

## **“USDA NRCS Technology News” ~ January-February 2002**

United States Department of Agriculture  
Natural Resources Conservation Service  
Science and Technology

“USDA NRCS *Technology News*” is a monthly electronic information piece provided by Science and Technology. It is designed to deliver pertinent information to our customers about new technology, products, and services available from the Soil Survey and Resource Assessment and the Science and Technology deputy areas. “USDA NRCS *Technology News*” is in a format that is available to all NRCS field staff.

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## MESSAGE FROM THE DEPUTY CHIEFS

Lawrence E. Clark and Maurice J. Mausbach

How the world has changed since our last annual meeting in Fort Worth, just 1 year ago! It is probably safe to say that none of us would have predicted the horrible catastrophe of September 11 and the equally disturbing events that have followed. Like all Americans, we were busy with our work, family, church, and other activities, secure in the belief that we were safe in our own nation.

Shortly after the World Trade Center (WTC) tragedy, editors of the magazine, *American Demographics*, polled 24 historians, economists, psychologists, sociologists, and public opinion specialists to obtain their assessment of how the attacks might affect the way Americans think and live. Some of the responses may be of interest to those of us who are involved in the work of natural resource conservation.

There are many opinions regarding what should replace the World Trade Center. Some feel it is important to replace the towers as they were. Others would like the site to become a permanent memorial to the businesspeople, firefighters, and police who died there. William Knoke, President of Harvard Capital Group, questions whether large towers are necessary any more. According to Knoke, "With connector technologies, such as Internet, e-mail, fax, voice mail, videophones, Federal Express, and an attitude shift, things like the World Trade Center are not as important as they used to be." In fact, he continues, "Wealth in the 21<sup>st</sup> century is created by people networking—people working out of their home offices, working around the clock." (1)

Tom Peters, noted management "guru" and author of numerous management books, also commented on the increased use of technology for carrying out business activities. Peters wrote, "I've had two people say to me, 'This is the end of face-to-face business meetings.' This is an exaggeration, but consider that people have already started doing a larger share of meetings using teleconferencing... The ability to teleconference with people is going up and up. Because of all these factors, the virtual working mode will become more common." (2)

Other experts pointed out that public reaction to the WTC also engendered an emotional aspect that may last for many years. As we have seen in television and newspaper reports, Americans have met the crisis with unparalleled heroism, tremendous generosity, and unlimited small acts of helpfulness and support for each other. As the pollster George Gallup, Jr. wrote in his response: "...Americans are at their best in a crisis. People are putting aside petty disputes, and we're going to see a period where we might even see a transformation of the human spirit and a religious renewal." He also predicts that Americans may become more "loving and forgiving" because of the tragedy. (3)

The messages of these expert responses present challenges to the natural resources conservation community. Predictions about the influence of technology on the work environment may lead us to reevaluate the way we do business in our field offices,

district offices, and other locations. We may not be working in high-rise buildings, but the concept of the virtual office remains the same. We have a great opportunity to make greater use of technologies already available to us, such as teleconferencing, video conferencing, and Web meeting.

Predictions about the changing mind and spirit of Americans can also present challenges. Does this mean that Americans may be more conscious of the environment and more willing to take action to protect it? Does it mean that it will be easier for us to find common ground among groups that are traditionally in conflict with each other?

One respondent to the American Demographics poll addressed the impact of the WTC tragedy on the culture of different generations. Neil Howe, an economist and historian, notes that the younger generation will in time work to replace what society has lost. He writes: "Already we can see (the younger generation) has been extremely interested in the ...90's movies like Saving Private Ryan and Pearl Harbor. They watch these movies and wonder, 'What was it like when America did big things together?'" (4)

In the past, we have done "big things together" to conserve soil and water. Is this our new opportunity to do the same? It has been said that it takes a significant emotional event to bring about change. If something good can come from the September 11 tragedy, perhaps it can be the willingness of the Nation to see that the natural resources of our land are worth preserving, now more than ever.

1. Fetto, John, Pamela Paul, Suzanne Riss, Alison Stein Wellner, David Whelan and Sandra Yin, "What's Next?," American Demographics, October 2001, pp. 35-46.
2. Ibid.
3. Ibid.
4. Ibid.

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## **CONSERVATIONIST'S CORNER**

Read Smith, President, National Association of Conservation Districts

For more than 60 years, NRCS and conservation districts have provided assistance to America's farmers, ranchers, and other land managers to help protect and enhance the Nation's natural resource base. Working with nearly 2.5 million cooperating landowners and operators annually, this partnership provides technical, financial, educational, and other assistance to help them manage and protect most of the private land in the United States.

In recent years, especially since the passage of the 1985 Food Security Act, individual conservation programs have become the focus of greatly increased attention—and funding. While these programs do much to help the environment by taking sensitive lands out of production or providing cost-share to offset the costs of conservation practices, the real backbone of the conservation effort in this country is the technical

assistance provided by NRCS and conservation district staff. These dedicated conservationists work with producers day-to-day to provide the scientific know-how to help them apply complex conservation treatments on their lands to stem soil erosion, manage manure and other nutrients, and to protect and enhance water quality, wetlands, and wildlife habitat. It is the technical excellence associated with the NRCS and conservation district delivery system that has earned NRCS and conservation districts the reputation as the Nation's foremost private lands conservation and pollution prevention program.

Several proposals have surfaced in recent months that would authorize private sector and other non-Federal "third-party vendors" to provide part of the technical assistance needed to carry out USDA conservation programs. Conservation districts have been supportive of those proposals. Third-party technical assistance is intended to supplement the technological base or the delivery system currently in place, not reduce or eliminate it. Districts have been clear in stating that the Federal Government must provide a basic level of technical assistance funding to ensure quality conservation systems are installed, provide technical training, develop updated technology, and support locally led conservation initiatives to ensure a safe and productive environment. The Federal technical presence that NRCS provides is vital to ensuring that sound technical standards are maintained throughout our Nation's conservation efforts.

It is critical that NRCS and districts remain on the cutting edge of the technology needed to deliver state-of-art technical assistance to producers and other land managers. That is why districts have over the years supported, as one of their top priorities, strengthening the NRCS conservation technical assistance. We know we cannot afford to jeopardize the technical excellence that is the hallmark of our delivery system. After all, that is what has made our partnership the envy of almost all other environmental and natural resource agencies and organizations—both here and abroad.

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## **NEW PRODUCTS AND SERVICES**

### **#1 Two Native Shrubs Released for Intermountain West**

Two native shrub selections with demonstrated cold tolerance have been released recently by the Plant Materials Center (PMC) of Aberdeen, Idaho, and its partners.  
Snake River

Plains Germplasm fourwing saltbush and Northern Cold Desert Germplasm winterfat are composite releases made up of collections that showed tolerance to cold temperatures in evaluations at the PMC and off-center test sites. Both species are erect shrubs that provide erosion control and browse for livestock and big game. They are common in dry, moderately saline, or alkaline areas. The two releases have potential for use in northern areas of the Intermountain West and should be better adapted than existing releases of the species.

Northern Cold Desert Germplasm was released in cooperation with the Idaho Agricultural Experiment Station. Snake River Plains Germplasm was released with the PMC, Pullman, Washington, and the Idaho Agricultural Experiment Station. Small quantities of certified seed will be made available to seed growers through the University of Idaho Foundation Seed Program and Utah Crop Improvement Association.

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## **#2 New Little Bluestem Selection Available for Native Seed Mixes**

A new source of little bluestem is available for the Northern Great Plains and Midwest. Itasca Germplasm little bluestem was released as a selected class of seed by the Plant Materials Center of Bismarck, North Dakota, and its partners—the Agricultural Experiment Stations of North Dakota, South Dakota, and Minnesota. It was selected to provide an adapted seed source for use in the upper Midwest, particularly Minnesota, eastern/central North Dakota, and eastern/central South Dakota. A broad genetic base of plants from these areas makes up the release.

The primary conservation use of Itasca Germplasm is as a component in native seeding mixtures. Secondary uses may include reduced maintenance plantings, wildlife plantings, and prairie landscaping.

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## **#3 Native Landscape Guide Created for Great Plains, Rocky Mountains**

“Creating Native Landscapes in the Northern Great Plains and Rocky Mountains” is a colorful guide to help people develop ornamental, environmentally friendly landscapes. Created by Plant Materials Center and NRCS staff in Montana with assistance from the Montana Association of Conservation Districts and Lower Musselshell Conservation District, the booklet provides an overview of native plant landscaping principles and

practices. It integrates the principles of several conservation initiatives, such as reduced water, energy, and chemical use; wildlife habitat enhancement; and invasive weed management. Text is accompanied by helpful plant selection tables and informative illustrations.

The publication can be obtained by contacting the Montana Association of Conservation Districts at (406) 443-5711 or NRCS Montana State Office at (406) 587-6842. It is also available online at <http://Plant-Materials.nrcs.usda.gov/pubs/mtpmcpunatland.pdf>

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#### **#4 Soil Biology Program Provides Soil Analyses, Information, and Assistance**

The Soil Biology Program was implemented by the National Soil Survey Center (NSSC) to develop an understanding of, and eventually develop soil interpretations about, biological characteristics of soils. Along with climate, soil organisms and microorganisms control the turnover rate of organic matter and, thus, play an important role in energy and nutrient cycling in soil systems. A primary objective of the Soil Biology Program is to evaluate and measure soil biological characteristics related to the amount and turnover rate of organic matter of the three organic matter pools found in soils—fast pool, intermediate pool, and slow pool. Pool data are useful in the study of carbon dynamics and macronutrient cycling, soil quality determinations, understanding global climate change, long-term soil fertility evaluation, and soil survey enhancement. The data can also help farmers, ranchers, land use planners, conservationists, and other landowners assess the effects of conservation management practices and erosion.

Initiated as a research program, the Soil Biology Program is now providing soil analyses and assistance on a limited request basis to special projects around the country. Eligible projects are selected in a review process from those submitted at the state level through State soil scientists, major land resource area offices, and State Conservationists. Available soil analyses include: organic carbon with enhanced accuracy through gas chromatography; soil carbon to nitrogen ratios related to the composition of plant and microbial communities; microbial biomass and activity, two labile carbon fractions, and potential mineralizable nitrogen from microbial activity for the fast pool; root biomass and particulate organic matter (POM >53 microns) for the intermediate pool; and clay associated amorphous organic matter (C-Min <53 microns) for the slow pool.

Also available for general use are fact sheets describing field methods for determining soil fauna, root biomass, and total soil organic matter. Information and educational

materials available include: “Basic Biological Factors of Soil Carbon and Nitrogen” — poster or page-size handouts; fact sheets about the Soil Biology Program; “Implementation of Soil Biological Analyses at the NRCS-NSSC Soil Survey Laboratory” —poster; and “Evaluation and Interpretation of Soil Biological Data from Two Selected Sites” —poster. Some of the above, including posters, are also available on the NSSC Web site at <http://www.nssc.nrcs.usda.gov>.

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### **#5 Soil Carbon Technical Note Available**

As interest grows in sequestering carbon in soil, conservationists increasingly need technical information on the benefits of increased organic matter and how to enhance soil organic matter. One source of information is the new agronomy technical note from the Soil Quality Institute—“Long-Term Agricultural Management Effects on Soil Carbon.” The note reviews data from long-term experiments and concludes that, in most cases, both reduced tillage and increased biomass—from cover crops or high-residue crop rotations—are necessary to increase soil organic matter levels. In cool, humid climates, however, the reduced tillage may be less critical because the lower temperatures reduce decomposition of organic matter.

The technical note is available from the Soil Quality Institute Web site at <http://www.statlab.iastate.edu/survey/SQI/agronomy.shtml>.

For more information, contact:

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### **#6 The Leader in You Spring Broadcasts Scheduled**

The Leader in You training series continues this spring with 3 new satellite broadcasts appropriate for all levels of The Conservation Partnership. Each seminar is 2 hours or less in length.

“Tribal Warfare in Organizations” is scheduled for April 2 from 1:00-3:00 p.m. Eastern Time. This seminar, based on the book “Tribal Warfare in Organizations” by Peg Neuhauser, takes an entertaining look at turf battles between professional groups. Using an anthropological approach, trainers Neuhauser and Ray Bender will guide participants through a process where they will develop profiles for various groups in their work setting.

Trainer Sandra Crowe has updated the popular program, “Since Strangling Still Isn’t An Option: Working with Difficult People,” to reflect a changing world. On May 14, from 1:00-3:00 p.m. Eastern Time, participants will learn to move through difficult situations with improved ease, power, and strength so they feel confident in the process.

The spring series concludes on June 12 with “Strategy in the New Competitive Landscape,” broadcast from 11:00 a.m.-12:30 p.m. Eastern Time. A new view of strategy focuses on value creation and the influence of a changing competitive landscape. The forces of deregulation, technological and industry convergence, emerging markets, “outsourcing,” and the Internet are creating a new competitive dynamic. This is “a new game with new rules.” Natural resources managers need to rapidly learn to understand and compete in this new environment.

The Leader in You program is sponsored by the NRCS Social Sciences Institute and the National Employee Development Center in cooperation with the National Association of Conservation Districts (NACD), National Association of Conservation District Employees, and the National Association of State Conservation Agencies,. The satellite training is available only to the employees, directors, and Earth Team volunteers of the sponsors. Taping rights are available.

The satellite broadcasts are also available as videotapes for viewing at a later date. They can be borrowed from NRCS training officers, NACD Pacific Region Office, and the NRCS Social Sciences Institute. Videotapes and the accompanying handouts are useful tools for an individual’s self-paced learning or for a training facilitator’s management or leadership training program.

For more information, contact:

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### **#7 PPC Series Adds Economics Service Networks Information**

"Economics Service Networks–Making Economics Easier to Use" is the most recent release in the Social Sciences Institute's (SSI) People, Partnerships, and Communities

(PPC) series. This new PPC describes the current delivery process of economics services to NRCS customers and contrasts it with a delivery scenario that could be offered by a well-developed economics service network on the Internet.

The Economics Service Networks PPC will be available in late February 2002. A variety of other user friendly social science tools, such as economic analysis software designed to assist field staff who work with NRCS customers, are available at the SSI Web site <[www.ssi.nrcs.usda.gov](http://www.ssi.nrcs.usda.gov)>.

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## TECHNOLOGICAL ADVANCES

### **#8 DNA Fingerprinting Developing as a Microbial Source Tracking Tool**

DNA fingerprinting, one tool for microbial source tracking (MST), is a technique under development for identification in various water bodies of the sources of fecal contamination—whether human, livestock, pets and companion animals, or wildlife. In theory, this allows targeted management activities for bacterial reduction. Although DNA fingerprinting has received the greatest amount of attention recently, several other MST methods are in use and can play an important part in fecal source tracking. For most of these techniques, bacteria from known sources (i.e., humans, swine, raccoons, deer, cows) are collected directly from the animal, isolated and grown in the laboratory, and become the basis of the library or database for subsequent comparison to unknown samples. Research normally involves isolating and culturing as many organisms as practical, but financial constraints can limit this approach because several hundred cultures may be needed from each major contamination source to sufficiently identify the source in a water sample. Regional differences in the genetics of isolates are becoming known, potentially restricting the broader use of genetic libraries.

State regulators and local public health officials are increasingly contracting scientists who employ the various MST techniques, including DNA fingerprinting. The Watershed Science Institute provides consultation services to States with questions about these techniques.

For more details on DNA fingerprinting and related MST techniques, visit <http://www.wcc.nrcs.usda.gov/watershed/products.html>—Nutrient and Pest Management section.

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### **#9 Enhanced SNOTEL Network Assists Flood and Fire Risk Assessment**

The NRCS SNOTEL (SNOpack TELelemetry) network, in operation since the late 1970's, provides snowpack information—used to produce streamflow forecasts—at over 1,000 points in the Western United States, including Alaska. The 660 SNOTEL sites report at least daily precipitation, snow water content, snow depth, and air temperature measurements. All data are available at the National Water and Climate Center's (NWCC) Web site <http://www.wcc.nrcs.usda.gov>. Click on "Snow."

The unprecedented droughts and fires in some portions of the West over the last 2 years highlighted the need for additional soil-climate information. To meet demands for improved water supply forecasts, fire danger monitoring, and drought and flood potential assessments, approximately 50 SNOTEL sites now have enhanced sensors, higher capacity data loggers, and upgraded meteor burst radios. The new sensor package measures relative humidity, precipitation using a tipping bucket gauge, barometric pressure, solar radiation, windspeed, wind direction, soil moisture, and soil temperature. These enhanced sites typically transmit data hourly.

In addition, the NWCC Data Center has enhanced the SNOTEL network's data distribution system. SNOTEL data are delivered hourly to the National Weather Service in Maryland, from where it is sent to all National Weather Service offices, the U.S. Forest Service, the Bureau of Land Management, and the National Park Service for flood forecasting and fire assessment.

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## TECHNOLOGY TRANSFER

### **#10 Soil Climate Analysis Network Supports Remote Sensing Research**

The most recent Soil Climate Analysis Network (SCAN) site to support hydrology and remote sensing research was installed recently on the Agricultural Research Service (ARS) facility in Maryland. ARS and NASA are interested in ground-based measurements of soil moisture and temperature to calibrate and verify remotely sensed parameters. The information is used for a variety of purposes including soil classification, irrigation water management, resource management, global climate change research, and drought and flood assessment.

SCAN, initiated in 1991, has proven to be a reliable source of soil-climate data, which serves a variety of uses from drought and flood potential to irrigation water management. The network has grown from 21 pilot project sites in 19 States to a network of 52 sites in 32 States. NRCS and many other partners have contributed to developing the SCAN. Over the last 3 years, partners have contributed nearly \$500,000, mainly toward installing new sites. ARS has provided funding over the last 3 years to install, operate, and maintain 11 SCAN sites to support remote sensing and other research. This year a new satellite will be launched that will have enhanced capabilities to monitor soil moisture and temperature, and 12 SCAN sites will be added to the network, including 5 sites to be installed and operated by Alabama A&M University.

All of the SCAN data can be viewed in near real-time by visiting the NWCC homepage at <http://www.wcc.nrcs.usda.gov>.

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### **#11 Spatial Climate Mapping Project Continues to Make Strides**

State-of-the-art, digital, high resolution climate maps of the United States have been produced through a cooperative venture between the NRCS National Water and Climate Center (NWCC) and the Spatial Climate Analysis Service (SCAS) at Oregon State University. In the past year, the SCAS has produced new climate maps using their Parameter-elevation Regressions on Independent Slopes Model (PRISM) system. Maps recently produced include mean monthly and annual precipitation of the Pacific Basin, including Guam and Pohnpei, mean monthly and annual temperatures of Alaska, and

average spring and fall dates of killing temperatures (28° F) across the continental U.S. The SCAS also produced a new average annual extreme minimum temperature map of the continental U.S. —that is, the typical lowest temperature achieved in the winter. The Plant Hardiness Map, widely known in the nursery industry, is used for delineating plant communities and survivability.

The NWCC has been instrumental in developing a partnership between the National Weather Service's Hydrometeorological Design Studies Center and SCAS for using PRISM to develop new precipitation frequency maps of the U.S., such as the 100-year / 24-hour storm, and to ensure that new maps will be delivered to users of these products, such as the NRCS, within the next 2 years. Many more projects, including the R-Factor and 10-year Erosion Index (EI10) maps for the Revised Universal Soil Loss Equation (RUSLE) model, will be delivered directly from SCAS to NRCS in the coming year.

Spatial data and maps, as well as a full description of this project and several applications of the data, are at the NWCC Climate Mapping Web site <<http://www.wcc.nrcs.usda.gov/water/climate/prism/prism.html>>.

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## WEB-BASED TECHNOLOGY

### #12 PLANTS Version 3.5 On-line

Version 3.5 of PLANTS, <<http://plants.usda.gov>>, is completed and online. Developments for this version have made more information available with simpler and quicker access and retrieval. Two of six servers were replaced for faster service, the selection interface on the Photo Gallery was improved in response to user comments, “one click” links were added to Plant Profiles, and quick access to related species information was implemented. In addition, there are more species available in the Fact Sheets/Plant Guides section, and it is easier to select and download them. The Alternative Crop module provides Web links to cultural requirements and marketing strategies for selected crops by States. The Crop Nutrient Tool automates and augments the information that is currently in chapter 6 of the NRCS Agricultural Waste Management Field Handbook. And finally, the most recent development—“Advanced Query” allows a query for all of the information contained in PLANTS. The query form

permits selection of core attributes for 41,000 plants and/or the additional 100 attributes for the 2,000+ conservation plants.

PLANTS received over 29 million hits and provided over 76 staff years of technical assistance in FY 2001.

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## HONORS

### **#13 NRCS Botanist a World Authority on North American Lilies**

Lilies have diversified in North America to occupy many different habitats, from high mountain meadows to forests and woodlands, streamsides, bogs and swamps, prairies, and even seacoasts and lakeshores. Mark Skinner, National botanist located at the National Plant Data Center (NPDC), has recently completed a taxonomic treatment of the genus Lilium, the true lilies, for volume 26 of the Flora of North America (FNA) <www.fna.org>. The treatment will include line drawings, species descriptions and discussions, and keys to all North American true lilies.

Oxford University Press will publish volume 26 in 2002, and NPDC will integrate the information into the PLANTS Web site as it has for previous volumes—see "Other Species Accounts and Images" on "Plant Profiles" for each species. Information on published volumes and access to the FNA online database can be obtained at <<http://hua.huh.harvard.edu/FNA/volumes.html>>.

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### **#14 PLANTS Highlighted by FirstGov for Science**

FirstGov is a public-private partnership connecting the world to U.S. Government information, services, and online transactions. The NRCS PLANTS Web site <[plants.usda.gov](http://plants.usda.gov)> is being highlighted by [science.gov](http://www.science.gov) <<http://www.science.gov>>. [Science.gov](http://www.science.gov), to be unveiled in early 2002, is the FirstGov for Science portal, connecting you to U.S. Government science and technology. Now, PLANTS is listed as a key site under “Agriculture and Food” at the FirstGov Web site <<http://first.gov>>.

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