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## 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](mailto:stan.anderson@lin.usda.gov).



## Hugh Bennett: Soil Scientist

By Douglas Helms, National Historian, Natural Resources Conservation Service, Washington, D.C. ([douglas.helms@wdc.usda.gov](mailto:douglas.helms@wdc.usda.gov)).

This year, the Natural Resources Conservation Service (NRCS) celebrated the 75th anniversary of the creation of the Soil Conservation Service (SCS) on April 27, 1935. Hugh Hammond Bennett led the effort to bring national attention to the problem of soil erosion. Bennett's concerns about soil erosion formed while he was a soil surveyor in the U.S. Department of Agriculture (USDA). He was first of all a soil scientist in a career that began just after USDA had initiated the soil survey. He became the first chief of SCS, eventually earning recognition as the "father of soil conservation." Studying the soil informed his ideas about the research and actions needed to combat soil erosion and to conserve soil.

Hugh Bennett was born near Wadesboro in Anson County, North Carolina, the son of farmers William Osborne Bennett and Rosa May Hammond. He earned a degree in chemistry and geology from the University of North Carolina (UNC) in June 1903. At that time, the Bureau of Soils within the U.S. Department of Agriculture had just begun to make county-based soil surveys, which would in time be regarded as an important American contribution to soil science. The North Carolina Department of Agriculture wanted to provide its farmers with information about the best fertilizers and crops for the various sections of the State. With support from the North Carolina Department of Agriculture, the Bureau of Soils commenced several soil surveys in the State. With USDA offering employment for soil scientists, Collier Cobb, professor of geology at the

University of North Carolina, developed a course in soil surveying. Quite a number of UNC graduates joined the Bureau of Soils. Bennett accepted a job in the bureau headquarters' laboratory in Washington, D.C., but agreed first to assist in the soil survey of Davidson County, Tennessee, beginning on July 1, 1903. The acceptance of that task, in Bennett's words, "fixed my life's work in soils."<sup>1</sup>

The outdoor work suited Bennett, and he mapped the soils and wrote a number of soil surveys. The 1905 survey of Louisa County, Virginia, in particular, profoundly affected Bennett. He had been directed to the county to investigate its reputation for declining crop yields. As he compared virgin, timbered sites to eroded fields, he became convinced that soil erosion was a problem not just for the individual farmer but also for rural economies. Thomas C. Chamberlain's paper "Soil Wastage," presented in 1908 at the Governors' Conference in the White House (published in *Conference of Governors on Conservation of Natural Resources* in 1909), profoundly influenced him. Shortly before Bennett's death, he said the Chamberlain paper "fixed my determination to pursue that subject to some possible point of counteraction."<sup>2</sup>

In addition to supervising the soil surveys in the Atlantic Division, a position he assumed at the bureau in 1908, Bennett accepted numerous opportunities to study soils abroad and in U.S. territories. He made two surveys in Alaska, one a reconnaissance at the request of the Alaskan Railway Commission (1914) and the second at the request of the Forest Service for the purpose of eliminating agricultural lands from the Chugach Forest (1916). He made a survey of the agricultural possibilities of the Panama Canal Zone (1909); worked on the Guatemala-Honduras Boundary Commission (1919); and at the behest of the Department of Commerce, surveyed rubber-growing potential in Central America and northern South America (1923-1924). Most of these surveys appeared as USDA technical publications. The Tropical Plant Research Foundation published a work by Bennett and Robert V. Allison entitled *The Soils of Cuba* (1928), which had been commissioned by the foundation.<sup>3</sup>

During his work for the soil survey, Bennett noted that interactions of land, slope, and soil properties led to soil erosion. The Bureau of Soils had developed the concept of the soil type as a means of mapping soils. Soil properties and slope were two characteristics included in the soil type descriptions. In soil surveys, Bennett began to note the correlation of soil types and the susceptibility to erosion. Concerning Orangeburg sandy loam, he wrote, "Unfortunately, the type is peculiarly susceptible to ruinous erosion under the conditions of rolling topography obtaining in the area.... If the gentler slopes are not terraced and the steep situations kept in timber, deep gorge like gullies or 'caves' gradually encroach upon cultivated fields, eventually bringing about a topographic condition too broken for other than patchy cultivation."<sup>4</sup>

In *The Soils and Agriculture of the Southern States*, published in 1921, Bennett discussed both the soil types that could be used for crops and the soil types suitable for less intensive uses, such as forest and pasture. He eventually talked of using land within its capabilities and of working with nature, not against her. After the Soil Erosion Service was established in 1933, susceptibility to erosion and other forms of land degradation came to be a guiding principle in planning and using soil conservation methods on farms. Bennett and colleagues developed a land capability classification system to be used in farm planning. The genesis of the system lay in his experiences in the soil survey. He recalled that "...what was found by the Lauderdale County, Mississippi, soil survey in 1910 had much to do with developing the basic concept of using land within its capability...."<sup>5</sup> This concept was used to guide the Nation's program of soil conservation.

When Bennett was in charge of the soil erosion experiment stations in the Bureau of Chemistry and Soils, he continually emphasized that conservation methods needed to be developed for various soil types. Some individuals and organizations proposed panaceas, such as extensive terracing. Bennett responded that the conservation methods had to be suited to the differing soil types. After Bennett retired from the Soil

Conservation Service, the Soil Survey Division and its leader Charles Kellogg were transferred to SCS. That reorganization linked the soil survey with one of its primary user groups. With increased funding through the budget of the Soil Conservation Service, the soil survey accelerated its mapping in the 1950s and onward.

Bennett's crusade for a national program of soil conservation is recounted in two articles that are available online free at the *Journal of Soil and Water Conservation* home page:

Helms, Douglas, "Hugh Hammond Bennett and the Creation of the Soil Erosion Service." *Journal of Soil and Water Conservation* 64(2), March-April 2009: 68A-74A. <http://www.jswconline.org/content/64/2/68A.full.pdf>.

Helms, Douglas, "Hugh Hammond Bennett and the Creation of the Soil Conservation Service." *Journal of Soil and Water Conservation* 65(2), March-April 2010: 37A-47A. <http://www.jswconline.org/content/65/2/37A.full.pdf>.

<sup>1</sup>Bennett, Hugh H., *The Hugh Bennett Lectures* (Raleigh: The Agricultural Foundation, Inc., North Carolina State College, June, 1959), p. 12.

<sup>2</sup>Bennett, *The Hugh Bennett Lectures*, p. 13.

<sup>3</sup>Helms, Douglas, "Hugh Hammond Bennett," in Cevalasco, George A., and Richard P. Harmond, *Modern American Environmentalists: A Biographical Encyclopedia* (Baltimore, Maryland: Johns Hopkins University Press, 2009), pp. 29-35; Helms, Douglas, "Early Leaders of the Soil Survey," in Helms, Douglas, Anne B.W. Effland, and Patricia J. Durana, eds., *Profiles in the History of the U.S. Soil Survey* (Ames: Iowa State Press, 2002), pp. 34-41.

<sup>4</sup>Bennett, Hugh H., et al., "Soil Survey of Lauderdale County, Mississippi." Field Operations of the Bureau of Soils (Washington, D.C.: U. S. Government Printing Office, 1912), p. 759.

<sup>5</sup>Bennett, *The Hugh Bennett Lectures*, p. 14. ■

## Block Diagrams Available on the Web

By Stanley P. Anderson, editor, USDA, National Soil Survey Center, Lincoln, Nebraska.

More than 1,000 block diagrams from published soil surveys are available in electronic form. A spreadsheet that indexes these diagrams is available on the Soils Web site (<http://soils.usda.gov/>). Select Soil Education > NCSS Training and Job Aids > Soil Survey Graphics > Block Diagrams spreadsheet, or just click on this link: [ftp://ftp-fc.sc.egov.usda.gov/NSSC/job\\_aids/graphics/diagrams/Metadata-diagrams.xls](ftp://ftp-fc.sc.egov.usda.gov/NSSC/job_aids/graphics/diagrams/Metadata-diagrams.xls).

The diagrams were prepared by the National Cartography and Geospatial Center in Fort Worth, Texas. The metadata was prepared by editors at the National Soil Survey Center.

Users can search the columns of metadata for specific key words, such as a series name or a county. The image files can be opened in a Web browser. They are available as TIFF, PDF, and AI (Adobe Illustrator) files. ■

## Two Editors Return to the NSSC

By Stanley P. Anderson, editor, USDA, National Soil Survey Center, Lincoln, Nebraska.

Jennifer Sutherland, editor, M0-18, and Patricia West, editor, M0-10, have transferred to the NSSC in Lincoln, Nebraska. These individuals formerly were editors at the NSSC, before they were transferred to MO offices about 15 years ago. They are now officially returning to the NSSC, where they will serve on the Soil Survey Standards Staff. ■

## Agricultural Heartlands Tour Review

By Dr. Stephen Cattle, University of Sydney. Note: This tour was conducted one week before the World Congress of Soil Science met at Brisbane, Australia, from 8/1/10 to 8/6/10.

Over the six-day period spanning July 26th-July 31st, delegates of the Agricultural Heartlands Pre-Congress Tour experienced a 1,300-km pedo-odyssey from Sydney to Brisbane, taking in some of the best agricultural soils in the country.

Thirty-five delegates from 13 different countries took part in the tour, which encountered weather conditions ranging from balmy mid-twenties sunshine to heavy fog to driving rain and mid-teens temperatures. Wildlife enthusiasts were treated to sightings of kangaroos, wallabies, emus, koalas, and burrowing cockroaches, while gourmands on the tour were able to avail themselves of Australian delicacies, such as lamingtons, scones, ANZAC biscuits, and the ubiquitous sticky date pudding (five evening meals in different towns, five servings of sticky date pudding). Those on the tour with an interest in agronomy were treated to the sight of the most promising winter cereal crop in northern New South Wales (NSW) for some time and the countryside emerging from the ravages of drought.

The soil component of the tour consisted of 14 pit inspections, several presentations regarding soil and land management, and much good-natured, informed debate about the classification and description of the soil profiles under inspection. At each soil pit the World Reference Base for Soil Resources (WRB) system was used exactly by European delegates to name the soil profile, while American delegates used the Soil Taxonomy system to classify and name the profiles. The tour leaders chipped in with the Australian Soil Classification scheme names for each profile. The discussion of the different schemes and of the various diagnostic soil features observed was a particular highlight of the tour, as was the generous discussion of soil formation and soil management that occurred at each site and on the tour coach.

Following is a brief re-capping of the day-by-day action of the tour. Day 1 was spent driving to, and examining soil in, the Hunter Valley of NSW. Here, two soil profiles derived from sedimentary rocks (mudstone and limestone) of the Sydney Basin were examined, followed by some tasting of the Hunter's well-known (vicultural) *produits régionaux*.

After over-nighting in the upper Hunter, the delegates spent day 2 visiting a mixed enterprise (cropping plus livestock) farm, "Nowley (fig. 1)," on the fertile Liverpool Plains. Here, we inspected some texture-contrast soils derived from colluvium of sandstone and/or basalt rock and spotted a koala "in the wild" in the self-proclaimed "koala capital of the world," Gunnedah Shire.

Day 3 involved traveling from Gunnedah to Narrabri in pouring rain and howling winds. The first soil profile inspected, in the massive Pilliga Forest, was a bright orange, sandy soil derived from alluvium of a Jurassic sandstone unit. Delegates showed much stoicism in trudging into a dripping wet forest to view and classify a soil pit in the rain, especially having just enjoyed a warm cup of coffee and a scone in a nearby teahouse. During the afternoon, the delegates inspected two more clayey, arable soils on or near the Namoi River flood plain at Narrabri. One of these soils, a grey Vertisol (fig. 2), is a very widespread and very important irrigated cropping soil of northern NSW.

On day 4, we took a diversion to Sawn Rocks to view some spectacular trachyte columns before heading to the town of Moree. Here, the group received a presentation from a local farmer about his precision agriculture systems—this presentation replaced a soil pit visit at the farm because the rain of the previous day had cut access to the property. After lunch, we headed to the Queensland border and inspected a fertile black Vertisol on a large irrigated cropping property west of Goondiwindi.



Figure 1.—The Agricultural Heartlands Tour group enjoying the sunshine at “Nowley” on day 2.



Figure 2.—Gaining an appreciation of Vertisol plasticity at Narrabri on day 3.

Day 5 saw sunny weather return. The tour group headed east towards Toowoomba. En route, we passed through brigalow-dominated countryside and observed some extremely sodic, alkaline, texture-contrast soils. A stop at the aboriginal cultural site at Yelarbon was a highlight. During the afternoon, the tour passed through the southern part of the Darling Downs, arguably the best cropping land in Australia. Here, presentations were given about the management and hydrology issues associated with cropping the black Vertisols of the region. Day 5 ended with an inspection of a deep red, iron-rich soil derived from basalt in Toowoomba.

The tour ended in Brisbane city on the afternoon of day 6, after the group had inspected a gritty, granite-derived soil and a texture-contrast soil previously used for growing pineapples.

In summary, the Agricultural Heartlands Tour was a great success, with an interesting variety of soil, weather, wildlife, and cuisine encountered, and a very knowledgeable group of delegates who were happy to share their experiences and expertise during our frequent discussions of profiles and soil issues. It was a great social, as well as scientific, experience.

And finally, the soil name of the week must go to the WRB crowd, who came up with the following to describe the very last soil profile of the trip (a yellow chromosol): Stagnic Cutanic Lixisol (Albic, Ferric, Abruptic, Ruptic, Humic, Clayic). ■



Subaqueous soils workshop participants and soil cores, North Kingston, Rhode Island, 2010.

## National Workshop on Subaqueous Soils Held in Kingston, Rhode Island

From Soil Survey Division, "Weekly Update," August 18, 2010.

The 2nd National Workshop on Subaqueous Soils was held in Kingston, Rhode Island, on August 8-13, 2010. The workshop was targeted at scientists interested in applying subaqueous soil mapping techniques and research in both estuarine and freshwater environments. Most of the subaqueous soils (SAS) work to date has focused on shallow, coastal marine settings (bays, coves, inlets, and lagoons), but the work is beginning to expand into freshwater settings. These soils are valuable for diverse aquaculture, resource conservation, and water-quality concerns and are used for both recreational and commercial purposes. Research and mapping of these soils have focused on resource inventory regarding soil productivity, resource management concerns, and environmental sensitivity.

The workshop was hosted by NRCS, NCSS cooperators from four universities, and multiple State agencies and supporters. States participating in the workshop included CT, DE, FL, MA, MD, NC, NJ, RI, SC, and VT. Activities included lectures and daily hands-on



Extracting a vibracore tube of a marine subaqueous soil with eelgrass on Ninigret Pond, Rhode Island.



**Vibracore sampling of a freshwater subaqueous soil on Worden Pond, Rhode Island.**



**NRCS soil scientist Maggie Payne describes the process used to develop the map of the subaqueous soils on Point Judith Pond, Rhode Island.**



**Dr. Mark Stolt using power shears to cut open an aluminum tube holding a vibracored soil.**



**An exposed soil core ready for a profile description.**

demonstrations of the latest techniques and tools used in mapping, sampling, and data collection. NSSC staff attended to focus on discussions of soil interpretations for diverse stakeholder needs, marine classification systems, and data integration with soil taxonomy, standards, ecological site recognition, national soils databases (NASIS), and the National Cooperative Soil Survey program at large. A Web Soil Survey of subaqueous soils in southern New England is planned for later this summer. ■



An electromagnetic induction (EMI) survey is being completed across a site south of Spokane, WA, by the local soils staff during a cultural resources investigation. The survey was conducted to assess the area for potential subsurface features that may be associated with prehistoric occupation at the site.

## Geophysical Training and Assistance Completed With the Field Soils Staff in Washington State

From Soil Survey Division, "Weekly Update," October 13, 2010.

During the week of September 27 to October 1, Wes Tuttle, Geophysical Soil Scientist, National Soil Survey Center, provided staff from the State of Washington with training in the use of electromagnetic induction (EMI) techniques and ground-penetrating radar (GPR) in soils investigations. Technical assistance included investigations conducted on land holdings of the Swinomish Indian Tribal Community (La Conner, WA, upper Puget Sound region) and the Lummi Indian Reservation (west of Bellingham, WA). Field investigations conducted on the local reservations concentrated mainly on how changes in salinity concentrations across the sites relate to crop production. EMI training was also provided at a cultural resources site south of Spokane, WA. EMI and GPR techniques were demonstrated as advantages of these noninvasive tools were discussed. The use of these tools is advantageous in areas where little to no ground disturbance is desired. ■

## Continuing Outreach Efforts

By Linda Greene, ACES enrollee, Natural Resources Conservation Service, National Soil Survey Center, Lincoln, Nebraska.

Increasing awareness of the Web Soil Survey, especially among nontraditional customers, has become an important part of the outreach activities of the National Soil Survey Center. In support of this effort, the center asked Brad Duncan,

Washington State's Assistant State Soil Scientist, to help give a workshop at the Northwest Regional Floodplain Management Association's (NORFMA) recent conference in Stevens, Washington.

The workshop demonstrated the Web-based application with instructions on how to create soil maps and other thematic maps relating to flood-plain management. Since NORFMA's membership consists primarily of engineers, specialists in climate, consultants, and county planners, Duncan used the opportunity to demonstrate how the Web Soil Survey can be a valuable tool for addressing climate issues, flood-plain restoration projects, GIS technology, salmon recovery, as well as soils.

According to Duncan, a number of the members stated that they use the Web Soil Survey "all the time," but still there were plenty of folks who had never seen the application and were impressed with its capabilities.

NORFMA covers communication and cooperation among the States of Oregon, Washington, Idaho, British Columbia, and Alaska. Its mission is to support the integration of multidisciplinary programs, promote an interest in flood-plain management, and increase public awareness of the value and function of flood plains. ■

## **2010 International Meetings of American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America**

From Soil Survey Division, "Weekly Update," November 10, 2010.

**T**he 2010 International Meetings of the American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America were held from October 31 to November 3, 2010, in Long Beach California. The meetings were attended by 17 scientists from National Headquarters and the National Soil Survey Center, along with about 35 other NRCS colleagues from around the country. NHQ and NSSC staff attending included Mike Wilson, Skye Wills, Ellis Benham, Jon Hempel, Doug Wysocki, Phil Schoeneberger, Sofi Elrashidi, Cindy Stiles, Joel Brown, Wes Tuttle, Thomas Reinsch, Carolyn Olson, Maxine Levin, Lenore Vasilas, Paul Reich, Jon Gerken, and Paul Benedict.

Oral and poster presentations were given by all the NSSC and NHQ staff attending. Presentation topics included future directions for soil survey management and soil classification, use of VNIR for rapid carbon assessment, techniques for onsite measuring, monitoring and sampling soils, ecological site assessment, dynamic soil properties, geochemistry, geomorphology, and a historical perspective of soil survey. Other presentations were related to specific soil properties, including loess, carbon, plinthite, and serpentinite. The annual tri-societies meetings are an important venue to share information about Soil Survey Division activities and present results of ongoing research by NRCS scientists and cooperators. These meetings provide an important and unique opportunity for interaction with NCSS partners and other national and international scientists to exchange ideas and receive feedback on a broad range of topics of importance to the Soil Survey Division. ■

## **Creation of Soil Ecology Branch**

**I**n an effort to accelerate the mapping and description of ecological sites, the Soil Survey Division created a Soil Ecology Branch to be located at the National Soil Survey Center. Joel Brown was named as the acting National Leader for the new branch. In addition, SSURGO funds were set aside for the hiring of 7 quality assurance

positions to be located at the MLRA-RO level and 19 quality control positions to be located at the MLRA-SSO level.

Efforts in fiscal year 2010 included the naming of two ad hoc, interdisciplinary teams to begin drafting initial plans that will serve as a starting point for the branch staff in fiscal year 2011. One team was charged with developing the ecological site description workflow, particularly emphasizing quality control and quality assurance. The second team was charged with identifying the business requirements for an integrated resources database.

The other major work item for the new branch was the drafting of position descriptions for the branch staff in Lincoln and for the quality assurance and quality control positions. As staffing plans evolved, the new branch inherited soil quality and dynamic soil property responsibilities, in addition to ecological inventory. Near the end of the fiscal year, Susan Andrews (Director of the Plant Data Center and Team Leader for Soil Quality in Greensboro, North Carolina) was selected as the National Leader for Soil Ecology. Other staff members are as follows:

- Agronomist—Mike Kucera
- Forester—Craig Busskohl
- Range management specialist—Curtis Talbot
- Soil scientist, dynamic soil properties—Skye Wills
- Soil scientist—Faustin Iyamuremye
- Soil scientist—Charles Kome
- Wildlife biologist—Marcus Miller ■



**Susan Andrews, National Leader for Soil Ecology.**

## **Cameron Loerch Joins National Soil Survey Center Staff**

**C**ameron Loerch joined the NSSC staff in Lincoln on October 11 as the new National Leader for Soil Survey Standards. In that role, Cameron will be supervising Lincoln staff responsible for NCSS standards involved with soil taxonomy, the National Soil Survey Handbook, training of soil scientists, editorial assistance, SCAN technology, and MLRA soil survey.

Cameron is a graduate of the University of Nebraska, holding bachelor's and master's degrees in Agronomy and Soil Science. He was a field soil scientist and survey project leader on soil surveys in Nebraska and Utah, then held positions on the State Office soils staffs in West Virginia and Nebraska. Cam worked on the quality assurance staff at the NSSC before moving



**Cameron Loerch, National Leader for Soil Survey Standards.**

to Auburn, Alabama, as MO leader with the establishment of MO regional offices in 1995. Over the past 10 years, Cameron served as the MO Leader in Lakewood, Colorado, and as the State Soil Scientist for Nebraska.

Cameron can be reached at 402-437-4010 or [cameron.loerch@lin.usda.gov](mailto:cameron.loerch@lin.usda.gov). ■

## Kenneth Scheffe Joins National Soil Survey Center Staff

After serving many years in New Mexico offices of the Natural Resources Conservation Service, Ken Scheffe has accepted the position of Soil Scientist on the Soil Survey Standards Staff at the National Soil Survey Center (NSSC) in Lincoln, Nebraska. Ken has BS and MS degrees in Soil Science from Texas Tech University. The BS was awarded in 1979 and the MS in 1982. Ken is a member of the Soil Science Society of America and the Soil and Water Conservation Society.

Ken held the following positions in New Mexico offices of the agency:

- Soil Scientist, Santa Rosa, 1982 to 1988
- Soil Scientist, Clovis, 1988
- Area Soil Scientist, Rio Rancho, 1988 to 1993
- Assistant State Soil Scientist, Albuquerque, 1993 to 1995
- Assistant State Conservationist, Resource Inventories and Assessments, Albuquerque, 1995 to 1998
- State Soil Scientist, Albuquerque, 1998 to 2010

Ken is married to Linda Scheffe, who is employed as an Agronomist on the Soil Survey Interpretations Staff at the NSSC. Ken and Linda have two children—Shawn, age 25, and Xela, age 20. Ken's hobbies include bicycling, woodworking, and gardening. ■

## Soil Business Systems

In August of 2010, David Hoover was selected as the National Manager for the new Soil Business Systems Branch. This new section of the NSSC will incorporate the functions of the West Virginia Geospatial Research Unit, Fort Collins soil business integration and development, and Lincoln computer programming and support and public presentation of data and information.

Major business functions and projects to be covered by Soil Business Systems include:

- SBAAG operations
- Web Soil Survey development
- NASIS Help Desk support
- Soil Data Mart and Soil Data Access development
- Soil Landscapes of the U.S. project
- National Soils Geospatial Database development
- Digital Soil Mapping course development
- National gridded soils data integration
- University soil lab data entry project
- LIMS and NASIS support and integrations ■

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