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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.

You are invited to submit articles for this newsletter to Jenny Sutherland, National Soil Survey Center, Lincoln, Nebraska. Phone—(402) 437–5326; FAX—(402) 437–5336; email—jenny.sutherland@lin.usda.gov. ■

2017 NCSS National Conference

The 2017 NCSS Conference will be held June 25–29 in Boise, Idaho. Boise, also known as the "City of Trees," is a small urban center on the western Snake River Plain, surrounded by agriculture to the south and mountains to the north. Attendees will have ample opportunities to explore outside of the conference. The Boise River runs through the heart of the city, accompanied by a 25-mile tree-lined pathway called the "Greenbelt." Adjacent foothills offer a network of over 190 miles of trails. Dining options are numerous and varied.

This biennial conference convenes to discuss and develop solutions to issues of concern to the National Cooperative Soil Survey program. The theme of this year's conference is "Resource Inventory and Assessment in a Changing Environment." Topics will relate to Soil Survey and ecological sites.

Cost to participate is $300 for general registration and $75 for student registration. Fees include all-day field trips on Sunday, June 25, and Thursday, June 29.

Interested domestic and foreign groups, such as lead scientists from Canada, Mexico, Asia, Africa, Europe, and Australia, are invited to participate as users of soil surveys. Students—and their contributions to the future of soil survey—are also welcome.

You can join the conversation about the National Cooperative Soil Survey National Conference by tweeting or posting updates to your LinkedIn and Facebook pages. The conference hashtag is #NCSSConference17. Type this hashtag in your tweets/posts to continue the conference "backchannel." You may also search Twitter for this hashtag to view tweets online.

The field trips will highlight:

- The SNOTEL monitoring system
- Soils and ecology of the seasonally dry Central Rocky Mountains
- Hazards for urban land use
- Geology and soils of the western Snake River Plain
- Range management practices
- Soils and viticulture in the Snake River Valley American Viticultural Area
- Local food production and soil health

Continuing Education Units (CEUs) for the Certified Professional Soil Scientist (CPSS) should be obtained through self-certification at the Soil Science Society of America (SSSA) website.

Registration
https://www.regonline.com/builder/site/Default.aspx?EventID=1978863

Draft Agenda
https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/partnership/ncss/?cid=nrcseprd1316816

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Soil Survey Manual, 2017, Published!

By Craig Ditzler, Kenneth Scheffe, and Curtis Monger, USDA–NRCS.

The fourth edition of the *Soil Survey Manual* (2017) culminates more than 4 years active work involving 45 authors, collaborators, and editors from NRCS and the NCSS partnership and numerous supporting scientists. This edition replaces the 1993 edition, which was written before full integration of computer technologies, such as the National Soil Information System (NASIS), SSURGO, and Web Soil Survey. It follows in the footsteps of the first *Soil Survey Manual* by Charles Kellogg published in 1937, the second edition published in 1951, and the third in 1993. The following excerpts are from the Introduction and highlight the numerous additions and changes appearing in the new *Soil Survey Manual.*

> "The *Soil Survey Manual*, USDA Handbook No. 18, provides the major principles and practices needed for making and using soil surveys and for assembling and using related data. The term 'soil survey' is used here to encompass the process of mapping, describing, classifying, and interpreting natural three-dimensional bodies of soil on the landscape. This work is performed by the National Cooperative Soil Survey in the United States and by other similar organizations worldwide. The Manual provides guidance, methodology, and terminology for conducting a soil survey but does not necessarily convey policies and protocols required to administer soil survey operations."
>
> "The Manual is intended primarily for use by soil scientists engaged in the work of making soil surveys. It is an especially important reference for soil scientists early in their careers as they learn the many complex aspects of making a soil survey. It is also an important reference for experienced soil

surveyors who want to review the details regarding many of the standards used in soil survey. For example, chapter 3, 'Examination and Description of Soil Profiles,' contains the accepted terms and definitions for specific soil properties that are used when describing soil profiles in the field. It also contains extensive information describing each soil property and the proper procedures for observing or measuring it in the field. The Manual is therefore an important companion to other soil survey references, such as the *National Soil Survey Handbook* (USDA-NRCS, 2016), the *Field Book for Describing and Sampling Soils* (Schoeneberger and Wysocki, 2012), and the *Keys to Soil Taxonomy* (Soil Survey Staff, 2014)."

"Since the third edition (1993) of the Manual was printed, significant changes have occurred that affect the ways soil surveys are made. In the United States, greater emphasis is now placed on the maintenance and modernization of previously completed soil surveys. Because of this, some soil scientists are now evaluating and improving existing surveys rather than making new soil surveys. The wide application of computer technology, in both the office and the field, has led to a proliferation of electronic data sources, including digital elevation models (DEMs), Light Detection and Ranging (LiDAR), digital geology maps and vegetation maps, and multi-spectral remote sensing data. The electronic data sources, combined with computer models that capture and apply knowledge of the interaction of the soil-forming factors, have allowed soil scientists to partially, and in a few cases totally, automate the soil mapping process. In addition, tools used for proximal sensing of soil properties, such as ground-penetrating radar and electromagnetic induction, have been increasingly used in special soil survey field studies. Greater attention is also being given to recognizing anthropogenic influences on soils. This has resulted in a need for the development of new standards for horizon nomenclature for human-altered soils, new terminology for describing human-made materials (artifacts) in soil profiles, and new classification groups. Soil surveys have also been conducted to a greater extent in shallow water (subaquatic) environments. New field procedures, descriptive terms, and taxonomic classes have been developed for conducting this innovative work.

"Because of these changes, a major revision of the Manual was considered to be essential. Many parts have been revised, some parts have been extensively rewritten, and some new sections have been added. Entirely new subject matter in this edition of the Soil Survey Manual includes:

- Chapter 5, 'Digital Soil Mapping.' This chapter presents many concepts and principles that have been developed regarding the use of computers and digital technology to aid in the making of soil surveys.
- Chapter 6, 'Tools for Proximal Soil Sensing.' This chapter covers recent advances in the use of noninvasive tools for rapidly collecting information about soil properties.
- Chapter 9, 'Assessing Dynamic Soil Properties and Soil Change.' This chapter provides important information for documenting key soil properties, particularly in the near surface layers that are significantly impacted by soil management practices.
- Chapter 10, 'Subaqueous Soil Survey.' This chapter covers the emerging specialized field of making soil surveys in shallow water environments. This work is proving to be highly valuable to resource managers, especially in coastal estuarine environments.
- Chapter 11, 'Human-Altered and Human-Transported Soils.' This chapter provides valuable guidance on making soil surveys in environments

heavily impacted by humans. Examples include urban areas, mined sites, and drastically changed soils used for agriculture.

- Appendices. The new appendices reflect the current form and content of web-accessible soil survey information in the United States. They are cross-referenced in various places throughout the text.

"Other significant revisions include:

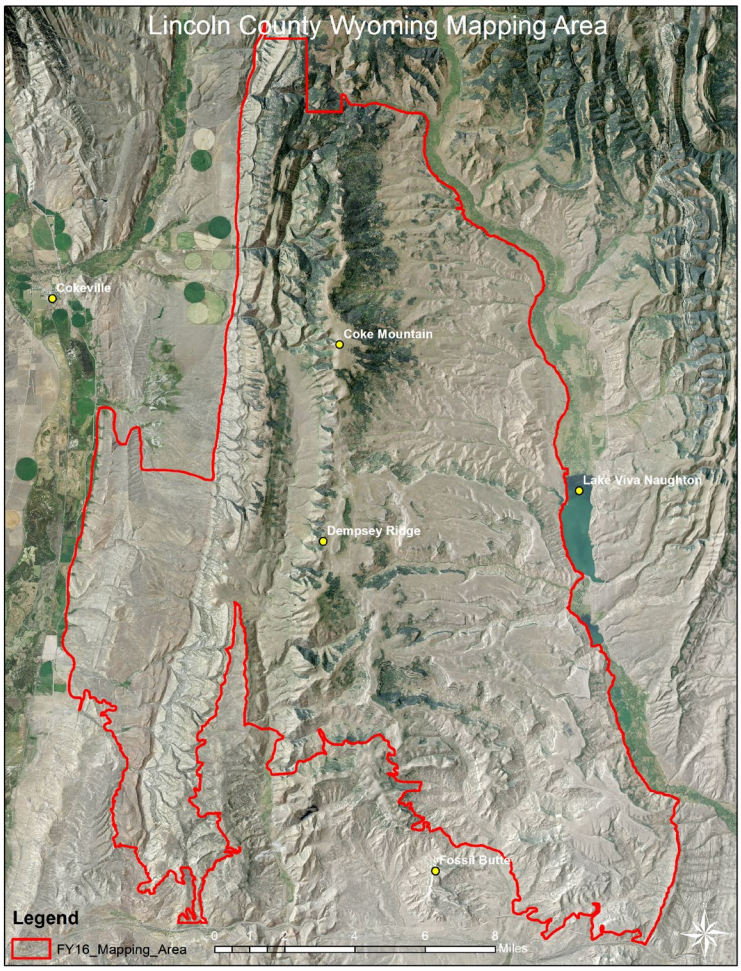
- The former chapter 3 ('Examination and Description of Soils') is now split into two chapters: 'Landscapes, Geomorphology, and Site Description' (chapter 2) and 'Examination and Description of Soil Profiles' (chapter 3). This effectively separates the details for describing landscapes, geomorphology, and local site characteristics from the details for describing individual soil profiles.
- The former chapters 2 ('Soil Systematics') and 4 ('Mapping Techniques') are combined and revised into a new chapter 4, 'Soil Mapping Concepts.' Information in the previous edition on procedures that have since become obsolete or nearly so (such as the use of stereoscopes and aerial photo pairs to visualize landforms in three dimensions, 'color checking' to manually inspect maps for proper joining of units, and use of dot-grids to determine the aerial extent of map units) has been omitted.
- The former chapters 5 ('Information Recording and Management') and 7 ('Disseminating Soil Survey Information') are revised and updated into the new chapter 7, 'Soil Survey Data Collection, Management, and Dissemination.' The new chapter discusses the use of computer databases to effectively store and manage soil survey information as well as provide information to end users.
- The former chapter 6 ('Interpretations') is revised and updated into the new chapter 8 ('Interpretations: The Impact of Soil Properties on Land Use'). The new chapter describes some of the latest strategies for making current interpretations more quantitative and providing interpretive information for anticipated uses."

Distribution of the *Soil Survey Manual* to NRCS offices and NCSS cooperators is well underway. Nearly 2,000 copies have been shipped from the NRCS Distribution Center to NRCS regional, survey offices, and state offices and to NCSS cooperators. Beginning on May 30, the NRCS Distribution Center will add the *Soil Survey Manual* to their list of publications available to the public. The URL for online requests for publications from the NRCS Distribution Center is https://nrcspad.sc.egov.usda.gov/distributionCenter/. Plans are underway to produce an online digital version that is hyperlinked, indexed, and searchable early this summer. ■

Summer Mapping Details in Lincoln and Carbon Counties, Wyoming

Submitted by Dan Perkins, MLRA soil survey leader, Pinedale, Wyoming.

The State of Wyoming, Soil Survey Region 4, and the Pinedale Soil Survey Office collaborated to offer five soil scientists the opportunity to be detailed for soil mapping in two counties during the summer of 2016. Experience at initial soil survey mapping is becoming harder to obtain for both new and experienced soil scientists. Currently, the State of Wyoming has 6.5 million acres that require initial mapping in three MLRAs managed by the Pinedale Soil Survey Office. Funding through a cooperative agreement between the State of Wyoming and the Bureau of



The Lincoln County mapping area in the summer of 2016.

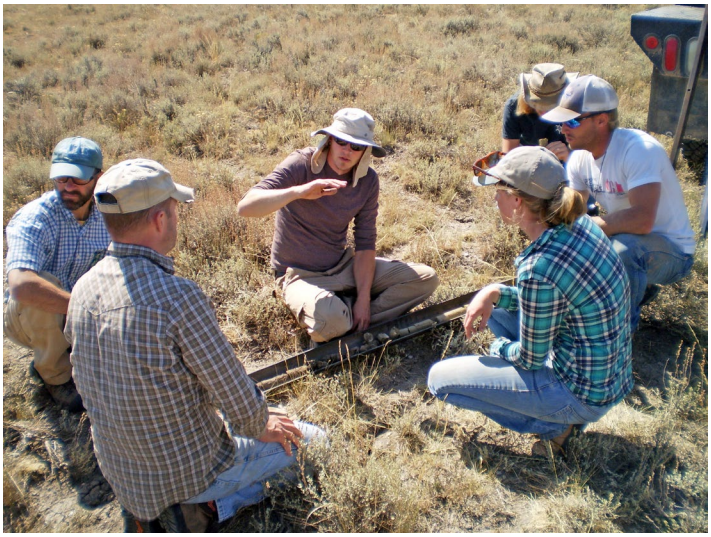
Land Management (BLM) allows Soil Survey to detail soil scientists from around the country to Wyoming for mapping.

The mapping detail this past summer focused on two initial soil surveys: Lincoln County (WY723) and Carbon County (WY630). Five soil scientists were selected for the detail opportunities: three in Lincoln County and two in Carbon County. The detailees for the Lincoln County survey, which was managed through the Pinedale Soil Survey Office, were Brian Nester (Salina, KS), Braden Pitcher (Dillon, MT), and Marissa Theve (Tolland, CT). In addition to the scientists on detail, the following individuals at the Pinedale office also worked in Lincoln County: Dillon Gray (soil survey project leader), Bryan Christensen (ESD specialist), Gabe Fancher (soil scientist), Kim Cumella (soil scientist), and Dan Perkins (MLRA soil survey leader). The two detailees for the Carbon County survey, which was managed through the soil survey office at Fort Collins, Colorado, were Andy Oxford (Pierre, SD) and Brianna Wegner (Bismarck, ND). The Fort Collins office was asked to assist in managing the two detailees in Carbon County to accelerate the initial mapping progress. The staff at the Fort Collins office has a vast amount of experience mapping MLRA 48 in Carbon County. They were a perfect fit to continue initial mapping. Kari Sever and John Norman, soils scientists based in Fort Collins, prepared and managed the two detailees in Carbon County. Kari's and John's expertise and assistance allowed initial mapping to continue in the two soil survey areas during this past field season.

Lincoln County Mapping Detail

By Dan Perkins, MLRA soil survey leader, Pinedale, Wyoming.

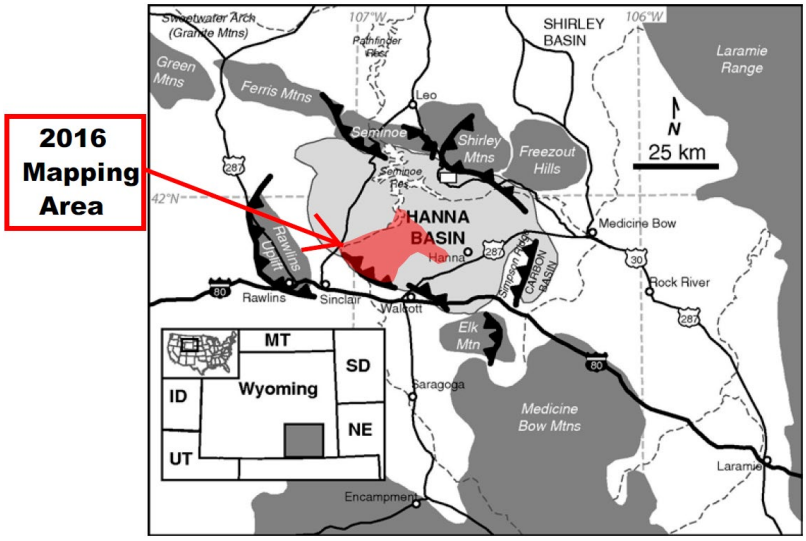
The 2016 mapping area in Lincoln County was complex and diverse. The area encompassed 161,000 acres and included parts of three MLRAs, three moisture regimes, and two temperature regimes. The crew mapped in MLRAs 13, 46, and 43B in an area wedged between the base of the Wyoming Mountain Range and Fossil Butte National Monument. Landscapes include foothills, mountains, and valleys. Major landforms include structural benches, cuestas, hillslopes, escarpments, mountain slopes, fan remnants, alluvial fans, flood plains, and areas of landslides and earth flows.



Soil survey crew examining a Vertisol sampled during a field review. Left to right: Gary Blazejewski (DC), Dillon Gray (SSPL), Brian Nester (SS), Kim Cumella (SS), Gabe Fancher (SS), and Craig Thomas (park ranger, BLM).

The geology in the mapping area includes formations ranging in age from Tertiary through Permian. Some of the more intriguing deposits are the Fossil Butte and Green River Formations, which are known for their excellent preservation of fossils. Landslides and earth flows are common in areas where the Wasatch Shale Formation is perched on top of thin layers of siltstone and limestone. Many faults and vertically folded, cross-bedded formations also exist. This geologic diversity created many challenges for access to areas and development of map unit concepts. Other mapping challenges included collecting documentation on sun-baked, heavy clay soils and soils that have high concentrations of flagstones, cobbles, or stones or that have petrocalcic horizons. Soil taxonomic orders in this area include Vertisols, Mollisols, Inceptisols, Entisols, and Alfisols. Each detailee did an excellent job navigating the rough terrain and learning the complex interrelationships among soils, geology, plants, and landforms. Understanding these relationships is necessary for the development of concise map unit concepts.

The field crew was based out of Kemmerer, Wyoming, for the field season. Soil survey activities included an initial orientation to the mapping area, access, soils, geology, vegetation, and standard mapping practices. Each detailee was provided a pre-map with a draft legend and a field mapping guide. The detailees went on a multitude of field visits with Dan Perkins and Bryan Christensen. The crew also held a progress field review with Bob Spokas (soil data quality specialist, Region 4), James Bauchert (Wyoming State Soil Scientist), and Pete Godfrey (BLM physical scientist). Overall, it was an excellent and productive mapping season in Lincoln County. The Pinedale Soil Survey Office would like to thank the soil survey regions that allowed employees the opportunity for summer detail work.



Map of the Hanna Basin showing the 2016 Carbon County mapping area.

Carbon County Mapping Detail

By Kari Sever, soil scientist, Fort Collins, Colorado.

The mapping area assigned to detailees Andy Oxford (Pierre, SD) and Brianna Wegner (Bismarck, ND) is north of Interstate-80 in Carbon County in the southwestern part of the Hanna Basin, just east of Rawlins, Wyoming (see map above). The basin is known for its natural resources, especially coal. The mapping area is a checkerboard of private cattle range and BLM land.

The geology of the Hanna Basin consists of exposed Cretaceous sediments of the Medicine Bow, Ferris, and Hanna Formations, which have been rotated to vertical orientation by a deep fault mechanism. In a broad sense, these formations are primarily coarse grained sandstones interbedded with shale and coal. Some sandstone in the south part of the mapping area contains conglomerate. Areas of exposed shale and coal are common in swales between scarp slopes of sandstone outcrops.

Low-grade coal layers (15 to 30 feet thick) exist within some shale deposits. These layers can be found throughout the mapping area but mainly in the northeastern part. Coal mining operations were active in the Hanna Basin from 1889 through 2012. The northeastern part of the mapping area contains approximately 6,050 acres of reclaimed strip mine that were mapped as Anthroportic Ustorthents. The complex geology of the area created many soil mapping challenges and learning opportunities.

The Hanna Basin is in MLRA 34A, adjacent to the Seminoe Reservoir. The survey area includes 96,000 acres of native grass and shrub rangeland. Elevation ranges from 6,400 to 7,500 feet. The moisture regime is aridic-ustic, and the temperature regime is frigid. The landscape is a true intermontaine basin, sandwiched between the Rawlins Uplift and the Shirley Mountains. The most common landforms are homoclinal ridges, cuestas, alluvial flats, alluvial fans, and hillslopes.

Ochric surface layers, tough argillic horizons, and sandstone and shale fragments of all sizes are abundant in the basin. The most commonly mapped soil orders were Alfisols, Inceptisols, and Entisols. Detailees became very familiar with soil characteristics commonly found in the Cool Central Desert Basin, including secondary carbonates, accumulation of salts, accumulation of gypsum, and natric horizons. Few Official Soil Series Descriptions (OSDs) that contain these soil properties exist in the

Comparing textures during the field review. Left to right: Andy Oxford, Dan Perkins, Kari Sever, Bob Spokas, and John Norman.

aridic ustic and frigid climate regimes. Therefore, the detailees (with assistance from John and Kari) were tasked with creating several new Official Soil Series Descriptions for the unique soils of the basin.

The team received range training and support from Bryan Christensen, ecological site specialist, Pinedale, and George Gamblin, rangeland management specialist, Wheatland. With training and practice, the team became confident in keying and assigning ecological sites and making range productivity estimates in MLRA 34A.

Vegetation found throughout the Basin includes Wyoming big sagebrush, black sage, basin sage, greasewood, rabbitbrush, pricklypear, needle and thread, Indian ricegrass, Sandberg bluegrass, and needleleaf sedge.

The field staff were based out of the resort town of Saratoga, Wyoming, and stayed in a small, rustic log-cabin lodge with individual cabinettes. The Copperline Lodge provided a great “home-away-from-home” for everyone who stayed there. The local area provided many unique experiences and adventures. The local Saratoga field office provided space for supplies and for office work on days of inclement weather.

A field review was held at the end of the mapping season to summarize the progress of the team. The review included Bob Spokas, soil data quality specialist, NRCS Soil Survey Region 4; Pete Godfrey, physical scientist, BLM; Kelly Owens, Hydrologist, BLM; Scott Woodall, ecological site specialist, NRCS Soil Survey Regions 4 and 8; and Bryan Christensen, ecological site specialist.

Detailees were provided a pre-map with a generalized draft legend, a field guide specific to mapping in Carbon County, and field assistance and support as needed from John Norman and Kari Sever. Brianna and Andy collected detailed documentation from over 300 pedon locations, produced over 20 unique map unit concepts, and updated the digital soil map with lines and attributes based on their work. They did an excellent job field mapping in Carbon County this year and produced outstanding documentation for the survey. ■

Sampling for Dynamic Soil Properties in North-Central Idaho

Submitted by Brian Gardner, MLRA soil survey office leader, Moscow, Idaho.

On Monday, October 17, 2016, the last shipment of samples and sampling gear was prepared at the Moscow, Idaho, soil survey office to bring an end to the 2016 Soil Survey Region 4 Dynamic Soil Properties (DSP) project. The project was designed to examine the effect of commercial thinning on dynamic soil properties of Vassar (and similar) soils. At its conclusion, the project resulted in description and sampling of 2 lab characterization pits, 10 full pedons (described to 150 cm and sampled to 60 cm), and 60 partial pedons (described and sampled to 60 cm). Approximately 365 horizons of sampled material and bulk density cores were sent to the Kellogg Soil Survey Laboratory. By the end of the project, at least 15 people from 5 different government entities contributed to the effort.

The idea for this project was first hatched in the spring of 2014 at the annual meeting between researchers at the USFS Rocky Mountain Experiment Station (RMRS) in Moscow, Idaho, and the Moscow, Idaho, soil survey office. Debbie Page-Dumroese, RMRS soil scientist, was interested in investigating how tree thinning would affect soil properties, such as carbon content, over the long term. The USFS is considering thinning as one possibility for climate change adaptation in the coniferous forest of the northern Rockies. However, the negative impacts to soil quality that might result by this kind of management are unknown. Brian Gardner, the soil survey office leader at Moscow, recognized this opportunity to develop a DSP project to evaluate soil quality in the forested environment of north-central Idaho.

The final project involved investigating dynamic soil properties on the Vassar series, a soil that formed in volcanic ash over granitic residuum and supports forest habitat types dominated by western red cedar. The series is classified as ashy over loamy, amorphic over isotic, frigid Typic Udivitrands. Vassar is a benchmark soil for MLRA 43A and represents about 190,000 acres of named and similar soils. A draft ecological site exists for the western red cedar habitat group. It is called “Western Red Cedar Moderately Cool Moist Herb” and is extensive in north-central Idaho.

A 2-year planning process produced 10 site investigations (5 thinned stands and 5 similar, unthinned stands) in the Nez Perce-Clearwater National Forest. Forest Soil Scientists Cara Farr and Andre Snyder were instrumental in identifying suitable stands and shepherding the project through the NEPA (National Environmental Policy Act) process.

Example of an unthinned stand.

By June 2016, all preparations were complete and the Moscow, Idaho, soil survey office staff—in partnership with the Missoula, Montana, soil survey office staff; the Idaho NRCS Area West Range Science Specialist; and the Idaho State Forester—were anticipating a 2-week sampling effort to quickly complete the project.

Unfortunately, travel funds became restricted and so the sampling proceeded with only a portion of the sampling team. The sampling effort scheduled for June was completed with indispensable contributions from Allyson Young (NRCS resource soil scientist), Kirk Sehlmeyer (Benewah Soil and Water Conservation District), and Frank Gariglio (NRCS State forester), as well as Debbie Page-Dumroese and Joanne Tirocke of RMRS. By the end of the 2 weeks, 6 of the 10 sites were sampled.

Allyson Young performing the compliant cavity method of determining bulk density while Soil Scientist Scott Bare looks on.

The remaining four sites were completed by the soil scientist team of Brian Gardner and Scott Bare from the Moscow, Idaho, soil survey office. After an additional 12 days in the field, sampling was finished on September 21, 2016, and the last full characterization pit was filled in.

Because the project had been greatly lengthened, it was necessary to send samples to KSSL as several separate shipments over the course of the summer. Candiss Williams, Larry Arnold, Scarlett Bailey, and other staff at KSSL were extremely helpful in managing database work for sample submission and shipping logistics for this complicated submission to the lab.

When the last shipment was finally sent, the Moscow, Idaho, team breathed a sigh of relief. They are now looking forward to the trove of data on DSPs and other soil properties that will soon be available to help better characterize one of the most important soils and ecosites of the Idaho mountains. ■

Landscape of the Vassar series and weather conditions during the June sampling effort.

Sue Malone, contract soil scientist.

MLRA Soil Survey Office in Klamath Falls, Oregon, Benefits from Contract with Retired NRCS Soil Scientist

The MLRA soil survey office in Klamath Falls, Oregon (Soil Survey Region 2) is contracting with retired NRCS Soil Scientist Sue Malone to expedite NASIS database work. The Klamath Falls office is working towards completion of a project that involves both initial soil survey and extensive revision of a published soil survey. This is a joint soil survey/TEUI project between NRCS and the U.S. Forest Service. In recent years, during her retirement, Sue has worked on and off on this project and others. Over the course of her long career as a soil scientist, she has worked on many other projects, been a trainer, and covered lots of ground. The expertise and experience she brings are a huge benefit to the soil survey.

When asked for her perspective on the work she is doing now as a contractor, Sue said:

> "I retired after 35 years of work with Soil Survey, both with NRCS and as a private contractor for the Forest Service. My last assignment was in Sonora, California, as MLRA Soil Survey Leader for the Sierra Nevada Mountains and Foothills Region. When I retired on the first day of 2010, I hoped that I would have future opportunities to continue sharing some of the experience I had gained throughout my career with the great people who took my place.
>
> "By mid-2010, I was hired as an ACES employee, and then later as a contract employee working for both California and Oregon on surveys I had previously managed. I worked half time for 3 years, enjoying the interactions with offices in both SSR–1 (Pacific Northwest Soil Survey Region) and SSR–2 (Pacific Soil Survey Region) and working with the MLRA soil survey leaders from my previous project locations.
>
> "In 2013, I took a hiatus from part-time work. I love retirement, a life of wonder that includes free time to travel, garden, quilt, hike, and kayak

Sue Malone enjoying good times around a soil pit in 2005 with fellow soil scientists Thor Thorson (left) and Duane Lammers (right).

and to enjoy my kids and grandkids (and great grandkids). Yet, during that hiatus from work, I discovered that I missed the stimulation and camaraderie found in the kind of work we do as soil scientists. Thanks to the persistence of Dr. Cynthia Stiles, Soil Survey Regional Director, SSR–2 (Pacific Region), I was once again given the opportunity to work part time as a sub-contractor for the soil survey in Klamath Falls and started working again just after Christmas 2016.

"I no longer pound the fields or dig pits, but I still get my hands dirty going over old soil descriptions from my field days working in this survey area. The very best part of what we do is taking all that field data, all the incredibly varied information that we collect over the years, and getting it fine-tuned to perfection, making a useable and beautiful product. Here in this office, I get to contribute to that final product, the majority of my major work being with the NASIS database, from data entry to quality control. With all my time focused on the database, and supporting work with OSD development and review, I can lift some of the load from the local crew who are busy with initial mapping. From time to time, my knowledge of the area is called on by Chris (MLRA soil survey leader), and then memories of the landscape and how it felt to dig and describe that pit come flooding back in ways that they might never do if I were home quilting. It is a great side benefit. I get to savor my old days in the field and use my previous work to add a bit when needed.

"At the risk of sounding like a total nerd, I do love NASIS. I loved my fieldwork, loved the decades I spent mapping in wild places, but at 71 years old, the wild places of NASIS are a bit easier to access. I love our magnificent database, and love seeing how it all comes together, and truly enjoy being a part of that process. I also love no longer being in management, truly enjoy being told what to do by a supervisor I respect… and letting him take all the heat."

Chris, her supervisor and MLRA leader, says there really is not that much heat to take from Sue's work and the soil survey product greatly benefits from being able to tap into the skill and experience that a retired soil scientist like Sue can offer. ■

Region 6 contest participants, coaches, administrators, and hosts at the WW Ranch near beautiful Woodlake, California.

Region 6 Collegiate Soils Contest Held in California

Submitted by Philip Smith, USDA–NRCS, Hanford, California.

On March 4, 2017, students from four California universities convened near Woodlake, California, at the Region 6 Collegiate Soils Contest for Students of Agronomy, Soils, and Environmental Sciences (SASES). The competition qualified three of the universities to enter the National Collegiate Soils Contest to be held at Northern Illinois University in April. Students from California State University—Chico, California State University—Fresno, and California Polytechnic State University—San Luis Obispo competed. Students from the University of California at Riverside were also present to observe and to learn how to form a team for next year's event. In the team competition, California Polytechnic State University placed 1st, followed by California State University—Fresno (2nd) and California State University—Chico (3rd). The schools ranked in the same order in the group judging competition. A total of 25 students competed. Individual awards were given to the top six individuals.

The involvement of four schools at this year's event marked a significant increase in participation from last year. In 2016, only two schools competed. Last year was the first in more than 30 years that there had been a Region 6 contest. This year's participation by four schools demonstrated a renewed interest in soil judging in the region and a commitment to soil science education by the universities, cooperators, and partners involved. The event also provided an opportunity for students to interact with potential future employers, including private consulting firms and the USDA Natural Resources Conservation Service.

The 2017 Region 6 contest, coordinated by the Hanford Soil Survey Office of the USDA-NRCS Pacific Soil Survey Region, was hosted at Mr. Wayne Weller's WW Ranch near the town of Woodlake, California. Fresno State University, the Professional Soil Scientists Association of California, and the Tulare County Resource Conservation District sponsored the contest. Contributions for lunch, trophies, backhoe pits, and logistics were provided by Wayne Weller and Eric Weller and neighboring ranchers Chris Lange and David DeSilva. Additional technical assistance

was provided by the Pacific Soil Survey Regional Office in Davis, the Sonora and Templeton Soil Survey Offices, NRCS soil scientists from Davis and Templeton, as well as personnel from the Bakersfield and Visalia NRCS field offices. Local area consultants and Earth Team volunteers from Hanford and Davis also contributed to the success of the contest.

The educational value of soil judging cannot be overstated. Because the experience is field based and hands-on, soil judging develops students' understanding of soils as they apply their knowledge in "real world" settings. While practicing and competing in field environments, students describe and interpret soil morphology and landform characteristics. These skills are important and marketable to employers. The soil judging competition itself is the culmination of several weeks of classroom instruction and "learning by doing." Due to its hands-on nature, soil judging develops unique skills that distinguish graduates from other applicants when applying for jobs in the agricultural and environmental job sectors. ■

2017 Alabama Cooperative Soil Survey Work Planning Conference

The Alabama Cooperative Soil Survey Work Planning Conference was held at the NRCS State Office in Auburn, Alabama, on April 18, 2017. The conference was moderated by State Soil Scientist Lawrence McGhee. The purpose of the conference was to bring cooperators and other soil survey partners up to date on cooperative Soil Survey efforts and Technical Soil Services in Alabama and to look at future activities in the Soil Survey Program.

Mr. Ben Malone, NRCS State Conservationist, welcomed about 25 representatives from Federal, regional, State, and other cooperators to Alabama. He highlighted interesting facts about Alabama and its great diversity. He also stressed the importance of our soil resource information during Alabama's recent outbreaks of low-pathogenic avian flu. Alabama's 33 million acres are covered by three soil survey regions of the NRCS Soil Science Division. Region 3 (Raleigh, North Carolina office) was represented by Stephon Thomas (MLRA project leader); Region 6 (Morgantown, West Virginia office) was represented by Christopher Ford (MLRA project leader); and Region 7 (Auburn office) was represented by Acting Regional Director Dr. Charlie Ogg.

Dr. Charlie Ogg, SSRO–7, acting regional director.

Cooperators who commented on soil survey cooperative activities included Dr. Bill Puckett, Alabama Soil and Water Conservation Committee; Dr. Joey

Shaw, Auburn University and representative for the Alabama Extension System; Dr. Ramble Ankumah, Tuskegee University; Dr. Monday Mbila, Alabama A&M University; Estella Smith, U.S. Forest Service; and Earl Norton, Erosion and Alabama Sediment Control Coordinator. Challenges that were discussed included maintaining existing partnerships in light of dwindling resources and developing new partnerships to address soil-related issues.

Alabama State Soil Scientist Lawrence McGhee.

Lawrence McGhee addressed participants on "Soil Survey: The Next Generation." He highlighted the need for updating the soil survey information in Alabama by using up-to-date technology and innovative methods and reaching out to non-traditional cooperators and partners.

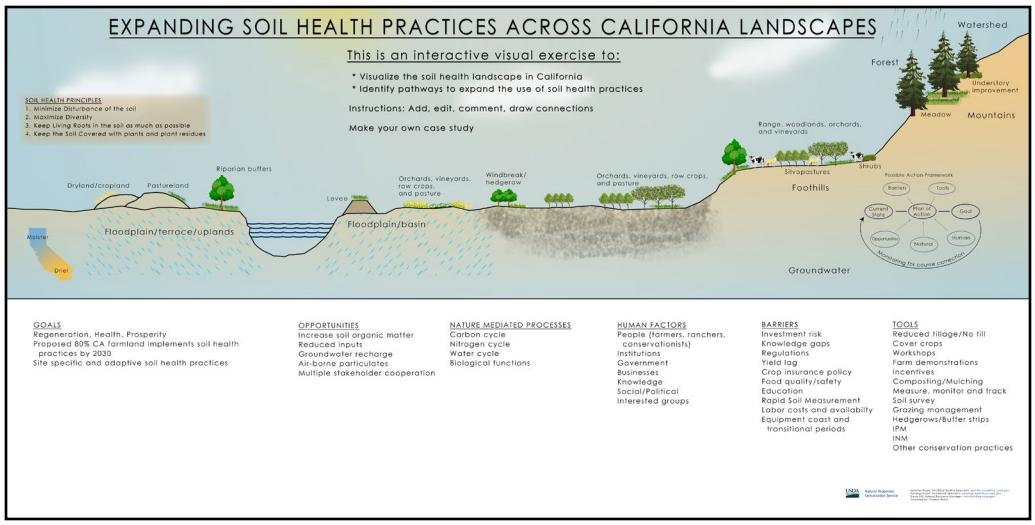
Jerome Langlinais, MLRA project leader, highlighted the afternoon technical session by discussing his current MLRA projects. He is using the Mobile National Estuary Program (MBNEP) to update the soil survey information in the Mobile Bay Area. Joe Gardinski, State GIS specialist, Auburn, noted some useful GIS tools for Soil Survey and Technical Soil Services. ■

SSR–2 Representation at the California Climate and Agriculture Summit

By Jennifer Wood, soil data quality specialist, Soil Survey Region 2, Davis, California.

Soil health is a hot topic among government agencies, NGOs, industry, the public, and a growing number of producers. While the term "soil health" encompasses information that is not new in soil science and soil conservation, its use demonstrates a renewed appreciation for the role of soil biogeochemical processes in managed and natural systems. The NRCS Soil Health Division partners with other USDA staff to implement soil health practices on the ground.

What do soil scientists in the NRCS Soil Science Division (SSD) have to offer the community of soil health enthusiasts? The specialty of the SSD is to provide information about soil properties and ecological processes across the United States. Soil Survey has been providing information to aid conservation and land use planning since the inception of the Soil Conservation Service in 1932. Because the primary product of Soil Survey is an information-rich map of soil properties, which are the integrated product of soil-forming biogeochemical processes, SSD soil scientists have a landscape-based understanding of the soil resource. The soil health movement strives to harness the inherent biogeochemical processes in the soil to



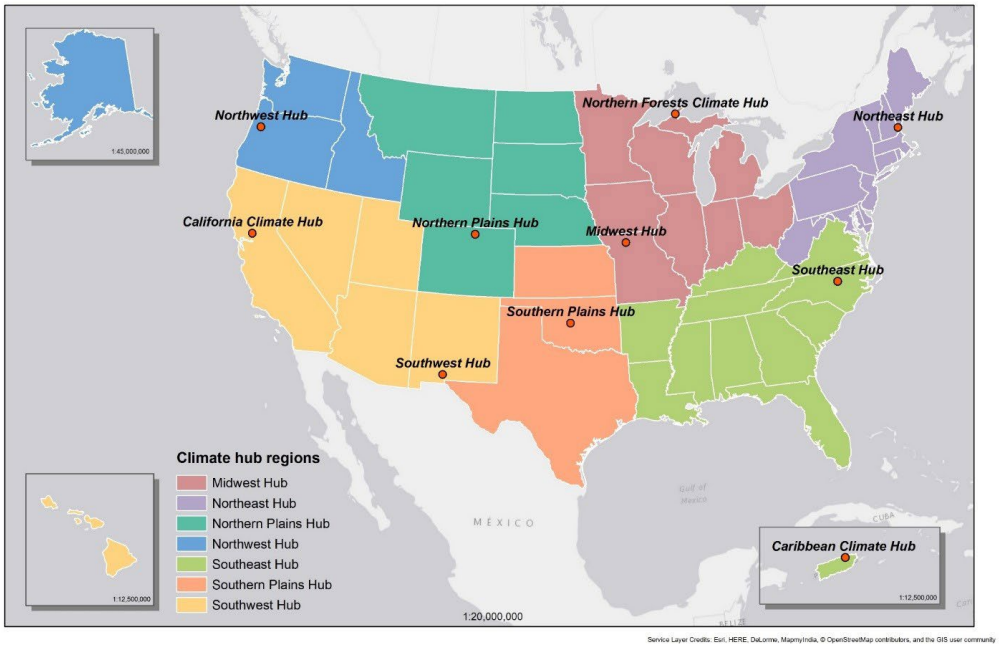
Starting form of interactive poster on expanding soil health practices across California landscapes.

maximize outcomes by optimizing human inputs. Landscape-based information and perspectives provided by the SSD can contribute to expansion of soil health practices on the ground.

The California Climate and Agriculture (CalCAN) Summit was held on February 28 in Davis, California. It made an excellent venue for promoting the SSD spatial and tabular (SSURGO) database for soil health purposes. Because soil survey data are fundamentally spatial products represented as planar maps of soil map unit delineations, 3-D block diagrams or 2-D cross sections of the landscape are helpful for presenting soil map unit concepts. Jennifer Wood, NRCS soil data quality specialist, Soil Survey Region 2; Zahangir Kabir, NRCS west regional soil health specialist; and Tom Share, NRCS-California civil engineering technician designed a poster using visualization principles and presented it at the summit. The poster was intended to help people in the field of soil health visualize soil biogeochemical factors and understand how soil health principles can be applied in different landscapes across a generalized cross section of California.

The poster was interactive. Summit attendees were invited to add their ideas about soil health factors in different landscapes across California. Another aspect of the poster, intended to encourage thinking about expanding soil health practices in California, was to propose and solicit ideas about soil health across five categories: nature-mediated processes, human factors, opportunities, barriers, and tools. Summit attendees filled up the poster writing down their ideas. An updated poster will be created to incorporate their suggestions.

The SSURGO database is rich with spatially defined data about soils, climates, landscapes, and other environmental variables. How can we use this database to provide information for soil health practitioners? Would it be useful to get a soil health report from Web Soil Survey? Would it be useful to click on a map unit in the Soil Web App and access a menu of soil health practices for that soil type on that landscape with that climate? Soil health products require collaboration between SSD soil scientists and local and regional experts across disciplines and sectors. At the CalCAN conference, one of the lessons we learned was that good ideas will be adopted by producers and that, like the microbial community, those ideas just need the right conditions and nourishment to flourish on their own. Information and expertise from the SSD is available to nourish the expansion of soil health practices across all landscapes. ■



Climate hub map.

MLRA Soil Scientist Serves as the NRCS Liaison to the USDA Southwest Climate Hub

By Amber Wyndham, MLRA soil scientist, Pueblo, Colorado.

I am working on a 1-year detail as the NRCS liaison to the USDA Southwest Climate Hub. Ten hubs were established across the United States in 2014 to deliver science-based knowledge and technical support to landowners regarding adaptation strategies to climate variability. The Southwest Climate Hub is located at the Jornada Experimental Range ARS research unit in Las Cruces, New Mexico. It provides data, tools, and assessments to support climate-informed decision-making by landowners in New Mexico, Arizona, California, Hawaii, Nevada, and Utah as well as the U.S.-affiliated islands west of Hawaii. The Southwest Climate Hub represents the largest State area of any of the climate hubs. It evaluates climate-related risks, such as fires, low water availability, invasive pests, floods, and drought at the local to regional level. Understanding the outcomes from a transitioning climate will help in the determination of best management practices for USDA agencies, partners, and landowners on ways to adapt and adjust their resource management.

As the NRCS liaison to the climate hub, I am working to develop a partnership between the NRCS and the climate hub regarding drought impacts on grazing practices in the Southwestern Great Plains (MLRA 69) and Southeastern Arizona Basin and Range (MLRA 41). The objective is to develop a drought-vulnerability assessment at the MLRA level that will help landowners and USDA agencies identify and develop adaptation options to mitigate the effects of drought on rangelands. A constantly shifting climate is expected to have diverse consequences on U.S. rangelands. Changing weather patterns will influence grazing practices and the livelihoods of millions of people. Because of increased climate variability, including projections of more frequent and intense drought in the southwestern United States, it is important to develop management adaptation strategies to reduce the effects of a changing climate at the local level.

The project evaluates how ecological site (ES) state-and-transition models can convey the effects of drought on rangeland health and improve decision-making for management adaptations. A vulnerability assessment will include: (1) a matrix showing how responses to climate variability differ across MLRAs, (2) identification of different vulnerability levels to climate variability based on site characteristics within ES groups, and (3) grazing management recommendations and adaptation strategies based on ecological sites and climate variability. The project addresses the Southwest Climate Hub's top priorities and supports NRCS initiatives on rangeland/soil health, ecological site descriptions (ESDs), and conservation planning.

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

Riparian areas comprise less than 1 percent of the land area in the western United States, but they are among the most productive and valuable natural resources. These areas are the major providers of habitat for endangered and threatened species in the western desert. Because of the variation of riparian areas across the country, they function in different ways. They all, however, have some similar ecological characteristics, such as energy flow, nutrient cycling, water cycling, hydrologic function, and plant and animal population. These functions give riparian areas unique value relative to the surrounding landscape (USDA, NRCS, RCA Issue Brief #11, August 1996). The ecosystems of riparian areas are primarily driven by hydrologic processes and function, while those of more static areas (e.g., arid uplands) are primarily driven by abiotic properties, such as soils and climate.

During the last several years, NRCS, partner agencies, and academia have provided information and guidance on addressing the dynamic and unique ecosystems of riparian areas. In 2011, the West Region National Technology Support Center staff developed a document called "Lotic Riparian Complex Ecological Site Description Guidelines." This document provides some baseline guidance for developing riparian ecological site concepts. The National Ecological Site Riparian Team is continuing the advancement of these initial concepts. The goal is to provide a more nationally focused conceptual framework for riparian ecological sites and ensure that proper methods are used for these sites and other water-dominated sites.

In 2014, the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) contracted with Pyramid Botanical Consultants to develop riparian ecological sites and descriptions that meet NRCS standards and are correlated to soils of the primary rivers and streams in the reservation. The deliverables included five riparian ecological site descriptions (ESDs) that meet the requirements for provisional status. This data will be used to address resource concerns related to riparian habitat, primarily through restoration of riparian areas to improve water quality and fish habitat.

Pyramid Botanical Consultants requested that NRCS coordinate with their efforts to ensure that the ecological sites and ESDs were developed according to NRCS guidance, policy, and standards, which is required for the data to be added to the NRCS databases, such as Web Soil Survey, NASIS, and ESIS. In August of 2014, staff from the NRCS Soil Science Division, CTUIR, Pyramid Botanical Consultants, and NRCS-Oregon met. The NRCS staff included Mike Regan, Region 1 Director; Kendra Moseley Urbanik, regional ecological site specialist; and David Trochell, Oregon resource soil scientist. The CTUIR staff included Cheryl Shippentower, plant ecologist, and Gordy Schumacher, range, agriculture, and forestry program manager; and the Pyramid Botanical Consultants staff included owner Marchel Munnecke. Together they discussed the needs of the CTUIR and the expectations, requirements, and timeline for all the parties involved. The meeting included a field visit to discuss the effect of land uses on the streams, placement of reference data collection points, soil mapping needs and issues, and assistance by NRCS regional and field office staff. The group also discussed the need for cultural resource clearance at each potential soil pit location prior to digging.

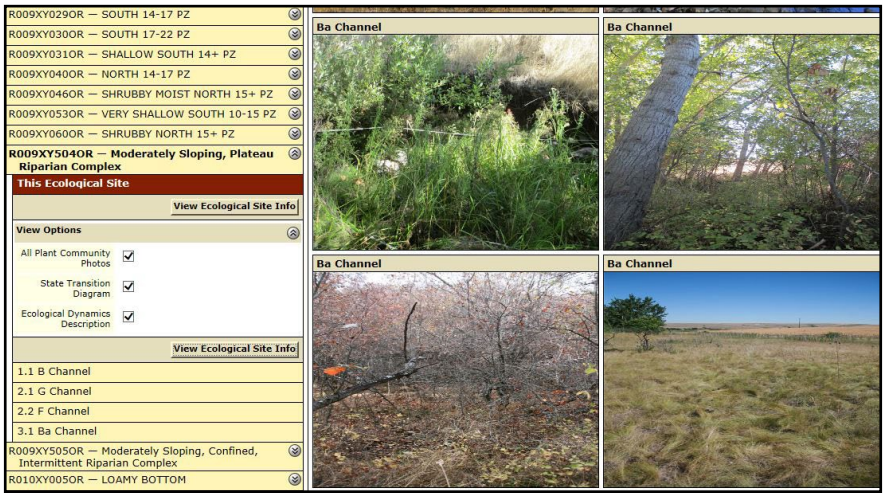
Marchel Munnecke (Pyramid Botanical Consultants), Cheryl Shippentower (CTUIR), and others discussing the impact of land use on a section of Isquulkpte Creek.

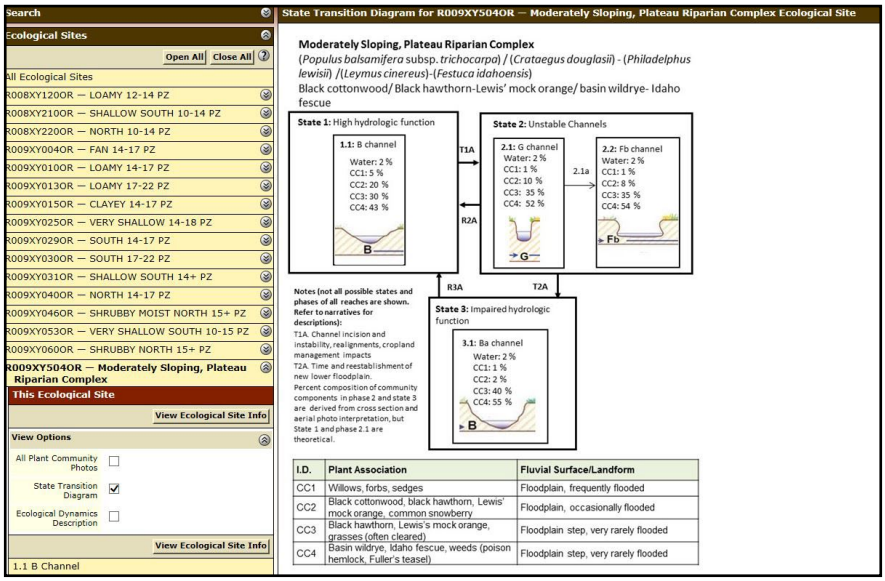
Over the next 2 years, Pyramid Botanical Consultants worked cooperatively with the CTUIR and NRCS staffs to collect vegetation and soil plot data that meet the requirements of the "Lotic Riparian Complex Ecological Site Description Guidelines." They also worked with NRSC staff to update and develop map units, ensuring that the soil-site correlation met NCSS standards and NASIS requirements.

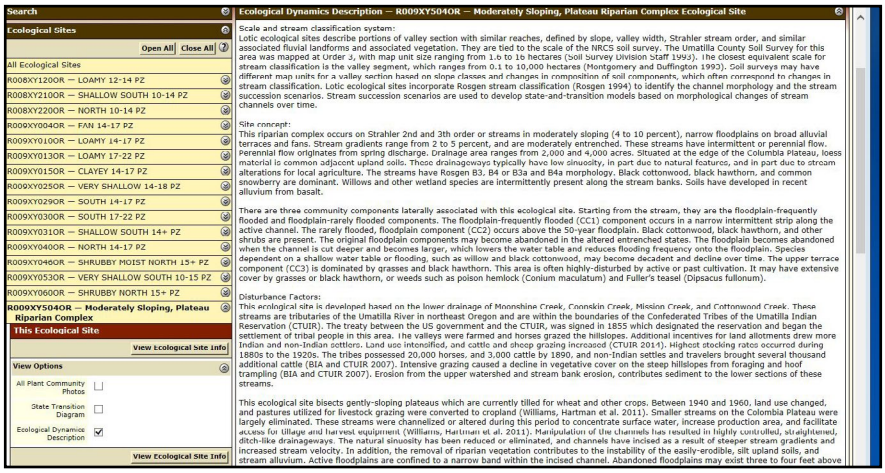
The final ESD products were approved as provisional ESDs in April 2017 and were made available to the CTUIR in the ESIS and Web Soil Survey databases. The ESDs include cross-section and waterflow diagrams, photographs of the plant communities, plant community narratives, state-and-transition models that describe the complex concepts following Rosgen stream classifications and channel succession, and ecological dynamics narratives for each riparian complex (refer to screenshots at end of article).

This collaborative and cooperative ecological site project is a great example of how the Soil Science Division can assist an NCSS partner and meet the agency's goals as well.

The following screenshots are from Web Soil Survey for ecological site R009XY504OR. They show the community component image, community component narrative description, state-and-transition model, and ecological dynamics narrative, respectively. ■







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