National Cooperative Soil Survey Newsletter

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Editor's Note

Issues of this newsletter are available at http://soils.usda.gov/. Under the Soil Survey tab, click on Partnerships, then on NCSS Newsletters, and then on the desired issue number.

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2014 WVAPSS Annual Business Meeting and Tour

By Susan Y. Demas, MLRA senior soil scientist, NRCS, Hammonton, New Jersey.

On July 25th, the West Virginia Association of Professional Soil Scientists held its annual business meeting and soil tour. The meeting was held at Carnifex Ferry Battlefield State Park in Summersville, West Virginia. Eighteen members and several guests, including two canines, were in attendance. The meeting opened with the introduction of new members and the appointment of officers. The new officers for 2014 are as follows:

President: Katey Yoast, NRCS, Morgantown, WV
Vice President: Amir Hass, West Virginia State University
Secretary/Treasurer: Nick Beaver, NRCS, White Hall, WV
Former President: Mike Harman, West Virginia University, Morgantown, and West Virginia Extension Service, Jefferson County
Executive Council (Constitution Bylaws Committee): Susan Demas, NRCS, Hammonton, NJ
Executive Council (Public Relations & Education Committee): Skip Bell, NRCS, Morgantown, WV
Executive Council (Ethics and Registration Committee): Stephanie Connolly, USFS, Monongahela National Forest

In the morning, the group took a guided tour of the Carnifex Ferry Battlefield, which is nestled on the scenic rim of the Gauley River Canyon (figure 1). The confluence of the Gauley and Meadows Rivers was the site of the 1861 Civil War battle.

The Civil War battle took place on September 10, 1861, at Carnifex. It represented the failure of a Confederate drive to regain control of the Kanawha

Figure 1.—The Gauley River Canyon. Photo courtesy of Rob Pate.

Valley and signified a Union victory that contributed to the Confederate withdrawal from Virginia. The late morning tour was led by Park Ranger Sam Cowell.

Following the business meeting and barbeque lunch, the group listened to Skip Bell, NRCS soil scientist, provide an overview of the soils and geology of the region. The bedrock geology of the area is primarily sandstones of the New River and Kanawha Formations in the Pottsville Group. Skip was part of the team of soil scientists that mapped the Gauley River National Recreation Area, West Virginia, in the early 2000s. The group hiked to several sites along a nearby trail to view soils and vegetative communities. ■

Figure 2.—WVAPSS members examining an exposure of a Laidig soil. Laidig soils are fine-loamy, siliceous, active , mesic Typic Fragiudults.

Sampling Trip and Field Review at Sequoia and Kings Canyon National Parks

During the week of November 10th, soil scientists from California performed a field review and sampled soils in the Sequoia-Kings Canyon National Parks (SEKI) Soil Survey Area. The National Park Service (NPS) Soil Resource Inventory is funding the project, which is administered by the Pacific Soil Survey Region office under Dr. Cynthia Stiles in Davis, California. This is the third field season of the survey, and 2 more years are scheduled to complete the fieldwork.

Participants on the trip included Cathy Scott, SEKI project leader, Sonora, California; Theresa Kunch, Sonora MLRA soil survey office leader; Dr. Julie Baker, soil scientist, Sonora; Susan Southard, National Soil Survey Center (NSSC) soil scientist and NPS liaison; and Jennifer Wood, soil data quality specialist, Davis. Dr. Randal Southard, pedology professor from University of California–Davis (and Dr. Baker's former major professor), and Genevieve Widrig of Templeton, California, also participated for part of the week. They helped with soil climate station maintenance. Maxine Levin, NSSC National Leader for Interpretations, and her sister Suerie McNeil volunteered their assistance on the first day. The sisters also graciously hosted the participants for 2 nights at their family ranch, which is in Dunlap, California, on the northwest border of the park.

Data were collected from the four Onset Weather Stations that were co-located with Park RAWS weather stations in the fall of 2013. Soil temperature and moisture are being measured at four depths (10, 20, 50, and 100 centimeters). The measurements will continue after the survey is completed so that a long-term soil climate record can be established for the Southern Sierra Nevada mountains.

Glacial till soils on moraines (left image) require the removal of cobbles, stones, and small boulders for some use and management. Soils at the same elevations on granite hillslopes (right) commonly are deeply weathered sandy soils that formed from granitic residuum.

The group excavated and sampled soils at map unit modal pedon locations. The park is dominated by granitic lithology and has remnants of Mesozoic- and Paleozoic-aged metamorphic rocks into which the Sierran batholith intruded. Much of the park was covered by ice during glacial periods of the Pleistocene, and glacial till is present as lateral and ground moraines on mountains slopes and valley floors. Samples were collected on one lateral-moraine glacial till soil, two residual granitic soils, and one colluvial metamorphic soil.

Participants helped sample, including collecting clods and bulk density data. Clockwise from Cathy Scott (in the pit): Genevieve Widrig, Suerie McNeil, Maxine Levin, Randy Southard, Sue Southard, and Theresa Kunch.

During the week, the participants reviewed lab data from prior years. The data confirmed the location of the lowest latitude Andisol yet identified in California and possibly in the entire lower 48 States. This Andisol is at an elevation of 3,300 meters, and the andic properties likely resulted from ash fall from eruptions of Mono Crater in eastern California around 900 years ago. ■

Dr. Randal Southard, professor of soils from University of California—Davis explains some of the soil and geomorphologic relationships in the park.

Dynamic Soil Properties under Cultivated and Restored Wetlands

The West Fork Beaver Creek watershed lies in the Minnesota River Basin, which transports 88 percent of the sediment entering the Upper Mississippi River Basin. State and Federal programs implemented in the Minnesota River Basin encourage agricultural land retirement to improve water quality. These programs are aligned with the Conservation Reserve Program (CRP), the Conservation Enhancement Reserve Program (CREP), and the Reinvest in Minnesota (RIM) program. Other agricultural impacts mitigated by these programs include the fragmentation of riparian corridors, grasslands, and forestlands. Although conservation programs in the Minnesota River Basin have largely targeted water quality, retirement of agricultural land may also improve the quality of the soil.

The Beaver Creek Minnesota DSP Research project is investigating two major land uses—cropland and retired land. The cropland is in a corn-soybean rotation and generally under conventional and ridge tillage. The retired land has been removed from similar production and placed in perennial grass as part of USDA's CRP and CREP and the RIM program. Data collected from the weather station and the soils will be used to build data files in the Agricultural Policy Environmental eXtender (APEX) model. This model will be used to simulate the long-term impact of land management on dynamic soil properties. To complement ongoing dynamic soil property (DSP) studies across the U.S., scientists at the National Soil Survey Center (NSSC) are evaluating sampling strategies and differences in DSPs under different management scenarios. Data from this study will also be used to complement the ongoing research by U.S. Geological Survey (USGS) to evaluate the impact of retired land on water quality within the Minnesota River Basin. The study is in collaboration with Minnesota NRCS, USGS, and the University of Minnesota–Crookston.

Previous studies in the basin observed that as the extent of retired land along the riparian corridor increased, there were significant decreases in nitrogen and sediment transport but not in phosphorus transport (Christensen et al., 2012). Phosphorus (P) is one of the leading causes of water-quality decline in the United States. High P levels in water can lead to algal blooms and hypoxia in surface waters. Decreasing conservation dollars dictate that NRCS maximize its effectiveness and efficiency in implementing practices to address P management and runoff on agricultural lands. Therefore, additional information on P behavior in soil is needed to better identify areas that are at risk to deliver excess P to surface waters.

In addition to understanding P behavior in soil, changes in dynamic soil properties are important in understanding the response of soils to changes in land use or management. Changes in management, and hence dynamic soil properties, may result in changes in measurable soil properties, including aggregate stability, infiltration, water-holding capacity, bulk density, and available nutrients. Because these properties affect nutrient and water availability and resistance to erosion, they also impact production. Dynamic soil properties are important to Soil Survey and NRCS conservation planning in their goal to define, document, and interpret how changes in soil properties, and therefore their interpretations, occur in relation to changes in various land uses and management systems. Increased availability of information on dynamic soil properties will also allow the development and/or improvement of management tools that support sustainable management.

Soil scientists from the USDA–NRCS National Soil Survey Center worked in Renville, Minnesota, from September 21 to 25, 2014, in the West Beaver Creek watershed. The scientists, Candiss O. Williams, Cathy Seybold, Skye Wills, and Steve Monteith, performed soil characterizations for three soils that represent the catena concept mapped in the watershed, namely Crooksford, Leen, and Okoboji

soils (figure 1). The characterizations were part of the dynamic soil property study to evaluate the impact of management on soil properties. Soils were also characterized by Dan Nath, area resource soil scientist, John Beck, state soil scientist, Doug Miller, assistant state soil scientist, and Joe Kristoff, area resource soil scientist. The soil scientists were joined by Victoria Christensen, U.S. Geological Survey hydrologist, Tom Kalahar, Soil and Water Conservation District technician, and landowner David Bakker. In addition to soil characterizations, infiltration and numerous bulk density methods were performed.

The sampling trip focused on land that had been retired and restored to native perennial grasses. The site sampled was retired and restored 14 years ago. It has been treated with ongoing efforts to control invasive species and maintain a mix of native prairie vegetation. The restoration effort included breaking tile lines and building a dyke with a water-control structure. This arrangement allows water to remain on the lower part of the landscape, potentially improving soil function by filtering and buffering nutrients and increasing carbon storage. It also makes describing and sampling the soils a challenge. The team tested sampling and bulk density methods to overcome these problems. One characterization pit and two shallow satellite pits were described

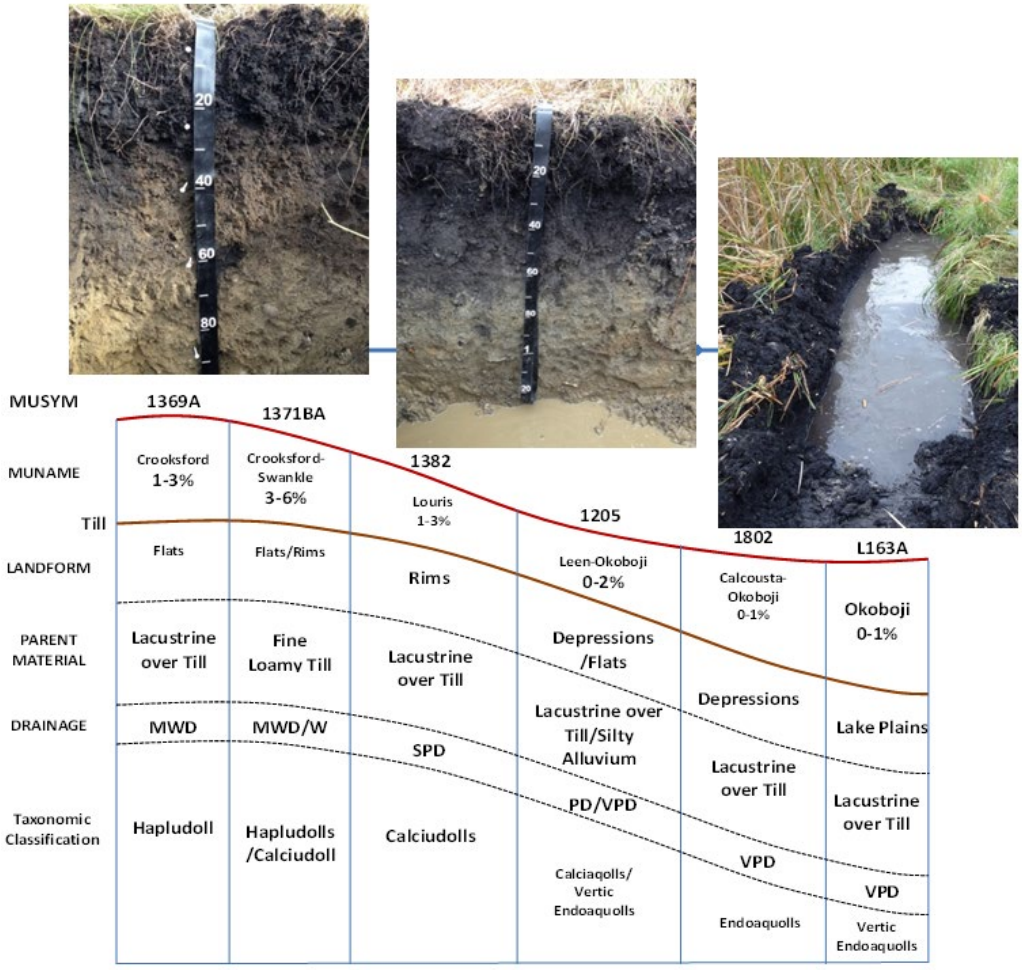


Figure 1.—Catena from the drainage basin of West Fork Beaver Creek, Minnesota. The series sampled (from left) are Crookston (Hapludoll, moderately well drained), Leen (Calciudoll, poorly drained), and Okoboji (Endoqauoll, very poorly drained).

and sampled for each soil evaluated to capture both the central concept and the range in properties for each soil series.

Initial results indicate that soils in the retired land have good observable soil health. The team found dark surface horizons with good structure, although evidence of agriculture (Ap horizons) was still present in the soils in the better drained landscape positions. There was evidence of good root exploration and biological activity in all pedons sampled (figure 2). Two of the three Okoboji profiles had organic horizons, which are generally not present in cropped soils. Once the project is complete, the data and final conclusions will be made available through the National Cooperative Soil Survey Characterization Data portal, NRCS soil databases, and the NRCS DSP webpage and through research publication and presentation.

Reference

Christensen, V.G., K.E. Lee, J.M. McLees, and S.L. Niemela. 2012. Relations between retired agricultural land, water quality, and aquatic-community health, Minnesota River Basin. Journal of Environmental Quality 41:1459–1472. ■

Figure 2.—Soil structure, roots, and earthworms observed in A horizons in areas of retired land.

Watershed, Irrigation, and Soil Fertility & Health Projects in Pakistan

Otto Gonzales and Matt Stellbauer, USDA Foreign Agricultural Service (FAS); Jon Fripp, civil engineer, and Cheryl Simmons, national technology specialist, NRCS Central National Technology Support Center; and Mike Kucera, agronomist, NRCS National Soil Survey Center, were recently on assignment in Pakistan. The assignment focused on supporting two projects: the "Watershed Rehabilitation and Irrigation Improvement in Pakistan" and the "Pakistan Soil Fertility and Soil Health Project."

Group photo at annual meeting of "Pakistan Soil Fertility and Soil Health Project."

On October 20 and 21, the annual meeting for "Watershed Rehabilitation and Irrigation Improvement in Pakistan" was held at the National Agricultural Research Center (NARC) in Islamabad. People from several different entities participated, including researchers, practitioners from agricultural research stations, staff from universities at provincial and national levels, service providers, and farmers from throughout Pakistan. Efficient use and management of irrigation water is critical to sustainable agricultural land use in Pakistan. This project, which has been extended to a fourth year, is dedicated to demonstrating and disseminating information on the best practices and technologies to help rural farmers. It has already assisted with many innovative watershed and irrigation measures to service providers, extension agents, and farmers throughout the country. The USDA team briefed the U.S. Agricultural Counselor on project activities. The USDA team also participated in meetings with USAID (U.S. Agency for International Development), ASSIST, and the Corp of Engineers. The meetings discussed how USDA expertise in watershed

rehabilitation and irrigation—and particularly soil fertility and soil health—can support USAID efforts to develop cropland irrigation in areas of the Gomal Zam Dam and the Satpara Dam.

On October 23 and 24, the annual review and planning meeting of the "Pakistan Soil Fertility and Soil Health Project," which has a goal of improving soil fertility and soil health through extension, was held at NARC. Those attending included soil scientists, agronomists, and other technical specialists from agricultural research stations and universities at provincial and national levels. The International Center for Agricultural Research in the Dry Areas (ICARDA) (http://www.icarda.org/) and the USDA Foreign Agricultural Service are the primary sponsors of the project. The major project goal is to bring together Pakistani institutions from both the private sector and public sector to collaborate and gain a common understanding of how to maintain or improve soil fertility and health for the 8 million farmers in Pakistan. During the meeting, Pakistani entities provided updates of project activities and plans for the upcoming year. Cheryl Simmons and Mike Kucera gave a presentation on soil health and fertility, the relationship between soil biology and fertility, and key principles for the management of soil health and fertility. In addition, Mike provided hands-on demonstrations of how to assess soil health. He used local soils from nearby fields.

In addition to participating in meetings at NARC, the USDA group also joined in a live broadcast of "Tea Time with the U.S." on radio station Power 99. The show was broadcast over most areas in Pakistan, potentially reaching more than 100 million listeners. The Tea Time topic was Soil and Water in Pakistan. Listeners were able to call in, and the radio broadcasters interviewed the USDA panelists on critical soil and water issues. ■

The USDA team and radio staff following the broadcast of "Tea Time with the U.S.."

MLRA Soil Survey Office Staff Assists Brooklyn College with Soil Microbial Diversity Study

By Marissa Theve, NRCS soil scientist, Tolland, Connecticut.

In fiscal year 2014, Donald Parizek, Jacob Isleib, and Marissa Theve, NRCS staff located at Tolland, Connecticut, assisted NRCS staff from New York and New Jersey (including State Soil Scientist Richard Shaw and Resource Soil Scientists Olga Vargas and Fred Schoenagel) and researchers from Brooklyn College in describing and sampling soils for a microbial diversity study. The objective of this study, which is sponsored by an NCSS Soil Survey Research grant, is to sample soil microbiological communities throughout the city and northern New Jersey and study their connection to dynamic soil properties, including carbon stocks for important urban soils. The principal investigators are Dr. Zhongqi "Joshua" Cheng (an associate professor and chair of Brooklyn College's Department of Earth and Environmental Sciences), Dr. Theodore Muth (an associate professor and head of the microbiology curriculum), and Hermine Huot (a post-doctoral research scientist from France).

In addition to its main objective, the project also provided opportunities for learning and research in soil science for students at an underserved urban university. Brooklyn College undergraduate and graduate students were thrilled to assist in the field with sampling and to learn about urban soils and soil mapping practices in the United States. Many asked about careers in natural resources and about classes they should take to qualify for soil scientist positions. Students from the undergraduate class EESC 3675: Environmental Aspects of Urban Soils will characterize the physical, chemical, and biological properties of the samples collected during the most recent 3-day sampling trip as part of their class exercises.

Brooklyn College's Alonso Córdoba collecting samples of soil microbes.

The characterization data from the project will ultimately fill a need in the recently completed 1:12,000 initial survey for New York City and complement a 2011 Urban Soil Carbon project. This allows for the calculation of carbon stocks for the entire city. Dynamic soil property data will have applications to urban soils worldwide. Soil series to be evaluated include Charlton, Haledon, Deerfield, Preakness, Laguardia, and Greenbelt soils, which are all benchmark soils, as well as Fortress and Todthill soils. Data will cover more than 26,000 acres of urban parkland and other urban open space. ■

New Publication Makes Soil Classification Easier

The recently published "Illustrated Guide to Soil Taxonomy" has made teaching and learning easier for anyone studying soil classification at a beginning level. The new guide is a highly illustrated derivative of the 12th edition of the "Keys to Soil Taxonomy." It is designed to help college students, especially those on collegiate soil judging teams, learn the fundamental concepts of pedogenic features and soil classification. The guide also aids soil scientists beginning their career in soil survey by presenting basic concepts of soil features and taxa that may be new to them.

The guide is also useful to natural resource management and engineering professionals who use soil survey information in their work. It presents broad concepts and diagnostic features used in soil classifications that impact use and management decisions. Definitions of the diagnostic horizons and features are accompanied by photos and background information, including common horizon nomenclature. Best described as containing "just the facts," the guide also contains numerous hyperlinks that direct the reader to additional information and photos that help to clarify this complex subject.

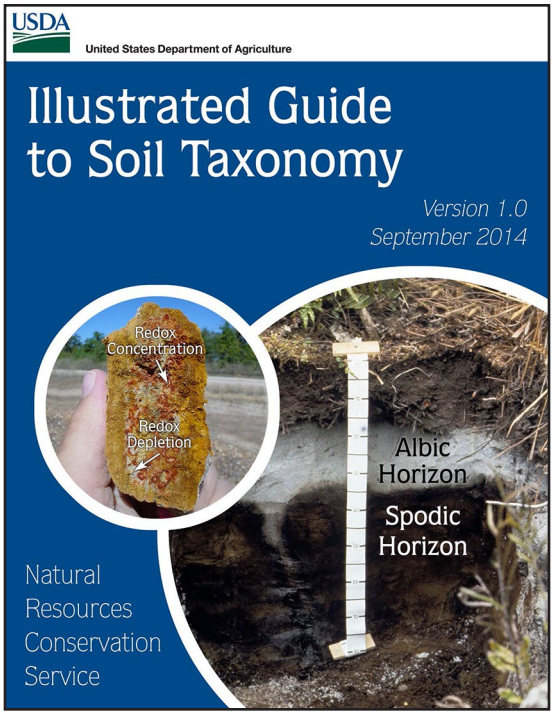
The beginning of the guide can be traced to a casual conversation between members of the academic community and the Federal government at the National Cooperative Soil Survey Conference in 2011. The conversation made evident the need for a better educational tool in the field of soil science. Because of this conversation, a workgroup was formed with the task of developing a guide that made understanding soil classification easier. In 2011, the regularly updated "Keys to Soil Taxonomy," which is the profession's handbook, was the only authoritative source from which to learn the NCSS system of soil classification. It was clear, however, that learning from the Keys could be incredibly difficult. The complexity of the subject, the technical language, and the lack of illustrations made the subject difficult for both those in the classroom and those in the field. According to Ken Scheffe, soil scientist, NSSC Soil Survey Standards Branch, "It's hard to classify soil or analyze an interpretation if you don't understand the language or have a visual reference."

Over the next 2 years, the workgroup created the "Illustrated Guide to Soil Taxonomy." Michael (Mickey) D. Ransom, Kansas State University, led the group, and Craig Ditzler, NRCS retired soil scientist, served as lead editor. The guide was designed to be user-friendly by simplifying the language and including images of numerous features taken from several continents.

"We anticipate the Guide quickly becoming the 'go-to' publication for both the student and novice soil classifier," said Scheffe. "The classroom will love it, the field will love it, and the new soil scientists will love it. It's going to make learning about classification quicker for everyone."

The guide can be downloaded for free (PDF) at:

http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/class/?cid=nrcs142p2_053580. ■



Soil Tunnel is Huge Hit

Staff from NSSC Kellogg Soil Survey Laboratory participated in the annual NaturePalooza on the East Campus of the University of Nebraska, Lincoln, on September 30th. Using a newly built Soil Tunnel, Physical Science Technicians Patty Jones and Michelle Etmund provided an opportunity for kids of all ages to see "up close" what goes on underground. Participants crawled through the almost 8-foot long tunnel, which was constructed with donations of material and labor from local businesses and then brought to life by the artistic hand of Jan Lang, also a Kellogg Lab staff member. Although a few children hesitated at first, most were willing and excited to take the journey underground, thanks to the realistic nature of the exhibit.

Visitors to the Soil Tunnel exhibit were also treated to free soil posters, Sammy Soil coloring books, fact sheets, and other learning materials designed for adults and children of all ages. Approximately 800 individuals attended the 1-day event hosted by the University's School of Natural Resources, whose goal was to promote respect for natural resources through learning.

Other event activities included "Build a Bird Feeder," "Wildlife Interaction," and "Growing with Ground Water." ■

The entrance to the 8-foot long soil tunnel displayed at the University of Nebraska NaturePalooza.

Developing Riparian Ecological Sites for the Confederated Tribes of the Umatilla Indian Reservation

In late August, Mike Regan (NRCS soil data quality specialist) and Kendra Moseley-Urbanik (NRCS ecological site specialist for quality assurance) from NRCS's Pacific Northwest Soil Survey Region (Region 1) met with a multi-disciplinary team to discuss the development of riparian ecological sites on lands of the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) outside of Pendleton, Oregon. The team included Cheryl Shippentower (plant ecologist), Gordy Schumacher (Range, Agriculture, and Forestry program manager), Amy Senn (archeologist), and Stacey Schumacher (GIS specialist) of CTUIR; David Trochlell (resource soil scientist) of the Oregon NRCS staff; Marchel Munnecke (owner/project manager) of Pyramid Botanical Consultants, a consulting firm hired by CTUIR; and Carolyn Wiarda (soil scientist from Terra West Consulting, Inc.) and Todd Kraemer (hydrologist from Pacific Watershed Associates), subcontractors of Pyramid Botanical Consultants.

After a morning meeting at which the goals and objectives of the project were discussed, part of the group spent the rest of the day visiting several of the stream reaches included in the project. Topics for the day included how land uses have affected the streams, where reference data collection points should be placed, soil mapping needs and issues, and what will be required to ensure that the archeological clearances are completed for each soil pit location needed for the project.

The project should result in five riparian ecological site descriptions (ESDs). CTUIR plans to use these ESDs to address many of their resource concerns related to riparian habitats, primarily through restoration projects that will improve water quality and fish habitat along the stream reaches. These new ESDs will also be incorporated into updated soil survey map units (specifically those in Umatilla County, Oregon), and the data will eventually be made available through Web Soil Survey. ■

Group discussing land use issues along Iskuulpte Creek.

Neighbor Helping Neighbor— The Combined Federal Campaign

The Combined Federal Campaign (CFC) mission is the world's largest and most successful annual workplace giving campaign. Its theme for this year was "Neighbor Helping Neighbor." Recently, The Motley Fool (a multimedia financial-services company) published "How Federal Workers Lead the Nation in Charitable Giving." It stated that the CFC program involves approximately 800,000 Federal employees, who contribute close to $209 million per year. This year, Federal civilian, postal, and military donors can choose to support any of about 24,000 nonprofit organizations that provide health and human service benefits throughout the world.

An individual may give monthly through payroll deduction or may give a one-time donation. Some employees choose to donate a "fair share." A fair share is defined as the equivalent of 1 hour of pay per month. No gift is too small. Two dollars per pay period (or a cash donation of $52) can provide a month of nutritious lunches for a child in need. A gift of 4 dollars per pay period can provide 4 days of adult care for a memory-impaired person. A gift of 20 dollars per pay period can provide for the annual repair of a wheelchair or a pair of leg braces for someone with muscular dystrophy. The donor chooses how his or her gift is used. The CFC-approved charities are listed in the Charity Listing Booklet, which is available to Federal employees from their key worker.■

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