United States Department of Agriculture • Forest Service • 0871–2844–MTDC

TECHNOLOGY AND DEVELOPMENT PROGRAM

TD NEWS

Number 2 http://www.fs.fed.us/eng/t-d.php 2008

Engineering

GPS Testing and Evaluation Program

The report "Tailoring GPS for the Forest Service: MTDC's Testing and Evaluation Program" (0871–2807–MTDC) discusses the past and future of GPS (global positioning system) technology in the Forest Service.

In 1983, the Washington Office engineering and timber staffs asked the Missoula Technology and Development Center (MTDC) to investigate potential uses of GPS in resource management. In the early days, GPS equipment was expensive, bulky, and hard to operate. Technology was changing rapidly and MTDC worked with manufacturers to suggest improvements.

Test courses were established across the continental United States and at the El Yunque National Forest in Puerto Rico. These courses let MTDC evaluate GPS equipment under various tree canopy conditions that employees could expect to encounter.

Now Forest Service employees rely on GPS for inventory and mapping. Other uses include recording fire boundaries, locations of invasive species, and important features of wildlife habitat, such as nesting trees. MTDC maintains the Forest Service national GPS Web site at *http://www.fs.fed.us/database/gps/* and continues to evaluate improved GPS equipment, such as cameras and personal digital assistants, and GPS systems, such as those used by aerial and ATV sprayers.

For additional information on the GPS testing and evaluation program, contact Andy Trent, project leader (phone: 406–329–3912; e-mail: *atrent@fs.fed.us*).

Designing Road-Stream Crossing Structures for Fish Passage

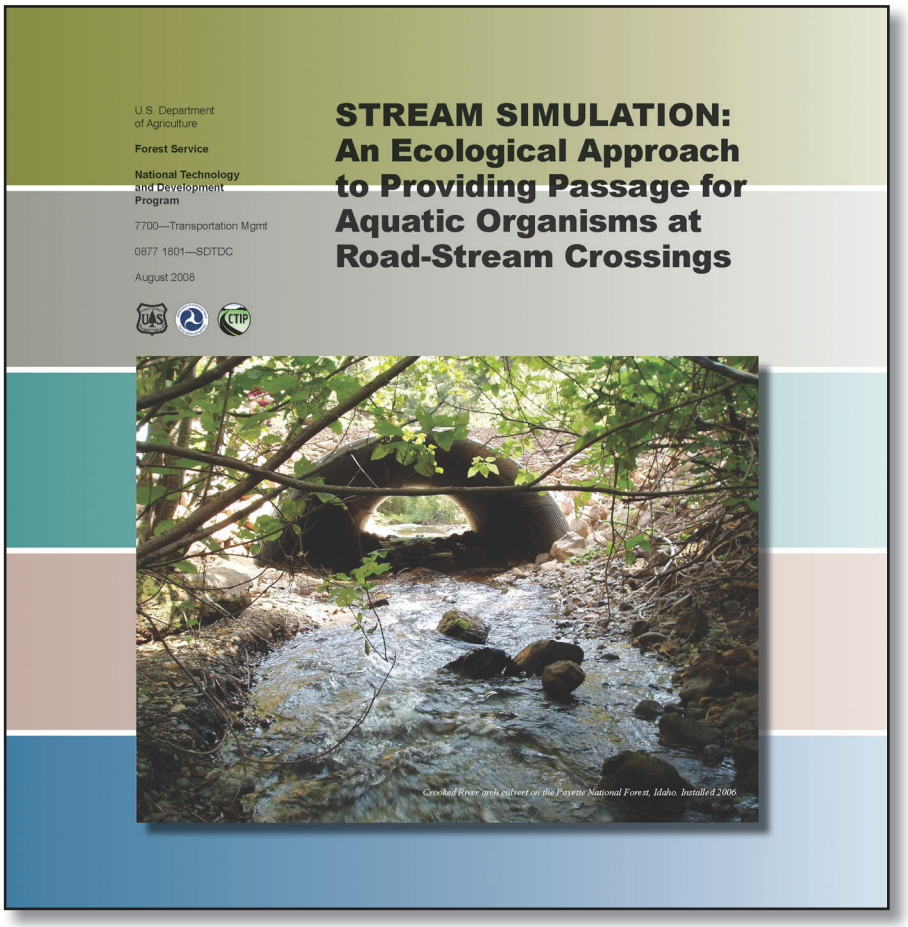
Streams are long, linear ecosystems that transport water, sediment, and debris downstream while allowing fish and other aquatic organisms to travel both upstream and downstream. Healthy functioning of stream ecosystems depends on their continuity. When streams meet roads, stream ecosystems can become blocked.

Designing culverts and other road-stream crossing structures requires simulating local stream characteristics. Stream simulation culverts have a continuous streambed that mimics the slope, structure, and dimensions of a reference reach in the adjacent stream.

The San Dimas Technology and Development Center (SDTDC) report "Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings" (0877–1801P–SDTDC) provides guidance on how to observe and analyze the stream and site, as well as how to use those observations to design the simulated streambed and construct a structure. The report integrates geomorphic principles. Many examples—both real and conceptual—demonstrate how the analytical and design techniques might be applied in different stream types.

The report is available at *http://www.fs.fed.us/eng/pubs/pdf/StreamSimulation/index.shtml* or *http://www.stream.fs.fed.us/fishxing/aop_pdfs.html*.

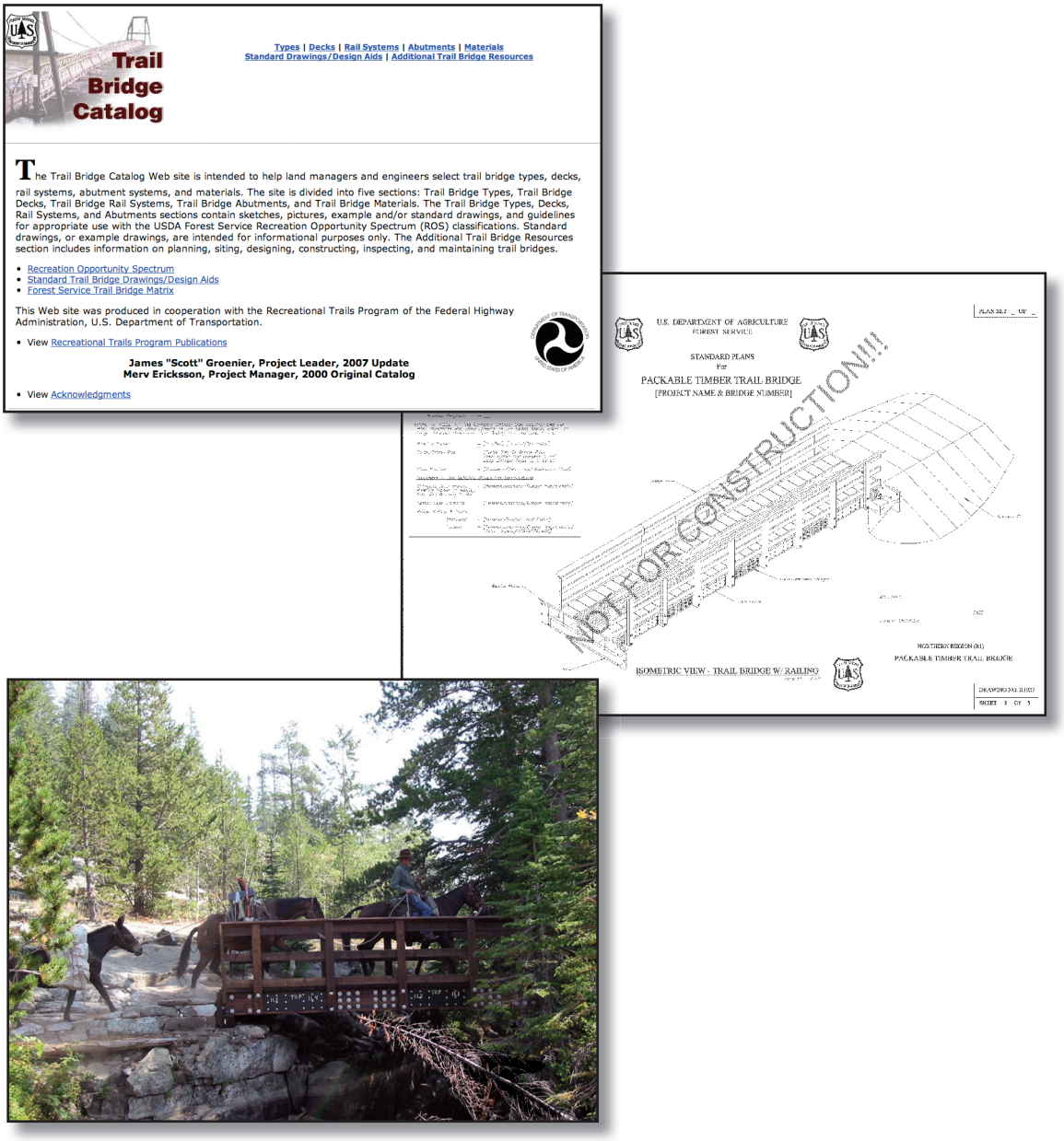
For more information about stream simulation, contact Kim Clarkin, project leader (phone: 909–599–1267, ext. 209; e-mail: *kclarkin@fs.fed.us*).



Updated Trail Bridge Information on the Web

For 8 years, land managers and engineers have relied on the trail bridge catalog Web site. Recent improvements to the "Trail Bridge Catalog" (0823–2W01–MTDC) include example trail bridge drawings (intended for information only) suited for different Forest Service Recreational Opportunity Spectrum classifications and additional information on planning, siting, designing, constructing, inspecting, and maintaining trail bridges. These updates should make it easier to plan, site, select, build, and maintain trail bridges while balancing esthetics and function. The Web-based catalog is available at *http://www.fs.fed.us/eng/bridges*.

For more information about the trail bridge catalog updates, contact Scott Groenier, project leader (phone: 406–329–4719; e-mail: *jgroenier@fs.fed.us*).

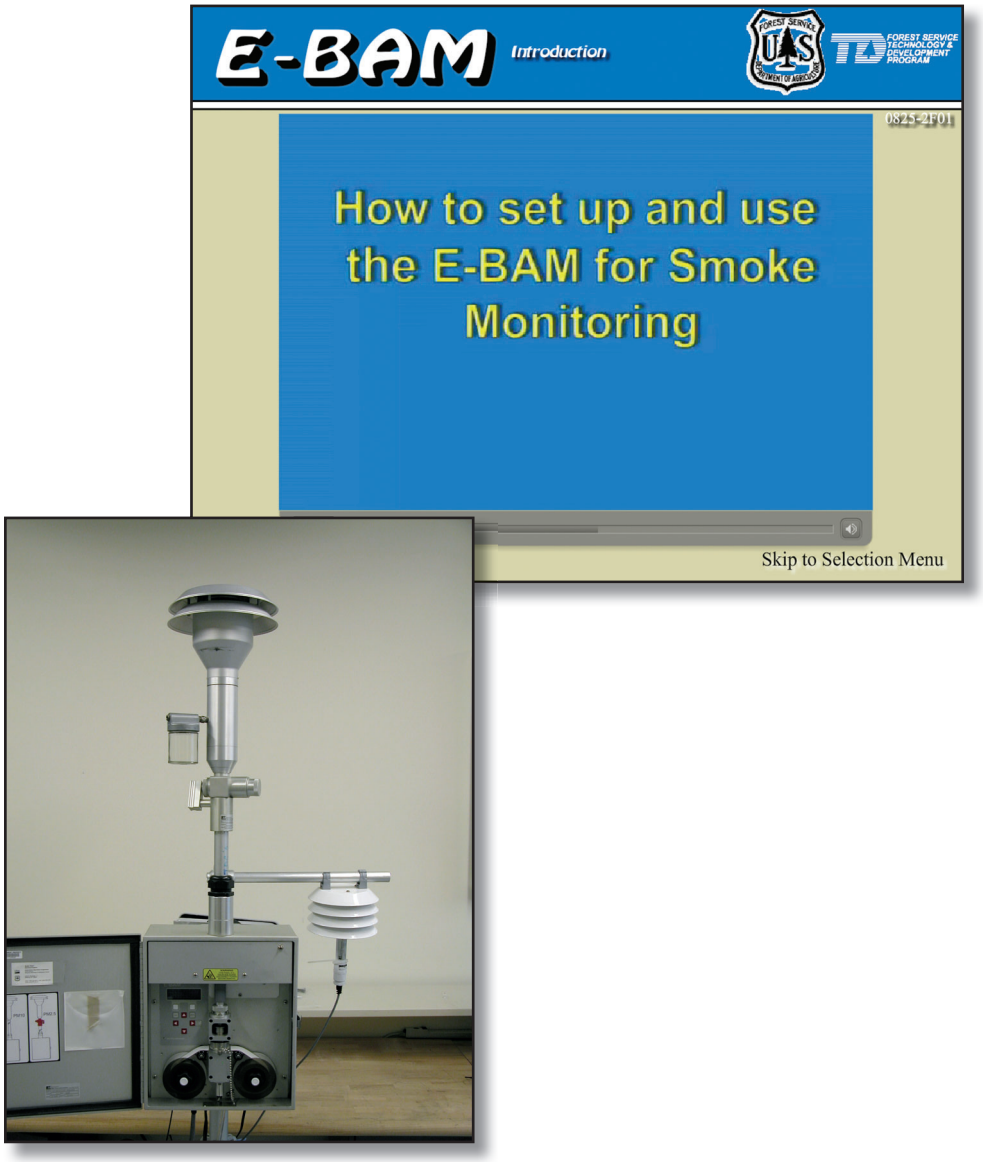


What's in That Smoke?

The smoke from wildland and prescribed fires contains fine particulates that impair visibility and raise health concerns. If communities don't have State or county air quality monitors, the E-BAM smoke particulate monitor can be deployed while fires are active. Information recorded by the E-BAM and transmitted by satellite can help community officials prepare health advisories.

The training presentation "How to Set Up and Use the E-BAM for Smoke Monitoring" (0825–2F01–MTDC) is available in Flash Media format at *http://www.fs.fed.us/t-d/pubs/flash/fla08252F01/index.swf* (Username: t-d, Password: t-d). The presentation shows how to set up the E-BAM and satellite modem to send smoke particulate data to the Interagency Real-Time Smoke Monitoring Web Site at *http://www.airsis.com/usfs/*.

For more information about the E-BAM smoke particulate monitor, contact Mary Ann Davies, project leader (phone: 406–329–3981; e-mail: *mdavies@fs.fed.us*).



New Equipment Makes Weed Spraying More Precise

ATVs and UTVs are widely used for spraying herbicides on range and forest lands. Applying herbicide at a constant rate reduces the use of herbicides and the applicator's exposure to herbicides. But when ATVs speed up and slow down while spraying in rough terrain, uniform application is a difficult task. The report "Field Evaluation of a Constant-Rate Herbicide Sprayer for ATVs and UTVs" (0824–2802–MTDC), describes a spray system that was configured by MTDC to apply liquid herbicides evenly while an ATV is traveling between 2½ and 4½ miles per hour. The report also includes information about spray droplet size and coverage during tests of boom and boomless spray nozzles, along with recommendations for calibrating sprayers. The spray system costs about $2,225.

The tech tip "Herbicide Shield for Spraying Irrigation Pipelines" (0824–2343–MTDC) describes a shield that MTDC designed to keep herbicide spray aimed at the weeds and unwanted vegetation around irrigation pipes and keep overspray and drift away from nursery seedlings. The tech tip includes information on a three-point hitch pipeline sprayer that uses a small 12-volt diaphragm pump to feed two spray nozzles. Drawing MTDC–1066 provides details of the shield and a material and vendor list.

For additional information on the constant-rate herbicide sprayer, the spray shield, or the drawing, contact Gary Kees, project leader (phone: 406–829–6753; e-mail: *gkees@fs.fed.us*).

Fire-Safe Alternatives to Wood Shingles on Historic Structures

Untreated wood roofs made of cedar shakes and shingles have a traditional, beautiful, and rustic look, but they are no longer appropriate in areas that experience wildland fires. Replacing these roofs with materials appropriate for historic structures is challenging for Forest Service engineers and heritage and facilities employees.

"Alternative Roofing Materials: A Guide for Historic Structures" (0723–1812P–SDTDC) identifies products that are cost effective, easy to install, and acceptable to your State Historic Preservation Office. The report includes a table that compares the cost, fire resistance, weight, and other qualities of various roofing materials.

For more information, contact Martha Willbee, recreation planner (phone: 909–599–1267, ext. 231; e-mail: *mwillbee@fs.fed.us*).

Keeping Horses in Mind When Designing Trails and Campgrounds

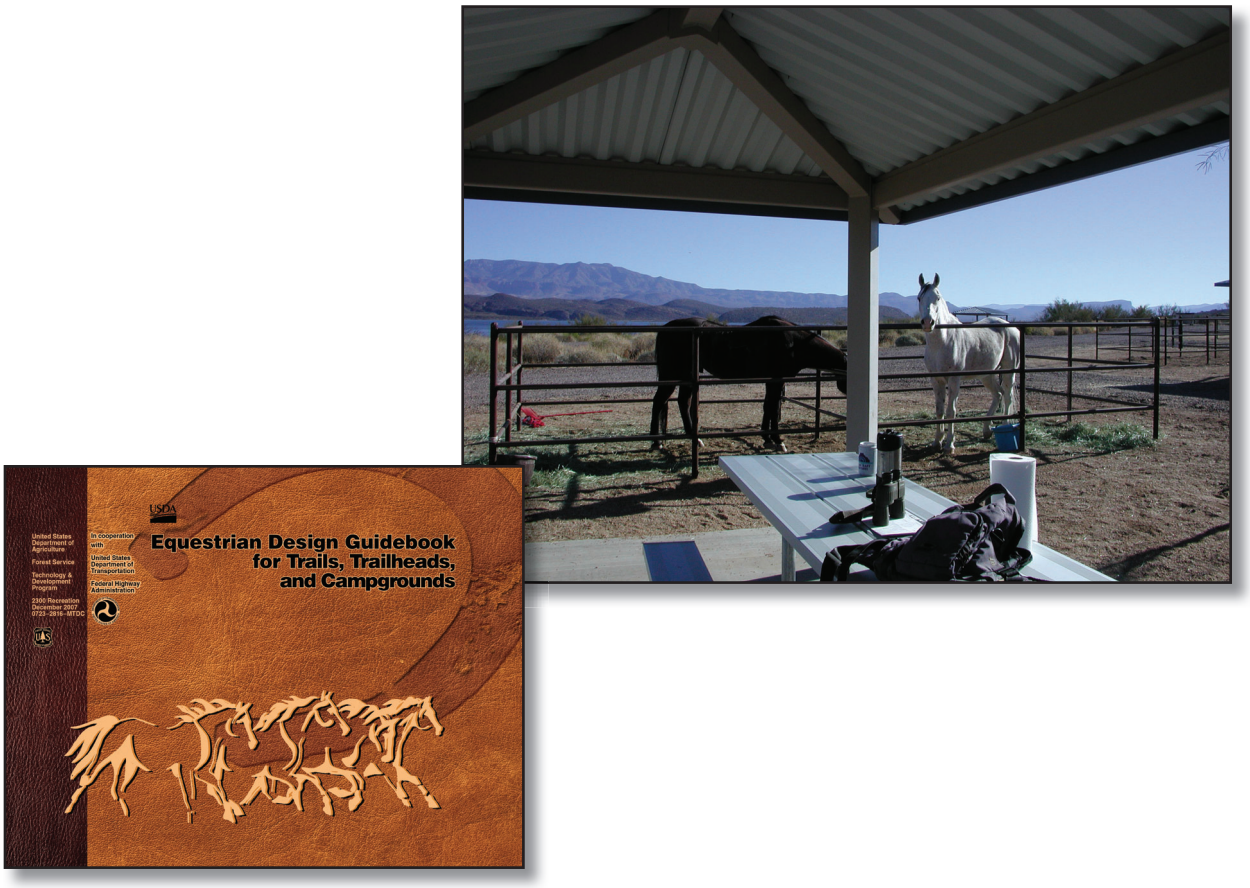
Imagine towing a nine-horse stock trailer into a trailhead for equestrians, only to find out there's not enough room to turn around. You won't be as likely to encounter such a problem if land managers, engineers, architects, horse advocates, and private developers use a new MTDC guidebook when creating recreation facilities for horses and their riders.

The "Equestrian Design Guidebook for Trails, Trailheads, and Campgrounds" (0723–2816–MTDC) has more than 300 pages with information from across America, Canada, and Great Britain. Hundreds of drawings and photos, references, and examples show how to accommodate horses and their riders in typical and specialized situations.

While the emphasis is on highly developed facilities and programs in urban, rural, and some wildland areas, the information can be applied more widely.

The MTDC guidebook was funded by the Recreational Trails Program of the Federal Highway Administration.

To order a guidebook, contact the FHWA at *http://www.fhwa.dot.gov/environment/rectrails/trailpub.htm*. For additional information about trails and campgrounds for equestrians, contact Sunni Bradshaw at MTDC (phone: 406–829–6765; e-mail: *srbradshaw@fs.fed.us*).



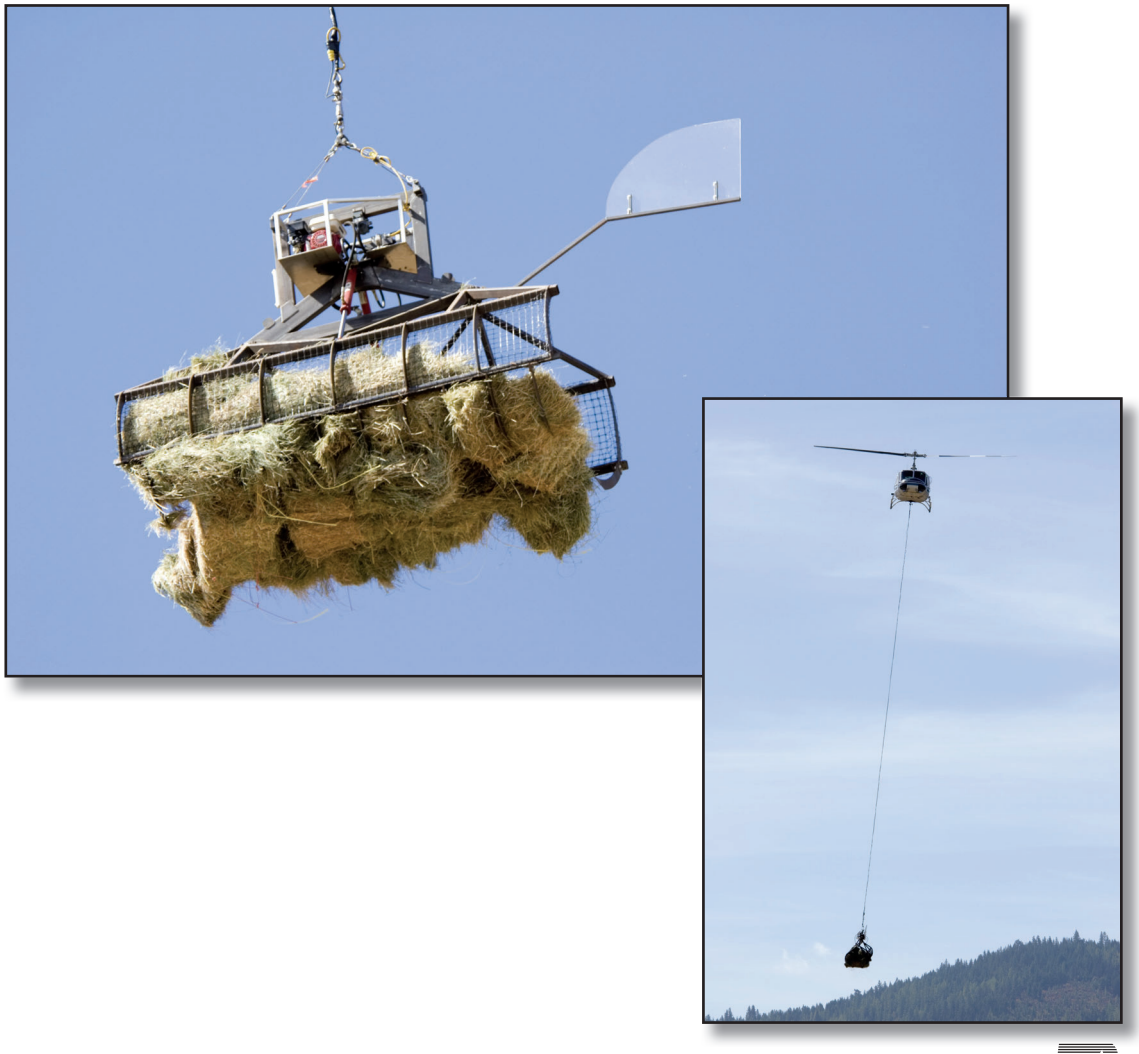
Heli-Claw Delivers the Mulch

Areas severely burned by wildland fires may be subject to erosion unless mulch is applied. The experimental MTDC heli-claw may make large-scale erosion control projects safer and more efficient. "The Heli-Claw: A New Way To Transport Mulch for Erosion Control" (0851–2323–MTDC) describes how a 10- by 10-foot set of hydraulically powered steel jaws, suspended on a 100-foot steel longline beneath a helicopter, can be used to pick up, transport, and disperse up to a ton of straw or similar material without requiring ground crewmembers to work underneath the helicopter.

Flight tests were conducted in 2007. View the flight tests at *http://www.fs.fed.us/t-d/pubs/videos/flash/08512C01/* (Username: t-d, Password: t-d). Because shredded wood may do a better job of erosion control than straw, the heli-claw was also designed so it can pick up and drop shredded wood. Field tests in 2008 indicated the concept is sound, but design changes are needed to make the heli-claw more reliable and effective.

The SDTDC tech tip "Helimulching—Equipment and Techniques" (0757–1305P–SDTDC) discusses the current best practices and provides technical guidance for aerial mulching projects.

For additional information on the heli-claw, contact Tim Lynch, project leader (phone: 406–329–3958; e-mail: *tlynch@fs.fed.us*).



The Scoop on Flying Fish

When firefighting helicopters are dipping water from lakes or ponds, fish or their eggs might get scooped up by mistake. If water bodies have threatened or endangered aquatic species, helicopter operations might be restricted to reduce the risk.

The San Dimas Technology and Development Center has developed a floating fish strainer (net) that a helicopter can lower into a lake or pond. The net has openings no larger than 3⁄32 of an inch, meeting requirements of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

Once the net is in place, a helicopter can dip its bucket or lower a snorkel into the net with the assurance that no fish or eggs are inside.

The net's opening is 15 feet in diameter to allow large helicopter buckets to dip from it. The net is 10 feet deep, so snorkels can be lowered without hitting the net's bottom, even when the pilot doesn't have an easy way of judging depth. The net weighs just 420 pounds, allowing it to be carried by a light helicopter.

A special retrieval system allows a helicopter to lift the net from the lake and carry it back to shore after it's no longer needed.

The tech tip "Helicopter Fish Strainer" (0851–1302P–SDTDC) includes detailed information about the net and drawings of the deployment and retrieval system.

For additional information, contact David Haston, project leader (phone: 909–599–1294, ext. 294; e-mail: *dhaston@fs.fed.us*).

Clean, Cool Water on the Fireline

During hard work on the fireline, firefighters can lose up to a liter of sweat an hour. If they don't replace those fluids, they won't be able to think clearly or work as hard. The tech tip "Hydration Strategies for Firefighters" (0851–2324–MTDC) looks at some of the benefits and drawbacks of standard water bottles and the newer sipping systems.

For more information about hydration strategies, contact project leaders Joe Domitrovich (phone: 406–829–6809; e-mail: *jdomitrovich@fs.fed.us*) or Brian Sharkey (phone: 406–329–3989; e-mail: *bsharkey@fs.fed.us*).

When Lightning Strikes

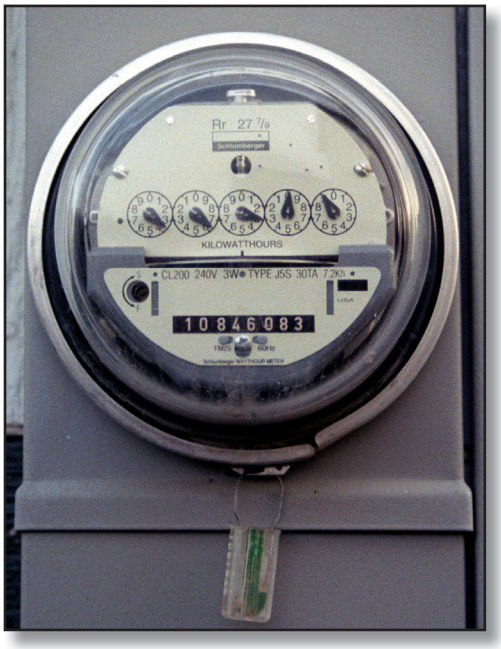
Age, theft, and vandalism take a toll on lightning protection systems at Forest Service lookouts and communications facilities. The tech tip "Evaluating Lightning Protection on Lookouts and Communication Facilities" (0873–2333–MTDC) includes information on the fundamentals of lightning protection and on standards that can help Forest Service employees determine whether they need to seek assistance when inspecting lightning protection systems.

Lightning rods, or air terminals, should be in place on the top of a structure; ground rods or wire loops should be buried at the base of the structure; and large-diameter copper wire and/or a metal tower structure must connect the air terminals with the buried grounding components. This tech tip lists items that must be connected to the lightning protection wiring and includes several references for standards and approved hardware.

For more information on lightning protection systems, contact Ted Etter, project leader (phone: 406–329–3980; e-mail: *tetter@fs.fed.us*).

Pay Less, Save More

Homeowners aren't the only ones who wonder if they are paying too much for utilities and wish they could understand their utility bills. Forest Service units may be paying for electricity and other utility services they are not using. Reviewing utility bills and making some changes may save thousands of dollars each year.



The tech tip "Reviewing Utility Bills Can Help Save Money" (0873–2303–MTDC) explains how to get copies of utility bills and what to look for once you have them.

For additional information, contact Kathleen Snodgrass, project leader (phone: 406–329–3922; e-mail: *ksnodgrass@fs.fed.us*).

All Is Not Ducky With Duckweed

Wastewater treatment lagoons will not function properly when duckweed or other invasive aquatic plants take over. The tech tip "Got Duckweed? Get Carp!" (0873–2304–MTDC) explains how (in most States) triploid grass carp can come to the rescue.

Triploid grass carp cannot multiply, but will live for more than 8 years and can grow to more than 30 pounds if they get enough to eat. Because they eat so much of so many types of plants, precautions must be taken to prevent their accidental release into natural waters.

For additional information, contact Kathleen Snodgrass, project leader (phone: 406–329–3922; e-mail: *ksnodgrass@fs.fed.us*).

Sick of Work? Maybe It's Just Your Workplace

While most buildings don't have severe indoor air quality issues, even well-run buildings sometimes experience episodes of poor air quality. Indoor air quality problems can harm your health, comfort, well-being, and productivity.

The report "A Manager's Guide to Identifying and Solving Indoor Air Quality Problems" (0873–2841–MTDC) helps locate and correct common sources of indoor air quality problems. It provides a handy table with common symptoms of problems, causes, and solutions. A fact sheet will help you identify the scope of your problems. It also explains when your building manager should get assistance from a specialist, such as a facilities engineer or industrial hygienist.

For additional information, contact Kathleen Snodgrass, project leader (phone: 406–329–3922; e-mail: *ksnodgrass@fs.fed.us*).

Shedding Light on Shedding Watts

The tech tip "Shedding Watts While Shedding Light" (0773–2333–MTDC) helps facilities engineers and supervisors learn more about the latest energy-efficient lighting options.

New tubular fluorescent lamps and ballasts are convenient and provide longer life and reduced power consumption compared to incandescent lights or older fluorescent lights.

LED lamps are worth considering in locations that are cold or difficult to service, such as traffic lights. These lamps, although currently more expensive than other lamps, contain no mercury.

Occupancy and daylight sensors are another way to reduce energy consumption and extend the useful life of lamps.

For more information on lighting options, contact Ted Etter, project leader (phone: 406–329–3980; e-mail: *tetter@fs.fed.us*).

Preserving Forest Service Buildings

In the first half of the 20th century innovative building materials were incorporated into Forest Service buildings. The MTDC series of tech tips on early 20th-century building materials provides practical information that can help people recognize and work with these materials. Each of the four tech tips describes the history, manufacture, and physical characteristics of a particular group of materials and addresses problems commonly encountered with them. Two of the tech tips are recent additions to the series.

The tech tip "Early 20th-Century Building Materials: Resilient Flooring" (0773–2322–MTDC) explains how to maintain, repair, and replace cork, felt-base, linoleum, rubber, and vinyl flooring.

The tech tip "Early 20th-Century Building Materials: Siding and Roofing" (0873–2308–MTDC) explains how to maintain, repair, and replace asphalt roofing, asbestos-cement siding and roofing, and metal siding.

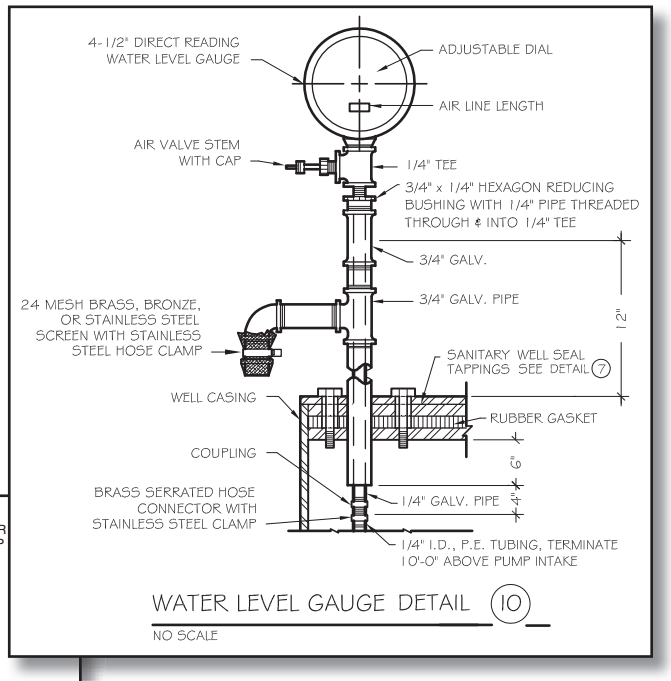
For additional information, contact Kathleen Snodgrass, project leader (phone: 406–329–3922; e-mail: *ksnodgrass@fs.fed.us*).

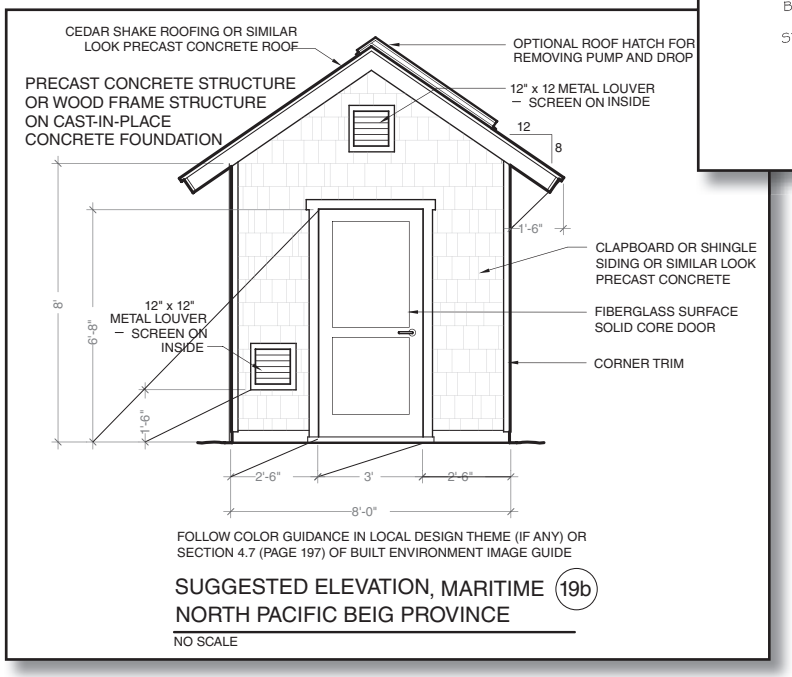
Standard Plans for Water Control Buildings

Most control buildings for Forest Service potable water systems are about the same size and contain the same equipment. In the past, each control building and the equipment inside it were designed individually for each location.

The tech tip "Standard Potable Water Control Building Plans on the FSWeb" (0873–2340–MTDC) describes standard plans that are now available on the Forest Service's internal computer network to help engineers and architects design small water systems. The plans comply with AutoCAD standards and the Forest Service's Built Environment Image Guide.

For additional information, contact Kathleen Snodgrass, project leader (phone: 406–329–3922; e-mail: *ksnodgrass@fs.fed.us*).





Using Explosives for Safe and Efficient Hazard Tree Removal

Fire-damaged or decayed trees can be too hazardous for sawyers to fell with a saw. Lone hazard trees or a group of hazard trees can be removed safely with explosives, even in the wilderness. The tech tip "Felling Hazard Trees With Explosives" (0867–2325–MTDC) describes this safe, cost-effective, and efficient alternative to sawing.

Certified blasters with a "Hazard Trees" endorsement work throughout the Forest Service. Line officers and project planners should consider using explosives if doing so will help get the job done more safely.

For more information about felling hazard trees with explosives, contact Bob Beckley, project leader (phone: 406–329–3996; e-mail: *rbeckley@fs.fed.us*).

Bees, Wasps, and Ants: First Aid Tips for Field Employees

Stinging and biting insects can be more than a nuisance if an employee has an allergic reaction and adequate treatment is not readily available.

Forest Service first aid kits no longer contain epinephrine. Employees who know they have insect allergies should get a prescription for epinephrine and carry an epinephrine kit when working in the field. The tech tip "Insect Stings and Bites: Basic Information About Bees, Wasps, and Ants" (0867–2331–MTDC) includes information about insect behavior, nest locations, and how employees can help provide first aid for insect stings and bites.

For more information, contact Bob Beckley, project leader (phone: 406–329–3996; e-mail: *rbeckley@fs.fed.us*).

New Faces

New Faces at MTDC and SDTDC

Rhonda Auger joined MTDC in October 2007 as a publications assistant. She is responsible for keeping an accurate inventory of all publications and preparing mass mailings (electronic and paper). Rhonda is a sophomore studying to be an x-ray technician at the University of Montana-College of Technology. A native Montanan, she grew up in Lolo, MT. Rhonda now lives in Missoula with her fiancé and two children.

Vicente Barandino, Jr., joined SDTDC in 2008 as a civil engineer. In 1984, Vicente received a bachelor's degree in civil engineering from the University of the East in Manila, Philippines. After college, he began a career at the Metropolitan Waterworks and Sewerage Systems, Manila. Vicente rose from a project inspector to principal engineer, where he led design and survey teams for a multimillion dollar water supply rehabilitation project before joining his family in the United States in November 1992.

Vicente worked 13 years for Motorola in Schaumburg, IL, where he was quality release program manager of wireless broadband projects before heading the quality management system (ISO9001) of the North America-design and development engineering department. In 2006, he became a transportation planner for the Allegheny National Forest. Vicente has a master's certificate in project management from George Washington University.

Joe Domitrovich is an exercise physiologist at MTDC. His project work includes hydration, nutrition, employee health, stress, and fitness testing. Joe also is a wildland firefighter. He has a bachelor's degree in kinesiology from California Polytechnic State University, San Luis Obispo. Joe received a master's degree in exercise physiology at the University of Montana where he is completing an interdisciplinary studies Ph.D. with an emphasis in exercise science.

Carlos E. Garcia joined SDTDC in February of 2008 as a civil engineer. He helps develop new or improved equipment, systems, materials, processes, techniques, and procedures for more efficient management of forested lands. Carlos started with the Forest Service in 2005 as the assistant forest engineer for the Plumas National Forest, working primarily on partnership development. He spent a summer working in the National Partnership Office on a Washington Office detail.

Carlos was born and raised in southern California, received an associate of arts degree in architecture from San Bernardino Valley College, and a bachelor's degree in architectural engineering from California Polytechnic State University, San Luis Obispo. From 1982 to 2005 he worked as a civil/structural engineer for the Navy, where he was a national expert in construction specifications serving at the Seabee Construction Battalion Center.

Greg McBride joined MTDC in November 2008 as a physical science technician working in the Wildland Fire Chemical Systems laboratory. Greg received a bachelor's degree in physical natural science from the University of Hawaii at Hilo. Before receiving his degree, Greg served as an F16 crew chief in the U.S. Air Force and was a hazmat/hazwaste program manager at the Aviano Air Base in Aviano, Italy.

Lexie Nichols joined MTDC as an office automation assistant in July 2008, performing front desk duties, such as answering the phone, editorial assistance, and staff support. Lexie is a Missoula native in her senior year at the University of Montana, studying classical civilizations and Latin.

Fitzpatrick Nobles joined MTDC in November 2008 as a student programmer helping to maintain and develop the center's Web sites. Fitzpatrick is a junior at the University of Montana, studying computer science. He moved to Missoula from Grand Forks, ND, where he majored in commercial aviation at the University of North Dakota. Fitzpatrick was born and raised in Idaho Falls, ID.

Ken Olson joined MTDC in 2008 as an electronics technician. He builds components and prototype circuits for center projects and studies electronics at the University of Montana-College of Technology. Born in Ramsey, MT, and raised in Missoula, Ken studied anthropology at the University of Montana. He worked in electronics while in the U.S. Army.

Jonah E. Vaughan joined MTDC in November 2008 as a student Web assistant helping convert publications to HTML and learning Web programming. Jonah, a University of Montana freshman majoring in computer science, spent last summer working as a wildland firefighter for the Montana Department of Natural Resources and Conservation. Jonah's dream career would combine his computer skills with wildland firefighting.

T&D Snippets

Know More With Less Effort

You can be among those in the know about recently completed T&D projects by subscribing to "T&D Snippets."

"T&D Snippets" gives you a quick summary of new reports, tech tips, DVDs, CDs, Web sites, presentations, and posters as they become available so you can view them, print them out, or order them.

The latest snippet is "T&D Snippets: Evaluating Lightning Protection on Lookouts and Communication Facilities" (*http://www.fs.fed.us/t-d/pubs/* Username: t-d, Password: t-d, search for "snippet").

To subscribe, send an e-mail message with the subject "Subscribe TD Snippets" to:
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On the Web...

- Forest Service and Bureau of Land Management employees–View MTDC and SDTDC documents at: *http://fsweb.mtdc.wo.fs.fed.us/search*
- Everybody–View SDTDC documents at: *http://www.fs.fed.us/eng/pubs/*
- Everybody–View MTDC and SDTDC documents at: *http://www.fs.fed.us/t-d/* (Username: t-d, Password: t-d)

Missoula Technology and Development Center (MTDC)
5785 Hwy. 10 West; Missoula, MT 59808–9361
Phone: 406–329–3900 • Fax: 406–329–3719
Forest Service Intranet Web site: *http://fsweb.mtdc.wo.fs.fed.us*

San Dimas Technology and Development Center (SDTDC)
444 East Bonita Ave.; San Dimas, CA 91773–3198
Phone: 909–599–1267 • Fax: 909–592–2309
Forest Service Intranet Web site: *http://fsweb.sdtdc.wo.fs.fed.us*

Library Card

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This issue of T&D News describes projects that are underway and finished products that are available at the Forest Service's Missoula and San Dimas Technology and Development Centers. Topics in this issue include:

- GPS Testing and Evaluation Program
- Designing Road-Stream Crossing Structures for Fish Passage
- Updated Trail Bridge Information on the Web
- What's in That Smoke?
- New Equipment Makes Weed Spraying More Precise
- Fire-Safe Alternatives to Wood Shingles on Historic Structures
- Keeping Horses in Mind When Designing Trails and Campgrounds
- Heli-Claw Delivers the Mulch
- The Scoop on Flying Fish
- Clean, Cool Water on the Fireline
- When Lightning Strikes
- Pay Less, Save More
- All Is Not Ducky With Duckweed
- Sick of Work? Maybe It's Just Your Workplace
- Shedding Light on Shedding Watts
- Preserving Forest Service Buildings
- Standard Plans for Water Control Buildings
- Using Explosives for Safe and Efficient Hazard Tree Removal
- Bees, Wasps, and Ants: First Aid Tips for Field Employees
- New Faces at MTDC and SDTDC
- T&D Snippets

Keywords: accessibility, all-terrain vehicles, aquatic weeds, electrical resistance, energy conservation, epinephrine, erosion control, Federal Highway Administration, fuzzy stumping, grounding, habitat fragmentation, historic preservation, inspections, monitoring, packstock, pesticides, public utilities, recreational facilities, roofing, safety at work, satellites, sipping hydration systems, smoke, snorkels, surveying instruments, suspension bridges, training, triploids, utility vehicles, ventilation, well houses

Forest Service Technology & Development Program

PROJECT PROPOSAL

Project Name/Title:

_____

_____

_____

Date:_____

Submitted by:_____

Unit:_____

Address:_____

_____

_____

Phone:_____ E-mail:_____

OVERALL PROBLEM/OBJECTIVE STATEMENT *(Describe the problem, how the work is currently being done, and why improvement is needed):*

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PROPOSED TECHNOLOGY & DEVELOPMENT WORK *(Describe your concept of the end product, such as a new equipment design, a PowerPoint presentation, a video, a handbook, Web site, CD, DVD, etc.):*

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POTENTIAL BENEFITS *(Describe how this project will reduce cost, save time, improve safety, increase efficiency, or improve resource management):*

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Center Manager
San Dimas Technology & Development Center
444 East Bonita Ave.
San Dimas, CA 91773-3198
Phone: 909–599–1267
Fax: 909–592–2309

Center Manager
Missoula Technology & Development Center
5785 Hwy. 10 West
Missoula, MT 59808-9361
Phone: 406–329–3900
Fax: 406–329–3719

Return address

Stamp

USDA Forest Service
Missoula Technology and Development Center
5785 Hwy. 10 West
Missoula, MT 59808–9361

Pesticide Precautionary Statement

This publication does not contain recommendations for the use of pesticides, nor does it imply that the uses discussed here have been registered. All uses of pesticides must be registered by appropriate State and/or Federal agencies before they can be recommended.

CAUTION: Pesticides can be injurious to humans, domestic animals, desirable plants, and fish or other wildlife—if they are not handled or applied properly. Use all pesticides selectively and carefully. Follow recommended practices for the disposal of surplus pesticides and pesticide containers.