MISSOURI resources

Spring / Summer 2005 • Volume 22 • Number 2

Director's Comment

I want to say "hello," and share some introductory thoughts with you. Gov. Blunt named me director of the Department of Natural Resources in February. I take seriously my call to public service, having served as a state representative and, most recently, as a state senator for the southwest Missouri counties of Barry, Christian, Douglas, Howell, Lawrence, McDonald, Ozark, Stone and Taney.

During my 20-plus years as a legislator, I have been persuaded that most folks across this state have no idea of the positive contributions this agency makes in our lives. Much of the indifferent or negative viewpoint we encounter involves an enforcement or regulatory experience. This experience may have been personal, shared by an acquaintance or viewed in the media. Whatever the source, when people are negatively impacted in our private or public pocketbooks, our jobs, or our businesses, we tend to react negatively. That is human nature.

We cannot change one minute of the past, but we as an agency can influence the future in a positive manner. My staff and I are proud and excited to serve you during this time of innovation in government.

Change at the department is clearly in the works. You have to change to improve. I look forward to sharing our efforts toward improved service with you in this column. Water quality, air quality and renewal of the parks-and-soils sales tax remain the department's priorities.

The parks-and-soils sales tax was first established in l984 and then renewed by Missouri's voters in l988 and l996. The tax funds three-quarters of our state parks system with its 83 state parks and historic sites with more than 140,000 acres for your enjoyment. The tax also funds almost all of our soil and water conservation efforts. The majority of the soils side of this tax is used to assist agricultural landowners through voluntary programs administered by soil and water conservation district boards in each county. By promoting good farming practices that help keep the soil on the fields, each soil and water conservation district is conserving the productivity of our working lands. In fact, since 1982, Missouri has reduced its rate of soil erosion more than any other state.

Just as we must remain accountable to Missouri taxpayers on our use of the parks-and-soils sales tax, we must adapt to the call for change from outside the agency. I hope to improve the way we do business on a daily basis. We will focus more time on solving issues that have great impacts rather than spending time dealing with small but fractious issues. And, we will use common sense to evaluate and prioritize the issues. The key is directing our efforts and resources at solutions based on how critical a specific problem may be in relation to our timeline for action.

How can the agency best serve Missouri citizens? By finding a better balance between protecting our natural resources and spurring economic growth. By speeding up our permit responses. By being more responsive, and providing prompt, friendly customer service as we search for the best solutions to environmental problems within the limits of federal and state laws and regulations.

I look forward to hearing from you on how we can improve our services at the Department of Natural Resources. You can reach us at 1-800-361-4827, by e-mail at [oac@dnr.mo.gov] or on the Web at [www.dnr.mo.gov].

Doyle Childers

Doyle Childers
Missouri Department of Natural Resources

MISSOURI resources

Spring / Summer 2005
Volume 22 • Number 2

State of Missouri Governor
Matt Blunt

Director, Missouri Department of Natural Resources
Doyle Childers

Deputy Department Director
Jeff Staake

Deputy Department Director
Ron Kucera

Interim Director, Division of Administrative Support
LaVerne Brondel

Interim Director, Air and Land Protection Division
Dan Schuette

Director, Geological Survey and Resource Assessment Division
Mimi Garstang

Director, Division of State Parks
Douglas Eiken, Ph.D.

Director, Water Protection and Soil Conservation Division
Scott Totten

Director, Environmental Improvement and Energy Resources Authority
Tom Welch

Editor
Stuart Westmoreland

Assistant Editor
Philip J. Tremblay

Editorial Board
John Balkenbush
Denise Becker
Kathy Deters
Dawn Fredrickson
John Knudsen
Connie Patterson
Kenneth Seeney

Design Director
Belinda Hughes

Assistant Designer
Ruby Wells

Associate Designer
Cari Schulte

Photographer
Scott Myers

Circulation
Liz Barnhart
Jeanne E. Binkley

Mission Statement
The mission of the Department of Natural Resources is to preserve, protect, restore and enhance Missouri's natural, cultural and energy resources and to inspire their enjoyment and responsible use for present and future generations.

MISSOURI RESOURCES
is published three times per year by the Missouri Department of Natural Resources to inform readers about important natural resource issues and how they are being addressed. Any correspondence should be directed to the editor at the Department of Natural Resources, Publications, P. O. Box 176, Jefferson City, MO 65102-0176, or call 1-800-361-4827.
E-mail address: moresdnr@dnr.mo.gov
MoDNR home page: www.dnr.mo.gov

MISSOURI RESOURCES
is available in alternative formats.

As a recipient of federal funds, the Department of Natural Resources cannot discriminate against anyone on the basis of race, color, national origin, religion, age, sex, or disability.

If anyone believes he or she has been subjected to discrimination for any of these reasons, he or she may file a complaint with either the Department of Natural Resources or the Office of Equal Opportunity, U.S. Department of the Interior, Washington, D.C., 20240.

Missouri Resources is printed with soy ink on recycled paper at Banta Publications Group, Liberty, Missouri.

PRINTED WITH SOYINK

printed on recycled paper

table of contents

Missouri Department of Natural Resources

page 2

Bike to Work

Getting the Cycle Started

by Larry Archer

With the price of gas these days, biking to work is looking better all the time. Besides the added exercise, some find that even long commutes by bicycle take only slightly more time than by car.

page 6

Hold Your Ground . . .

BMPs Stop Erosion; Keep Water Clean

by Guy Frazier

Best Management Practices (BMPs) have been helping farmers control topsoil loss for years. Land developers are now taking advantage of that knowledge, and the water quality benefits reach far beyond the new subdivisions and malls.

page 10

"Trash Cams" Nab Dumpers

Provide Evidence for Local Enforcement

by Craig Abbott

Illegal dumping costs Missouri counties untold dollars in cleanup costs every year. Worse, water and ground pollution, as well as decreased property values associated with dumps, run the tab even higher. Thanks to innovative and inexpensive technology, the guilty are beginning to foot the bill.

14 • News Briefs
Resource Honor Roll, Letters, E-Notes, Time Exposures

20 • Resources to Explore
Of Grave Concern

23 • Teacher's Notebook
Food for Thought

25 • One Last Word
Make That Call

DNR photos by Scott Myers

Above right: A mourning figure graces the William Jewell monument at Jewell Cemetery State Historic Site in Columbia.
Above: Snowy egrets and great egrets feed in a wetland at Edward "Ted" and Pat Jones – Confluence Point State Park.
Cover photo by Scott Myers.

Bike to Work

Getting the Cycle Started

by Larry Archer

photographs by Scott Myers

Roger Randolph's morning commute usually takes just under a half hour – not much by metropolitan standards, but pretty common in Jefferson City. Unlike many of his fellow commuters in cities small and large, Randolph suffers none of the normal commuting complaints: traffic headaches, frustration and aggression.

In fact, he usually arrives at work refreshed, invigorated and ready to work – as soon as he parks his bicycle.

Randolph, of the Missouri Department of Natural Resources Water Protection and Soil Conservation Division, regularly makes the five-mile ride to work in 23 minutes – only seven minutes more than the same trip by car. For him, time spent exercising and time spent commuting are now nearly one and the same.

"I've bicycled quite a bit over the years and it just seemed to be a good way to get aerobic exercise," he said. "That's almost free time that I get to exercise."

While physical fitness is the main motivation for many bicycle commuters, there are other work-related benefits, according to Caryn Giarratano, Ph.D, State Bicycle and Pedestrian Program coordinator for the Missouri Department of Transportation. "Commuting allows people to wake up, clear their heads," Giarratano said.

The morning bike ride increases oxygen to the brain – resulting in better preparation for daily decision making, and produces endorphins, which cause people to feel relaxed and peaceful. Riding also increases lean muscle mass, which results in increased fat burning while at rest, she said. "All of these activities indicate benefits to the individuals."

Bringing these benefits to more Missourians by encouraging bicycling and walking is included in the goals of Giarratano's program. Success begins with encouraging in-

Author Larry Archer joins the afternoon traffic in downtown Jefferson City. Cycling commuters, like motorists, do best when they leave lots of room, buckle (their helmet) up, and signal their turning intentions well in advance.

terest among potential bicycle commuters. "In order to allow bicycling, people have to feel that their choice of transportation supports their lifestyle," she said.

Once cyclists have made the decision to commute and have prepared themselves (see page 5 sidebar), it's up to the community to provide the adequate "built environment," she said. The ideal built environment would include features that allow safe and shared use of streets (signage, wide shoulders or bike lanes) or separate off-road bike/pedestrian trails. Communities wanting to encourage cycling need to start with their transportation plan and make sure that the needs of cyclists are included. All communities over 50,000 are required to have a transportation plan, and smaller communities are encouraged to have one.

In St. Louis and Kansas City, not-for-profit groups work with municipal governments to promote cycling in general, including bicycle commuting. "Our primary mission is to promote the bicycle as transportation," said Bob Foster, executive director of the St. Louis Bicycle Federation and an 11-year bicycle commuter.

Archer arrives at the new Lewis and Clark State Office Building on Riverside Drive. Ample bicycle parking near the workplace and onsite shower facilities can help make the two-wheeled commute an efficient, enjoyable and healthy choice.

The wider the street, the better. On faster arteries, where traffic also can be heavy, bike commuters are more visible on the widest streets. Not only can they stay well to the right of vehicles, they also can often bypass snarls, minor accidents and other temporary hindrances. Cyclists, however, are obligated to obey all vehicle traffic laws, signage and control lights – even speed limits.

The cycling commuting community in the cities is still relatively small, but it is slowly picking up steam, Foster said. "Just about every day I'll see five or six people on the route I'm taking," he said. He commends St. Louis for integrating bicycling with public transportation. Many buses now have bicycle racks and the city's light-rail system, Metrolink, allows cycling commuters to bring their bicycles on the train for no additional charge.

In Kansas City, buses also have bicycle racks, which give bicycle commuters the option of taking the bus to work in the morning and riding home in the afternoon, said Aaron Bartlett, a bicycling/pedestrian planner for the Mid-America Regional Council. "That concept has really won us a lot of converts," Bartlett said.

Bartlett also sees the environment for cycling improving. Kansas City adopted a bicycle plan in 2002 and most of the metropolitan area's major street plans include consideration of bicycles. Similarly, many of the communities within the metropolitan area are working to "create a network of on-road bicycle routes and lanes," he said.

Bicycle promoters frequently have to work hard to be heard by city officials, whose attention is being sought by a number of groups pushing divergent interests. Such is not the case with Columbia Mayor Darwin Hindman, who describes himself as a "recreational, commuter bicyclist." "I ride my bike to work almost every day," said Hindman. "I've been promoting bicycling and walking ever since I've been mayor."

Hindman was a friend of cycling long before he became mayor. An ardent supporter of healthy, active lifestyles, he was an early promoter of the Katy Trail State Park and the MKT Trail, which connects downtown Columbia to the Katy Trail. Currently, the city's plan calls for trails that encircle it, with spokes into neighborhoods and the city core. It is currently about 20-25 percent complete. Work is underway on a system of trails connecting a number of city parks and natural areas; and street standards now include pedways on collectors and arterial streets. "As time goes by we're going to have better and better facilities," he said.

Hindman's early "Mayor's Challenge" to encourage people to ride to work and school at least once a week has evolved into "Bike, Walk, Wheel Week," which in 2004 drew more than 1,000 participants using "self-powered," mostly bicycle, transportation to work. While Columbia's Bike, Walk and Wheel Week is a strictly local event, both St. Louis and Kansas City are participating in the national Bike to Work Week in May. Columbia also has added bike racks to all city route buses to encourage the bus/bike tandem commute.

Once riders and municipalities have made the commitment to bicycling, employers can complete the effort by providing places for riders to safely park their bikes and, if possible, shower facilities for riders to clean up. While many cyclists have learned how to freshen up without full shower facilities, many building plans now include such options. Showers, lockers and a bicycle rack are all features of the Lewis and Clark State Office Building in Jefferson City. The building will serve as the main office of the Department of Natural Resources.

"Including bicycle-friendly features in the building's design was part of an overall effort to have that building be a physical manifestation of our mission to be stewards of Missouri's natural resources," said Jeff Staake, deputy director of the Department of Natural Resources.

While practical reasons – fitness, health, environment and economics – typically rate at the top of most bicycle commuters' list of motivation, Foster said he's found what he thinks is an even better incentive. "Remember when you were a kid and used to ride your bike everywhere and how fun that was?" he said. "Well, it's just as much fun when you're grown up."

Larry Archer is a division information officer for the Outreach and Assistance Center.

GETTING STARTED

The benefits of bicycle commuting are many: improved health and fitness, decreased impact on the environment and lowered transportation costs. However, many potential commuters allow themselves to become stuck on issues that keep their bikes in the garage and their cars on the road to continue the daily rush-hour grind.

Usually those issues revolve around concern over riding in traffic, and the need to clean up and change clothes, if necessary. Experienced bicycle commuters have found ways to deal with these roadblocks.

Planning your route in advance is one way to deal with traffic, said Aaron Bartlett, a bicycle/pedestrian specialist with Mid-America Regional Council in Kansas City. Scouting alternative routes by car can make new riders more comfortable with the terrain. Using the "Avoid Highways" feature of MapQuest.com also can provide a few potential alternate routes that avoid the worst traffic.

Frequent rider Roger Randolph suggests that an early start makes for a more relaxing ride. "I leave early in the morning, so I avoid a lot of traffic," Randolph said. By leaving work 30 minutes earlier or later in the afternoon can also help riders avoid the worst rush hour has to offer.

Following the rules of the road is key to dealing with traffic, said Caryn Giarratano, coordinator of the Missouri Department of Transportation's bicycle/pedestrian program. "A bicycle by state law is classified as a vehicle, so bicyclists have all the same rights and responsibilities as motorists," Giarratano said.

Those include riding on the right side of the road, signaling stops and turns, and obeying traffic signs and signals. In addition to signaling intentions with the traditional hand/arm gestures, making eye contact with drivers can add another layer of helpful communication. "You need to watch, and you need to make eye contact (with drivers)," said Randolph. "You kind of make a little peace with them for a few seconds."

Like any exercise regime, riding to work is more enjoyable and more likely to become habitual if done with a friend, said Bartlett. "When riding with someone else, you have increased visibility. You also have help if you experience a flat tire or other mechanical difficulty," he said. "Also, people tend to bike more if they have someone to bike with."

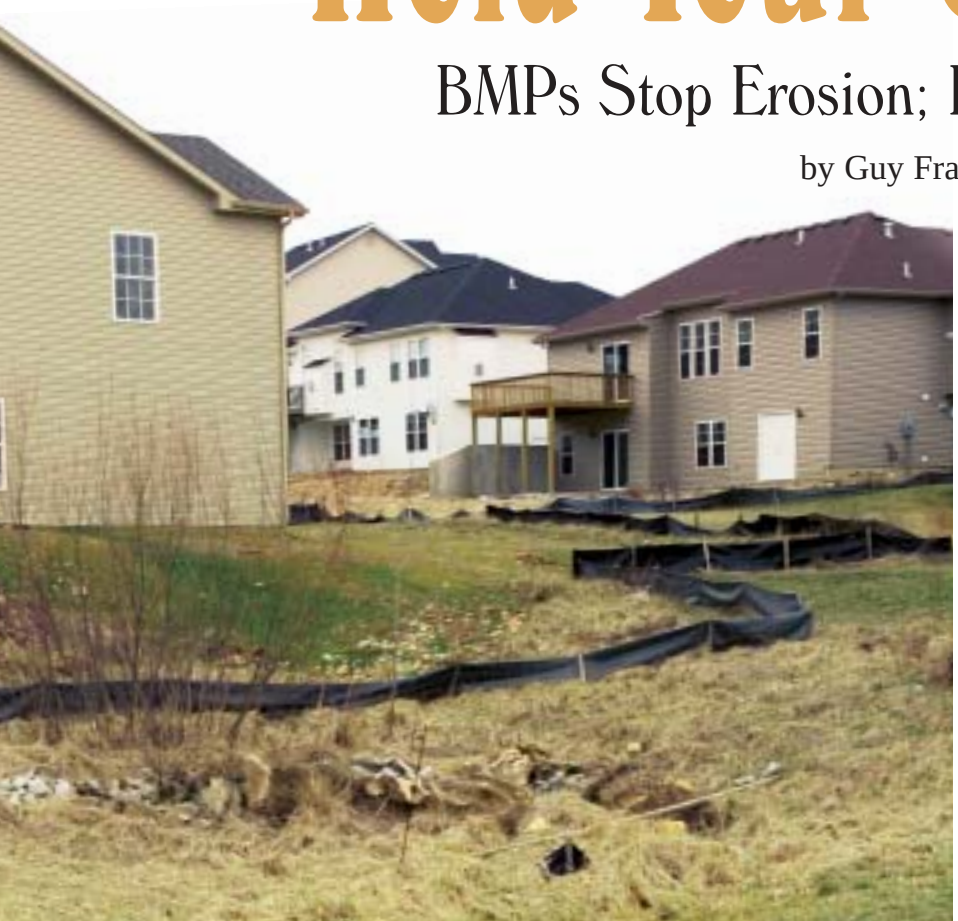
Where shower facilities are available, many riders drive to work early in the week with a supply of clothes and drive at the end of the week to take them home. Where showers are not available, innovative riders have been able to "freshen up" at a sink.

Several organizations have Web sites with additional details on getting started – and sticking with – bicycle commuting, including League of American Bicyclists [www.bikeleague.org] and Bike-to-Work.com [www.bike-to-work.com/].

Hold Your Ground...

BMPs Stop Erosion; Keep Water Clean

by Guy Frazier



DNR photo by Scott Myers

For nearly sixty years, agriculture has worked to slow down water runoff to minimize erosion in order to conserve the fertile topsoil. The Best Management Practices (BMPs) developed for agricultural producers to conserve soil are the foundation for those BMPs developed to control storm water runoff on land disturbance sites. The runoff, erosion and water pollution problems faced by developers are not unlike those faced by farmers. They also occur in both rural and urban settings and can quickly impact large numbers of people.

Although the focus is a little different from agriculture, the reasons for installing BMPs for land disturbance are similiar. A

common goal of both agricultural and storm water BMPs is to keep the water that is discharged from the property free from sediment. So what's the big deal? Why should we care if a little dirt gets washed away? Did you know that sediment continues to be the largest water pollutant by volume? Along with soil particles are other contaminants that we often forget about. Oils, fuels, pesticides, fertilizer, litter, metals and other chemicals cling to that soil particle.

In order to use BMPs, it's important to have an understanding of erosion and storm water runoff. Erosion occurs naturally and often takes tens of thousands of years or more to create geologic wonders. In the case of the Grand Canyon, it took millions of years.

Generally, there are five different types of erosion that can occur due to storm water runoff. As a raindrop falls to unprotected soil it can create an impact with a splash that begins to dislodge soil particles. As more raindrops fall to the ground, more soil particles are dislodged and mixed, making soil soup. This is known as splash erosion. Water follows the path of least resistance. If the area is wide enough with a gentle slope, the soil and water mix begins to move in sheets. In many instances, sheet erosion is hard to see after a storm. As the sheets of water begin to concentrate, tiny channels or rills develop. Rill erosion is small enough that it can easily be stepped across. As several rills come together and concentrate they will eventually form a gully. As several gullies join, they create channel or stream erosion.

Erosion control is essentially energy dissipation. The volume and velocity of water runoff are the main factors. If the volume of water can be reduced, then the destructive energy is reduced. The same is true if water velocity is reduced. By slowing water down, the destructive energy is reduced. For example, the flow of water through a garden hose really does little to clean your muddy boots. But if you place your finger over the end of the hose, the resulting increase in water velocity quickly washes the mud away. This analogy helps explain erosion control. We must reduce the energy by reducing the volume of water, reducing the speed of the water, or both.

A Storm Water Pollution Prevention Plan (SWPPP) is the mortar that links a system of BMPs. Without a good plan, time and money often is wasted on implementing practices that fail because they do not function as a system. Before construction starts, a plan should be drafted to address storm water runoff. As with any building project that is about to start, a plan should be developed or the result may not meet expectations. When developing a plan, keep in mind that vegetation has been referred to as the "skin of the earth." Wherever vegetation is removed and the soil exposed, the earth "bleeds" sediment. Just as a surgeon makes precise incisions to limit the amount of cutting during surgery, minimizing cover removal and re-establishing surface vegetation as soon as possible will speed the "healing process."

… vegetation has been referred to as the "skin of the earth." … re-establishing surface vegetation as soon as possible will speed the "healing process."

DNR file photo

Making precise cuts also applies to the construction phase. Instead of completely clearing areas where work will not be done for months, it is best to leave the vegetation in place until construction begins. This area can assist erosion control by reducing the volume of water runoff by allowing infiltration and slowing water as it flows across the surface. Inspecting and maintaining BMPs

(Opposite page, top) Paul Morris and Thabit Hamoud from the St. Louis Regional Office examine a silt fence at a construction site in St. Louis County.
(Opposite page, bottom) A residential development in Boone County uses a combination of BMPs and phased construction to help reduce storm water runoff.
(Above) The department offers erosion control workshops that cover BMPs and their installation.

DNR photo by Scott Myers

is also very important. At some point in time, all BMPs will need maintenance. Each site and situation is different both in location and topography. Considerations made during the planning process can pay great dividends later.

According to Raymond Smalling, a civil engineer who is involved on a variety of private land construction developments, "Sediment and erosion control starts with a good plan that evolves over time with properly implemented … BMPs."

Here is a brief look at some helpful BMPs, organized by the type of control, or function, they provide.

A consideration often overlooked is site preparation. A good example is the entrance to a public road. The entrance should be constructed using geo-fabric with clean rock over the top. The geo-fabric helps keep underlying soil from working up through the rock. The entrance should be long enough to allow mud to fall off site-exiting vehicles before entering a public road. Prior to grading, plans should be made to stockpile topsoil to be used later for final grading. Topsoil has all the ingredients to help vegetation establish quickly.

Surface stabilization practices are the first to be determined and are critical to the overall plan. Examples of surface stabilization BMPs include temporary and permanent seeding, sodding, mulching, tree protection, erosion control blankets, land grading, retaining walls, dust control and soil bioengineering for slope protection.

DNR file photo

These BMPs should be implemented as soon as possible to protect disturbed areas and assist with reducing water runoff volume and velocity.

"Probably the most effective and least-used BMP for controlling storm water and urban runoff is phased development and construction," said Bob Broz, water quality specialist with the University of Missouri Extension. "If a large tract is being developed, leave it in its natural condition as long as possible. Most builders think they are saving time and money by going out and clearing the entire area of a development, even though only very small portions are going to be developed at any given time."

Some BMPs address runoff controls which include temporary diversions, permanent diversions, perimeter protection, temporary swales and right-of-way diversions. Diversions can help protect disturbed areas by reducing the volume of water.

Runoff conveyance practices help protect areas where high volume and high velocity water is anticipated. These practices serve to slow down and manage the volume of water moving through a channel or drain. Some options are grass-lined channels, rip-rap (rock)-lined channels, temporary slope drains, subsurface drains, rocky outlets and energy dissipaters, which slow the water down and allow infiltration.

Storm drain inlet protection is necessary since nearly all storm drains directly discharge to streams and rivers. This is the last chance to treat storm water before it enters these receiving streams. It is important to slow down water just before it enters an inlet. This allows sediment to settle out before water passes into the inlet.

Sediment control can be accomplished with sediment fences, straw bale sediment traps, rock dams, filter strips, temporary sediment traps, or sediment basins.

(Below) Thabit Hamoud from the Department of Natural Resources' St. Louis Regional Office compares a project's Storm Water Pollution Prevention Plan (SWPPP) to actual construction on the ground. A well planned and implemented SWPPP is key to successful erosion control.

DNR photo by Scott Myers

DNR file photo

Like tools in a toolbox, no single BMP is best for every situation. But, according to Broz, some of the older ideas still work just fine today.

"Many of the older practices are still the most cost effective … . The installation … of silt fences is a good example. … they are one of the most effective ways we have of reducing and controlling soil erosion from construction sites," Broz said.

Even today, the most recognized BMP is probably the sediment fence. It has been used to completely treat a given construction site, and seldom is it successful by itself. After viewing hundreds of sites, it appears we expect sediment fences to do much more than they are capable of and for much longer than they are designed for.

Storm water management is no more than allowing water to stop and release slowly and trying to replicate the natural volume of water flowing through an area prior to being developed. This can be accomplished using detention ponds and basins, extended detention ponds and basins, infiltration basins, infiltration trenches, porous pavement and constructed wetlands.

Stream protection practices such as temporary stream crossings, streambank protection, streambank setbacks and channel clearing can aid in protecting streambanks.

The conversion of undeveloped land to residential and commercial use is on the rise in many parts of Missouri. The potential for erosion in these areas is part of the development equation. Fortunately, there is increased awareness of potential storm water problems associated with progress and development. Technology is getting better and there are BMP's for nearly every situation. The key is planning and using the right BMP at the right time and in the right place. Used correctly, BMPs can minimize the negative effects on water quality caused by commerical and residential development projects.

Space precludes a complete listing of storm water BMPS and their details. If you are interested in learning more about managing storm water, please contact the department's Outreach and Assistance Center (OAC) at 1-800-361-4827. Our Protecting Water Quality Web site has helpful information about Best Management Practices and runoff. Visit [www.dnr.mo.gov/wpscd/wpcp/wpcp-guide.htm]. OAC also offers free workshops on erosion control.

Guy Frazier is an environmental specialist in the department's Outreach and Assistance Center. Frazier specializes in assistance and training on storm water issues.

(Left) One popular use of erosion control blankets is stabilizing drainage channels to slow runoff. (Right) Establishing vegetation quickly on a site is essential to the effectiveness of a BMP. A department publication, Protecting Water Quality, lists optimum seeding dates. With the exception of Nov. 15 through Dec. 31, certain grass seeds can be applied and germinated with acceptable results.

"Trash Cams" Provide

DNR file photos

Nab Dumpers

Evidence for Local Enforcement

by Craig Abbott

As the sun comes up over rural Saline County, Mo., nature begins to come alive. A flock of Canada geese flies overhead. Wildflowers dance randomly in the breeze. A covey of bobwhite quail scurries across the gravel road. These glimpses of natural beauty are a treasured resource, enjoyed by countless Missourians in every county of the state.

Unfortunately some aren't that lucky and the latest tire or bag of garbage carelessly thrown on a pile the night before spoils this vision of natural wonder. Now, in addition to that junk washer and dryer, various construction and demolition waste, and rotting household trash, one more illegally dumped item has made its way to an illegal dumpsite situated off the roadside. Illegal dumps are not a natural feature. They are a blight that potentially effects the personal landscape of every Missourian.

It is hard to believe that our neighbors would do such a thing, but the reality is that some people do ignore their responsibility to manage their trash properly. Illegal dumping is and continues to be a problem throughout Missouri. From St. Louis to Kansas City, people are trashing our landscape. The Department of Natural Resources' five regional offices receive hundreds of complaints each year from Missouri citizens who want to get lawbreakers to stop dumping their trash illegally. These frustrated citizens know that illegal dumps cause problems for everyone.

Environmental Threats

Dumpsites are a major cause for concern, because they pose both environmental and public health and safety threats. They provide breeding grounds for mosquitoes, rats and other disease-carrying animals, and they decrease property values. Dumpsites also have the potential to contaminate surface and groundwater, pollute the air if burned, and cause an odor nuisance.

Mary Hopke, an environmental specialist with the department's Northeast Regional Office, spends most of her days in the field investigating complaints about people dumping trash along gravel roads, in creek beds, along stream banks, and even in sinkholes, which are direct paths to our drinking water.

"I see everything: from the homeowner dumping household trash to the contractor who dumps large amounts of construction and demolition waste while trying to avoid landfill disposal costs," Hopke said. She says that each piece of trash illegally dumped has the potential to contaminate Missouri's surface waters or even the well at a private home.

(Left) The department and local law enforcement agencies are using cameras, which can be hidden up to half a mile away, to monitor and gather evidence of illegal dumping throughout the state.
(Below) In one instance, hidden cameras provided enough evidence to charge 15 defendants on 25 charges of illegal dumping near the town of Gilliam in Saline County.

DNR file photo

Meramec Regional Planning Commission photo

(Top) Author Craig Abbott, of the department's Solid Waste Management Program, examines trash at an illegal dump near Beulah in Phelps County.
(Above) Fines levied against convicted dumpers help pay for the cost of cleanup.
(Right) Trash dumped illegally is not only unsightly but can also lead to groundwater contamination.

What Is Being Done

Sometimes finding the people responsible for illegal dumping is easy and the dumpsite gets cleaned up. Occasionally, however, the investigation reveals that the violator cannot be identified. This used to result in the department not being able to do anything about the problem. Today, that doesn't have to be the end of the story. Technology offers a chance to catch those who dump illegally, and on their shoulders fall the costs of cleanup.

Catching people in the act of illegally dumping trash may seem impossible, but the Department of Natural Resources has taken the position that illegal dumping will not be tolerated and the law will be enforced. Thanks to "trash cams," the violators are now exposed for all to see.

This program developed after the department received a federal grant aimed at reducing the amount of illegal dumping taking place in Missouri. Cameras now are set up on a random basis to monitor illegal dumpsites throughout the state. So far, the program has been very successful.

The cameras are activated by seismic detectors that sense a vehicle's approach or by an infrared beam that detects movement. The cameras can be installed as far as a half mile from the dumpsite and still capture identities and license plate numbers.

In early 2003, after a camera was installed near a Saline County dumpsite, 15 people were charged and convicted for violations of the Missouri Littering Law, which reads:

"A person commits the crime of littering if he throws or places, or causes to be thrown or placed, any glass, glass bottles, wire, nails, tacks, hedge, cans, garbage, trash, refuse, or rubbish of any kind, nature or description on the right-of-way of any public road

DNR photo by Scott Myers

or state highway or on or in any of the waters in this state or on the banks of any stream, or on any land or water owned, operated or leased by the state, any board, department, agency or commission thereof or on any land or water owned, operated or leased by the federal government or on any private real property owned by another without his consent."

Fines Provide Cleanup

It doesn't pay to dump trash illegally. In addition to being responsible for damage to the environment, the consequences of being caught can be just as unpleasant. Each person convicted of illegal dumping in Saline County was ordered to pay $750 in restitution so that the dumpsite could be cleaned up.

On April 15, 2004, Saline County Prosecuting Attorney Don Stouffer announced that nine more defendants had been charged with 18 counts of littering. The department's hidden cameras were used for five months to monitor activity at the dumpsite. The cameras recorded people dumping household trash, roofing materials, appliances, motor oil, tires, mattresses and box springs.

"We understand the people caught on tape may be required to pay for more than their fair share, but that is one of the consequences of illegal dumping," Stouffer said.

The department previously has had little success identifying dumpers. Illegal dumpers must be positively identified in order to collect penalties and require cleanup. If dumps are not cleaned up, experience shows that illegal dumping will continue. The department's regional offices spend a great deal of time responding to such complaints.

There have been numerous newspaper and magazine articles written about the concealed camera project over the past year. Several television interviews and radio reports have aired as a result of the project's success, as well. The department believes that this publicity helps deter illegal dumping and educates thousands of citizens about the laws, the impact and the risks of illegal dumping. The publicity also has prompted requests from agencies in at least 14 other states and Canada seeking specific information about the project.

Where Do We Get Rid Of Our Trash?

Missouri has 24 permitted landfills and 47 permitted transfer stations throughout the state. Local trash hauling services are available in most of the state or you can personally take your trash to these places. These disposal areas are permitted to take trash and are equipped with environmental protections, such as groundwater and gas monitoring wells that detect pollution if it occurs. In Missouri, at landfills and transfer stations, the average cost of disposal per ton is about $35, so why take the chance?

Take It Personally

The next time you see an illegal dumpsite, be assured that the Department of Natural Resources is doing everything possible to find and punish people for illegally dumping, but we can still use your help. If you know of an illegal dumpsite, you can make a difference by letting us know the location and directions to it.

To file a complaint, contact your local law enforcement agency or the Missouri Department of Natural Resources office in your area. You may also file an online complaint at [www.dnr.mo.gov/alpd/swmp/dumping/enf-instruct.htm].

Without putting yourself at risk, try to obtain the following information:

- License plate number and description of the vehicle involved (make, model, year, color, condition of vehicle)
- Number of persons involved, with description (gender, hair color, build, approximate age)
- Date and time of the incident
- Location and, if possible, directions to the dumpsite
- Ownership of the site, if known, either public or private
- Your name and telephone number, if you wish to include it.

Soon grass and wildflowers will grow again on the former illegal dumpsites in Saline County. Money collected from those convicted of illegal dumping has paid for the trash to be picked up and disposed of legally. The sites can again become a forested part of Missouri's scenic heritage.

For additional information on proper waste disposal and other solid waste management issues, please call our toll-free number at 1-800-361-4827; the department's Solid Waste Management Program at (573) 751-5401 or visit the program Web pages at [www.dnr.mo.gov/alpd/swmp/homeswmp.htm].

Craig Abbott is an environmental specialist with the department's Air and Land Protection Division.

Saving Green On Gasoline

With gasoline prices exceeding the $2 per gallon level across the entire country, the Missouri Department of Natural Resources is offering motorists hints on how to take the edge off recent gas price hikes.

Many analysts are predicting that nationwide gas prices are likely to reach and settle well above the $2 mark throughout the spring and summer driving seasons. This will lead many drivers to seek options to decrease their gasoline usage and lessen the shock of gas price increases.

To help motorists take advantage of these cost-saving opportunities, the Department of Natural Resources' Energy Center offers "Saving Green on Gasoline," a publication aimed at encouraging drivers to consider a number of steps that can decrease transportation fuel use. These steps range from keeping the family car in tune to decreasing single-driver commuting in favor of car pooling, using public transportation or riding a bicycle. Each option can save commuters significant money on getting back and forth to work.

The typical Missouri vehicle uses approximately 600 gallons of fuel and is driven more than 16,000 miles each year. With more than 4.2 million registered vehicles in Missouri, that adds up to a lot of miles driven, gasoline consumed and money spent at the gas pump.

Where it is available, public transportation may be the least expensive way to commute. One person switching from driving alone to riding the bus to work can reduce transportation costs up to $1,500 annually. Sharing a ride to the office with co-workers saves money, reduces stress, and helps cut down on traffic congestion and pollution. Regularly car pooling to work with a coworker can effectively cut commuting costs in half. The results can be savings of up to $1,500 a year in gasoline costs alone. Local Rideshare programs can connect workers with prospective carpool partners.

Even those who continue to drive themselves every day can save green on gasoline. A careful driver may get 20 percent more miles per gallon than the average driver and 50 percent more than a wasteful one. Proper car maintenance, including tune-ups and proper tire inflation, can also save car owners up to 10 percent.

Saving gas begins with buying a fuel-efficient vehicle. In addition to traditionally smaller high-mileage vehicles, many manufacturers now offer a number of gas/electric hybrid models or models that run on ethanol, biodiesel or other alternative fuels.

For more information on public transportation, car pooling, fuel-efficient vehicles and other ways to Save Green on Gasoline, visit the Missouri Department of Natural Resources' Energy Center Web page at [www.dnr.mo.gov/gasprices.htm]. Or call the Department of Natural Resources' toll-free at 1-800-361-4827.

Teachers Win Water Education Award

The Missouri Department of Natural Resources has presented the 2004 Water Education Award to five teachers for their efforts to educate students about water quality issues. Three teachers from southwest Missouri received their awards during the December meeting of the Watershed Committee of the Ozarks.

Mike Collins began the Reeds Spring High School Stream Team in 1993 and soon had students conducting monitoring on Railey Creek. They gather biological, chemical and bacterial information. Collins is also an advisor for a watershed committee and works closely with the Stone County Soil and Water District.

Geri Brown became an active volunteer monitor in 1996. Her Stream Team No. 210 has been involved with educational events, recruiting, workshops, writing articles for the newspaper, litter pick-ups, watershed inventories and putting up displays at local events. She is also involved with Project Wet teaching methods, recycling and the Science Club at Strafford High School.

Willard High School teacher Diane Crain began monitoring in 1994. Over the past 10 years, her Stream Team has donated more than 2,000 hours to the protection of streams in the Willard area. Crain is also head of the high school Science Club. Her students are helping with the research work that Drury University is doing on Stockton Lake.

Joan Twillman received her award during the World Water Monitoring Days celebration in St. Louis in October. Twillman began a Stream Team for her students at St. Charles West High School in 1993. Twillman's Stream Team has been involved with workshops, litter pickups, water quality monitoring, educational events and research projects. She has developed an Authentic Science Research class where students can work on extended projects. Twillman is also head of the Science Club. Club members have competed successfully in the Envirothon, Science Fairs and the Science Olympiad. Twillman is also the area coordinator for the Science Fair event and is a Project WET facilitator.

Susan Franklin teaches at Norborne High School in Carroll County. She became active in the Stream Team Program in 1996. She has guided her students through many monitoring activities on the Turkey and Wakenda Creeks. They have planted trees, completed a watershed inventory, held meetings and planned and completed litter pick-ups on the streams. She is active in leading students in the Envirothon, a competition focused on environmental issues.

The Water Education Award was created to help commemorate the 30th anniversary of the Clean Water Act. The department rotates the award between high school and middle school teachers each year. For more information, contact Priscilla Stotts with the Water Protection Program at (573) 751-1300.

Bike Trails Rate B+; Brochure Details 300-mile Ozark Trail

Congratulations are in order for Missouri's mountain bicycling trails. The International Mountain Bicycling Association (IMBA) recently released "grades" for all fifty states in their annual Report Card. Missouri received a B+ for mountain bike access, ranking 16th in the country. The grades are based on numerous factors, including the strength of grassroots efforts to promote trail building and trail use as well as the status of relationships among bicyclists, land managers and other trail users. Additionally, the state was ranked second, behind Scotland, in the People's Choice category, an online poll allowing IMBA members to vote for the best place for riding and trail access. These grades should not be taken lightly, as IMBA stands apart as a leader in the world of mountain bicycling advocacy. The Department of Natural Resources has partnered with IMBA to provide trail building workshops for its staff, and feels Missouri's ranking is due in part to its efforts to collaborate with volunteer and trail advocacy organizations to provide over 100 miles of mountain biking trails in Missouri's state parks and historic sites. For instance, Crowder State Park works closely with the Green Hills Trail Association, a volunteer trail advocacy group, to maintain existing trails and construct new trails within the park. For more information about the Report Card or to learn more about IMBA, visit their Web site at [www.imba.com].

In addition to its mountain biking trails, the Missouri state park system offers trails for every passion, including almost 200 miles of equestrian trails, almost 800 miles of hiking trails, and off-road vehicle opportunities, as well. The department continually strives to expand trail opportunities and has plans to construct new trails this year at Ha Ha Tonka State Park, Onondaga Cave State Park, and Bothwell Lodge State Historic Site. To learn more about trails in Missouri's state park and historic sites, visit the department's Division of State Parks' Web site at [www.mostateparks.com].

As well as managing its vast network of trails, the department also provides access to the Ozark Trail, Missouri's longest natural surface trail, at Johnson's Shut-Ins, Taum Sauk Mountain, Sam A. Baker and Lake Wappapello state parks. Over 300 miles in length, the Ozark Trail follows a scenic and varied route from the St. Louis metropolitan area southwestward through the Ozarks of southern Missouri to the Arkansas border where it will eventually join the Ozark Highlands Trail. A cooperative effort between the department, other federal and state land management agencies, and several not-for-profit organizations has resulted in a new brochure providing detailed information on the Ozark Trail in Missouri. You can request a copy of the new Ozark Trail brochure by calling the division's toll free number at 1-800-334-6946 (voice) or 1-800-379-2419 (Telecommunications Device for the Deaf). The brochure is also available on the Division of State Parks' Web site at [www.mostateparks.com/ozarktrail/index.html].

environmental notes

Don't Lose Your Shirt – Recycle It!

We've all done it. Our collection of old clothes, blankets, and jackets piles up for years. We sort out some that are good enough to give to a clothing charity or resale store. The rest might go in the trash. Many of us do not recycle used textiles, and statistics prove it.

Manufacturers of clothing, canvas, blankets and other woven or knitted fabric recycle about 93 percent of their textile processing waste, according to the Council for Textile Recycling. However, consumers in the United States discard more than four million tons of fabric each year. Most discarded textiles go to landfills. Nationally, only a million tons are reused or recycled. About half of this total is collected by second-hand stores, charities and churches for resale or distribution here and in foreign markets. The rest goes to rag graders who decide what and how fabrics can be reused. Buyers may pay 10 cents per pound for cloth "mixed rags."

Textile fibers are divided into 150 categories, most are sold as used clothing. The second largest end use is fiber for paper, coarse yarn and padding for chairs, auto floorboards and furniture. This takes more than 25 percent of the recycled tonnage. The final major use for recycled fabric is industrial wiping and polishing cloths, such as shop towels. This uses about 20 percent of the recovered textiles and most go to markets in this country. They are used for cleaning machines, wiping up spills or polishing products before they go to market.

To find out more about textile recycling, please check the Web pages at [www.textilerecycle.org]. Call the Missouri Department of Natural Resources at 1-800-361-4827 or (573) 751-5401 for further information on recycling, reuse or waste reduction options.

Passport Adventures Lead to State Parks

Are you ready for your next state park adventure? The new Missouri State Park

Passport Program began April 1 and will run through December 2006. The two-year program includes opportunities to earn special incentives to visit Missouri state parks and historic sites.

All Missouri state parks and historic sites are included in the passport but participants are required to visit only about 75 percent of all the parks and sites in each of the six regions to receive a special regional patch. Once the participant visits the designated number of parks or sites in the region and get their passport stamped, they can receive the patch at the last facility they visit. If the person completes all six regions, they also will get a prize package that includes camping coupons and a banner to display their patches.

This passport program also includes two bonus categories – overlooks and historic structures. Participants must visit eight of the 12 designated overlooks and 13 of 20 facilities with historic structures. The overlook category will take you from an overlook of the Missouri River at Weston Bend State Park in the northwest to a Mississippi River overlook at Trail of Tears State Park in the southeast. The historic structure category includes many structures built by the Civilian Conservation Corps in the 1930s, plus mills and covered bridges. Those who complete each of these bonus categories will receive a special prize.

Several years ago there was talk about the state of North Dakota diverting water from the Missouri River to other areas. I hadn't heard anything since, so I thought the project may have been dropped. The other day, I saw an article that indicated this is still active, and moving forward.

This is just a suggestion, but I would like to see an article in *Missouri Resources*, hopefully with maps or graphics, that gives the latest details on the project, as well as the potential effects on other states and the environment. A discussion of the politics involved would be interesting, as well.

H. L. Milberg
St. John

Editor's Note:

Tentatively, an article on this subject is scheduled for the Winter 2006 issue of Missouri Resources*. Although the politics alone would fill an entire issue, our intent is to offer the latest information as we know it, including the potential impacts referred to by Mr. Milberg. We sent him a copy of the Spring 1995 issue, which included a story entitled, "Water Fight." That piece provides excellent background on the topic, much of which is still applicable today. Additional copies are available for interested readers.*

Your Environmental Note on plastic shopping bags in the Winter 2005 issue was interesting, but, in my opinion, incomplete. When you say these bags are "tough to recycle," do you mean it's hard to find a recycling center that accepts them, or that when I return mine to Schnuck's that they have a hard time recycling them? If the former, why not name names about the retailers that use these bags but won't accept them back for recycling? If it's the latter, what makes them harder to recycle than, say, milk jugs?

You suggest that readers use fewer of these bags, but don't address the obvious question: "Paper or plastic?" Are the paper bags a better environmental choice, all things considered?

How do you feel about consumers who, like me, reuse these plastic bags for picking up dog poop and trash on my neighborhood walks, and then send them to the landfill? This is a common practice here in Kirkwood, where we have the great Francis Scheidigger Recycling Center, which recycles upwards of 300 tons per month, and deserves more recognition for their efforts.

Charlie Raiser
Kirkwood

Editor's Note:

The bags are difficult for recyclers to recover much plastic resin from. We feel, however, that the numbers of these bags (post-use) is underestimated, and if the general public would help show recyclers just how many they really are accumulating, more retailers would accept them, and, ultimately, more recyclers would attempt to recover the shopping bag plastic film. Paper IS probably a better environmental choice, but like you, we reuse the bags for cat litter box clean-out duties, vehicle trash bags and to hold various items on hunting and fishing trips. We are planning future articles on the subject as more options become available.

My grandma is the best and thriftiest woman I know. She would recycle plastic bags. She also was very good at crocheting. Combine those two traits and you have an interesting hobby. She would start at the bag opening, then with her scissors, spiral down the bag, cutting the plastic into strips about one inch wide. After she got her crochet hook out, she would tie the ends of the strips together, making a long plastic chain, and keep crocheting round and round until she had a rug. You can make any color combination and shape, and have fun doing it. It is an inspiring hobby and only needs a hook, scissors and plenty of plastic bags.

Linda Arathoon
Dexter

Letters

Letters intended for publication should be addressed to "Letters," *Missouri Resources,* P.O. Box 176, Jefferson City, MO 65102-0176 or faxed to (573) 751-8084, attention: "Letters." Please include your name, address and daytime phone number. Space may require us to edit your letter. You also can e-mail *Missouri Resources* staff at moresdnr@dnr.mo.gov

The new passports can be obtained free of charge at all state park and historic site offices or by contacting the Missouri Department of Natural Resources at 1-800-334-6946 (voice), 1-800-379-2419 (Telecommunications Device for the Deaf) or at [moparks@dnr.mo.gov].

Water Pollution Grants Offered

The Missouri Department of Natural Resources is accepting applications for grant funding to develop Watershed Management Plans for waters that are impaired by nonpoint source pollution. These grants are new to the department's 319 grant program and will range up to $15,000.

Educational institutions, local governments and not-for-profit organizations are eligible for the new Watershed Management Plan grants. Projects must address watersheds that are on Missouri's 303(d) list of impaired waters. Funds are limited for this opportunity and awards will be made on a first-come, first-served basis.

Nonpoint source pollution occurs when runoff from rainwater, snowmelt and irrigation carries pollutants such as garden fertilizers, pesticides, construction debris, and even pet and yard wastes, into local waters.

Funding for this grant program comes from the Environmental Protection Agency through the Missouri Department of Natural Resources. Applications will be accepted two more times in 2005: Aug. 15 and Nov. 15, or until the limited funding is awarded.

To obtain a copy of the Watershed Management Plan request for proposals or an application packet, please contact Darlene Schaben, Water Protection Program at 1-800-361-4827 or (573) 751-7428. For more information or questions about the application, please contact Greg Anderson with the Water Protection Program at (573) 751-7144.

For more information on the Water Protection Program, visit this Web page: [www.dnr.mo.gov/wpscd/wpcp].

'Tis the Season For Ozone

Ozone season officially began April 1 and ends Oct. 31. Ground-level ozone forms when carbon-based chemicals known as hydrocarbons and oxides of nitrogen react with sunlight.

Ground-level ozone can increase breathing difficulty for people who suffer from asthma, heart disease, emphysema and other respiratory diseases. Exposure to high levels of ozone can even cause healthy adults to experience breathing difficulty, especially those who exercise or work outdoors.

Citizens can check the ozone forecast each night with the weather and modify their activities. Citizens can reduce ozone by carpooling or using mass transit, waiting until after 7 p.m. to refuel their cars and avoiding use of charcoal lighter fluid.

For more information on ozone, please contact the Missouri Department of Natural Resources at 1-800-361-4827 or (573) 751-4817.

Tire Fire Risk Continues to Grow

Illegal waste tire dumps pose serious environmental and health threats. Polk and Ray counties witnessed those threats after a tire fire started in each county within one week of each other. Approximately 750,000 waste tires were piled in an old quarry in Polk County. The tire fire started March 11 and an estimated 4,000 to 10,000 waste tires remained after the fire died down. Approximately 20,000 waste tires were located in Ray County when a fire started on March 14. The thick black smoke could be seen for miles.

The Department of Natural Resources, U.S. Environmental Protection Agency and local fire officials worked to contain the fires. However, the terrain and difficulty in extinguishing tire fires forced a decision to let the tires burn. Tire fires can smolder for weeks, months or even years, releasing hazardous substances into the air, soil and potentially into water sources.

Missouri lost its waste tire fee in January 2004. The department used the 50-cent-per-tire fee to cleanup more than 13 millions tires across the state. The department estimates more than 3 million illegal waste tires remain scattered across Missouri.

New DNR Director To Address Waste Conference

Doyle Childers, director of the Missouri Department of Natural Resources, will be the keynote speaker at the 33rd annual Missouri Waste Control Coalition conference, June 26-28 at the Lodge of the Four Seasons, Lake of the Ozarks. The conference theme is "CSI: Environment" a title modeled after the TV crime show.

Childers will speak at 9 a.m. on June 27 at the opening session and will share his thoughts about the direction of the department.

Kristin Allan is president-elect of the MWCC and conference chairperson. She is manager of the Market Development Program at the Missouri Environmental Improvement and Energy Resources Authority (EIERA).

"We are thrilled to have Mr. Childers as our keynote speaker," Allan said. "Most of the conference attendees have a direct or indirect connection to the department and in some cases it will be their first opportunity to meet the department director."

Allan said that other conference highlights will be the track on brownfields, and brownfields expert Charlie Bartsch will be the Monday luncheon speaker. Also, the waste-to-energy session will be an interesting discussion. At the Tuesday lunch, Missouri State Highway Patrolman Scott Pauley will provide vital information about personal security and safety.

In addition to the technical and waste management sessions, there are social activities such as a golf tournament and Sunday and Monday evening

Time Exposures

Send your photo to "Time Exposures," c/o *Missouri Resources*, P.O. Box 176, Jefferson City, MO 65102-0176. All pictures will be returned via insured mail. Pre-1970 environmental and natural resource photos from Missouri will be considered. Please try to include the date and location of the picture, a brief description and any related historic details that might be of interest to our readers.

U. S. Army Corps of Engineers photo

Kansas City in 1900 was a very different place than it is today. This photo of dikes in the Missouri River also shows the Armour meatpacking plant in the background. The dikes, built by the U.S. Army Corps of Engineers and local firms like the Kansas City Navigation Company, changed the Missouri from a wide, shallow and unpredictable river to a navigable river with a consistent channel. The Armour meatpacking plant was one of the largest in the world and the livestock industry dominated the area's economy. Other aspects of the meatpacking industry were impossible to ignore, like the constant smell of thousands of head of cattle and the thick, greasy smoke that poured out of rendering plants.

receptions. Allan expects 275 attendees at the conference.

For more information, contact Kristin Allan at EIERA at (573) 751-4919, or [kristin.allan@dnr.mo.gov].

Fuel-Saving Vehicles Tour the State

A caravan of hybrid and alternative-fuel vehicles made its way through the state as part of "Drive Clean and Green Across Missouri," an event sponsored by the Missouri Department of Natural Resources' Energy Center, St. Louis Regional Clean Cities and Kansas City Clean Cities coalitions.

Designed to introduce Missourians to the latest in high-efficiency hybrid, and alternative and flexible-fuel vehicles, "Drive Clean and Green Across Missouri" was chosen for funding by the U.S. Department of Energy over several other proposals submitted nationwide. The event began April 5 at the St. Louis Science Center and finished April 8 at the Discovery Center in Kansas City. Stops across Missouri included St. Louis, Wentzville, Columbia, Jefferson City, Rolla, Lebanon, Springfield, Warrensburg and Kansas City.

The goal of the caravan was to educate Missouri citizens and students on the benefits of fuel economy and use of renewable and alternative fuels in terms of saving money, reducing oil imports, reducing greenhouse gas emissions and generating more efficient technologies. Hybrid electric vehicles (HEVs) combine the internal combustion engine of a conventional vehicle with the battery and electric motor of an electric vehicle. Alternative fuels included ethanol, biodiesel, natural gas, and propane.

Among the vehicles in the caravan was the hybrid Ford Escape, which is built at the company's Kansas City plant. Other vehicles on the tour included:

Hybrids – Chevrolet Silverado, Toyota Prius and Honda Insight

Alternative Fuel Vehicles – biodiesel Jeep Liberty, compressed natural gas bi-fuel Chevrolet Silverado, propane bi-fuel Ford 150 series truck, 85-percent ethanol (E-85) Chevrolet Avalanche, E-85 Ford Taurus, E-85 Dodge Ram and E-85 Ford Explorer.

Several organizations, including the National Biodiesel Board, the National Ethanol Vehicle Coalition, Missouri Soybean Association, Missouri Corn Growers Association, Laclede Gas, Missouri Propane Gas Association, various organizations associated with alternative fuels and various automobile manufacturers participated in the drive. Information was provided on hybrid and alternative fuel technologies, driving techniques, ride sharing, and transportation alternatives. Also, copies of the Environmental Protection Agency's Green Vehicle Guide were distributed.

For more information call the Missouri Energy Center at (573) 751-3443 or 1-800-361-4827.

For department news releases on the Web, visit [www.dnr.mo.gov/newsrel]. For a complete listing of the department's upcoming events, meetings and hearings, visit our online calendar at [www.dnr.mo.gov/oac/calendar.htm].

Blue Springs South High School
Prairie Restoration Effort

The sights and sounds that emerge each spring from wild prairie vistas are not completely lost to Missourians. In fact, with some effort, even a small segment of restored prairie can bring back the spirit of the Great Plains. It is a challenge to find unspoiled prairie in Blue Springs and other busy communities surrounding Kansas City. However, students at Blue Springs South High School have recently won a national award that recognizes their efforts to recreate a prairie environment within the community's Young Park. In April, representatives of the school's environmental science classes traveled to Florida to accept the National Environmental Excellence Award from Sea World, Busch Gardens and Fujifilm. This year, the $10,000 award will go to only eight schools nationwide. It is the first time that a school in Missouri or Kansas has received this award. Keith Hannaman, environmental science teacher at Blue Springs South, credits student interest in participating in Missouri's high school Envirothon competition for launching the 2002 prairie restoration project. As students researched the state's native plants, they walked through Young Park, next to the school property, to find plants that didn't belong in a prairie setting. The next logical step was to learn which plants did belong there and figure out how to reestablish them.

Dan Marske, Megan Sparks, Brittany Perrin

After a land donation expanded Young Park, the students formed a partnership with Blue Springs director of Parks and Recreation Roscoe Righter and former mayor Greg Grounds to bring the prairie back to two acres of the 26-acre park. Students planted 1,500 plants provided by a Missouri grower to recreate a tallgrass prairie environment on the dry and rocky site. Hannaman teaches six classes of 25 students each to prepare them for college-level environmental science courses. Students also have conducted landscaping projects on the school property. Their work has won an Excellence in Teaching Award for Hannaman and recognition from other national and state groups. Later, they hope to plant some trees to honor the group of students that first launched the prairie restoration project. The classes also monitor water quality and bird migrations at a nearby golf course pond.

"We certainly appreciate all the help and support we have had while working on these environmental projects," said Hannaman. "We are proud of our work and it is especially meaningful since we live in such a fantastic state that does so much with its natural resources and provides such wonderful support for outdoor opportunities for its public." Mike Currier of the Department of Natural Resources' Division of State Parks suggests visits to [www.prairies.org/] or [www.grownative.org/] to learn more about prairie restoration.

Darren Schroepfer
Well Driller Led by Example

A third generation water well driller, Darren Joseph Schroepfer knew the importance of his work in terms of environmental protection. He understood how his daily decisions tied into the greater scheme of things; how shortcuts or miscalculations could endanger an entire community's drinking water for years to come. Having witnessed, and at times, been called in to repair mishaps, Schroepfer looked for methods of improving drilling standards and conveying to other drillers the environmental significance of their work.

Darren Schroepfer

In 2002, Schroepfer received an invitation from former Gov. Bob Holden to participate in the Missouri Results Initiative, a project that targeted certain state processes for improvement. Serving on the Water Well Certification Workgroup, he attended months of committee meetings, often foregoing paid jobs in order to help shape the committee's recommendations. He spoke with other drillers, worked on committee assignments and researched newer technologies. He provided insightful opinions and advice that were rooted in real-world experience. His recommendations led to a number of innovative changes, some of which have been or soon will be implemented.

Noting that locations of wells were often reported inaccurately or were not consistent, Schroepfer supported requiring the use of Global Positioning System (GPS) units to provide exact well locations. Accuracy is extremely important for many reasons, such as when groundwater contamination is found and affected well owners must be notified. The requirement to use GPS units is currently being incorporated into the well certification regulations.

As a means of improving well construction standards, Schroepfer advocated requiring proof of proper well certification in order to complete a property transaction, similar to the requirement for assessing septic systems. He said it was ironic that, when buying a house, "We care more about what we flush down the toilet than the well water we put in our bodies." Steve Sturgess, director of the department's Geological Survey Program, served on the committee with Schroepfer. "Darren was a proponent of utilizing the best standards possible when installing a well because he understood the huge impact that well drilling has on our drinking water aquifers. He was not afraid to pursue sweeping changes in order to increase well driller compliance and make the public aware that we need to protect this fragile resource." To Schroepfer, the manner in which he conducted his well drilling business conveyed his understanding of its importance. Schroepfer was married and raising four children when, at the age of 38, he was tragically killed as a result of a job-site accident.

Every day, well drillers like Darren Schroepfer serve on the front lines of environmental protection. Their hands-on responsibility for the protection of our groundwater not only touches our lives today, but generations to follow. Without participation and adherence to construction standards, the entire community suffers. Through Schroepfer's work ethic, leadership and extraordinary efforts to improve the well drilling industry, the benefit to Missourians is considerable, and deserves recognition.

Of Grave Concern

by Dawn Fredrickson
photographs by Scott Myers

In 1967, the Missouri State Legislature enacted a statute requiring the Missouri State Park Board to "maintain every grave of a former governor within this state which is not within a perpetual care cemetery." Today, the Missouri Department of Natural Resources maintains three cemeteries, which contain the graves of four Missouri governors. Not only do these cemeteries protect the final resting place of pioneers who helped shape Missouri's past, they also provide a glimpse into the beliefs and cultural values of 19th century America.

Sappington Cemetery State Historic Site

Sappington Cemetery State Historic Site, near Arrow Rock in Saline County, was established as a family cemetery in 1831 and holds the graves of well-known area doctor, Dr. John Sappington (1776-1856), and two Missouri governors, Gov. Meredith Miles Marmaduke and Gov. Claiborne Fox Jackson. Symbolism in Sappington Cemetery reflects several period beliefs. The large, old cedar and Austrian pine trees inside the cemetery represent eternal life because they are evergreen. Gov. Marmaduke's arched monument suggests victory over death while the clasped hands on his monument symbolize a farewell and hope of meeting in eternity. Twin columns over Gov. Jackson's grave denote "noble lives" of he and his wife.

Names of those buried within Sappington Cemetery sound a roll call for several of Saline County's most prominent citizens. Both Dr. Sappington and his wife, the sister of Kentucky Gov. John Breathitt, are buried there. A nonconformist, Dr. Sappington attacked the common medical practice of bloodletting to treat patients. In the 1830s, he perfected and mass marketed quinine in pill form to treat malarial fever, a major disease in the Missouri River valley. The St. Louis Medical Society denounced him as a quack, but his "anti-fever pills" quickly became the frontier's most famous prescription. An inscription over Dr. Sappington's grave reads: "A truly honest man is the noblest work of God. He lay like a warrior taking his rest."

Meredith Miles Marmaduke (1791-1864), also buried in the cemetery, was elected Missouri's lieutenant governor in 1840. A Democrat and strong Unionist, he became Missouri's eighth governor for nine months in 1844 after Gov. Thomas Reynolds died. Marmaduke married Dr. Sappington's daughter Lavinia in 1826. Active in the Santa Fe trade, Marmaduke also served as Saline County judge and surveyor. His son, John Sappington Marmaduke, was Missouri's 25th governor (1885-1887).

Claiborne Fox Jackson (1806-1862) was beginning his term as Missouri's 15th governor when the Civil War began. Jackson supported slavery and advocated the secession of Missouri. In June of 1861, federal troops occupied the capital of Jefferson City, forcing Jackson and his officials to flee and join Confederate forces. He died in Little Rock, Ark. in 1862 and was re-interred in Sappington Cemetery after the war. Jackson married three of Dr. Sappington's daughters: Jane in 1831, Louisa in 1833 and Eliza in 1838. Jane died in 1831, the same year they were married. Louisa died in 1838 and Eliza died in 1864. All three women are buried in the cemetery. Sappington Cemetery State Historic Site is located five miles southwest of Arrow Rock on Route AA in Saline County.

Jewell Cemetery State Historic Site

Jewell Cemetery State Historic Site, located within the city limits of Columbia, was once part of an estate owned by George Jewell, the forefather of one of Missouri's leading early families. The most noteworthy of George Jewell's descendants buried here are William Jewell, a well-known educator, and Charles Hardin, the 22nd governor of Missouri.

William Jewell (1789-1852) was a longtime educator, physician, reformer, architect and ordained minister. He held political office as mayor of Columbia and later as a state legislator. As mayor of Columbia, Jewell initiated the surveying and paving of the city's streets. Later, as state legislator, Jewell worked for reforms such as abolishing the whipping post and pillory and for establishing a public hospital in St. Louis.

Jewell also was a strong advocate of public schools, supporting a bill to establish the location of the state university in Columbia and chairing a committee to raise subscriptions for the university, giving $1,800 himself. Jewell also contributed money for the establishment of William Jewell College, a Baptist college, in Liberty. As an architect, he took charge of its construction until his death. William Jewell's tombstone has a memorable epitaph: "His work is done, he did it well and faithfully."

Last of the Jewell descendants to own the family cemetery, Missouri Gov. Charles Henry Hardin (1820-1892) willed the cemetery to Boone County and stipulated that no one other than a descendant of George Jewell ever be buried in the

(Opposite page photo) The plaque on the entrance gate at Jewell Cemetery State Historic Site reflects a descendant's wish to allow only family members to be buried on the grounds.
(Opposite page detail) The images found on gravestones reflect the cultural beliefs of various time periods. This weeping willow tree at Jewell Cemetery was a common 19th-century theme, symbolizing sorrow and human frailty.
(Above) Gov. Daniel Dunklin's grave commands a magnificent view of the Missouri River.

Carved on Gov. Meredith Marmaduke's gravestone, at Sappington Cemetery State Historic Site, are the square and compass, indicating his affection for the Masonic Order. (Detail, above right) The clasped hands on the gravestone at Sappington Cemetery symbolize "farewell," and the hope of meeting in eternity. The rose and lily represent love and purity, respectively.

family cemetery. A plaque affixed to the iron gate at the cemetery's entrance reflects his sentiment, "No one not the husband, wife or child of a descendant of George Jewell can be buried here." Oddly phrased, the intent was to admit those listed, not exclude them.

Hardin was the son of William Jewell's sister, Hannah Jewell Hardin. While practicing law in Fulton, he was elected to the Missouri House of Representatives and then to the Senate, serving from 1852-1860 and returning to the Senate in 1872. In 1874, he was elected governor on the Democratic ticket. Hardin was one of the founders of Hardin College for women in Mexico and also helped establish a city park and organize the Missouri Military Academy there.

The earliest grave in Jewell Cemetery dates from 1822, with the most recent dating 1968. About 20 unlettered, but neatly quarried blocks of native limestone lie as grave markers at the back of the cemetery. These are presumed to mark the graves of slaves owned by the Jewell family. Jewell Cemetery is located in southern Columbia off Providence Road / Hwy. 163 in central Boone County.

Gov. Daniel Dunklin's Grave State Historic Site

Overlooking the Mississippi River, Gov. Daniel Dunklin's Grave State Historic Site, near Herculaneum, houses the grave of Missouri's fifth governor. Daniel Dunklin (1790-1844) moved from South Carolina to Mine-a-Breton, near Potosi, in 1810. He began his political career in 1815 with appointment as sheriff for Washington County by territorial Gov. William Clark. He built a small tavern in Potosi, and it soon became the general meeting place for the discussion of society and politics.

In July 1822, a group of delegates from Washington County met at Dunklin's Tavern to nominate a representative to the state legislature. Dunklin was nominated and later elected, serving in the legislature from 1822 to 1823. He returned to politics in 1828 when he was elected lieutenant governor. Four years later in 1832, Dunklin was elected Missouri's fifth governor. While Dunklin was governor, the Platte Purchase added additional land to northwestern Missouri.

Gov. Dunklin is often called the father of Missouri's school system. He sought to establish both higher and secondary public schools on a firm and stable basis. In 1834, Dunklin recommended that a site for a state university be chosen and partially funded through the sale of land. Five years later, the University of Missouri became a reality. In 1835, he supported passage of a law through the General Assembly that established the public school system in Missouri. The law outlined the minimum school year, established the basic curriculum, and allowed for local taxation to support schools.

In 1840, Dunklin moved to the Herculaneum area, where he lived until his death in 1844. Both he and his wife, who died in 1851, were buried in a field near his estate. Their son, James L. Dunklin, inherited the estate upon the death of his mother. Not as successful in business as his father, James was forced to sell the estate. In 1885, the sale of the estate reserved a one-acre plot that was to become the present Dunklin Cemetery. Following the sale, Daniel and Emily were re-interred in this cemetery. Governor Daniel Dunklin's Grave State Historic Site is located in Herculaneum in Jefferson County, approximately 30 miles south of St. Louis.

For more information about these and other state parks and historic sites, contact the Department of Natural Resources toll free at 1-800-334-6946 (voice) or 1-800-379-2419 (Telecommunications Device for the Deaf). Information also can be found by visiting the Web at [www.mostateparks.com].

Dawn Fredrickson is planning section chief for the Department of Natural Resources' Division of State Parks.

FOOD FOR THOUGHT

by Jim Lubbers
photographs by Scott Myers

The population of the United States is nearly 300 million people. This is about 5 percent of the global population, but we consume about 25 percent of the world's resources. It has been estimated that if developing countries had an equivalent standard of living, we would need four planets like Earth to support us. Yet even in the United States there are millions living in households that must skip meals due to economic constraints. But for most of us, the abundance of food is something we take for granted, and we seldom think twice about wasting food.

Understanding where our food comes from gives us an unequivocal rationale for protecting the environment and its ability to feed us. Similarly, understanding the costs of our food production-through-consumption chain should motivate us to waste less food and promote more efficient and sustainable consumption practices. The United Nations' environmental Web site [www.agrifood-forum.net/practices/index.asp] offers detailed consumption data which will support and assist this and related classroom projects for you and your students.

Using 10 percent as an estimate, we throw away enough food to feed about 30 million people, not to mention what they could do with everything else we throw away. To make matters worse, the amount of energy invested (fuels, infrastructure, processing, distribution, etc.) to de-

Food and packaged food products are abundant in the U.S. Unfortunately, the amount of food we waste is staggering.

For You To Do

EXPLORE:

In pairs or teams, have your students select a food product (ensure variety) and make a random list of workers involved in getting that product to the table. Use actual products that students bring from home (to eat later?).

EXPLAIN:

Guide the students through the process of sequencing the efforts suggested by the various workers. Compare the chain of events for different foods. You might have them work up a bulletin board showing the different stages of the production-through-consumption food chain.

ELABORATE:

This process can be done with almost any item and is not limited to food products. The process itself is your adaptation of Life Cycle Analysis, tracing the origins and impacts, good and bad, of ordinary things.

liver that food to your plate far exceeds the energy value in calories you'll get from eating it. When we throw away food, we need to realize that we are also throwing away all the energy, water, materials and labor invested in getting it to your plate!

In a sense, our food production system is similar to a natural food chain where about 90 percent of the energy is used by the organism at each level just to maintain its own activities. Food production by humans starts out the same way it does in a natural system, requiring sunlight for photosynthesis by green plants. But then the crops are sorted, cleaned, ground up, mashed, cooked, packaged and hauled away to the grocery store where we pay for the 90 percent loss and get 10 percent of the original product. In addition to all of the processing inputs, each step also generates its own share of pollutants and solid waste – by-products that would be completely recycled in a natural system. It really does pay to eat lower on the food chain.

We need only to go to the supermarket to select what we want from an amazing and abundant variety of foods and other consumer goods. All of our food can be traced back to its origins, usually a farm somewhere or perhaps a forest or an ocean. The fewer steps between the source of our food and eating it, the greater the savings. For Missouri's agricultural products, go to [www.agrimissouri.com].

Even if we are able to raise our own food, we are still dependent on a clean, healthy environment for our food and many other goods and services. Our food really doesn't come from the grocery store!

Jim Lubbers is an environmental education specialist for the department's Outreach and Assistance Center.

Make That Call ...

... It Helps Us All

by Renee Bungart

Ah, spring is in the air. What a perfect time to step out into nature and enjoy a stroll in the country. The leaves are turning green again and everything looks so beautiful and alive.

You start your walk along a quiet roadside, hoping to find peace and tranquility. Turning the corner, you notice something in the weeds, just off the road. In a minute, you are face-to-face with a huge, ugly, pile of tires! As you pass the unsightly mound, you hear a few muffled sounds. Mice? Rats? A family of black snakes?

What would you do if this happened to you? Would you pass right on by without giving it a second thought? Would you consider telling someone, or reporting it? Would that make you a tattletale?

My kids have heard me tell them nobody likes a tattletale. But something happened that made me think twice about that old saying. I received a call at work from a citizen who wanted to report a water quality problem. He told me at first he was afraid to call, afraid his neighbor would find out who reported it. After considering his options though, he decided it was more important to protect the natural beauty of a river that flowed near his property. It was time for him to get involved. Time to make a difference.

It only took one person to call and make a difference. With his information, submitted anonymously, the department was able to work with the responsible party and correct the situation. Most importantly, the river was returned to its natural beauty.

Continued budget and staff reductions reduce the amount of time the Department of Natural Resources can spend in the field looking for environmental problems. That's why it's so important for Missourians to take a stand in protecting our natural resources. Here are just a few ways to get involved in your area's environmental protection:

- Engage the youth. Involving children and teenagers in environmental protection is essential to making sure future generations don't suffer many of the problems we face today, and have in the past. Girl and Boy Scout troops are a great place to start.
- Participate in Stream Team cleanups. Stream Teams provide hands-on experience and education about the quality and importance of Missouri's 56,000 miles of flowing water. To find a Stream Team near you, or to start your own team, call 1-800-781-1989.
- Get involved. Public participation plays a key role in the decision-making process for air-, land- and water-quality issues. Find out about the issues facing your community. Visit the department's online calendar for upcoming public meetings, hearings and events at [www.dnr.mo.gov/oac/calendar.htm].
- Most importantly, report an environmental problem. Be aware of and report illegal dumping of wastes in your community. To report dumping or other problems, call the department toll free at 1-800-361-4827 (Mon.-Fri.) or (573) 634-2436 (24/7), or visit the department's online complaint form on the Web at [www.dnr.mo.gov/concern.htm]. Don't worry about being a tattletale – your name is optional.

Renee Bungart is division information officer for the department's Air and Land Protection Division.

Abandoned waste tires, such as these found under a metropolitan highway overpass, are just one of many potentially hazardous examples of illegal dumping in Missouri.

DNR file photo

MISSOURI DEPARTMENT
OF NATURAL RESOURCES
P.O. Box 176
Jefferson City, MO 65102-0176
1-800-361-4827

PRST STD
U.S. Postage
PAID
Permit No. 442
Jefferson City, MO
65101