have its own personality that will fit the resource needs of the area. As with any program delivery process, the success of implementing this concept is dependent upon the efforts of the Project Office field specialists and the committed support of management. I am optimistic that during this fiscal year we will have at least one MLRA Project Office established within the Southern Rocky Mountains Soil Survey Region (MO-6).

Soil Survey Photography

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Every soil scientist in MO6 should be using a camera to document the survey operations in his/her area. Some of these photographs will be used for the illustration of the published soil survey. The National Soil Survey Handbook, part 644, 128-130 can furnish you with thorough guidance on NRCS soil survey area photographs.

Each of you has received a new soil tape and a soil photography CD. The CD is an excellent PowerPoint presentation on “Soil Survey Photography—Principles and Techniques,” by John Kelley, SDQS in Raleigh, North Carolina. This will also prove to be a useful tool for taking and selecting good photographs. While a nice new tape is a good thing to have, use the same measuring tape for an area’s illustrative photos, if possible, for a consistent look. If you have been using an old tape for your profile shots, continue using it to keep your photographs consistent-looking in your survey.

For those soil scientists that are working on manuscripts that will be published in the traditional book format, there are specific guidelines to follow. The MO6 staff plans to prepare surveys for public and NRCS uses in every way available to us, including CD, web publishing, and interim copies in 3-ring binders. We also plan to publish in the traditional book format, which necessitates meeting the requirements of the printers.

Use black and white film for the illustrative landscape photos - submit a negative and a print of each for publication. Color slides are what we want for the cover and for the soil profile shots—if possible, we need at least eight different profiles.

Digital photos, at present, do not meet the high quality standards for publication in

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New Developments in GPS

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For the past several years we have been purchasing the global positioning system (GPS) receivers from a military contract with Rockwell Avionics. The Precision Lightweight GPS Receiver (PLGR) was purchased because of its superior precision for locating points. Recently the government, which maintains the global positioning system (GPS) satellites, turned off “selective availability” (SA). What this means to us is that the signal from these satellites is no longer intentionally degraded for security purposes. Now non-military GPS receivers can locate points with nearly the same precision as the PLGR for a fraction of the price. The price of the PLGR with accessories has escalated to about $2,500. Good commercial GPS receivers can be purchased for a few hundred dollars, depending on the brand and features on each model.

After visiting with our National GPS Coordinator in Ft. Worth, TX, we decided to try a commercial GPS receiver and compare precision and features vs. the PLGR. The model recommended and purchased was the Garmin III Plus. The accessories we ordered included a carrying case, an external magnetic antenna, mapping software, and a cigarette lighter power cord. The total cost was $590 per receiver with accessories.

The Garmin III Plus.

In initial tests the Garmin III Plus has compared very well with the tried-and-true PLGR. The following is an abridged comparison of some of the features of the two units:

	Garmin III Plus	**PLGR**
Size:	5.5 x 2 x 2.5"	9 x 4 x 2.5"
Weight:	0.6 lbs.	2.5 lbs.
Internal power —duration:	4 AA - 16 hrs	8 AA - 10 hrs
On-screen maps:	Yes	No
Waypoints:	500	999
Routes:	20 with 30 legs	15 with 25 legs
ASCII output:	Yes	No

We have purchased enough of the Garmin III Plus receivers to supply those soil scientists who do not already have a PLGR assigned to them. Those who will be shipped the new GPS receivers are Marisa Rice, J.P. Pannell, Mike Petersen, and Jim Borchert. If you need an additional GPS receiver, contact your supervisor and order through your normal channels.

The PLGRs should continue to give us years of service. They are well suited to soil survey and technical soil services, as well as to other natural resource data collection needs. Hopefully the Garmins will serve us at least as well. However, because of cost and features, we do not plan on ordering any more PLGRs at this time.

The Garmins do offer more features such as on-screen maps with automatic tracking, are smaller and lighter, and offer precision nearly equal to the PLGRs.

National Resources Inventory Report

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The Natural Resources Conservation Service (NRCS) has been collecting resources information since the early 1930's, when the agency was known as the Soil Conservation Service (SCS).

NRCS is mandated (through the Rural Development Act of 1972, the Soil and Water Resources Conservation Act of 1977, and other supporting legislation) to assess the condition, and trends of soil, water, and related resources on the nation's non-Federal lands at intervals of 5 years or less. To accomplish this assessment, the National Resources Inventory (NRI) program was established.

The first NRI was conducted in 1977, and subsequent inventories were made in 1982,1987,1992, and 1997. The 2000 NRI is the beginning of a transition to a continual inventory process to better assess the soil conservation, natural resources health, and other environmental issues.

Implementing a continuous inventory will help eliminate the 5-year cycle of hiring or detailing personnel, and training for data collection only to have the team disbanded after data collection is complete. Another benefit will be up-to-date, relevant data and information.

2000 Natural Resources Inventory

The 2000 NRI was originally slated to be a two part inventory consisting of an on-site inventory and a remotely sensed inventory. In April of 2000 the on-site portion of the inventory was canceled to allow more time to be focused on the preliminary work necessary for the remotely sensed portion of the NRI.

The remotely sensed portion of the NRI uses high quality 9" x 9" natural color photography along with ancillary materials, (such as cropping history reports, elimination keys, etc.), to determine land cover/use, acres of farms and built-up, acres of rural transportation, and acres of water. USLE (Universal Soil Loss Eauation) and WEQ (Wind Erosion Equation) factors are also collected on areas that are in cropland, pastureland, and CRP.

The 2000 NRI data collection is scheduled to be completed at the end of December of this year. At this time approximately 38 percent of Colorado and 60 percent of Southern Wyoming is completed.

Soil Survey Photography

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updates or surveys that will be placed exclusively on a CD-ROM, or if your survey will undergo some sort of in-house desktop publishing, digital will be an acceptable format. In this case you will submit two color slides of each of the profile shots.

Please let me know if your current photo process is different from these standards. I'll work with you the best I can to see what options we can pursue to get your existing photos into the manuscript.

Keep a file of all your slides. The National Soil Survey Center is developing a central repository website photo gallery of high-resolution images scanned from quality slides. States are encouraged to contribute slides of soil profiles, landscapes, and other interesting soil features. In the future, the Soil Survey Division will announce a "call for slides" that specifically depict topics to be addressed in future revisions of the Soil Survey Manual.

Geophysical Study Undertaken in Costilla County, Colorado

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The spade, auger, and aerial photo, though still essential, are not the only components of our soil survey tool kit. With the exponential growth of technology and knowledge, many new and not-so-new tools are being used to increase the speed and quality of soil surveys. These tools include geographic information systems (GIS), multi-band imagery, remote sensing, data loggers with an assortment of sensors (e.g. temperature, precipitation, moisture, and conductivity), global positioning system (GPS), and geophysical instruments (e.g. seismograph, ground penetrating radar [GPR], and electromagnetic induction [EMI] sensors).

During July 24-28, 2000 Jim Doolittle, Research Soil Scientist, brought his assortment of geophysical instruments to Costilla County, Colorado. Jim is attached to the National Soil Survey Center in Lincoln, NE, but he is physically located in Radnor, PA. Our purpose for requesting his assistance was to evaluate the suitability of using EMI and GPR methods to help with the soil survey of the area. In addition he provided training and practical exposure to different geophysical tools and survey methods.

In many areas of the country, GPR is very effective in predicting depth to water tables, bedrock, and contrasting material. However, thus far in Colorado, observation depths have been limited, usually less than a meter. The experts believe that this may be due to higher soluble salts and base saturation, and the presence of 2:1 lattice clays. In Costilla County, Colorado on areas of soils forming over basalt, observation depths were less than 24 inches. In areas of very deep Torripsamments, depths were as deep as 40 inches. Even though the results of the GPR observations were not as deep as we had hoped, we plan next summer to test the GPR on higher elevation mountain soils that are more leached.

Most of Jim's time and expertise were spent operating and training on the Gem300, a relatively new addition to the list of EMI sensors now available. This sensor offers several advantages to the EM 38, a sensor that many of us are familiar with. Some of these differences are:

* Simultaneous multifrequency readings (senses different depths and resolution at each observation)
* Built in data logger (readings are uploaded to a computer for analysis)
* Readings can be taken in continuous mode without stopping. This method is particularly useful for collecting data on a pre-measured grid.
* Readings are taken at hip height. You do not have to bend over and place sensor on the ground.

To determine if the GEM300 could be used to help predict depth to bedrock, a 100-meter by 100-meter grid was

Figure 1 - Jim Doolittle and Marisa Rice, soil scientist, San Luis, CO, transect a barley field in Costilla County, CO. Jim (left) is operating a GPS receiver to accurately locate each observation. Marisa is operating the GEM300.

Geophysical Study Undertaken in Costilla County, Colorado

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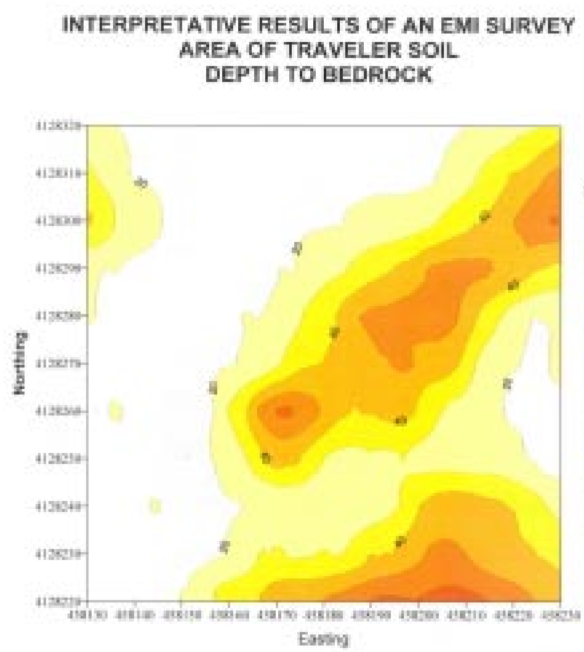
established using a GPS receiver. Eleven lines, 100 meters long and 10 meters apart, were laid out on rangeland soils overlying basalt.

Figure 2 is a map of the grid with each observation represented by a dot, and the colored areas are zones of similar apparent conductivity in milliSiemens per meter (mS/m).

Once the survey was completed, soil transects were performed to relate soil depths to the EM300 readings. In the resulting interpretive map (**Figure 3**), apparent conductivity readings were related to depth to bedrock.

In areas of this landform, geology, and soils the GEM300 demonstrated the potential to use this sensor as a tool to predict depth to bedrock and to improve the accuracy and speed of a soil survey. The soil survey party should now be able to quickly transect similar areas with the GEM300 and predict depth to bedrock.



Depth Class	Observations	Percent
Shallow	290	38%
Moderately Deep	280	37%
Deep	168	22%
Very Deep	21	3%

Figure 3 - Interpretive map for depth to bedrock using data from a GEM300 EMI sensor.

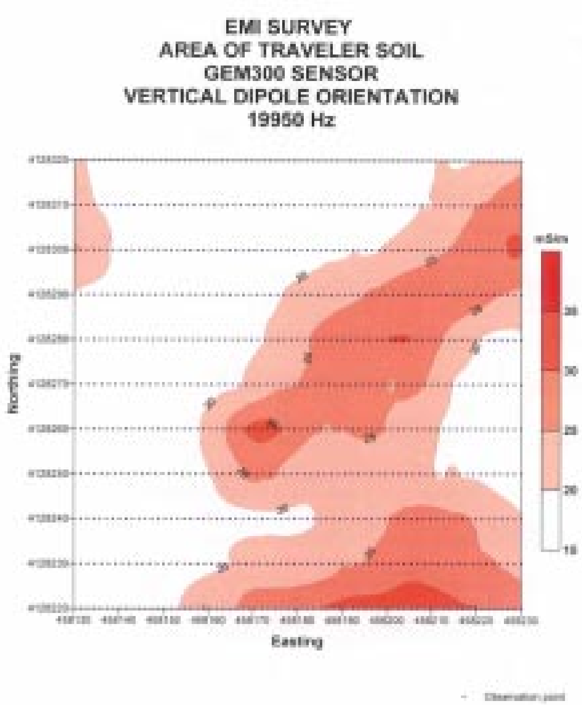


Figure 2. - 100 x 100 meter grid with UTM easting readings (x axis) and northing readings (y axis).

Special thanks to Jim Doolittle for his assistance and for producing the maps above (**Figures 2 and 3**). We have already requested two weeks of his time next summer (2001) and look forward to further applications of this technology.

Another BAER Incident

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A few years ago my young son and I had a close encounter (about 4 feet!) with a large black bear in northern Colorado. Three warning shots from a handgun safely ended that incident. My most recent experience earlier this summer in northern Colorado did not involve real bears or handguns: instead, I was invited to join the BAER team working on the Bobcat Gulch Fire near Loveland, Colorado. Tim Wheeler, soil scientist on the Colorado state soils staff, joined the High Meadow fire BAER team.

BAER is a U.S. Forest Service acronym for Burned Area Emergency Rehabilitation. BAER teams are multi-disciplined teams consisting primarily of a soil scientist, a hydrologist, a forester, a range conservationist, an ecologist, an economist, a biologist, and an engineer. Other disciplines are involved as needed. The Bobcat Gulch Fire, and the High Meadow Fire southwest of Denver, occurred in June, 2000. Each fire burned about 11,000 acres of both private and Federal lands. The NRCS became involved in the rehabilitation process because private lands were burned.

The primary objective, quoted from the BAER handbook, was to, “alleviate emergency conditions following the fire, to help stabilize soil; to control water, sediment, and debris movement; to prevent permanent impairment of ecosystem structure and function; and to mitigate significant threats to health, safety, property, and downstream values.” The secondary objective was to coordinate and provide direction for the rehabilitation of disturbance caused by suppression activities, such as fire lines, roads, heliports, and camps. Our overall goal was to complete the Burned-Area Report in as short a time as possible. This report would be submitted to the agency heads who would then use the report to request emergency rehabilitation funds. The team averaged 14-hour workdays starting at 6 AM on Tuesday, June 20th and finishing the report at 7 PM on Saturday, June 24th.

As soil scientist for the team I was charged with:

* pulling together whatever existing soil survey information was available;
* assessing the extent and degree of hydrophobic soils;
* creating maps and acreage figures for soil map units, hydrologic groups, and runoff potential;
* estimating erosion potential;
* assisting other team members with identifying what treatments were needed and where they should be applied; and
* completing the soil sections of the Burned-Area Report.

About 70 percent of the Bobcat Gulch Fire occurred in the Roosevelt-Arapahoe-Routt National Forest soil survey area (CO645). The other 30 percent occurred in the Larimer County soil survey area (CO644). The Roosevelt-Arapahoe-Routt National Forest soil survey area is uncorrelated and uncertified. The Larimer County Area soil survey is correlated and certified. Fortunately, both surveys had been digitized, so I did not have to create the spatial layers for each survey area. The next challenge was to merge these spatial layers into one seamless join. With the help of a very skilled USFS GIS person, we were able to make an “acceptable” join between the survey areas. The differences in mapping intensity and slope breaks proved to be the major issues with joining. Although both surveys are considered to be Order 3, the USFS survey was mapped more broadly than the NRCS survey. In addition, slope breaks did not match between the surveys. The USFS used predetermined slope breaks, while the NRCS survey used breaks that reflected the actual slopes that occurred for a map unit. Predetermined slopes breaks

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Another BAER Incident *continued from page 10.*

were very problematic when it came to calculating erosion potentials.

The next task was to ensure that the erosion factors (T, K, and LS factors) were populated in the databases for the all the soil map units in the fire area. Overall there were 16 map units, with six from the Larimer soil survey and ten from the Roosevelt-Arapahoe-Routt soil survey. The total soil components numbered 31. Slope-length factors (LS) were not populated for any component. The six map units from Larimer had all the other critical erosion factors populated. At that time, the map units from the USFS survey did not have the erosion factors populated. With the assistance of Eric Winthers, soil scientist on the USFS Region 2 staff in Lakewood, we were able to derive all the erosion factors for the USFS map units and complete the database population.

As usual, determining slope lengths took a little more effort than coming up with the other erosion factors. Fortunately, I had a digital soils layer to work with and the assistance of Eric Winthers and USFS GIS specialist Brett Suddarth. Using ArcView software, we were able to drape the soils layers over a digital topographic quad layer.

Figure 1.—High-intensity burn area on Green Ridge, with total consumption of all surface organic material. The two pedons with strongly repellent layers at 6 inches were in this area.

Being able to view the soil polygons and the topography made it possible to select 3 to 5 polygons from each map unit and actually measure slope length. Averaging these measurements provided an average slope length for each map unit.

The final determination of erosion factors was the C (cover) factor. Some information on C factors for ponderosa pine forests, the dominant forest type in the burn area, is available in the *Colorado Tech Guide*. To determine what C factors to use for the different burn intensity levels of low, moderate, and high, I began researching materials about the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE). It was not possible to find information about C factors related to burn intensity; however, I did learn some information about using C factors on constructions sites. In sites where the vegetation and surface rocks have been bladed off, a C factor of 1.0 is used. In a high-intensity burn area, pretty much all of the surface organics have been consumed, leaving nothing but an ash layer. Considering this, and the definitions of low and moderate burn intensities, I assigned C factor ratings of 0.1, 0.4, and 0.8 respectively. With an acreage figure for all soil map units by burn intensity, I was now ready to calculate some erosion potentials.

The calculations were based on using the dominant component in the map unit. I do not consider my figures to be precise; however, I have confidence in their "relative" accuracy in estimating pre- and post-fire erosion potentials. Pre-fire erosion potentials were about 19 tons per acre per year, while post-fire erosion potentials were 54 tons per acre per year. This represents almost a three-fold increase in erosion potential. Initially, these figures seemed high; however, given the steep slopes and long slope lengths in the burned areas, these figures probably are in the ball park.

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Another BAER Incident *continued from page 11.*

The soil scientists on the teams were charged with assessing the degree and extent of hydrophobic soils in the burn area. Hydrophobic conditions are created when the surface organics, primarily ponderosa pine duff layers in this case, are consumed by fire. Vapors from the burned organics permeate the soils, and, upon cooling, leave a waxy coat on soil particles. This waxy coat repels water. The more coarse-textured the soils the deeper the vapors penetrate. The dominant soils in the burn area are shallow and moderately deep, loamy-skeletal, paramicaceous soils derived from gneiss, schist, and micaceous granite. Vapors readily permeated these soils.

Because of the extremely short timeframe for completing the burned area report, I was not able to do an extensive and statistically sound evaluation of the hydrophobic conditions. The field procedure consisted of driving across the entire width of the fire and periodically stopping to test for hydrophobicity. I collected information on unburned areas as well as from low-, moderate-, and high-intensity burned areas. Testing for hydrophobic layers involves placing a drop of water on dry soil and observing how long it takes to be absorbed into the soil. According to the guidelines outlined in the USFS BAER handbook, a layer is weakly repellent if it takes less than 10 seconds for the water drop to be absorbed; moderately repellent if it takes 10 to 40 seconds; and strongly repellent if it takes longer than 40 seconds.

Figure 2.—The author testing for hydrophobic soil conditions.

Hydrophobic conditions can occur naturally in pre-fire conditions. In fact, on all of the unburned sites tested, a thin (about 0.25 inch thick) hydrophobic layer was found right at the contact between the surface organics and the mineral soil. I have found this to be the norm for the forests I have worked in the Southwest.

The findings showed the moderate- and high-intensity burned areas had exacerbated hydrophobicity. These areas consistently had moderately and/or strongly repellent layers below 0.5 inch. Two pedons tested in the most intensely burned area, located within the drip-line of two large ponderosa pines, were strongly repellent at 6 inches. The depth of repellency was directly related to fire intensity and the thickness of the original organic layer. About 45 percent of the 11,000 burned acres was covered by what the USFS defines as “water repellent” soils.

Even though 45 percent of the burned area was covered by water repellent soils, I suspect the post-fire runoff potentials are not that much greater than the pre-fire runoff potentials. My rationale is that strongly repellent layers occurred in the top 0.25 inch of the mineral soil surface in the pre-fire state. In the post-fire state strongly repellent layers, on the average, extended to a depth of 0.5 to 1 inch below the mineral soil surface in the moderate and high intensity burn areas. One reason that as long as the upper part of the mineral soil surface was strongly repellent, the bottom depth (total thickness) of that strongly repellent layer would not affect the runoff potential in the short term. It is the top of the repellent layer that affects runoff.

Of much more significant impact to the potential of erosion and runoff was the loss

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Another BAER Incident

continued from page 12.

of surface cover. About 45 percent of the area was classified as a high-intensity burn. These areas had nearly all of the surface organics removed, with many trees totally consumed. About 25 percent of the area was classified as a moderate-intensity burn. These areas had partial consumption of the surface organics, with most trees still intact. Stating the obvious, it is the moderate- and high-intensity burn areas that have the greatest potentials for erosion. Even though these areas occupy 70 percent of the fire area, they account for 94 percent of the potential erosion. Areas of high and moderate burn intensity with the potential to impact municipal water supplies and damage vital roads were targeted for most of

Figure 3.—Extreme heat caused this granite boulder to exfoliate. The chemistry of the rock was also altered by the intense heat. The exposed faces reacted to 10% HC1, indicating calcium carbonate is present. Normally this granite would not react to acid.

the rehabilitation treatments and practices. The major treatments were reseeding, contour tree felling, and road stabilization measures. All other areas were left to regenerate naturally.

I was fortunate to assist with some of the reseeding efforts on the private lands. This was a very rewarding experience. During the reseeding efforts, many of the people whose homes were destroyed personally thanked us for all we were doing. It also was refreshing to work with the local NRCS field office staffs on such a worthwhile effort.

Listen to the River

by Jodi Boyce, Soil Scientist, Montrose, CO
marjorie.boyce@co.usda.gov

Listen to the river, the mighty rolling river
Listen to the river, roll on to the sea.

We found the river in '91, so clear and deep and strong,
Rapids running everywhere, we stayed all summer long.
The trees were swaying in the breeze, all nature seemed to dance
In time with the river's music, ringed by rustic elegance.

C D E F G H I

Listen to the river, the crashing raging river,
Listen to the river, roll on to the sea.

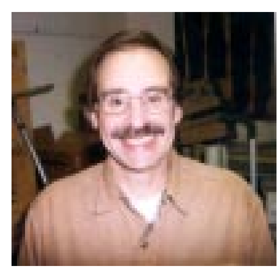
A hot day in the desert we took the horses down,
Water tumbling over the rocks made a deafening sound.
We found the river in '91, so clear and deep and strong,
Memories of that summer, like the river, they roll on.

j k l m n o p

Listen to the river, the mighty rolling river,
Listen to the river, roll on to the sea.

This song is included on a CD called *"Echoes from the Canyon"* by **Fleeting Moment**, a local bluegrass band. They made this CD in conjunction with the Black Canyon of the Gunnison becoming a national park. It is for sale in the Park and in local music stores here in the valley. There is another song on the CD that Jodi wrote; it is an instrumental called "Gunnison River Rag."

Who *Is* This Guy?



He's Alan Walters, our newest soil scientist. Located in Craig, Colorado, this is his autobiography:

"I grew up in NY, so I don't like anyone touching my stuff without asking. I went to college in NY, Ohio, and Arizona. I started with SCS in Wyoming in 1974, and have worked for the Agency in WY, CO, and WA. I am married with 2 daughters, a weiner dog and a cat. I am always outnumbered."

MO Technical Leadership Team Meeting

J.C. Loerch, State Soil Scientist of CO/MO6 Leader
cameron.loerch@co.usda.gov

On October 31 and November 1 the MO-6 soils staff met with State Soil Scientists Ken Scheffe (NM), Bill Broderson (UT), and Darrell Schroeder (WY) to discuss priorities within the MO-6 region and to put final touches on the FY2001 business plan. Scott Zschetzsche, soil survey project leader in Grants, NM also participated. A few issues that surfaced as needing attention this year include the following:

•Make available and implement “new technologies” in the soil survey project offices such as field data recorders, on-screen digitizing of soil survey mapping, and utilizing GIS products as decision-making tools.

•Database population in NASIS for existing SSURGO certified data sets. With the release of NASIS 5.0, a new download will be needed for SSURGO, toolkit and soil data viewer uses.

•Training needs of soil scientists related to soil mechanics, hydric soil indicators, and wetlands.

•Develop a strategy for building and recruiting soil scientists for entry level positions.

•A copy of the FY2001 business plan and activity schedule is planned to be posted on our website.

Seated, left to right: Cameron Loerch (CO), Ken Scheffe (NM), and Scott Zschetzsche (NM). Standing, left to right: Bill Broderson (UT) and Darrell Schroeder (WY).

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J. Cameron Loerch, State Soil Scientist and MO6 Leader