

Newsletter

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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.



Partnering to Map Subaqueous Soils

By Maggie Payne, Soil Scientist, Natural Resources Conservation Service, Warwick, Rhode Island.

The definition of soils has recently been extended to include subaqueous soils, or soils that are permanently submerged under less than about 2.5 meters of salt water or fresh water. Soil survey efforts along the Atlantic and Gulf Coasts (Delaware, Florida, Texas, Maine, Maryland, Connecticut, New Hampshire, and Rhode Island) now include the mapping of sub-tidal environments in shallow water bodies.

Almost two-thirds of the worldwide population currently lives in coastal areas, and recent demographic studies suggest that in the next 25 years, 75 percent of the U.S. population will be living within 50 miles of a coastline. With increased use and pressure, there is increased demand to document the condition of shallow waters, such as coastal lagoons, shallow bays, and estuaries. An account of the soils in these areas would provide valuable information to coastal regulators and others about areas important for eelgrass or shellfish habitat, areas of sedimentation and shoreline change, and potential dredge sites.

Soil survey data within the Coastal Zone (which includes the beaches, duneland, and marshes along with the landscapes submerged by shallow water) have been shown to be missing (subaqueous soils), outdated and inaccurate because of shoreline deposition and erosion, or related to soils that are inadequately mapped in

undifferentiated groups and complexes. Accurate soils data in this zone are needed to help with restoration projects. In 2006, Rhode Island alone spent well over 10 million dollars on coastal restoration projects. By addressing the soil resource in the Coastal Zone, the Soil Survey Program can provide valuable soil data and interpretations.

Understanding the need for such information in the “Ocean State,” NRCS staff members in Rhode Island took the lead in establishing the institutional framework needed for mapping coastal and subaqueous soils and coastal and marine habitats in the State. This framework, now known as the Mapping Partnership for Coastal Soils and Sediment, or MapCoast (www.mapcoast.org), is made up of the Rhode Island NRCS, URI researchers and scientists, and other State and Federal agencies. This partnership incorporates multiple disciplines, integrating soil survey techniques and terminology with the technology typically used in marine mapping. Along with classifying benthic habitats according to the NOAA Coastal Marine Ecological Classification System (CMECS), one of the goals of this partnership is to create a seamless soil survey that includes the mapping of coastal soils and shallow waters according to NCSS standards.

Mapping and Analysis

The techniques used in mapping subaqueous soils are similar to those used in a traditional survey of terrestrial soils. Mapping the subaqueous soils involves a few

additional obstacles. Because water cover keeps mappers from easily identifying landforms, vegetation, and surface stoniness, the MapCoast Partnership employs such technology as side-scan sonar, sediment profile imaging, and underwater cameras to determine landscape units. Instead of using topographic maps to determine landscape position, subaqueous soil mapping uses bathymetric maps to identify landscapes and landforms. Digging soil pits to observe subaqueous soils within these units is all but impossible, so instead of shovels, scientists use augers and other tools, such as peat samplers and vibracores, to obtain the samples.

Complete soil descriptions are made for each sample taken, and lab data analysis is performed on all vibracore samples. Two very important characteristics of subaqueous soils that are not typically described in terrestrial soils are incubation pH (an indication of sulfide content) and fluidity or n-

value. The formation of sulfides is a major soil-forming factor in these soils. Sulfides accumulate in the form of pyrite and monosulfides from the anaerobic reduction of sulfate from seawater. MapCoast partners have studied the rate of sulfide oxidation in

various soils in order to create interpretations for those soils. Additional research on carbon sequestration, eelgrass suitability, and shellfish growth rates also is underway. These studies will result in a better understanding of the interpretations that can be made on the basis of a subaqueous soil map of the region.

One of the major benefits of mapping these areas under the Soil Survey Program is the use of the classification system in *Soil Taxonomy*, which provides a standard methodology for describing and communicating information about these soils. Initially, subaqueous soils were classified dominantly as Aquepts. A proposed new suborder defines all submerged and subaqueous soils as Wassents, from the term “wasser” (German for water). Wassents would be the first suborder to classify out under Entisols and would enable more succinct naming conventions for these soils.

Shallow water and intertidal areas are vital to the ecologic and economic well-being of our coasts, but soils in these locations have been largely ignored by soil and marine scientists alike. As aquaculture, recreation, and development pressures increase, there is a vital need to provide information about these areas in order to best manage the nation’s coastal zones.

To date, the MapCoast Partnership has mapped over 8,000 acres of coastal lagoons and bays in Rhode Island, collected 275 soil cores and pedon descriptions, conducted three end-user conferences, and provided outreach of our work in national conferences, news articles, features, and publications. It is actively working to improve our mapping protocol and establish a shallow water mapping center in the State. Utilizing funding from NOAA, the partnership just completed its first



The tools used in mapping soils in shallow water commonly are the same as those used in mapping terrestrial soils, such as augers.



Jim Turenne, Rhode Island Assistant State Soil Scientist, demonstrates the use of a vibracore to collect a subaqueous soil core.



A soil sample showing a buried marsh horizon.

year of a 2-year study to develop a mapping protocol for subaqueous soils.

In September of 2007, Craig Ditzler (a former Rhode Island resident), Karl Hipple, Philip Schonenberg, and Bob Dobos from the National Soil Survey Center toured the subaqueous soils mapping effort underway in Connecticut and Rhode Island. The crew spent some time aboard the NRCS research boats, collected and described a soil vibracore from a washover fan slope, toured the URI Pedology Laboratory, and discussed data needs and interpretations. The results of the tour include several proposals involving taxonomy and some new data elements that need to be added to NASIS.

The MapCoast Partnership was recently featured in *41 °N*, a publication of RI Sea Grant and URI Coastal Institute. To receive a copy of

this publication, contact Jim Turenne at 401-822-8830 or view the online copy at <http://seagrant.gso.uri.edu/41N/>

vol4no1. Video news features of MapCoast in action can be viewed at <http://nesoil.com/Video.htm>. ■



Bob Dobos and Don Parizek observing an eelgrass bed in Little Narragansett Bay.



Mark Stolt (URI), Al Averill (MO 12), and Karl Hipple (NSSC) describing a soil core.



NRCS staff from the National Soil Survey Center and from Connecticut and Rhode Island cutting a vibracore open at Ninigret Pond.

Mapping from East to West

Arkansas soil scientist expands experience on new horizons.

By D'andre L. Yancey, Soil Scientist, USDA, Natural Resources Conservation Service.

When I was a young professional, new to the discipline of soil science, the first observation I made was to realize the expertise and high standard of excellence set by my predecessors. As a person trained in a similar but different field of science, I was intimidated to find out what kind of profession had chosen me. In order to improve my knowledge base and be competitive, I started to read, but there was still a major piece of the puzzle missing.

I asked myself, "What is the most efficient way for me to become the best soil scientist I can be?"

Simultaneous with these thoughts, there was a change in the priorities of the National Cooperative Soil Survey, with emphasis being placed on the completion of all initial soil surveys within the country.

I realized this was the perfect solution to the problem at hand: how to accelerate my education as a soil

scientist in a real-life, hands-on experience in which I had no choice but to sink or swim. The solution was to take a year and do nothing but map.

Only because of the detail opportunities around the country could this plan come to realization.

I proposed this idea to Luis Hernandez, State Soil Scientist in Arkansas, and he agreed that this detail could be beneficial to me and to Arkansas and the Natural Resources Conservation Service.

Since leaving Arkansas, I have mapped more than 16,000 acres in Lamar County, Alabama, and more than 11,000 acres in Sevier County, Utah. I am currently on a detail in the Mojave Desert in California.

Even though some people may consider the frequent moves a sacrifice, I would not change any part of this experience. The experience has helped me to grow personally and professionally. More importantly, I now actually feel like a soil scientist. ■



D'andre L. Yancey.



Areas of Joshua Tree National Park, Mojave Desert, San Bernardino County, California.



Spanish Translation of the *Keys to Soil Taxonomy*

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

The tenth edition of the *Keys to Soil Taxonomy* (2006) has been translated into Spanish. This translation was made by Dr. Carlos A. Ortiz, Professor of Soil Sciences at "Colegio de Postgraduados," Montecillo, Mexico. The translation was coordinated by Luis Hernandez, Arkansas State Soil Scientist/MLRA Leader. Technical review was provided by the following NRCS employees: Milton Cortes, Edwin Muniz, Astrid Martinez, Milton Martinez, Alvin Perez, Manuel Matos, and Diana Angelo.

The translation is available for downloading on the Soils Web site (http://soils.usda.gov/technical/classification/tax_keys/). It also is available on CD. For a copy of CD, contact the National Soil Survey Center, Lincoln, Nebraska. A limited number of copies will be printed and available by late winter through LANDCARE, the NRCS online ordering and distribution system. ■

Review of *The Worst Hard Time*

By Karl W. Hipple, National Leader, Soil Survey Interpretations, NRCS, National Soil Survey Center, Lincoln, Nebraska.

The Worst Hard Time: The Untold Story of Those Who Survived the Great American Dust Bowl, which was published by Houghton Mifflin Company in 2006, was written by Timothy Egan, a Pulitzer Prize-winning author and journalist for the *New York Times*. The author details the early years of settlement when homesteaders were drawn to the lush green prairies where rainfall was adequate to produce wheat, corn, and grass to feed herds of cattle. The U.S. economy was strong, and machinery was replacing more time-consuming labor methods. Egan paints a vivid word picture of the government-enhanced abuse of the natural resources of the Great Plains, the perseverance, heart, and heartache of its people, and the fears and frustrations of homesteaders trying to survive during some of the darkest years in American history.

As Egan develops this story, he weaves the hearts, minds, and dreams of the "nesters" and the communities they established into a heartbreaking story of the dynamics of government-sponsored homesteading, severe drought, America's Great Depression, severe cyclic dust storms, human and animal sicknesses (such as dust pneumonia), and a new type of mental illness called "dust madness." Battling these factors ultimately drove many settlers to utter despair or in later years prompted many to relocate to California, as chronicled in *Grapes of Wrath* by John Steinbeck. *The Worst Hard Time* encompasses about 40 years separated into three periods: a) 1901-1930 Promise: The Great Plowup, b) 1931-1933 Betrayal, and c) 1934-1939 Blowup.

Egan begins his story by discussing the era of homesteading in the early 1900s, when the U.S. Government and private real estate companies, such as the Southwestern Immigration and Development Company, took extraordinary measures to enhance and guide land settlement. The U.S. Government used the Homestead Act while the Southwestern Immigration and Development Company ran advertisements in newspapers nationwide offering free train rides for potential nesters to look over the land. The early settlement years were characterized by adequate rainfall, the introduction of machinery, good wheat prices, the efforts of the Bureau of Soils to complete a national soil survey, increased pressure on the land by ramped-up food production to supply food to the Allied Powers during World War I (1914-1918), and boundless enthusiasm for living the good life.

Land speculation was part of this enthusiasm. In 1908, the Southwestern Immigration and Development Company fraudulently sold 3,000 lots in Boise City, Oklahoma, for forty-five dollars each despite the phantom existence of the city, its trees, its artesian well, and its paved streets. Rather than finding the advertised "fully stocked" paradise, people who arrived to view their newly purchased share of Boise City found no railroads, no houses, no businesses, and a stock watering tank instead of an artesian well. These new settlers had no idea that the Southwestern Immigration and Development Company did not even own the land in the Oklahoma Panhandle that the settlers had just purchased. Hope for a better life, however, continued to drive families to the plains.

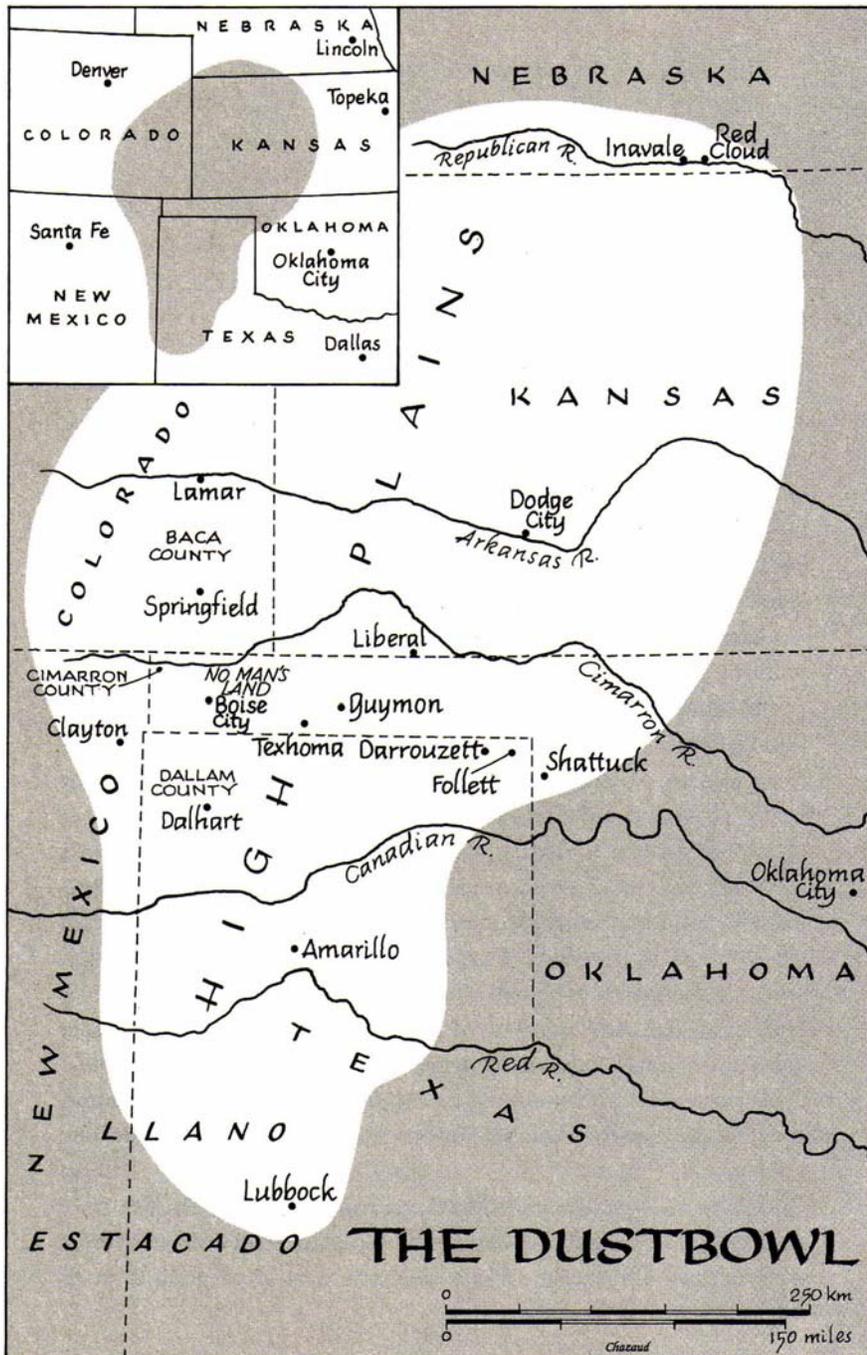
The author introduces the American Dust Bowl by masterfully humanizing the airborne dust. He emphasizes that

the Dust Bowl encompassed much more than just epic land degradation caused, according to Hugh Hammond Bennett, by mankind's "sinister" treatment of the land and "our

stupendous ignorance." This time period is characterized by human inventiveness, stubbornness, frustration, horror, suffering, entrepreneurship, and in some cases,

hopelessness. Wisdom inherited from the Comanche was passed on to the nesters in an aphorism that the early cowboys of the XIT Ranch stressed repeatedly in conversations, "Miles to water, miles to wood and only six inches to hell."

The story's human side is developed by descriptions of ordinary people involved with the plow out and subsequent "blowout" of the prairie. These people include Bam White, Ike Osteen, Jeanne Clark, Fred Folkers, Louise Watson, Doc John Dawson, and others living in small prairie towns, such as Dalhart, Texas; Boise City, Oklahoma; Liberal, Kansas; and Lamar, Colorado. Egan characterizes the "Dirty Thirties" by the following examples: folks cleaning dust from houses with scoop shovels; cars stuck in waves of sand on roads; folks watching their livestock go blind and/or suffocate because of the dust; invading grasshoppers that destroyed crops and denuded trees; static electricity contained in recurring dust clouds that knocked people down when they tried to shake hands; stores selling five-hundred-foot rolls of house-sealing tape for thirty-five cents; and times during storms when "one could not see his or her hand in front of their face." Egan also describes the extra, often futile, efforts of the nesters and sobbusters to combat or reduce the health effects of the dust. These efforts include placing Vaseline in their nostrils to trap dust, the Red Cross issuing respiratory masks to school children, and women placing wet towels beneath doors or damp sheets over windows at night in an attempt to keep out the dust or at least filter the air. These simple measures were intended to treat the symptoms of an enormous calamity—a combination of the use of plows to turn the prairie sod (the glue that held the soil in place), the extreme drought of the 1930s, and the





Images of the Dust Bowl from the photo gallery of USDA, Natural Resources Conservation Service.

economic factors of the Great Depression, which began in 1929.

The increasing number of dust storms in the “Dirty Thirties” (14 in 1932 and 38 in 1933) that were overwhelming the nesters soon impacted other parts of the country. As the dust clouds blew east and carried “black air” and misery to people in Washington, D.C., newly elected President Franklin Roosevelt and his government had to do more. President Hoover (President from 1929 through 1932) had been unsuccessful in combating the Depression and the “dusters” that continued, now with increasing frequency. The stock market crash of 1929 was over, but the Depression was still at full throttle, food was scarce, the drought was worsening, and banks were failing. The nesters fully expected the Federal Government to help.

The Federal Government was active in the early 1930s, trying to correct the economy by buying more than 6

million hogs to stabilize prices in 1933. The Soil Erosion Service in the Department of the Interior was formed in 1933 with “Big Hugh” Bennett as Director. Bennett had already co-authored his greatest work, a USDA Bulletin entitled “Soil Erosion: A National Menace,” which was published in 1928. With the severe drought, however, many of his ideas on how to control erosion were not working. Bennett became increasingly frustrated with the government for encouraging exploitative farming during the years of the wheat boom. In the late 1920s, and long before others advocated for soil conservation, Bennett condemned the government for its notion that “the soil is one resource that cannot be exhausted.”

The worst dust event, labeled “Black Sunday,” occurred on April 14, 1935. It removed and transported 300,000 tons of topsoil in a single afternoon. Egan indicates that the Black Sunday storm moved twice as much soil as was

moved when the Panama Canal was dug. Digging the canal took 7 years, and the storm lasted only an afternoon. This extreme storm (a black roller) had a colossal impact on the lives of people across the nation. It was an event that Hugh Bennett used to his advantage.

Many describe Bennett as a mixture of scientist and actor who was a tireless advocate of land stewardship and of placing control of conservation initiatives in local hands. Egan describes the scenario in which Bennett skillfully used the afternoon darkness generated by the infamous “Black Sunday” dust that swept over Washington, D.C., to his advantage as he lobbied Congress to create a permanent agency to heal the land. One famous quote from that lobbying speech deals with his response to a senator who loudly asked about the daytime darkness. Bennett simply responded, “This, gentlemen, is what I’m talking about. There goes Oklahoma.” Congress passed the Soil



Hugh Hammond Bennett, the first Chief of the Soil Conservation Service. Picture from the gallery of USDA, Natural Resources Conservation Service.

Conservation Act the following day. This act provided permanent funding to restore and sustain the health of the nation's soil.

The 1934 *Yearbook of Agriculture* stated that "approximately 35 million acres of formerly cultivated land have essentially been destroyed for crop production...and 100 million acres, now in crops, have lost all or most of the topsoil" (United States Department of Agriculture, *Yearbook of Agriculture*, 1934.) One of Bennett's favorite and often repeated sayings is, "An inch of topsoil can blow away in an hour, but it takes a thousand years to restore it." In 1935, the U.S. Government tried to

help by buying cattle to provide seed money for the nesters and others to help restart the economy and for use by the Federal Surplus Relief Program in the distribution of food to families nationwide. Egan says that the government purchased "wretched looking cattle stumbling over the prairie, many of them blind, their ribs outlined through their skin, scabby with sores, and their insides bound up by dust." He indicates that 50 percent or more of the cattle had to be destroyed.

The Worst Hard Time tells an interesting and rich story of the lives of the early nesters who settled the prairie,

the early history of the agencies that eventually became the Natural Resources Conservation Service (NRCS), early U.S. Government social programs, and the impacts of climatic events in the 1930s. The book is well researched and documented with old written records and in-person interviews with a few remaining nesters. For employees of the Natural Resources Conservation Service, this book is a must read. For others, the book provides a look at a tough period in U.S. history through the eyes of strong, stubborn, and often colorful people whose lives illustrate the meaning of the word "persevere." ■

A Note About *The Worst Hard Time*

From "Friday Message" (7/27/2007) by Steve Chick, State Conservationist, NRCS, Lincoln, Nebraska. The message is to all NRCS employees and conservation partners in Nebraska.

When it was recommended to me that I read the book *The Worst Hard Time* by Timothy Egan, I had no clue that it would grab my attention like it has. I often hear folks describe books that "they cannot put down," but I have rarely had that experience. I am not exaggerating by describing this book in that way. Anyone connected to agriculture and conservation, especially in the Plains States, should read this book. It vividly describes how early successful wheat crops on large expanses of sod-busted prairie resulted in an unsustainable bubble that burst when the rains ceased and drought persisted for several years. Suffice it to say that it is almost unimaginable what these resilient folks endured, except that this book uncovers the reality of those times. Here are just a couple of excerpts, but the only way to do it justice is to read the book.

...For the next nine years, Ike would see Baca County (CO) go mad. Earlier, the land had been overturned in a great speculative frenzy to make money in an unsustainable wheat market. After a big run-up, the prices crashed. The rains disappeared—not just for a season but for years on end. With no sod to hold the earth in place, the soil calcified and started to blow. Dust clouds boiled up, ten thousand feet or more in the sky, and rolled like moving mountains—a force of their

own. When the dust fell, it penetrated everything: hair, nose, throat, kitchen, bedroom, well. A scoop shovel was needed just to clean the house in the morning. The eeriest thing was the darkness. People tied themselves to ropes before going to a barn just a few hundred feet away, like a walk in space, tethered to the life support center. Chickens roosted in mid-afternoon.

...Oklahoma had lost 440 million tons of topsoil, and another survey out of Texas, which said 16.5 million acres had been eroded to a thin veneer...

The book relives the lives of many families that suffered through the hard times, including the loss of family members due to dust pneumonia. Out of this tragic time was born the Soil Conservation Service and Soil Conservation Districts, which led to **the** most successful natural resources restoration and management effort through the Federal/state/local/landowner partnership. Please consider reading this book. ■

North Central Region Work Planning Conference

By John C. Warner, Soil Data Quality Specialist, MO 5, NRCS, Salina Kansas.

The North Central Region Work Planning (NCRWP) Conference will be held June 23-26, 2008, in Manhattan, Kansas. Manhattan is located in the heart of the beautiful Flints Hills of Kansas. This year the field trip will be an exciting tour of the Konza Prairie Biological Station

(KPBS). The KPBS is a native grassland owned by the Nature Conservancy.

There are four committees for this meeting. These are Taxonomy, Interpretations, New Research, and Research Needs.

For more information, contact John Warner at 785-823-4559 or e-mail him at john.warner@ks.usda.gov. ■

Southern Regional Cooperative Soil Survey Conference

By Deanna (Anderson) Peterson, State Soil Scientist, NRCS, Gainesville, Florida.

The Southern Regional Cooperative Soil Survey (SRCSS) Conference will be held July 14-17, 2008, in Gainesville, Florida. The theme for the conference is "Innovative Technologies for the New Soil Survey."

Located in north-central Florida, Gainesville is home to Florida's largest and oldest university, the University of Florida, and the "Gator nation." In the midst of north Florida's rolling sandy terrain and ecological communities, karst geological formations are evident throughout the Gainesville natural areas (Paynes Prairie State Preserve and Devil's Millhopper State Park).

Monday's field trip will combine soil-ecological sites at Austin Cary Memorial Forest and GIS demonstrations at the University of Florida. Beginning on Tuesday, the conference sessions will include but will not be limited to information sharing from national leadership and partners, breakout groups, poster sessions, and reports from the SRCSS committees. The standing committees are Soil Taxonomy and Standards,

Research Priorities, New Technology Committee, and Soil Interpretations. The Subaqueous Soil Ad Hoc Committee also will be meeting.

For more information, including information about how to register, see <http://conference.ifas.ufl.edu/ssc> or contact Deanna (Anderson) Peterson at (352) 338-9535. Her email is currently deanna.anderson@fl.usda but will be changing to deanna.peterson@fl.usda.

Northeast NCSS Conference

By Kip Kolesinskas, State Soil Scientist for Connecticut and Rhode Island, NRCS, Tolland, Connecticut.

The Northeast NCSS Conference will be held June 2-5, 2008, at the University of Rhode Island Coastal Institute in Narragansett, Rhode Island. The field trip will highlight anthropogenic soils (with a mysterious archeological twist), subaqueous soils, loess and carboniferous soils, and current research about soil-related impacts from turf and nursery

agriculture. Expect an authentic clam bake, scenic coastline, and plenty of New England charm!

There will be six committees for this meeting. These are Taxonomy, Subaqueous Soils, Hydric Soils, Research Needs, New Technology, and Bylaws.

More detailed information will soon be posted on the Rhode Island and Connecticut NRCS Web sites. Otherwise, contact Kip Kolesinskas at 860-871-4047 or email him at kip.kolesinskas@ct.usda.gov. ■

West Regional Cooperative Soil Survey and Western Society of Soil Science Conferences

By Ron F. Myhrum, Natural Resources Assessment Team Leader, NRCS, Spokane, Washington.

The 2008 conferences of the West Regional National Cooperative Soil Survey (WRCSS) and

the Western Society of Soil Science (WSSS) will be held in Spokane, Washington, at the Red Lion Hotel at the Park, June 16-20. The conferences are being co-located so that they can provide many opportunities for participants share knowledge and information and to build partnerships between organizations with interests in soil resources.

The WRCSS theme is "Soil Survey and Ecological Site Classification." This theme will be well represented in oral presentations during the conference and during an all-day field trip on Tuesday, June 17, in the surrounding area. WRCSS participants include representatives from universities, NRCS, USFS, BLM, BIA, NPS, the Washington Society of Soil Scientists (WSPSS), the National Society of Consulting Soil Scientists (NSCSS), and Canadian Soil Scientists.

WSSS conference members will join the WRCSS members for the general meetings, joint technical sessions, a poster session, a banquet, and the field trip. ■

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