

Missouri Resources Magazine

Spring 2000

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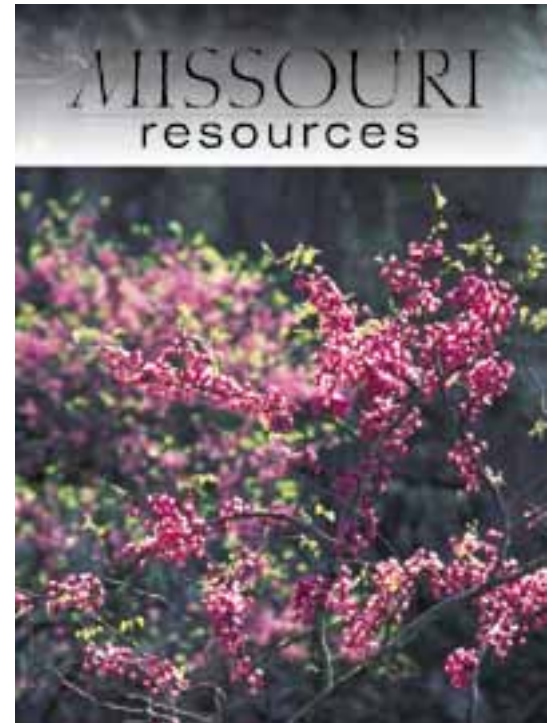
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Comments from the Director:

Spring is always a busy time of year for us at the Department of Natural Resources, and this year is no exception. In addition to our regular work, we are preparing to celebrate Earth Day across Missouri in April. And, as always, our state parks are gearing up to offer a variety of interesting programs to visitors as we head into warmer weather. All of this is our way of celebrating the abundant natural resources that Missouri offers.



This spring brings a new program that we are implementing in the St. Louis area. Like many of our responsibilities, this program impacts many people - the 1.2 million motorists who drive in St. Louis city and in St. Louis, Jefferson, St. Charles and Franklin counties.

The Gateway Clean Air Program is a new vehicle emissions testing program. It is an important component of Missouri's strategy to ensure clean air for St. Louis region residents. It complements other efforts, such as vapor recovery nozzles on gas pumps, cleaner burning fuel and reductions in industrial emissions. We need to bring the St. Louis area into compliance with federal ozone or urban smog regulations to protect the public and environment.

Beginning in April 2000, vehicles in St. Louis city and St. Louis, St. Charles and Jefferson counties will take a new enhanced emissions test. For the first time, Franklin County will begin using an improved basic idle test.

As with any new program, there are lots of questions. My staff and I, and our partners in this venture, have visited with media outlets in the St. Louis area and asked for their support in helping us reach as many people as possible with the "who, what, when, where, why and how" answers. Newspapers and radio and television stations have all demonstrated a willingness to help us in getting the correct information out to the public about the Gateway Clean Air Program.

A lot of effort and thought went into maximizing customer convenience as we have developed the program. We based most of this development on research obtained from citizen focus groups held in the St. Louis area. We worked hard to include these suggestions so we could make the transition as simple as possible. I like to put into practice what I believe - the Missouri Department of Natural Resources is a service- and customer-based organization.

That said, let me restate that I am personally committed to see this program succeed. I have family in the St. Louis area, including my mother, whom I hear from on a regular basis. You can rest assured that I am well aware of the need to educate and inform people about how the program will work.

Missouri's program will be similar to the vehicle emissions program currently operating in Illinois. DNR and Gateway Clean Air are not alone in this effort. We have many partners, including the American Lung Association, state and St. Louis area officials and each person who drives in the St. Louis area, helping us.

I'm encouraged by the amount of support we have gained in the last few months as we draw closer to implementing this program on April 5, 2000. Each of us has a part to play to ensure that St. Louis air quality improves and that public health is protected. The smooth implementation of the Gateway Clean Air Program is a big step in the right direction for all of us.

If you would like more information about the Gateway Clean Air Program, please call the customer hotline at 1-888-748-1247 or visit the Web site at [www.gatewaycleanair.com].

A handwritten signature in black ink that reads "Steve Mahfood". The signature is written in a cursive style with a large, sweeping initial "S".

Steve Mahfood
Director, Missouri Department of Natural Resources

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Planting for Preservation

Native Missouri Species Offer Advantages for Garden; Yard

As more and more of what was once prairie is paved over for commercial and residential development, the diversity of regional plant and animal life is challenged. There are several advantages to planting grasses, flowers and trees that have evolved and adapted in Missouri. Such species tend to be heat-tolerant and drought-resistant, reducing the need for frequent watering. They are more ecologically friendly than invasive exotics that often choke out other plant growth. Native plants have also co-evolved with wildlife such as birds and butterflies and for some breeds offer their own suitable habitat.

According to the Conservation Federation of Missouri, would-be native gardeners can begin by attaching a birdhouse to the back post of a mailbox and planting indigenous species at the base. Clusters of Missouri natives will draw hummingbirds as well as monarch and swallowtail butterflies attracted by nectar and food.

- Sunny locations support: Missouri black-eyed Susans, coneflowers, butterfly weed and rose verbena.
- Shady locations are conducive to: wild geranium, columbine, spiderwort and fire pink.
- Among native trees are: flowering dogwood, deciduous holly, red buckeye and the taller black cherry, pin oak, red maple, sassafras and sugar maple and white oak.

While few people can devote acres to preserving prairie grasses, even casual gardeners can help conserve the state's natural habitat through a simple, selective planting plan.

Source: Conservation Federation of Missouri

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From the Hills to the Grills *by Peter Yronwode*



An aerial view shows six new emission-controlled charcoal kilns and the second-generation afterburner in operation near Mountain View. Preparations are under way for six more kilns and a second afterburner.
DNR photo by Doug Elley

Imagine Memorial Day without barbecue - unthinkable! Burgers sizzling on a charcoal grill are as essential as summer itself. Those cookouts would be a lot less flavorful if it weren't for the Ozarks. Southeastern Missouri produces approximately three-quarters of all the barbecue charcoal used in the United States, converting sawmill waste into the mainstay of summertime outdoor cooking. But there is another side to the pleasing aroma of meat sizzling over a charcoal fire. It is the dense, moist, choking smoke that rises from the 229 kilns scattered around Missouri's Ozarks where charcoal is made. Until 1998, there was nothing the Missouri Department of Natural Resources (DNR) could do in response to citizens' complaints to reduce this noxious and dangerous air pollution. The U.S. Environmental Protection Agency (EPA) strongly encouraged DNR to find a way to solve this problem. Finally, in March 1998 the Missouri Air Conservation Commission adopted regulations to phase in controls of charcoal kiln smoke. This marked the end of a 26-year controversy. By July 1, 2005, dense smoke around charcoal kilns will be only a bad memory, thanks to an agreement between DNR, EPA and the charcoal industry.

Making charcoal from poor-quality timber and sawmill waste is a process that has changed little in centuries. Before it becomes dimensional lumber, every log harvested in the Ozarks first must be sawed square. The bark-covered slabs produced by that first cut become the raw material for charcoal briquettes. Seasoned hardwood is sealed in an air-tight enclosure and allowed to burn with the barest minimum of air. Just like in a woodstove with the damper closed, the wood slowly turns to almost pure carbon as its lighter, more volatile components are driven off by heat. This process, called pyrolysis, can occur in a pile of wood buried in a hole in the ground or inside a metal or concrete box called a Missouri-type charcoal kiln. For years, making charcoal was one of the few sources of income for people in the Ozarks. In more recent times, the small, independent charcoal producer has become a rarity. Many independent kilns have been leased or purchased by the large corporations that produce and market charcoal briquettes.



The old steel kilns at Royal Oak Enterprise's Mountain View plant now store finished charcoal.

DNR photo by Peter Yronwode.

When the Missouri Air Conservation Commission first began to regulate air quality in 1972, it attempted to control charcoal kiln smoke. With the backing of timber industry organizations, charcoal producers successfully argued that such control was too expensive for small "mom-and-pop" operations, and that the industry as a whole was rapidly shrinking and would soon disappear. Missouri-type charcoal kilns were exempted from three important air pollution regulations: the limit on particulate matter (soot), the limit on odors and the limit on opacity (the perceived darkness of a plume of smoke). Although hundreds of citizens complained over the years that smoke

from charcoal kilns was causing them difficulty in breathing, soiling their houses and obscuring roads, DNR was unable to take any meaningful action. The only limitation on charcoal production was a requirement that permits be issued before new kilns could be constructed. Missouri kilns were frequently repaired to avoid the permit requirements for new construction. By the early 1980s, all other states in which charcoal was produced had regulations limiting at least smoke opacity. This regulatory disparity resulted in a concentration of charcoal production here. Although other states have substantial timber resources, Missouri still produces approximately three-quarters of the nation's barbecue charcoal.

The regulatory climate for charcoal production began to change after the 1990 amendments to the federal Clean Air Act were passed. All industries were required to pay fees proportional to the amount of air pollution they emitted. A large charcoal producer asked DNR to organize tests to determine if the pollution emission rates published by EPA were correct. This test data would become the most comprehensive measurements of charcoal kiln emissions ever made. The tests were conducted in 1996 at a facility near Mountain View. Testing was unusually difficult because kilns usually operate for three to five days and would have to be sampled throughout this period. Despite these difficulties, DNR was able to learn a lot about the quantity and composition of charcoal kiln smoke. Although many of the chemicals in charcoal smoke are toxic or

carcinogenic, all are also highly flammable. A simple afterburner could destroy them easily. This information proved key in developing the charcoal kiln regulation.

CHRONOLOGY OF MISSOURI CHARCOAL KILN REGULATION

<u>Date</u>	<u>Action</u>
1972	Charcoal kilns are exempted from Missouri air pollution regulations
January 30, 1992	DNR attempts to strengthen charcoal kiln reconstruction record-keeping
April 1, 1993	First Missouri air pollutant emission fees are due
December 1994	Citizens petition EPA for ambient monitoring of charcoal kiln air pollution
April 1, 1995	First charcoal kiln air pollutant emission fees are due
August 23, 1995	Charcoal industry proposes air pollutant emission testing
April 20, 1996	MDNR/EPA begin ambient monitoring of charcoal kiln air pollution
June 11, 1996	Charcoal kiln air pollutant emission test is conducted
February 7, 1997	EPA begins CERCLA-EPCRA enforcement action
July 24, 1997	Charcoal industry agrees to control in letter to MO Air Conservation Commission
September 18, 1997	Air pollutant emission limits for Missouri charcoal kilns are negotiated
September 30, 1997	CERCLA/EPCRA consent agreement is filed
July 30, 1998	Missouri charcoal kiln regulation becomes effective
September 8, 1998	Permit applications are filed for new controlled charcoal kilns
December 7, 1998	First charcoal kiln afterburner fired
December 31, 1998	First round deadline for control/shutdown of charcoal kilns
December 31, 2005	Deadline for complete control of Missouri charcoal kilns

At the same time, EPA and DNR began to monitor the air next to a charcoal facility near Bakersfield in Howell County. This effort was in response to a petition from 200 area people requesting that EPA measure how much particulate matter was present in the air around an operating charcoal kiln. The results were surprising. One monitor produced the highest particulate-matter levels ever recorded in Missouri. Many of the measurements were several times greater than the federal standard, and in a few cases, more than 10 times greater.

Armed with these test results, both DNR and EPA began a campaign to bring charcoal-kiln emissions under control. Ultimately the tools used were two laws called the Comprehensive Environmental Response and Liability Act (CERCLA) and the Emergency Planning and Community Right-To-Know Act (EPCRA). EPA discovered that the larger charcoal kilns were not reporting their emissions of methanol (wood alcohol) and nitrogen oxides as

required by these laws and assessed a penalty of \$750,000. The four largest producers were able to reach an agreement with EPA and DNR to install afterburners to control their smoke in return for suspension of the penalty. These producers also played a pivotal role in drafting a regulation for charcoal kilns and supported it at hearings of the Missouri Air Conservation Commission. The negotiations lasted almost six months, but eventually a rule was passed which required each charcoal production facility to install afterburners on at least two kilns every year, or else remove them from production. EPA required the four largest charcoal companies to control more than two kilns per facility per year each year, but allowed the companies to choose where to install these controls. However, EPA required that kilns near Mountain View and Vienna be controlled first because they were located so close to these towns. Air Pollution Control Program Director Roger Randolph called the agreement, "... a good example of the state - EPA partnership working as it was designed to."

DNR developed emission limits for these new afterburners. Three pollutants were regulated. Particulate matter could not exceed 1.5 pounds per hour, carbon monoxide could not exceed 1.75 pounds per

hour, and volatile organic compounds could not exceed 0.24 pounds per hour. These rates apply to each afterburner, regardless of how many kilns it controls. They represent a 99 percent reduction of pollutant emissions. The opacity of afterburner smoke was limited to 10 percent, a level that is barely visible.

The industry wasted little time complying with the regulations. Several kilns were shut down immediately, including the facility near Bakersfield where EPA monitored emissions. Royal Oak Enterprises, which by this time had absorbed the other three large producers, built the first charcoal kiln afterburners and installed them at its plant near Mountain View. These first-generation afterburners use propane to burn charcoal kiln smoke. The first of three was ignited on December 7, 1998. Twelve kilns at the site were controlled.



At Kingsford's Belle charcoal plant, sawdust is dried in the foreground drum. The retort chamber on the right converts it to charcoal while the after-combustion chamber stack on the left destroys smoke produced during the process.

DNR photo by Nick Decker.

The improvement in air quality was so dramatic that some Mountain View residents thought that the plant had shut down. The smoke that had been an everyday annoyance suddenly disappeared. A letter addressed to EPA in January 1999 confirmed the residents' appreciation: "Just a note to let you know how much the air quality has improved. You and your colleagues have done a great job of cleaning up the air ..." He added, "We can now open our house windows ... and get good fresh air."

City Councilman Dwain Hockman told the West Plains Quill, "Anything to keep that industry going with all the people they employ is great. I'm pleased that they can get into compliance, stay in business, and give us some relief from the smoke."

Jim Hayes, who supervises Royal Oak's operations in Salem, said that while production dropped slightly, eliminating the smoke was worth the cost. A test supervised by DNR in July 1999 showed that the afterburners easily met the emission limits established under the charcoal rule.

Although the first-generation afterburners in Mountain View were a success, they required a lot of propane to keep them hot enough to burn the smoke effectively. Royal Oak hoped to improve afterburner performance at its next controlled facility, located between Peace Valley and Mountain View. After receiving a construction permit from

DNR, Royal Oak closed three large steel kilns and built six new concrete kilns, capable of producing 25 to 27 tons of charcoal each. All six are connected to a single computer-controlled afterburner 50 feet tall. Because both the kilns and afterburner were developed with pollution control as a design goal, the single unit is both effective and efficient. It uses far less propane than the earlier design and controls more smoke. After passing a performance test supervised by DNR, the new design will be copied on six more kilns at the same site and at another site in Salem. Royal Oak expects to use this second-generation afterburner design at all the kiln sites it agreed to control under its agreement with EPA.

Each afterburner is expected to cost about \$260,000, but over a year, each could control up to 2,550 tons of air pollutants. Other pollution-control equipment can cost up to several thousand dollars per ton of pollutants removed. At \$100 per ton, this afterburner is a good investment in Missouri's environment.

Unfortunately, installing afterburners may remain out of reach for smaller producers. Royal Oak estimates its first-generation afterburner cost \$80,000 to control four kilns. It has agreed to give the blueprints to any small producer that wants to duplicate its design. A typical independent producer would need two afterburners. Presently, DNR knows of only one independent producer experimenting with afterburners. At least one company in Missouri is researching a cost-effective afterburner for sale to small charcoal operators. If it succeeds, controlled kilns may become more common at small operations. Otherwise, the trend toward consolidation of charcoal production is likely to continue. In 1998, the General Assembly passed two incentives to encourage charcoal producers to install control equipment. Half the cost of afterburners can be taken as a tax credit, and charcoal was made eligible for the Wood Energy Tax Credit from which it was previously exempted. Under this program charcoal producers may collect a tax credit of \$20 per ton of charcoal produced. These incentives may spur installation of afterburners at independent facilities.

Many Missourians continue to contact DNR, asking when the charcoal kilns near them will be controlled. After 2001, if the facility is covered by the EPA settlement, the timing of controls will be left to the owner as long as the total number of kilns controlled each year conforms to the agreement. Neighbors can try to advance the schedule by contacting the owners, but DNR has no power to force a particular facility to implement controls early. Independent facilities must either control or shut down two kilns per year. By 2005 all functioning charcoal kilns in Missouri will be controlled, eliminating roughly 64,000 tons of air pollution per year.

It is expected that controlling air pollution from charcoal kilns will add no more than 10 cents to the cost of a bag of charcoal. While you are enjoying your barbecue this summer, think for a moment about the health benefits to your neighbors in the Ozarks. It will truly feel like a dime well spent.

Peter Yronwode is an environmental specialist with the Air Pollution Control Program within DNR's Division of Environmental Quality.

CHARCOAL FROM SAWDUST

Mounds of sawdust are unsightly, and as they decompose they release a brown soup of pollutants into streams and groundwater. Kingsford Products in Belle is helping to solve this problem by converting sawdust into charcoal briquettes. While other Missouri producers char solid sawmill waste in small kilns, Kingsford's modern plant carbonizes sawdust in a cylindrical multiple-hearth retort chamber. The sawdust burns slowly as it moves from one hearth to the next, pushed by rotating arms. By the time it reaches the bottom it has become charcoal.

The smoke from this process is burned in a large after-combustion chamber (ACC). Virtually all the pollutants from the pyrolysis process are consumed in the ACC, which emits no visible smoke when it is operating properly. DNR requires several automatic pollutant monitors on the ACC stack and supervises annual tests to confirm that the plant is complying with its emission limits. The ACC exhaust is close to 2000 degrees F. Some of this heat is used in a rotary drier to dry the sawdust before it enters the retort chamber. Much of the rest of the hot ACC exhaust is used to dry briquettes made in the adjacent plant.

Kingsford, a division of Clorox, operates four other sawdust retort plants around the U.S. to make its charcoal briquettes. The Belle plant employs 115 workers and ships more than 100,000 tons of charcoal briquettes each year. Kingsford operates no conventional charcoal kilns in Missouri, proving that good environmental policy is also good business.

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Investing in the Past

by Mark Miles



Mail carriers pose in front of The Chesterfield Post Office. The building was originally constructed in 1914 to house The Farmers State Bank of Chesterfield. Guided by historic photographs, architects removed the later additions to the building and reconstructed storefront elements.

Photo courtesy of Donald Hoffmann

have been converted into the new 368-room Drury Plaza Hotel.

The Drury Development Corp.'s \$32 million renovation of the Fur Exchange is but one of a rapidly growing number of rehabilitation projects using the existing federal rehabilitation tax credits in combination with a new state tax credit that encourages the preservation and reuse of Missouri's historic resources.

Missouri's Historic Tax Credit Program provides preservationists and developers with a 25 percent state rehabilitation tax credit that can be earned by investing in Missouri's historic resources. According to Stephen Mahfood, director of the Missouri Department of Natural Resources (DNR) and the state's historic preservation

In 1919, construction began on a new seven-story commercial warehouse building located just four blocks from the Mississippi River in St. Louis. It was designed to house the display rooms and auction room of the International Fur Exchange. By late 1997, the aging International Fur Exchange building, like all too many historic buildings, seemed slated for the wrecking ball. Indeed, demolition work had already begun when a last-minute reprieve gave the building a second chance at life.

In the fall of 1997, St. Louis hotelier Charles L. Drury purchased an option on the building and began exploring the feasibility of converting it into a downtown hotel. Today, thanks in large part to a new state tax credit program aimed at encouraging investment in historic buildings, the International Fur Exchange and the adjacent American Zinc, Lead and Smelting Co. Building

officer, "The state credit, combined with the existing federal tax credits, offers one of the best, if not the best, economic incentives for the preservation of historic buildings in the country. The bottom line is that investing in historic buildings makes sense. The impact of that investment can have a profoundly positive effect on the economic health and vitality of Missouri's cities, small towns and neighborhoods."



The Missouri Historic Tax Credit program has spurred redevelopment of several hotels around the state: The Hotel Bothwell in Sedalia was built in 1927. It underwent a \$1 million renovation that was completed in November 1999.

DNR photo by Nick Decker

credits remained in place, although reduced from 25 to 20 percent. Other changes, however, dramatically reduced the ability of developers to use the credits. Under these revisions, changes in the "passive loss" aspects of the code made it difficult to package development projects and generate investor capital. The result of these changes was quickly felt in Missouri. From a high of \$188 million invested in 1982, rehabilitation investment activity declined with only \$3.4 million invested in the state during 1995.

Deeply concerned by the deteriorating state of many of Missouri's finest historic resources and by the lack of private investment to preserve them, preservationists around the state launched a bold initiative to establish a state tax rehabilitation credit. The new credit would closely parallel the federal credits and help reinvigorate rehabilitation activities in the state. In 1996, legislation was introduced in the Missouri General Assembly calling for the creation of a 25 percent investment tax credit for the rehabilitation of historic buildings. The

Using the tax code to encourage the preservation of historic structures began at the federal level in 1976. In that year, changes were introduced to eliminate some of the provisions that favored new construction over rehabilitation. Incentives that encouraged preservation and discouraged demolition of older buildings were added. In the early '80s, Congress passed new incentives to encourage the preservation of historic buildings. An important key was a 25 percent investment tax credit for the rehabilitation of historic buildings. Essentially, the program permitted a developer to receive a quarter of rehabilitation investment returned as a federal tax credit. Since their inception, these federal tax credits have been administered in Missouri by DNR's Historic Preservation Program (HPP).

Developers quickly embraced the program as the credits became a development and investment boon. From 1982 to 1988, more than \$745 million in rehabilitation projects took place in Missouri alone. Fueled by the credits, major rehabilitation projects such as the renovation of Union Station and the Fox Theater in St. Louis and the Coates House Hotel, Quality Hill and the Garment District in Kansas City, took place.

During the 1980s, Missouri was one of the leading states in the nation using the rehabilitation credits. In 1986, Congress overhauled the federal tax code. While many existing tax incentives were eliminated, the preservation

measure was passed in September 1997, signed by the governor, and took effect Jan. 1, 1998.

The new Missouri Historic Tax Credit Program is administered by the Missouri Department of Economic Development (DED) with DNR's HPP playing a key role in reviewing all projects applying for either state or federal credits. Noted Ann Perry, who administers the state tax credit program for DED, "The state credit is a great complement to the federal program. We have found that developers are using the credit for gap financing to make projects happen that otherwise would not have happened with the federal credits alone."

Although the state credit has been in existence only a few years, the results have been dramatic. Since the state program went into effect in 1998, 28 projects have been completed. DED has issued \$11.5 million in state income tax credits. The economic impact of the program can be appreciated when one realizes that those 28 projects represent an investment in local Missouri communities of approximately \$46.3 million. Perry notes that these projects have produced 552 new housing units and have created an estimated 1,325 new jobs. Other projects that have been completed utilizing the state credits include the Elms Hotel in Excelsior Springs, the Chase Hotel complex in St. Louis, the Northland Lofts in the old Sears and Roebuck warehouse in North Kansas City, the Hotel Bothwell in Sedalia and the Standard Printing Co. in Hannibal.

Many more projects are in progress including the Cupples Station in St. Louis, the Hotel Governor in Jefferson City and numerous other buildings in the Garment District in Kansas City. According to Perry, approximately \$43.7 million in state credits are pending for fiscal year 2000.

Although the federal and state credits are similar, there are some significant differences. In addition to the differences in the size of the credits (20 percent for the federal program, 25 percent for the state), federal credits are limited to income-producing commercial or residential properties; the state program allows an owner of a historic residence to claim the credit for rehabilitation of their personal residence.

To qualify for both the federal and new state credits, projects must meet three critical tests: 1) The building must be "historic"; 2) The rehabilitation work must follow the Secretary of the Interior's Standards for Rehabilitation; and 3) The rehabilitation must be "substantial."

Both credits use the same definition for "historic." To qualify as a historic building, a property must be either: individually listed in the National Register of Historic Places; a contributing element of a National Register of Historic Places historic district; or a contributing element of a local district that has been certified as being historic by the U.S. Department of



the Interior. This recognizes that buildings identified by the U.S. government as significant warrant special preservation incentives.

The International Fur Exchange, built in downtown St. Louis in 1919, along with the American Zinc, Lead and Smelting Co. Building, became the Drury Plaza Hotel.
DNR photo by Nick Decker

Both credits use the same standards to evaluate the proposed work and to ensure that rehabilitation work is undertaken in an appropriate manner. To qualify for the credits, projects must follow the Secretary of the Interior's Standards for Rehabilitation. These standards are 10 basic principles created to help preserve the character while allowing for change.

Underlying this requirement is the recognition that it would be counterproductive to award tax credits to encourage the preservation of important historic resources, while permitting work to be done that could adversely impact or diminish the historic character of the building.

"It's difficult to place a monetary value on such items as original materials, workmanship and design," said Claire Blackwell, HPP director. "Adherence to the secretary's standards ensures that those elements are protected," she added.



The Hotel Governor in Jefferson City was a gathering place for state lobbyists and legislators for many years. Closed since 1988, it is being renovated and will reopen as offices for government and businesses.

DNR photo by Nick Decker

To qualify for the credits, both the federal and state programs require that a rehabilitation must be "substantial." The credits are aimed at encouraging significant investment in historic resources, not merely minor fix-up or maintenance activities. The federal investment threshold is either \$5,000 or in excess of the adjusted basis of the building, whichever is larger over a 24-month period. "Adjusted basis" is essentially the current depreciable value of the building. The state uses a different investment threshold. To qualify for state credits, an investment must exceed 50 percent of the building's basis with "basis" defined as the property's acquisition cost.

Both programs use similar criteria to evaluate allowable expenses. Construction-related expenditures are allowable, while site improvements, landscaping, new construction and building furnishings are not.

Owners seeking the federal credits submit an application, photographs, plans and specifications to the HPP for review. Once the HPP grants preliminary approval, projects are forwarded to the U.S. Department of the Interior's National Park Service for final approval. When construction is complete, the work again is reviewed by the HPP and the Park Service.

The process for obtaining the state credits is similar to that of the federal credits. Initial application, however, is made to the Department of Economic Development. The project is then forwarded to the HPP which verifies the historic status of the property and determines whether the work meets the Secretary of the Interior's Standards. Once the completed work has been approved by the HPP, Missouri's Department of Economic Development reviews project expenditures to verify their eligibility and issues the credit to the taxpayer.

While large-scale projects such as the Fur Exchange demonstrate the attractiveness of the credits to developers, smaller-scale projects also have benefited from the program. Perry notes that 28 percent of the projects that have claimed the state credits since its conception are owner-occupied properties. "Because the state historic credit can be used for residential homeowners, we have been able to reach out not only to commercial properties, but to see neighborhoods revitalized as well," Perry said.

The program has had a positive impact in smaller towns as well. The Farmers State Bank of Chesterfield building was erected in 1914 and featured an ornate pressed-metal storefront design manufactured by the Mesker Brothers Co. of St. Louis. The building served as a bank and Chesterfield's post office. Heavily altered over time, the building seemed fated to be swept away as the suburban community experienced rapid growth in recent years.

In 1999, architects Lauren Strutman and Dick Busch purchased the building and began work to convert the building into their architectural offices. Using historic photographs, later additions were removed, and missing storefront elements were reconstructed. The project was completed in July 1999. Since its completion, the project has generated a tremendously positive response in the community. It recently received a preservation award from the city of Chesterfield and people frequently stop and comment on the dramatic improvement in the building's appearance. The success of the project has had a ripple effect as well. Two adjacent residential properties have recently been purchased and are slated to be renovated in the coming months.

Strutman said the availability of state and federal tax credits was one of the key factors in making the project happen. "It made a tremendous difference in our ability to do the project," she noted. "The positive effect it has had on preservation efforts here in Chesterfield can't be measured."

By encouraging private investment in Missouri's historic resources, the state and federal credits are a powerful tool for the preservation of the state's rich and irreplaceable heritage.

Mark Miles is the assistant director of DNR's Historic Preservation Program within the Division of State Parks.

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LETTERS

Just a few thoughts on newly required reformulated gasoline. I watched "20/20" recently as they detailed the disasters that are happening as a result of the chemicals used in the gas. What were our legislators and EPA thinking about? It should be outlawed immediately or at the least very extensively tested for. After you find it, it's too late. Check California - they outlawed it and are now looking for good drinking water due to chemicals' fast migration through the groundwater. I may be a worrywart, but I don't think so.

William Koenig
Washington

Editor's Note:

When it comes to groundwater contamination I guess you could call us worrywarts, too. DNR's Public Drinking Water Program became aware that [Methyl Tertiary Butyl Ether \(MTBE\)](#) was a potential problem for public water in 1995 and began testing for it. Every community well in Missouri has been tested for MTBE. Of 2,700 public water systems, two have had MTBE contamination. The city of Washington has eight deep wells that supply drinking water. They have been tested twice for MTBE, last September and in September 1996. There was no evidence of MTBE or any other gasoline additive.

MTBE makes gasoline burn cleaner, helping clean up the air in many urban areas. The key to avoiding another environmental problem in the name of clean air is preventing gasoline storage tank leaks. DNR's Hazardous Waste Tanks Unit has been proactive in making sure these tanks are upgraded. By the end of last year, about 97 percent of the tanks in Missouri were upgraded. Gov. Mel Carnahan recently wrote the Environmental Protection Agency asking it to implement the Blue Ribbon Panel's recommendation to phase out MTBE. Until a solution is found, DNR will continue surveillance and prevention activities to protect water resources.

My name is Becky Davis and I receive *Missouri Resources*. In the latest issue, Winter 1999-2000, Vol. 16, No. 4, on the back page there is an article by H. Dwight Weaver called *Bootheel Politics, Frontier Style*. I very much enjoyed the article and photo. After reading the story three different times, I had an idea, and I wish to ask your permission. I am very much into genealogy and know some folks who are researching the Walker name. Is it illegal for me to have copies made of this article and send to these folks? I know there are copyright laws, and I wanted to check with you folks before copying the article. I also want to thank you for the wonderful magazine that you publish. I look forward to getting my copy.

Becky Davis
Hamilton

Editor's Note:

It is perfectly legal to copy anything published in Missouri Resources, as well as send it to whomever you wish. Reprinting guidelines are available through the "Letters" address.

Having just moved back to Missouri last fall, we immediately registered to receive *Missouri Resources* with our first copy being the Winter 1999-2000 issue. It is the best magazine published by a state of the numerous ones we've seen since leaving in 1962. We have several grandchildren living in this area who are interested in the articles published in your magazine for their home school participation. Are past issues available for us to begin building a library of information for their new state?

Walt and Jean McCluskey
Edgar Springs

Editor's Note:

We have limited back issues available and fill requests from readers while supplies last.

Letters intended for publication should be addressed to "Letters," *Missouri Resources*, P.O. Box 176, Jefferson City, MO 65102-0176 or faxed to (573) 751-7749, attention: "Letters." Please include your name, address and a daytime telephone number. Space may require us to edit your letter. You can e-mail *Missouri Resources* staff at moresdnr@mail.dnr.state.mo.us

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NEWS BRIEFS

Annual Water Report Issued

The Missouri State Water Resources Law requires that an annual report advise the General Assembly on the status of stream and aquifer water resources monitoring requirements. The Missouri Department of Natural Resources'(DNR) Water Resources Program in the Geological Survey and Resource Assessment Division (GSRAD) performs these tasks.

Copies of the 1999 annual report now are available. Topics included address not only GSRAD activities, but also DNR's Division of Environmental Quality initiatives related to water resources. The report will be informative to people with an interest in water quality and supply issues, especially in times of drought.



Water quality monitoring, planning, dam safety, water use, well, wastewater discharges, nonpoint-source pollution, public drinking water systems, soil and water conservation, and interstate water issues are in the report.

Copies may be obtained from the Water Resources Program at (573) 751-2867, or from GSRAD in Rolla, at (573) 368-2125, FAX at (573) 368-2100; or e-mail at [GSRADpubs@mail.dnr.state.mo.us].

New Exhibit Opens at State Museum

An exhibit that showcases the successful creation of a recreation center for African-Americans in the early 1930s opened Feb. 17 at the Missouri State Museum in the state Capitol in Jefferson City.

"Lake Placid: A Recreational Center for Colored People," tells the story of a Kansas City doctor's efforts to create recreational facilities for African-Americans at a time when such facilities were strictly segregated. Dr. Percy C. Turner wanted a place similar to the Lake of the Ozarks for his fellow African-Americans to enjoy. With help from the federal Works Progress Administration, Turner purchased land, built a dam and formed Lake Placid in Morgan and Benton counties near Stover. Initially developed in the 1930s, Lake Placid still exists and is experiencing a revival. The exhibit will be on display through June 30.

The Missouri State Museum, operated by the Missouri Department of Natural Resources, is located on the first floor of the state Capitol and is open daily.

Boardwalk Provides Access to Canyon

A new boardwalk allows visitors to Grand Gulf State Park near Thayer access to Missouri's "Little Grand Canyon."

The main feature of the park is a mile-long canyon with walls that reach 130 feet high. Several overlooks on top of the canyon allow visitors to look down into the gulf, which was formed when a giant cave collapsed. The new boardwalk, which involves a series of platforms and stairs, allows visitors to descend part of the way into the canyon. The boardwalk was designed to have minimal impact on the environment while providing a close-up look at sheer rock walls and the canyon.

[Gateway Clean Air Program Launches This Spring](#)

Beginning in April, vehicles in St. Louis city and St. Louis, St. Charles and Jefferson counties will take a new enhanced emissions test. Franklin County will begin using an improved basic idle test. In addition to station-based emissions tests, the Gateway Clean Air Program will include RapidScreen, a remote sensing method that will test emissions as vehicles are driven in the St. Louis area. RapidScreen, designed to identify the cleanest-running vehicles, will enable motorists with clean-running vehicles to pass the emissions test without visiting a testing station.

Vehicle models 1971 and newer will take an emissions test once every two years. In Franklin County, vehicles will take the improved basic idle test annually. Model years 1999 and 2000 and odd-year models do not have to be tested this year.

The 12 testing stations are scheduled to open April 5. For more information, contact the Gateway Clean Air Program at 1-888-748-1AIR (247) or visit the Web site at [www.gatewaycleanair.com].



Energy Center Forges Business Partnerships

A new initiative by DNR's Energy Center helps companies learn and use energy-efficient practices. Forty percent of Missouri's energy consumption is in the commercial-industrial sector.

Working closely with partners such as the University of Missouri-Rolla's Industrial Assessment Center and the Mid-America Manufacturing Technology Center, the Energy Center's Business and Industry program suggests energy-saving practices to companies such as Caterpillar Inc. in Boonville. The Energy Center also is forging partnerships with Ameren Corp. and Kansas City Power and Light Co. to cosponsor educational workshops. Information about electric utility restructuring and energy-efficiency training for large industrial and commercial operations is planned.

"Integrating energy-efficient techniques into industrial operations and commercial buildings saves businesses money and gives them a competitive edge," said Mohamad Alhalabi, director of the Energy Center's Business and Industry program. "It also helps the environment by lessening energy demand."

Morris State Park Joins DNR

A new park has been added to the Missouri state park system, thanks to the generosity of a Springfield businessman. A donation by Jim D. Morris of Springfield will be used to create Morris State Park near Campbell in Dunklin County.

With its location in an area known as Crowley's Ridge, the 161-acre park will preserve a unique chapter in Missouri's natural and cultural history. Located in a range of low hills in the Mississippi River floodplain, the

Crowley's Ridge area preserves a landscape like none other in Missouri. The new state park contains examples of almost every kind of forest present in the area 200 years ago as well as several unique plant species.

The area's geology, natural history and human history will be interpreted. To preserve its natural integrity while allowing access to the public, development will be minimal. Initial work will include a parking area, restroom, an interpretive/information board and trails.

With the addition of Morris State Park, DNR's state park system now has 81 state parks and historic sites.

Digital Land Survey Info Available

State statutes require DNR's Land Survey Program in the department's Geological Survey and Resource Assessment Division (GSRAD) to collect and preserve land surveys made by people authorized to establish land corners and land boundaries. The staff also helps county officials maintain and index all land survey documents.



The Land Survey Program, previously the Land Survey Authority, has been in existence since 1971. Since then, 1.5 million land survey documents have been collected, microfilmed, indexed and preserved. Microfilm is the medium used to archive the documents. All registered land corners are scanned and maintained in a digital format.

The program has 74,000 land survey corner documents on microfilm and in digital format. Until now, GSRAD has only been able to provide paper copies of the documents and indexes.

During the past two years, the Land Survey Program has converted the Land Survey Database to a PC-based program. Arrangements have been made with a local bank to store daily backup tapes in a safe-deposit box.

To provide staff and the public with digital data, it was necessary to convert 72,000 land survey corner documents, 1.5 million records, and the 74,000 index records to PC-based programs.

The digital information is used by the Land Survey staff to make various queries and for research in filling orders. The digital index databases are available for purchase on CD. The Corner Master Index and documents also are available for purchase by region. The state has been divided into 30 regions. Updates are made monthly to the corner documents and the Corner Master database. The Land Survey Index is updated daily.

For information call GSRAD at (573) 368-2237.

Governor Extends Committee's Work

Gov. Mel Carnahan extended the work of the Governor's Advisory Committee on Chip Mills. The committee was created by executive order in September 1998 to study the impact chip mills and timber harvesting practices have on Missouri forests.

The committee released a draft report of its findings in December. The draft was placed on public notice from Dec. 1-31, 1999. In order to complete the public input process and evaluate and make final changes, the governor issued an executive order to extend the committee until Feb. 1, 2000.

In January, the governor again extended the committee's work to evaluate the Missouri Department of Conservation's (MDC) "Draft Report on the Chip Mill Issue." This report was put on public notice and comments were accepted until March 3, 2000. For a copy of MDC's report or more information, contact MDC at (573) 751-4115 ext. 304. MDC's draft report also can be viewed through a link on the DNR Web site [www.dnr.state.mo.us/deq/chipmills/]. A public hearing on the report was held in early March.

The advisory committee will use the information from MDC's draft report and all public comments to further refine the committee's report. Once ready, the committee's report again will be placed on public notice for further input prior to finalization and submission to the governor.

The chip mill committee is co-chaired by Steve Mahfood, DNR director, and Jerry Conley, director of MDC. Joe Driskill, director of the Department of Economic Development, John Saunders, director of the Department of Agriculture, Sen. Wayne Goode, Sen. Doyle Childers, Rep. Jerry McBride and Representative Bill Foster also are members of the committee.

Gov. Carnahan appointed the following public members: David Bedan, Citizen Environmental Conservation Group; David Dey, private property owner organization representative; Emily Firebaugh, forest landowner; Jay Law, Citizen Environmental Conservation Group; Mark Garnett, forest products representative; and Joe Smith, forest products representative.

EIERA Awards \$48,750 for Farm Compost Project

The Environmental Improvement and Energy Resources Authority's (EIERA) Missouri Market Development Program has approved \$48,750 for the Green Farm Project in Knob Noster. Green Farm officials plan to produce organic compost from yard and wood waste, recovered cardboard, newspaper, and other low-grade paper. Annually, approximately 875 tons of material will be diverted from area landfills.

The assistance will allow Green Farm officials to purchase several pieces of equipment, including a dump trailer, mixing wagon, farm tractor and skid steer loader. This equipment will enhance Green Farm's composting and wood chip operation.

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ONE LAST WORD

A Shift in Thinking

*by Connie S. Patterson
photograph by Nick Decker*

Anyone who has been to the Children's Barnyard at the Missouri State Fair remembers the huge sow and her numerous little piglets. Adults and kids alike pack into the barn to see what for many Missourians is a mainstay of home - farm animals like baby chicks, horses, cows, hogs and even the occasional barn cat. But it's always the mama hog inside the front door that gathers a crowd of curious onlookers.

Of course, hogs do more than entertain fair-goers. For many Missourians, they provide a living. In fact, Missouri is the seventh-largest hog producer and raises 5.3 percent of the nation's hogs. In 1998, more than 8.3 million hogs were marketed in Missouri - up substantially from 1988 when our state marketed 5.1 million hogs. In 1978, the Show-Me State raised 5.8 million hogs. In addition, Missouri is home to 5,000 hog operations, according to the Missouri Department of Agriculture's 1999 Farm Facts. In 1988 and 1978, Missouri had 17,000 and 35,000 hog farms respectively. This shows there are more hogs in Missouri today, but they are being raised on fewer farms.



In 1810, when Walker arrived at Little Prairie along the west bank of the There There has been a lot of attention lately to a shift in thinking about the agricultural community. The industrialization of agriculture has led to the development of fewer, larger farms,

sometimes at the expense of the independent family farm. Today, local cooperatives are gaining momentum as the way of the future. These cooperatives allow for economies of scale on shared resources, but also allow farmers to retain some independence. "If independent farmers band together in value-added cooperatives, their profit margins will increase, allowing smaller family farms to be successful and profitable," said Kyle Vickers, deputy director of the Department of Agriculture. "Profitability keeps the smaller independent farms in operation."

Many of today's farmers want to remain independent of large company farms but are struggling financially to do so. According to John Ikerd, professor of agricultural economics at the University of Missouri-Columbia, fewer than 2 percent of Americans are called farmers today and less than half of that number view farming as their primary occupation. The average American spends little more than a dime of each earned dollar on food, and the farmer receives only a penny of that dime, according to Ikerd. The remainder pays for processing and marketing costs.

Many people are unaware of the importance of agriculture in our society. Today, we have more hogs than 10 years ago, but we have fewer independent farms. There is no question that agriculture is important to Missouri and to Missourians. In 1998, there were 110,000 farms in Missouri, according to the Missouri Department of Agriculture's 1999 Farm Facts. In fact, Missouri ranks second only to Texas in the number of farms. The move toward cooperatives serving independent family farms will help keep many of these 110,000 farms in operation.

So how does this tie in to our natural resources? "Smaller and more dispersed production facilities can mean less waste to apply to the land and less odor," said Vickers. "The results may be a more positive impact on the environment." However, there are concerns that the move to reinvigorate independent family farms with cooperatives might be hindered by environmental regulatory requirements.

"We do evaluate agricultural operations differently based on size," said Missouri Department of Natural Resources Director Steve Mahfood. "We look at the soil's capacity to use waste as a nutrient source. Independent agriculture, with smaller farms dispersed over a larger land area, can support the same number of animals being raised in a different way than larger farms concentrated on fewer acres. Our goal - the tie between agriculture and natural resources - is the same, preserving our resources for future generations."

So, the next time you take your family to the fair and visit the Children's Barnyard, take a look to see where the big pig came from. In fact, you and your children will probably see, there on the fence, the sign of the proud young Missouri farmer who raised the sow and her many babies.

Connie S. Patterson is director of communications for the Missouri Department of Natural Resources.

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PARTNERS IN PROTECTION

*by Susan Eskens
photographs by Nick Decker*



The cooperative effort to improve Mark Twain Lake's water quality is showing signs of success.

This 1954 quote is from former president Dwight D. Eisenhower. Prophetically, it still rings true today - especially in Missouri. Ours is a state of crystal clear streams and beautiful lakes. Missouri's water resources have been essential to the economic and recreational welfare of our state. That is why it is inspiring to see Missourians joining together to form partnerships to protect this valuable resource.

Every two years, the Missouri Department of Natural Resources (DNR) develops a list of impaired waters as required by section 303(d) of the federal Clean Water Act. DNR collects information from the public on the quality of waters suggested for placement on the 303(d) list. Because it is impossible for DNR to observe every

segment of water in Missouri at all times, we rely on input from the local citizens to alert us to potential problems. To announce the public comment period of the proposed year 2000 list, DNR placed ads in 148 newspapers; these identified how and when to comment on the list. The Clean Water Commission made a final decision on the 2000 list on March 15, 2000, and it will be sent to the U.S. Environmental Protection Agency (EPA) by April 1.

Mark Twain Lake, Table Rock Lake and the Rock Creek watershed have been on, or are suggested for the list, but already are on track back to health thanks to the joint efforts of DNR and several partnerships in the watersheds.

Mark Twain Lake

Mark Twain Lake encompasses about 18,000 acres. It is an important drinking water source in northeast Missouri that is threatened by agri-chemicals, nutrients and sediment. These problems are very difficult to address in such a large drainage area. Sedimentation is the result of soil erosion from many tributary watersheds, and creates higher costs for water treatment, premature filling of the water impoundments and loss of aquatic habitat. Agricultural pesticides exceeding federal and state standards have been detected in the lake. These drain from farmland where they have been applied. Excess nutrients also run off during storms. These cause taste and odor problems in the water supply as algae grows and then dies. Improving land management and application practices can minimize these sources of water impairment.



At DNR's State Environmental Laboratory, Chemist III Christopher Jaynes conducts organic analysis tests.

agri-business, community officials, private industries and other special-interest groups with an involvement in preserving the water quality of Mark Twain Lake and six other public water supply reservoirs in the watershed. This group was founded in 1999 when sample results determined that the lake's water was meeting drinking water standards.

"One reason for the decreased levels of atrazine in the water is that the Mark Twain area has been specifically targeted with programs to prevent nonpoint-source pollution and we proactively involved landowners and the

Mark Twain Lake was placed on Missouri's Impaired Waters list in 1998, but it is being recommended for removal from the 2000 list. For several years, DNR has worked with many partners to solve these problems. The University of Missouri Extension Center, Missouri Department of Conservation, Clarence Cannon Wholesale Water District, the federal Natural Resources Conservation Service (NRCS), local county soil and water districts and many other groups assisted in improving awareness of water quality problems and best management practices to solve them.

The Mark Twain Water Quality Initiative was created to form an alliance of farmers, soil and water conservation districts, government,

public," said Wanda Eubanks of the Mark Twain Water Quality Initiative. "The wide range of partners that have helped over the years has made the task of improving the water quality in Mark Twain Lake a truly cooperative undertaking."

DNR and EPA have provided grant funding to the Mark Twain Water Quality Initiative to support this work. The NRCS, University Extension, Missouri departments of Conservation and Agriculture, the Farm Services Agency, the U.S. Army Corps of Engineers, landowners, community associations and agri-chemical industries also participated. DNR's Soil and Water Conservation Program supports soil conservation practices through the parks-and-soils sales tax that funds erosion prevention programs. These voluntary incentive programs are administered at the local level by the local soil and water boards. The Corps has estimated a two-thirds reduction in sediment buildup from what it had planned when the reservoir was designed. This reduction is an excellent performance measure for northeast Missouri's soil conservation efforts effectively adding years to the project life span. "The benefits derived from this wonderful example of a partnership are reduced sediment, nutrients and atrazine going into the lake, which provides drinking water and recreational benefits to a significant portion of citizens in northeast Missouri," said DNR Director Steve Mahfood.

Table Rock Lake

Local participation has generated concern and interest for one of southern Missouri's greatest tourist attractions. Table Rock Lake historically has had some of the clearest water in Missouri. People from all over the Midwest visit the lake to scuba dive. Today, because of the algae that grows in the lake, water clarity has been reduced by more than 50 percent.

University of Missouri-Columbia Professor Jack Jones has studied the water quality of Table Rock Lake since 1978. He points to recent agricultural and human development within the basin for increased algae and reduced water clarity. "Changes of this type are readily apparent to the general public, because lake transparency is universally interpreted as a direct measure of water quality," said Jones. "Lake water with reduced water clarity has less aesthetic appeal and diminished utility for most human uses."



Missouri Department of Natural Resources employees sample a stream for invertebrates, whose presence supply clues about water quality.

Pamela Anderson, executive director of the James River Basin Partnership, has polled area residents to see if they have noticed the change. "Eighty percent of respondents to a phone survey in 1997 said the lake and the James River were more polluted than they were 10 years ago."

The James River Basin Partnership, funded in part by DNR, is an influential, grassroots, not-for-profit organization that was formed to reverse the decline. The group is dedicated to educating citizens in

and near the James River Watershed on the wise use and preservation of water resources. They also work to improve the water quality of streams, rivers and lakes of the James River Watershed, the major Missouri tributary to the Table Rock Lake. "We're made up of a diverse group of concerned citizens representing interests from the watershed as a whole, including agriculture, governments, businesses and private individuals," Anderson said. "We coordinate with the Natural Resources Conservation Service on the James River Watershed Assessment and also offer educational programs to children. We believe that the first step towards solving problems is having a general awareness of the causes."

Table Rock Lake has been added to DNR's year 2000 303(d) list because of point- and nonpoint-source pollutants. One notable pollutant causing water clarity problems in Table Rock is phosphorus. Phosphorus, from wastewater treatment facilities, septic tanks and area farms, increases the growth of algae, which results in the lake's dark green color.

As a result of the work of Jones and the awareness spread by the James River Basin Partnership, local people petitioned the Clean Water Commission to enact a rule to limit phosphorus amounts allowed in wastewater discharges to Table Rock Lake. The commission enacted the rule, effective Nov. 30, 1999. "It will take some time to see the benefits of this rule, because existing wastewater facilities will have to add phosphorus removal equipment to their plants. But it is a step in the right direction," Anderson said. DNR will provide special EPA and state grants plus State Revolving Fund loans to communities in the watershed to upgrade treatment.

Mahfood noted, "People have seen the need to protect the water quality of Table Rock Lake for health and environmental reasons. The James River Basin Partnership helped coalesce support that has included two bi-state meetings with Arkansas on the importance of Table Rock Lake. The governor has helped by providing a keynote address to over 300 meeting attendees."

Rock Creek

The Rock Creek watershed in Jefferson County, south of St. Louis, is another 303(d) listed watershed that is on the road to improvement. Point-source pollution from several small wastewater treatment systems was the problem. During the development of the area's earliest subdivisions, small stand-alone wastewater treatment facilities were sufficient to handle the domestic sewage. But on Aug. 9, 1997, 7 million gallons of raw, untreated sewage bypassed one of the plants and was discharged into Rock Creek. The bypass resulted in a fish kill and forced waders out of the creek in Mastodon State Historic Site. A study of the water showed bypasses of sewage and the combined discharges of the smaller facilities were overloading the small creek.

Existing treatment facilities needed to be upgraded or shut down and replaced with centralized collection and treatment facilities. In the interim, Jefferson County agreed not to issue occupancy permits on new houses unless the waste their occupants generated was removed by trucking it to a treatment facility that would better handle the additional volume. This was only a temporary solution. To accommodate the increased amount of sewage generated by expanding subdivisions, the nearby Rock Creek Sewer District agreed to purchase several of the smaller facilities with the help of a State Revolving Fund loan from DNR. A plan was developed that would eliminate the smaller facilities after connecting them to a larger plant to be built by the sewer district in Kimmswick.

The Rock Creek Sewer District built a second 500,000-gallon-per-day plant next to its existing 500,000-gallon-per-day facility. A trunk sewer was built under Interstate 55 to connect the smaller facilities to the Rock Creek treatment plant.

"This regionalization effort is good for the environment in Jefferson County because overloaded, as well as older and less effective wastewater treatment plants, will be phased out as they are connected to the newer Rock Creek District treatment plants," said Steve Townley of DNR's Water Pollution Control Program. "Eventually, with the help of another State Revolving Fund loan next year, the district will eliminate all of the facilities that had discharged into the Rock Creek watershed, connecting all to the Rock Creek District plant which discharges into the Mississippi River."

It is DNR's statutory responsibility to protect Missouri's water resources and to ensure the economic and recreational benefits clean water brings. This responsibility requires the involvement of many partners and local citizens. With the help of groups such as those found in northeast Missouri, Table Rock Lake and Jefferson County, Missouri's water will continue to be a precious and plentiful resource.

Susan Eskens is a public information specialist in the department's Division of Environmental Quality.

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RESOURCE HONOR ROLL

Biking enthusiasts can pedal their way through portions of Thousand Hills State Park in Adair County, thanks in large part to the thousand hours Marty Haynes devoted to developing a 13-mile trail. Haynes, a Kirksville native and avid mountain biker, saw the need for a public biking trail. In 1996 he attended a series of meetings and sought DNR state park officials' permission to develop a path at Thousand Hills.



Marty Haynes

After securing the department's support, he worked with a park employee to mark with flags the trail's path. Haynes also began the task of recruiting volunteers to cut trees and clear brush.

However, those volunteers were few and far between. A frustrated Haynes found himself struggling to maintain the path he had worked to clear while continuing to advance the trail. He also learned he needed permission from Kirksville officials before the trail could cross a dam on Forest Lake. The only other option was rerouting the trail, substantially adding to its distance.

Persistence paid off. After two years Haynes completed the work and the Thousand Hills State Park bike trail opened to the public.

UtiliCorp has harnessed the wind to offer customers a green alternative to fossil fuels. Green power is energy generated by renewable sources, such as the sun, water or wind, instead of traditional coal and gas-fired power plants. Prompted by the U.S. Environmental Protection Agency, UtiliCorp began exploring wind as an energy source in 1998, said Gene Russell, the company's director of environmental services.



Gene Russell

Two wind turbines at the Jeffrey Energy Center generate enough electricity to supply approximately 300 customers in Missouri and 300 in Kansas with a 100-kilowatt hour block of energy each month. The average household uses 600 to 700 kilowatts monthly. Working with DNR's Division of Energy and the Missouri Public Service Commission, UtiliCorp introduced a green power tariff. Participating customers pay an additional \$5 per month on their bills for wind-generated electricity.

Approximately 88 customers in Missouri and 45 in Kansas have enrolled in the program since it was first offered in September, Russell said. UtiliCorp is working to spread the word about the availability of green power and its advantages.

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RESOURCES TO EXPLORE

Prairie State Park

By Laura Hendrickson



Bison at Prairie State Park depend on the various grasses there for more than 90 percent of their diet. Grazing is essential to the preservation of the prairie ecosystem.

DNR photo by Nick Decker

mystifying scene - a boundless sea of grass that stretched beyond the horizon. They had heard much about these great grasslands called prairie, but could not have imagined the vast treeless expanse before them.

Not all accounts of prairie were complimentary. For some, the prairie was an overwhelming, monotonous and lonely landscape. For numerous reasons, it was one of the last frontiers to be conquered. Many settlers feared the American Indians as well as the autumnal fires they set. The lack of trees that provided fuel, shelter, and protection from the elements was alarming.

The challenges of settling the prairie were monumental. Sodbuster was a name given to people who began to break the soil with an ax to plant their crops. The enormous difficulty of breaking native sod was largely overcome by the use of John Deere's self-scouring plow. Within half a century, the immense prairie landscape, which evolved over thousands of years, was converted into agricultural lands.

Tallgrass prairie is Missouri's most endangered natural and historical landscape. Prairie State Park was established in 1979 by the Missouri Department of Natural Resources with assistance from The Nature

In 1820, the population of the Missouri Territory was around 67,000. Missouri was

As early settlers pushed westward, leaving the familiar eastern forests behind, they encountered a new and

Conservancy to preserve an example of this vanishing landscape. The park is the largest protected tallgrass prairie remnant left in Missouri, encompassing 3,702 acres in western Barton County. It embodies a high-quality example of a landscape that at one time covered more than a third of the state.

"Just as the sun was sinking below the horizon, I entered one of those beautiful glades or natural meadows which are so often seen in this part of the New World, and never without producing an agreeable feeling ... The prairie spread out before me all its enchanting beauties, and, fearful of passing too rapidly, I reined my horse."

- Henri Brackenridge, explorer, 1810

Prairie State Park preserves this unique landscape and encourages biodiversity by replicating historic natural disturbances. Through controlled fires and the reintroduction of native grazers, efforts are made to mimic a naturally functioning ecosystem reminiscent of presettlement times.

Without the presence of fire, trees and shrubs rapidly invade the prairie, eventually shading out the grasses. Fire historically played a key role in maintaining the openness of the prairie. American Indians used fire in a variety of ways, but primarily as a hunting tool. A 1680 account by Father Louis Hennepin described how American Indians would set fire to the grass all around a herd of bison, allowing only one passage for escape. The hunters would station themselves along this passage, sometimes killing as many as 120 bison in one day. These autumnal fires promoted new growth in the spring, which attracted herds of bison. Today, park staff members replicate the impacts of American Indian and lightning-set fires through prescribed burns.

Grazing is equally important in maintaining a prairie ecosystem. Missouri grasslands were once occupied by great herds of bison, elk and deer. The last elk herds were driven from the state in the early 1800s, and the great herds of bison were hunted nearly to extinction, by 1890. To help restore the effect of grazing, bison were reintroduced to Prairie State Park in 1987, and elk in 1993. The current size of the park bison herd is 45, with 19 calves expected to arrive soon.

Grazing and fire play crucial roles in supporting prairie life. Grassland birds depend on these two elements to create patches of shorter grass where they can court, perch on the ground, and build nests. The greater prairie chicken is an intriguing bird that requires prairie habitat. During the early spring, the male prairie chickens meet at dawn to begin their ancient courtship ritual at a booming ground, also referred to as a lek. The males compete for the hens' attention by stomping and turning circles on the ground. They also inflate yellow-orange-colored throat sacks and sing a three-note boom. This mating dance has occurred on the same ground every spring for possibly hundreds of years.

Unfortunately, experiencing this event may soon be lost to visitors. In the late 1800s, flocks of prairie chickens were sometimes said to have momentarily blocked out the sun. But as more and more prairies were lost, prairie chickens began to disappear. Less than 1,000 survive in the state, and based on current trends, they will become extinct from Missouri by the year 2009. Prairie State Park provides habitat to approximately 75 birds, one of the largest remaining single populations of the greater prairie chicken.

When is the best time to visit Prairie State Park? Every season offers different opportunities to explore prairie life. Spring is announced by the boom of the prairie chicken. Pumpkin-colored bison calves are born, while birds, such as the eastern meadowlark, sing courtship songs and weave grass into beautiful nests. Ornate box turtles and slender glass lizards wake from their winter sleep and emerge from the soil. New plant life pushes through last year's old growth. The landscape turns into a sea of green, speckled with red, purple and cream-colored blossoms of Indian paintbrush, wild hyacinth and wild indigo.

By mid-summer, patches of pale purple coneflowers stand out among the vegetation. Summer bird residents such as the Henslow's and grasshopper sparrows make an appearance along with the dickcissel, who throws his head back and proudly sings his name, "dic, dic, dickcissel." Grasshoppers, butterflies and dragonflies hop, fly and zoom through the waving grasses in search of food or a mate. Butterfly milkweed, a deep orange-colored flower is an irresistible attraction for butterflies. The rattlesnake master, whose roots were once believed to cure rattlesnake bites, blends with the most abundant group of flowers on the prairie. This group includes sunflowers, coneflowers, coreopsis, daisies and asters.

Hot temperatures may encourage us to seek air conditioning and shade, but the prairie thrives in heat. Big bluestem and Indian grass do not flower until the hot days of summer.

Extensive root systems, ranging from 10-15 feet underground, enable prairie plants to reach deep, moist layers of soil, and provide a defense against grazing and fire. When the aboveground portion of the plant is removed or destroyed, energy that is reserved in the roots makes new growth possible.

Autumn brings fall colors to the prairie with native grasses in shades of tan, copper and gold. By late fall, native grasses have reached their maximum height, some nearly nine feet tall. Standing above them all is big bluestem with its three-part seed head, resembling a turkey's foot. Flowers also are taller now to compete with the native grasses. The blazing star (or gayfeather) draws attention to itself with its mass of slender, purple spikes while several types of goldenrod sway among the russet-colored stems of grass.

When the fall colors have passed and skies turn gray, winter wildlife comes into focus. The bison, elk and deer are easier to locate in the snow-covered landscape. Animal tracks are revealed in new fallen snow. Northern harriers, prairie falcons and other raptors are spotted cruising over the land searching for food. Smaller, winter residents such as the Harris' sparrow and juncos are observed hopping on the ground looking for fallen seeds.

Regardless of the season, hiking is the best way to explore the prairie. Four trails loop through the landscape for



The golden blooms of the large-flowered coreopsis can be enjoyed in late May and June while purple prairie phlox is in flower throughout both months.

DNR photo by Nick Decker.

a total of 11 miles. A short stroll can be enjoyed behind the visitor center, or a longer overnight backpack camping experience is available for those wanting to sleep under the stars in the prairie expanse. The trails are great for wildflower viewing, photography, watching wildlife and picnicking near a slow-moving prairie stream.



Each season brings a changing kaleidoscope of color to the prairie. Chris Evans of Joplin found a quiet spot amid the emerald grasses to sketch a wildflower. He was working to fulfill the "Discover a Plant" requirement for earning a Junior Naturalist badge at Prairie State Park's Junior Naturalist Day Camp.

DNR photo by Cyndi A. Evans.

America. Prairie State Park preserves and interprets a disappearing natural and historic landscape. The park is a unique resource for the people of Missouri as one of the last lingering fragments of original beauty, and home to several plants and animals that may never be seen again.

For more information about this park or any other state park or historic site, contact the Missouri Department of Natural Resources toll free at 1-800-334-6946 or 1-800-379-2419 (Telecommunications Device for the Deaf); or you can visit our Web site at [www.mostateparks.com].

Laura Hendrickson is park superintendent at Prairie State Park.

The park visitor center is open throughout the year to interpret the tallgrass prairie. The most striking feature of the center is the diorama depicting the prairie from spring into fall. The park naturalist presents a variety of hikes, activities and programs, such as pioneer life, wild edibles and stargazing. Wildflower hikes are offered the first Saturday of each month from May until September. The 2000 Prairie Jubilee will be held Oct. 14 and may be the biggest celebration of Missouri's tallgrass prairie. This year, it coincides with the Lek Trek, a hiking event across the state to promote awareness of grassland birds, especially the greater prairie chicken.

True natural American landscapes are tragically rare today. Less than 1 percent of the original prairie exists today across North

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TEACHER'S NOTEBOOK

"Playground ReTIREment Homes"

story and photos by Nancy Newland

The school children looked on sadly as five huge commercial tires, sunk in the ground and used as climbing apparatus, were hauled off to the recycling plant. Three months later the children gasped with delight as they stepped onto the new crumb rubber playground surface, diced from those tires as well as 5,704 other recycled Missouri tires. A more vivid closed-loop-recycling lesson is hard to find.

The Playground Odyssey at St. James School in Liberty took 10 months and involved research, fund raising, grant writing, site preparation, installation and maintenance. During the research stage, local parks departments, landscape architects, school groundskeepers, engineers and physicians were consulted for their professional opinions on crumb rubber playground surfaces. Check the Consumer Product Safety Commission Internet Web site (or call 800-638-2772) for extensive statistical research on playground safety and materials testing.



The St. James School in Liberty qualified for a Missouri Department of Natural Resources grant to install a playground utilizing crumb rubber as the cushioning play surface.

The biggest issue in playground safety and design is surfacing. The three main choices are mulch, gravel or crumb rubber. St. James School eliminated mulch early, despite its initial low cost. Wood mulch has a tendency to blow away, decay, harbor mold and insects, cause splinters and must be replenished annually. Gravel requires a strong, costly frame to support the 12 inches required for minimal fall-height protection. Gravel scratches play equipment, school flooring and children's knees. It hurts when it gets inside shoes and is dangerous when thrown by children or ejected by lawnmowers. Gravel is difficult to walk in, forms hardpan in traffic areas, and is an extreme slip hazard when scattered onto nearby hard surfaces.

Crumb rubber, made from the sidewall of



More than 5,700 scrap tires, which are banned from landfills, found a retirement home at the playground, seen below under construction.

scrap tires, is an appealing, environmentally friendly alternative. A mere 6-inch layer provides adequate fall-height protection. It will not scratch play equipment, flooring or knees and is less harmful if thrown. It is not slippery, dries rapidly, and melts snow quickly due to its tendency to retain some heat. The cost is comparable to gravel when delivery, border height and proper depth are considered. Children love the spongy feel. In fact, why bother to install playground equipment at all - a giant pit of crumb rubber would do just fine!

a safer playground that benefited the environment without pinching our wallet.

These facts made the choice easy for us -

Common Concerns

Allergy:

The latex in tires is not the same as the allergy-causing latex in gloves, and any minuscule allergy risk is more than offset by the increased safety of this surfacing. After all, children have been swinging on tires for a century, and average playground usage does not release tiny lung-injuring particles. Crumb rubber also is unlikely to harbor mold and other allergens.

Flammability:

While crumb rubber is flammable, it actually is more difficult to ignite than mulch. It can sustain a flame, but only when deliberately and patiently ignited with a fuel source.

Misconceptions:

When evaluating rumors about how crumb rubber behaves, simply think of how automobile tires perform. Crumb rubber will not melt, get sticky on hot days, clog the vacuum, or feel any hotter than the asphalt children play on.

The rubber will not stain clothing or damage laundry or equipment. One problem with crumb rubber is that it may work its way into children's shoes (like gravel) and be carried into the school or the home, where it is harmless (unlike gravel), but annoying. This problem is solved by lining the children up after recess on the playground itself, thus providing an opportunity to empty shoes if necessary. Recycled tires also are available in a rubber-tile form.

Funding:

Our school qualified for a \$5,000 grant from the Missouri Department of Natural Resources (DNR). An extensive recycling education program was conducted for the students, including a tire recycling poster contest entitled "Black Waste into Black Gold." Contact Dan Fester in the Waste Tire Material Grant Program through DNR's [Solid Waste Management Program](#) at (573) 751-5401.

Site Preparation and Maintenance:

Grade the site so water flows away from the area, install a simple drainage system and cover the soil with heavy-duty, well-anchored landscape fabric. Consider borders made from 100 percent recycled plastic, available through playground companies. Students should rake and sweep the material regularly to maintain proper depth, and trained staff should inspect quarterly.

Tips:

Install crumb rubber a month before school starts so rain can wash off any dust. Have students take turns doing the raking. Design playground exit areas one level higher than the crumb-rubber pit and install mats to minimize scattering. Post a sign about your playground and help educate users about tire recycling.

Since 1990, whole tires have been banned from Missouri landfills. Choosing crumb-rubber surfacing provides state-of-the-art safety, novel fun and a unique recycling opportunity for schools and parks. How many tires can your project provide a retirement home for?

Nancy Newland is a freelance writer, former high school biology teacher and environmental education specialist, as well as a mother of three playground testers.