Spring 2007

WSA Currents & PROFILES

INFORMATION WITHIN REACH

Welcome

to the spring issue of "Currents & Profiles," the National Watershed, Soil, and Air (WSA) Technology and Development Centers' news and notes to the field. "Currents & Profiles" updates the watershed community on the progress of our projects and newly available publications.

This issue provides information on projects the steering committee selected for study in 2008. You will find the following topics in this issue:

Mission Statement

To systematically apply scientific knowledge and advanced technology to create new or substantially improved equipment, systems, materials, processes, techniques, and procedures to meet the challenges and objectives of sustainable forest ecosystems management.

Watershed, Soil, and Air Technology & Development Program

0725 1810—SDTDC

•HIGHLIGHTS

On February 28, 2007, the WSA steering committee and WSA T&D staff had a conference call to review current project status, and to prioritize and select new projects for 2008. A total of 18 project proposals were submitted. Projects ranged in scope from watershed restoration construction specification standards to Web site development. Several projects were sent to other steering committees (Remote Sensing Applications Center, Forest Management, and Inventory and Monitoring) for their consideration. Some project proposals were similar to previous projects. In other cases, commercial technologies already exist. In both cases, relevant information was forwarded to the proponent or regional WSA steering committee member for their use. The following projects were selected for 2008.

Development of Science-Based Winter Guidelines for Mechanical and Fuels Treatment Operations.

Proposed by: John Townsley, Randy Tepler, and Brad Flatten (Region 6)

Within the past few years soil management has become increasingly an appeal issue. Mechanical vegetation and fuels management operations can, in some circumstances, adversely affect soils beyond regional thresholds. Winter operations conducted over frozen ground and snow have been observed to effectively reduce soil disturbance. Avoidance of adverse soil disturbance has been observed both with soils that are sensitive to disturbance and in situations where preexisting or legacy disturbance is present and it is desirable to avoid exacerbating the problem. Unfortunately, there are few science-based guidelines for winter operations that easily can be applied by managers who must operate in varying winter conditions, and over various soil types.

Project objectives: To develop criteria for determining when soil conditions are appropriate for winter logging and mechanical fuel treatment operations.

National Road Best Management Practices: Compilation of Research on Their Effectiveness.

Proposed by: Carolyn Napper (SDTDC)

The WO is preparing to release National Best Management Practices (BMP) for all forest resource management activities in 2007. BMPs represent a set of techniques for reducing nonpoint sources of pollution. BMPs are also the means by which the Forest Service complies with the Clean Water Act. Roads on national forests do present the most significant contribution of sediment to streams and rivers, yet there is limited information available on the effectiveness of road BMPs. A previous project on BMP effectiveness did not tier to the new national BMPs which were being revised as the document was being written. The document would be an honest display of the current state of knowledge regarding the effectiveness of road BMPs.

Project objectives: To create a technical reference of the current science on the effectiveness of national road best management practices.

Software Application for BMP Monitoring Field Data Recorder

Proposed by: Sherry Hazelhurst and Rick Henderson (WO)

A Best Management Practices (BMP) program is being developed by a WO/RO team that includes two components: (1) a set of Forest Service BMPs, and (2) a monitoring program to document the implementation and effectiveness of the BMPs. A team is currently working to develop/refine sampling protocols and associated reporting forms for each BMP. The information will be stored in a corporate database. The BMP monitoring program will be tested in 2008 and implemented Forest Service wide in 2009.

Project objectives: To develop recommendations of types of data recorders best suited for BMP monitoring, identify a suitable data entry software application for the BMP data, and identify GIS and digital photography capabilities.

If you have any questions, comments, or suggestions on the above projects, please contact Kim Clarkin or Carolyn Napper at SDTDC by phone or e-mail.

•CURRENT PROJECTS – UPDATE

New Satellite Telemetry System for Smoke Monitors

Proposed by: Interagency Smoke Monitoring Committee

Air quality specialists and fire managers use smoke monitors to determine particulate- concentration levels and impacts from prescribed and wildfire smoke. Data from these monitors are transmitted by satellite to a Web server for updated, real-time results. The current data telemetry systems use the ORBCOM satellite constellation as a means to transmit the data. There have been increasing problems with the system—including latency of data being posted, trouble connecting with the satellites, and hardware failure. MTDC is investigating alternative telemetry systems including using the Iridium satellite constellation network to eliminate those problems with the current system. Field tests are expected this summer. For more information about this project, contact MTDC project leader Andy Trent at (406) 329-3912 or atrent@fs.fed.us.

Water Diversion Control Structures

Proposed by: Dave Gloss, Medicine Bow National Forest (Region 2).

An outline for the field guide was reviewed by an ad hoc group of experts and interested parties from the Forest Service, Fish and Wildlife Service, and the Natural Resources Conservation Service. The outline has been finalized and we are preparing a contract package for a consultant to write the guide and provide photos and sketches. For further information, contact SDTDC project leader Kim Clarkin at (909) 599-1267, ext. 209 or kclarkin@fs.fed.us.

Photo: Michael J. Kellett, Boise National Forest, Idaho

Low Impact Fire Plow Line Sweeper/Blower

Proposed by: Allen Nicholas and Kara Kleinschmidt, Shawnee National Forest (Region 9)

This project is to develop an attachment for a low ground-pressure implement to remove organic litter off the fireline and to reduce adverse impacts to soils from repeated plowing. Currently, the Shawnee National Forest is interested in modifying an existing piece of equipment (JD450) that can remove a 6-foot-wide swath of hardwood leaves and berry vines on preexisting fireline. Modification of existing equipment with different types of implements (rakes, blowers) is being considered that avoid impacts to the soil A-horizon. Upcoming field visits will help define the various equipment configurations and options. Contact MTDC project leader Keith Windell (406) 329-3956 or kwindell@fs.fed.us.

Erosion Control for Roads

Proposed by: Jennie Fischer, Boise National Forest (Region 4)

Erosion control for roads was completed in October, 2006. However, with new national road best management practices being released this year; this topic will be included in the 2008 project, National Road Best Management Practices: Compilation of Research on Their Effectiveness.

Soil, Water, Road Condition Index (SWRCI)

Proposed by: John Bell, WO Engineering, and Keith Simila, Alaska Region Engineering. Project is co-funded by Engineering and WSA.

SWRCI is being peer reviewed and comments are expected back in May 2007. The document was modified to include both a field guide and a desk reference. The field guide provides users with a data collection sheet, photographs of the selected indicators in various conditions, and instructions on how to use SWRCI as a rapid assessment tool for the effect of roads to soil and water. The desk reference provides the scientific background for the selection of each indicator. Both the field guide and desk reference are available in draft form, and information and forms from other forests collecting road related information can be found at the following Web page: http://fsweb/programs/eng/SWRCI/project_index.shtml. For more information on the project, contact SDTDC project leader Carolyn Napper at (909) 599-1267, ext 229, or cnapper@fs.fed.us.

A road in R-9 on the White Mountain National Forest where the SWRCI process was field tested.

Compaction Monitoring Technologies

Proposed by: Edward Huffman, currently on the Cibola National Forest (Region 3)
Project is co-funded by Inventory and Monitoring and WSA.

The project objective is to identify equipment and procedures for monitoring soil compaction and assess the advantages and disadvantages of the equipment. Currently, a Web page http://fsweb/programs/im/Soil%20Projects/Compaction/im%20template.shtml) provides information on different resources for compaction monitoring. The Web page includes professional papers, research findings, and links to other valuable Web sites. A draft report of different techniques including core sampling, cone penetrometers, visual indicators, paraffin clod, and the nuclear gauge will be available for resource specialists. Contact SDTDC project leader Carolyn Napper at (909) 599-1267, ext 229, or cnapper@fs.fed.us

Measuring Soil Moisture to Lower Risk of Compaction from Equipment Operations

Proposed by: Wayne Johannson, Plumas National Forest (Region 5)
Project is co-funded by Inventory and Monitoring and WSA.

In January 2007, we canvassed soil scientists who might be interested in testing different soil moisture devices on actual project sites where soil compaction was an identified concern. From our efforts, five soil scientists volunteered to participate in the test and provide feedback on the efficiency and effectiveness of the different devices. The following table provides information on the test locations and type of equipment being used.

Soil Scientist	Region/Forest	Soil Moisture Equipment
Brad Rust	R5, Shasta-Trinity NF	Aquaterr digital soil moisture meter.
Jason Jimenez	R5, Stanislaus NF	Field Scout TDR soil moisture probe with internal datalogger and GPS.
John Hamann	R1, Lewis and Clark NF	Aquaterr digital soil moisture meter and Delmhorst digital soil moisture meter.
Dan Svoboda	R10, Chugach NF	Field Scout TDR soil moisture probe with internal datalogger and GPS.
Craig Busskohl	R6, Umatilla NF	HydroSense soil moisture probe (from Campbell Scientific, Inc.) and Speedy soil moisture test.

For more information on the project consult the Web page http://fsweb/programs/im/index.shtml and scroll over to Soil Moisture. Contact SDTDC project leader Carolyn Napper at (909) 599-1267, ext 229, or cnapper@fs.fed.us.

The Field Scout TDR is one of the soil moisture devices being evaluated.

• NEWS FROM THE WSA T&D STEERING COMMITTEE

Among the requests for FY2008 Watershed, Soil, and Air project proposals, we received a request from the Pacific Northwest Research Station and the Umpqua National Forest to develop a water level measurement device and protective housing that could be installed directly into a weir or flume structure, thereby eliminating the need for a measurement well and gauge house. The proposal requested a precision of 0.001 feet and compatibility with commercially available dataloggers.

A project to develop a low-cost water-level sensor and recorder that meets most of the stated requirements, except with a 0.01-foot precision instead of the desired 0.001-foot precision, called the AquaRod, was developed in the late 1990s under a cooperative agreement between the Stream Systems Technology Center and the University of Washington.

At the time, the Forest Service was interested in and needed high quality, low-cost technology to measure stream levels. To be most useful, the data needed to be in an automated format for easy processing on desktop computers. The technology needed to be durable enough to withstand field conditions, have a minimum of movable parts, and be easy to maintain and operate.

The proposed design was based on core concepts developed at the University of Washington for low cost, distributed, water monitoring. The instruments developed were to be sufficiently low cost to make them economically feasible for placement in national forest settings, in existing stilling wells, and pipe crest-gauges. Extensive deployment of these instruments would allow the Forest Service to gather data on flow levels in the national forests and to use this data for planning purposes and for instream flow determinations.

The AquaRod is a high-precision, low-maintenance instrument based on capacitance-measuring technology. It is comprised of a pod, which contains the electronics for data acquisition, and a rod, which is the capacitance gauge. A simple snap-on design permits easy deployment in cold, damp conditions. The instrument is battery operated and can be programmed to log water level changes at preset time intervals.

To monitor events over an extended period, the AquaRod can be programmed to record only when the water level changes more than a preset threshold. Water and air temperatures are also recorded with every measurement. The AquaRod is freeze tolerant, is not susceptible to plugging of a sensing port, and does not require an air-vent tube. Data is easily downloaded to a computer via a serial RS232 connection.

Additional information about the AquaRod and its development can be found in the January 1998 issue of Stream Notes (http://stream.fs.fed.us/news/streamnt/pdf/SN_1-98.pdf).

Photo courtesy Stevens Water Monitoring Systems, Inc.

Rights to manufacture AquaRods were originally sold to Sequoia Scientific, Inc., by the University of Washington who later sold these rights to several other vendors. Today, AquaRods can be purchased from Stevens Water Monitoring Systems, Inc., Advanced Measurements and Controls, Inc., and Geo Scientific Ltd., for about $1,000.

The use of trade and company names is for the benefit of the reader. Such use does not constitute an official endorsement or approval of any service or product by the U.S. Department of Agriculture to the exclusion of other that may be suitable.

• PUBLICATIONS AND TRAINING AIDS

Smoke Particulate Monitors: 2006 Update. 0625 2842. Missoula, MT: U.S. Department of Agriculture, Forest Service, Missoula Technology and Development Center.

This evaluation updates earlier evaluations of real-time monitors. These monitors can be used to evaluate air quality in areas affected by smoke from wildland fires. The evaluation was conducted in a laboratory setting and compared each monitor to at least one more identical monitor, to the other monitors evaluated, and to a Federal Reference Method sampler that was used as the standard. The DUSTTRAK monitor manufactured by TSI Inc., had not been evaluated before, nor had the external ac pump. http://fsweb.mtdc.wo.fs.fed.us/php/library_card?p%20num=0625%202842

Smoke Monitoring Workshop
Andy Trent conducted a 4-hour workshop on smoke monitoring at the 2nd Fire Behavior and Fuels Conference at Destin, Florida. One of the main emphases of the conference was smoke management, with three full days devoted to the topic. The smoke monitoring workshop focused on the current technologies for particulate monitoring, described the pros and cons of each technology, and current commercial monitors used by the Forest Service. Also discussed were the primary regulatory issues pertaining to smoke monitoring and how to operate several different monitors and satellite data telemetry systems. Contact Andy Trent at (406) 329-3912, or atrent@fs.fed.us for the presentation information.

Smoke Monitoring Training Aids – A Web-based operating manual is available. Contact project leader Mary Ann Davis at (406) 329-3981, or mdavies@fs.fed.us.

• LINKS OF INTEREST

RestoringRivers.org is a Web site devoted to the science of stream restoration. It represents the combined efforts of the National River Restoration Science Synthesis (NRRSS)–an international group of ecologists, engineers, and geomorphologists–together with the non-profit river advocacy group American Rivers. Visit this Web page to find information about the results of NRRSS, including regional and State summaries, case studies, and publications, as well as future information on the science and policy of stream restoration (modified from the Web page).

Information on field kits for quantifying coliform bacteria in the backcountry can be found at: http://fsweb.sdtdc.wo.fs.fed.us/programs/im/fy04/coliform_06/coliform-home_06.html. The page presents the results of a T&D Inventory and Monitoring Program project.

Information on the Soil Field Guide project that uses photos to identify different soil-disturbance classes caused by mechanical operations can be found at: http://fsweb/programs/im/Soil%20Projects/Field%20Guide/im%20template.shtml . The page provides information on the project, disturbance condition class form, and photos of equipment and condition class ratings. This T&D Inventory and Monitoring Program project is on-going. For more information on the project contact project leader Carolyn Napper at: 909-599-1267, ext. 229, or cnapper@fs.fed.us.

A new MTDC guide to restoration and rehabilitation of human impact sites in the backcountry is now available at http://fsweb.mtdc.wo.fs.fed.us/pubs/htmlpubs/htm06232815/ .

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