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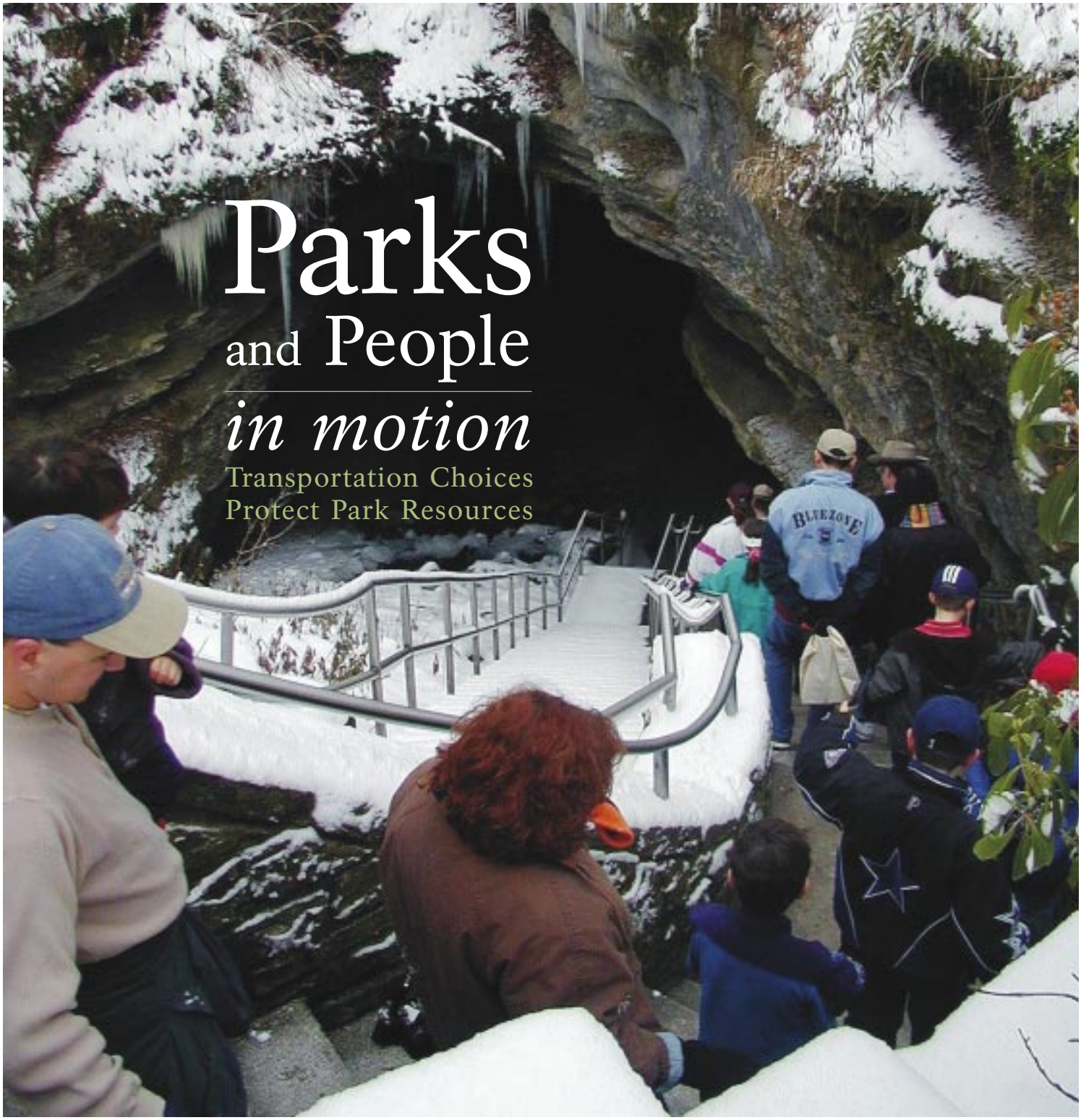

Parks and People *in motion*

Transportation Choices Protect Park Resources

In This Issue

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Sustainability News
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On the Internet
See www.nature.nps.gov/sustainability for additional information including points of contact, news briefs, and specific park updates.

Features

PHOTO BY CHIP CLARK

NPS PHOTO BY NEAL HERBERT

NPS PHOTO BY JUDY ROCCHIO

Cover: Underground walking tours are popular at Mammoth Cave National Park, but 75 percent of visitors stay on the surface to canoe, horseback ride, fish, camp, and hike.
NPS PHOTO

Opposite top: Water drains into the Mammoth Cave watershed from farms, highways, and communities throughout the region. Cooperation, conservation, and partnerships are vital to protect park natural and cultural resources as a result.

Opposite middle: Zion National Park collaborates beyond park boundaries to establish a transportation system that includes shuttle buses, a visitor center, and a pedestrian/bike trail.

Opposite bottom: Former Regional Director John Reynolds test-drives a Ford electric vehicle with Golden Gate National Recreation Area Assistant Superintendent Mary Scott. ***(See page 19 for information on the Ford Motor Company-National Park Foundation partnership.)***

Acadia's Island Explorer Clears Air and Traffic

Maine's Acadia National Park lies "downwind" from major sources of industrial and urban pollution. Long-range transfer of pollutants frequently degrades park visibility and air quality. Yet, Acadia remains one of the most popular destinations in the Northeast. Most of the three million visitors to the park arrive via private vehicle. Resulting traffic congestion on park and local roads contributes to pollution, adversely affecting the visitor experience and the quality of life for local residents.

The National Park Service, in partnership with the Maine Department of Transportation, gateway communities, and other local partners, instituted a voluntary, fare-free transit system in 1999 to help alleviate traffic congestion and air pollution. The "Island Explorer" consists of 17 propane-powered buses that link campgrounds, motels, gateway communities, and the national park. According to the U.S. Department of Transportation, Island Explorer passengers have helped reduce carbon monoxide emissions by 33 percent and the release of volatile organic carbons (VOCs) by 25 percent. Park and local officials are pleased with the success of the Island Explorer and plan to expand the fleet to meet increased demand.

Len Bobinchock
Deputy Superintendent
Acadia National Park

I shall be telling this with a sigh
Somewhere ages and ages hence:
Two roads diverged in a wood, and I—
I took the one less traveled by,
And that has made all the difference.

—ROBERT FROST, *THE ROAD NOT TAKEN*, 1915

The Road Less Traveled

On a trip to the Dakotas in 1832, artist George Catlin observed the impact of America's westward expansion on Indian civilization, wildlife, and wilderness. He quickly realized the need for preservation "by some great protecting policy of government . . . in a magnificent park . . . a nation's park, containing man and beast, in all the wild and freshness of their nature's beauty!" His idea became the seed for the national park concept.

During America's ensuing Industrial Revolution, population growth, along with the availability of affordable transportation and fuel, made parks a victim of their own success. Vehicle miles traveled in the United States have increased by 120 percent since 1970—more than four times population growth. The use of privately owned gasoline-powered vehicles has contributed significantly to smog, air pollution, and societal nuisances such as traffic congestion and urban sprawl. Sprawl, in itself, is bringing about the rapid deterioration of open land, forests, and ecosystems that are vital elements of nature's capacity to recreate the materials upon which all species depend.

With national park visitation presently approximating 280 million people per year, the environmental impacts and resulting pressures on parks reach far beyond their boundaries. We now understand that global atmospheric changes are melting the glaciers of Glacier National Park and causing invasive species to squeeze out Yellowstone's native cutthroat trout. Vistas of shopping malls and parking lots have replaced many of the meadows and forests near Valley Forge National Historical Park. As urban sprawl chisels away at park borders, these unique places become islands, isolated from migratory corridors and bioregions necessary to sustain native wildlife.

This issue of **Sustainability News** features the emerging story of sustainable transportation in the National Park System. Sustainable transportation is a topic of great scope and concern, thus the subject is considered from four different perspectives including the modes of transportation employed by the NPS, transportation pathways we build, transportation fuels we consume, and of course, educating the public about our efforts. Alternative modes of transportation highlighted include the shuttle buses operating in Acadia and Zion to reduce the volume of park vehicular traffic and the Ford vehicles powering NPS operations with electric engines in California. Also mentioned are alternative fuels such as biodiesel and ethanol that are being introduced at Mammoth Cave, Yellowstone, and other parks to reduce pollutant emissions.

Many of these efforts are connected by paths that offer traditional modes of transportation as an alternative. Bicycle and pedestrian routes have become as integral to effective transportation plans as the educational initiatives that allow our visitors to participate directly in NPS preservation efforts by enjoying a ride on a heritage trolley at Lowell National Historical Park or a refurbished red bus at Glacier National Park.

What must we do to provide sustainable transportation solutions to our visitors and staff? The solutions are emerging, but many goals remain in the distance. Sustainable solutions will evolve through continuous self-examination, experimentation, and commitment. The public sees national parks as the best examples of what is worth protecting in the context of a changing world. Our mission, therefore, can be no less than to help provide the bridge, road, and bus to a more sustainable future.

Shawn Norton, Coordinator
NPS Environmental Leadership Program

Innovations | NPS SUSTAINABILITY PRACTICES AND PROJECTS

NPS PHOTOS

Top: Mount Rainier National Park uses lead-free, water-based, road striping paint to reduce the amount of lead entering the environment.

Bottom: Catoctin Mountain Park reused 25,000 cubic feet of milled asphalt removed from an outdoor education facility parking area to level and stabilize an existing gravel lot at another park location.

Opposite: Pacific Coast Highway (State Highway 1) is the southern boundary of Santa Monica Mountains National Recreation Area. Los Angeles-bound commuters seek to avoid traffic jams by traversing the park from U.S. Highway 101 inland to the coast.

Alternative Modes in the Making

Situated in densely populated Southern California, **Santa Monica Mountains National Recreation Area** conserves the nation's best remaining example of a rare Mediterranean ecosystem. During the week, the area's two-lane roads are filled by Los Angeles-bound commuters who use State Highway 1 to avoid congestion on U.S. Highway 101 and Interstate 5. Such traffic causes delays for visitors trying to reach the park's 150,000 acres of scenic coastal mountains.

Planning is underway for a proposed shuttle system that will ease traffic congestion, improve air quality, and enhance the visitor experience. "Bumper-to-bumper traffic is something park patrons are trying to get away from," says Acting Superintendent Woody Smeck. Special focus groups, public meetings, and an extensive survey generated input and ideas from existing and potential visitors. Several meetings and consultations with various jurisdictions and public agencies were also part of the planning process. Respondents expressed strong interest in a shuttle system that would link multiple park sites. As a result, the National Park Service will implement a demonstration project focused on weekend service for the "Heart of the Park" loop serving popular coastal and mountain sites.

Planning, environmental compliance, and facility design are nearing completion. Thirty-five million visitors to the mountains and beaches will have an option to combine their current public transportation choices with this new link to their favorite recreation sites. Visitors may experience increased accessibility, improved parking, and safer driving on mountain roads. The project will also facilitate outstanding one-way hiking and biking routes through return or starting point service via the shuttle. Total visitation for the planned route is estimated at 10,000 people per summer weekend day.

Across the National Park System on the Atlantic coast, **Acadia National Park's** Island Explorer shuttle system is already a proven success. Before the system began operation in 1999, it was difficult to enjoy the park without an automobile because of the long distances between island towns, surrounding communities, and park destinations. Bar Harbor, the island's commercial center, was especially congested during summer, making parking difficult for business patrons. A public-private partnership including federal, state and local agencies, and nonprofit and private partners solved the problem by introducing propane-powered shuttle buses to the region. Since 1999, more than 850,000 passengers have elected to use the clean-running shuttles, thereby eliminating 250,000 vehicles from park and local roads. The result was a reduction in harmful emissions, as well as quieter and safer roadways for shoppers, pedestrians, bicyclists, and other area visitors.

Acadia is now a test site for Intelligent Transportation Systems (ITS), which include advanced traveler information systems and automatic vehicle identification. The program increases safety and accessibility by providing current details about parking and traffic, bus arrivals and departures, weather, and other visitor information. Acadia Deputy Superintendent Len Bobinchock says, "The bus stops are announced mechanically through a global positioning system. Typically you see that in large urban systems." The park received $2 million in funding from the Department of the Interior and the Department of Transportation for the field operations test. "The reason we were able to get the grant money was because the Department of Transportation wanted to test these technologies in a rural area," says Bobinchock. "We were an experiment. No other parks have it."

People in New York and New Jersey will soon experience improved access to **Gateway National Park**. Through a partnership with the National Park Foundation (NPF) and Ford Motor Company, alternative transportation systems are being studied to convey visitors to and from Jamaica Bay Wildlife Refuge, Floyd Bennett Field, Sandy Hook Lighthouse, and other popular park destinations. An electric tram is already used in some areas, but future possibilities include a new ferry system and a fleet of environmentally friendly vehicles for NPS staff.

Great Smoky Mountains National Park is another beneficiary of the Ford partnership. The NPF recently received a $70,000 grant from Ford for a gateway community transportation plan involving the national park and Townsend, Tennessee. Transportation solutions that result will reduce traffic congestion experienced by nine million park visitors each year and others throughout the South Appalachian region.

Alternative Fuels Primer

Biodiesel
- Domestically produced from vegetable oils and recycled cooking oil. Safe, renewable, biodegradable, and reduces pollutants.
- Unmodified diesel engines can use blends of 20% biodiesel and 80% petroleum diesel (B20).

Electricity
- Used to power electric vehicles with rechargeable batteries.
- Used in fuel-cell vehicles where electricity is produced by combining hydrogen and oxygen without combustion or pollution.

Ethanol
- Renewable, domestically produced, alcohol-based, liquid fuel produced from starch crops such as corn.
- Blended with gasoline as E10 (10% ethanol and 90% gasoline), E85, or E95 for use in flexible-fuel vehicles.

Low-Sulfur Gasoline
- EPA requires all gasoline to be low in sulfur in 2006 and estimates cost of reducing sulfur from average level of 300 ppm to 30 ppm is about 2 cents per gallon.

Natural Gas (CNG/LNG)
- Domestically produced, low-emission fuel.
- Can be stored in tanks as compressed natural gas (CNG) or liquefied natural gas (LNG).

Propane (LPG)
- Low-emission fuel produced as by-product of natural gas processing and crude oil refining.
- Infrastructure of pipelines, processing facilities, and storage already exists for efficient distribution.

Ultralow-Sulfur Diesel
- Petroleum-based with maximum sulfur content of 15 ppm (current U.S. standard is less than 500 ppm.)
- Reduces hydrocarbons to nearly undetectable levels and slightly reduces nitrous oxide emissions.

NPS PHOTO

Cleaner Than Conventional Fuels

Yellowstone National Park is reducing fuel emissions as a participant in the Department of Energy's Clean Cities Program, a national initiative which supports partnerships that use alternative fuel vehicles to improve air quality and enhance national energy security. The park developed a method to determine the benefits of using biomass-based fuels and lubricants in snowmobile engines by permitting only E10 (10 percent ethanol and 90 percent gasoline) in gasoline-powered park vehicles. To study the advantages of using regionally produced biodiesel fuel in a diesel-powered vehicle, the park partnered with regional businesses, regulators, the states of Montana and Wyoming, and the Department of Energy. Data collected from the 92,000 miles driven in a biodiesel-fueled truck revealed benefits including reduced emissions, toxicity, and smoke, as well as increased safety.

The **Denali National Park** visitor transportation fleet operated by concessioner Denali Park Resorts (ARAMARK) uses low-sulfur diesel fuel to reduce emissions. In 2004 the fleet will be part of a test to evaluate a new type of clean diesel fuel with virtually zero levels of sulfur and aromatic emissions. Sponsored by the Department of Energy National Energy Technology Laboratory, the test will compare the performance and emissions of three buses running on the new "S-2" diesel fuel and three buses using normal diesel fuel. The clean-burning liquid fuel is produced by a gas-to-liquids process that captures gases flared from oil production facilities. Similar tests will be conducted in an urban setting on the Washington, D.C. Metro fleet.

Pollution, traffic, and air quality concerns are also being addressed at **Prince William Forest Park** where several NPS vehicles are bi-fueled with regular gasoline and liquefied natural gas. Additions to the fleet will include hybrid and electric vehicles, but officials have not forgotten about traditional modes of travel. Prince William is working with state and county agencies to provide hiking and biking trails that connect local communities to parks and communicate the NPS message beyond park boundaries.

Improving Park Pathways

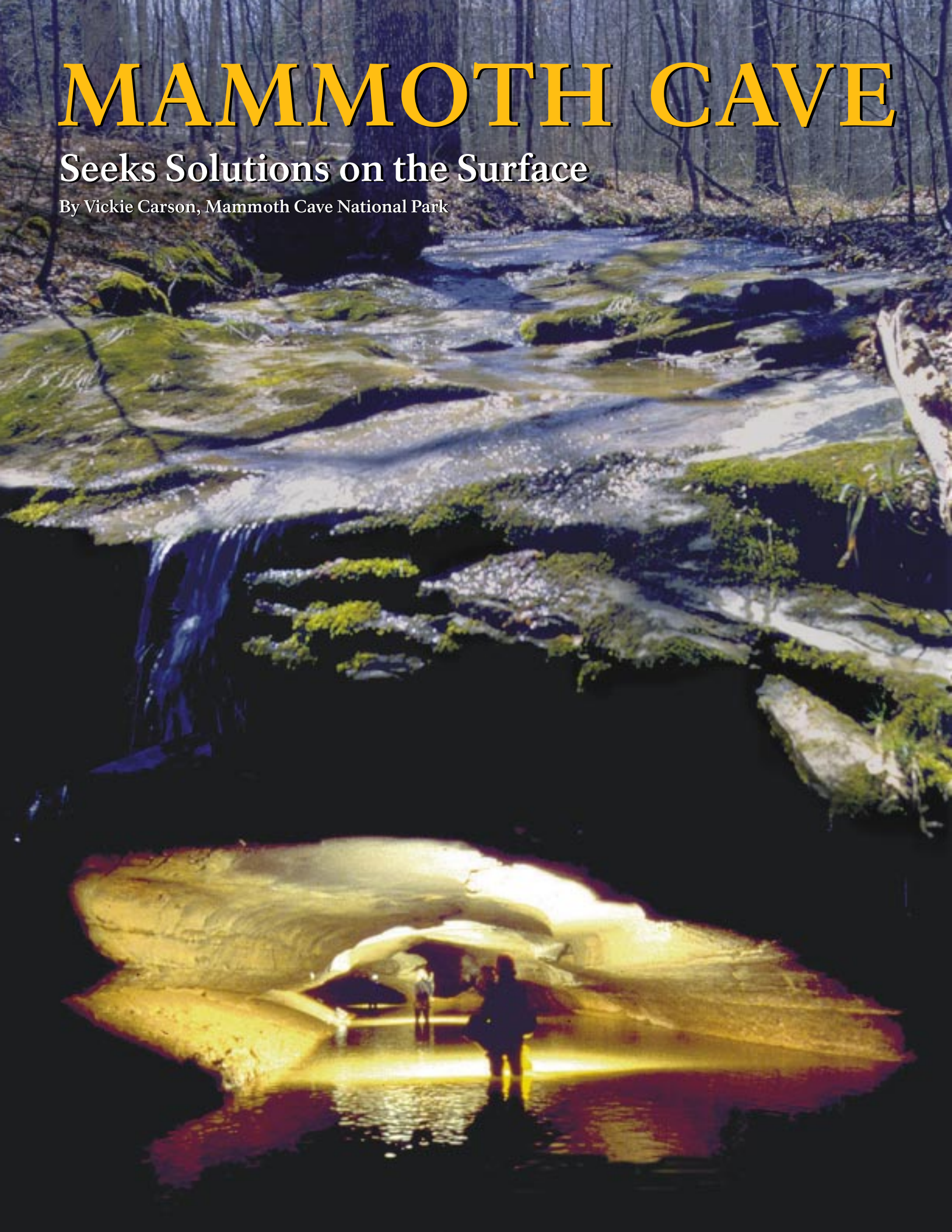
Each year **Mount Rainier National Park** stripes miles of roads and parking lots using lead-free, water-based paint to reduce health risks and lead entering the environment. Drying time often increases because water-based paints have lower volatile organic compound levels. Although Mount Rainier experiences high precipitation, the park has achieved good results using the safer paints, which lack carcinogens, solvents, and flammable contents.

Catoctin Mountain Park paved a gravel parking area recently using recycled asphalt. The millings would have been removed by a paid contractor or disposed of by the park. Resource Manager Jim Voigt says, "I felt there had to be a good use for the material rather than send it to a landfill." The millings were placed atop the gravel lot and compressed with a roller. A more stable, level, and permeable parking surface resulted. "With a little green thinking, we made a facility improvement with recycled materials, saved valuable space at the landfill, and saved money as well," says Voigt. ■

MAMMOTH CAVE

Seeks Solutions on the Surface

By Vickie Carson, Mammoth Cave National Park



NPS PHOTO BY JOE MIEMAN

NPS PHOTO BY VICKIE CARSON

Top: A semi-truck loaded with barrels of printer's ink and arsenic overturned on Interstate 65 in 1980, spilling its contents into the adjacent Hidden River karst watershed.

Bottom: Hydrologist Joe Mieman monitors water quality in the park for protection of karst features and organisms against the adverse effects of pollutants in the watershed.

Left: In karst terrain, surface activities affect the cave environment below. Photo composition by Tres Seymour, Mammoth Cave National Park.

Every day at Mammoth Cave National Park, the staff gets a green light to operate in a green mode. In 2001 Mammoth Cave became one of 20 National Park Service Centers for Environmental Innovation because of its sustainable management efforts to conserve more than 350 miles of caves, the scenic Green and Nolin River valleys, and the hilly country in south central Kentucky.

"Greening requires a change in awareness and attitude," says Superintendent Ronald R. Switzer. "Here, it comes naturally because the delicate cave environment requires extraordinary protection measures."

Surface Activities Affect Cave Environment

In karst terrain, everything that happens on the surface affects the cave below. The underground rivers that formed Mammoth Cave drain rainwater from the surface of the park as well as from surrounding farms, highways, factories, and communities—an area of 60,000 acres, extending as far as 10 miles from the park boundary. With no jurisdiction over most of the cave's watershed, the park has discovered that cooperation and partnerships are absolutely necessary to protect park resources.

"Parks can no longer be managed just to their legislated boundaries," says Switzer. "Sustainable practices must extend beyond the boundaries and into the community." Sustainable practices can mean a change in everything from gasoline to cleaning products or concessioner operations to transportation choices.

Transportation activities outside Mammoth Cave require as much attention as those inside the park, especially since more than 12 miles (each) of Interstate 65 and CSX Railroad lie within the park watershed. In 1980 a semi-truck carrying barrels of printer's ink and arsenic overturned on Interstate 65 and spilled into the adjacent Hidden River karst watershed. Hidden River Cave, polluted to a level considered beyond repair even before the spill, is now a model of karst restoration. The American Cave Conservation Association, which relocated its headquarters to the Mammoth Cave area in 1986, worked with adjacent landowners and local governments to clean up the cave and prevent additional pollution.

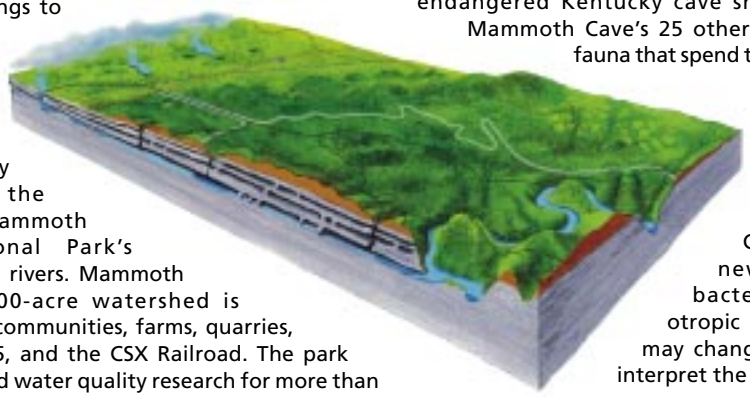
The 1980 spill heightened awareness of Mammoth Cave's vulnerability. In 1995 park staff, working with the Kentucky Division of Water, the Environmental Protection Agency, and the Barren River Area Development District (a quasi-governmental association of elected officials), created a groundwater hazard map (HAZ-MAP) to assist environmental emergency responders in protecting groundwater from spills along Interstate 65 and the CSX rail line. Area emergency responders received copies of the HAZ-MAPs and were trained to use them. Equipped with this detailed map set, an emergency responder knows immediately where, hydrologically, the spill occurred and exactly where to deploy lines of defense for spill mitigation.

When planning began for widening Interstate 65 from four to six lanes, park officials requested the Kentucky Department of Transportation to incorporate certain design features that would slow or prevent highway spills and routine runoff from entering the cave. "In rebuilding I-65, we're trying to instigate a drainage system all along the Mammoth Cave drainage basin," comments Kenneth Cox, a branch manager for preconstruction with the Kentucky Department of Transportation. "When we're finished, we want it to do two things: help purify the water and contain hazardous spills before they enter Mammoth Cave."

Mammoth Cave Hydrologic System

Rainwater enters the underground river system through thousands of sinkholes 10 miles south of Mammoth Cave National Park, eventually emerging through springs to join the Green River.

Activities outside the park boundary can affect the health of Mammoth Cave National Park's underground rivers. Mammoth Cave's 60,000-acre watershed is occupied by communities, farms, quarries, factories, I-65, and the CSX Railroad. The park has conducted water quality research for more than 30 years, with only modest study of biological impacts. The recently funded Long-Term Ecological Monitoring Program will provide much needed data on the eyeless cave fish, eyeless crayfish, and the endangered Kentucky cave shrimp, as well as Mammoth Cave's 25 other troglobites, cave fauna that spend their entire lifecycle underground. A new partnership with Western Kentucky University's Biotechnology Center has revealed new species of bacteria, some lithotropic (rock eaters), that may change how geologists interpret the age of the cave.



GRAPHIC BY TOM FOSTER, WESTERN KENTUCKY UNIVERSITY

NPS PHOTOS

Top and Bottom: Mammoth Cave air quality comparison photos illustrate decreased visibility from pollutants. Visibility on October 1, 2002 (top), is 18 miles. Visibility on October 8, 2002 (bottom), is 71 miles.

What was once the agrarian South is now highly industrialized, dotted with power plants, and home to people in growing population centers that love to drive. Los Angeles and Denver have bad days when ozone and nitrogen emissions spike; air quality in the southeastern states is troubled by persistent problems with acid rain, visibility, and sulfur.

Two features the park suggested are grass-lined waterways and passive retention basins. "These are often built to contain runoff during construction and then removed," says Switzer. "Both are much more effective in containing or buffering a spill, in comparison to a paved ditch."

"Once people can see that change leading to sustainability can work, thinking about sustainability becomes infectious," continues Switzer. "All park employees begin to look for new technology, new ways to accomplish sustainability, new sources of funding, and new avenues for public support. It's a culture change. It doesn't happen overnight. It takes time to grow and become a positive force in park management."

New Fuels Lead to Cleaner Air

In 1999 several national parks had flexible-fuel vehicles, but Mammoth Cave made a commitment to using ethanol (specifically E-85, 85 percent ethanol and 15 percent gasoline) by installing a refueling tank in the park. No other Department of the Interior site had done this before. With the help of the Kentucky Corn Growers Association (KCGA), Mammoth Cave installed an ethanol refueling station in the park adjacent to its unleaded and diesel tanks. A dedicated partner, KCGA provided $5,500 of the necessary $18,800 to purchase and install the tank. "That tank is the key to the park's program," says Steve Kovar, Mammoth Cave Chief of Facilities Management and a "green leader." "Prior to its installation, there were few chances to burn E-85 because the closest supplier was in Louisville, about 90 miles away. Now we use it every day."

The General Services Administration (GSA) provides vehicles to Mammoth Cave, and the park is switching to bi-fuel vehicles (those able to run on gasoline or ethanol) as old vehicles are returned to GSA. So far, 16 of the park's 40-vehicle fleet (vans, sedans, and pickups) operate on E-85.

When the E-85 tank was installed at the park, discussions already had begun about using biodiesel to fuel park mowers, heavy equipment, and the two river ferries. "Through the Kentucky Clean Fuels Coalition, we connected with Griffin Industries, a local supplier," says Kovar. "Changing to biodiesel required no retrofitting. We just filled up the tank and went to work. It burns clean and even acts as a cleansing agent, which is especially important in older vehicles. Since our fleet is made up of late models, we were in good shape." The park's next order of biodiesel fuel will contain low-sulfur diesel. "Low-sulfur diesel, on its own, lacks lubricity, but when mixed in an 80/20 blend as biodiesel, the added soybean oil takes care of it," adds Kovar.

Statewide Leadership

Superintendent Switzer is pursuing statewide environmental leadership opportunities to broaden protection for park resources. The Kentucky Clean Fuels Coalition (KCFC), a nonprofit organization chartered in 1993, was formed to educate the public and serve as a resource for alternative transportation fuel information and technology. Switzer has agreed to serve as president of the organization in 2003. "Several years ago, Superintendent Switzer recognized the importance of taking the lead environmentally," says Melissa Howell, executive director of KCFC. "Now Ron has stepped forward to carry the banner for Kentucky."

Because of its location in the heavily populated southeastern United States, Mammoth Cave National Park is exposed to the worst air quality in the country. The park's monitoring station has recorded data showing poor visibility, higher levels of ozone, and increased acid rain. A recently released 10-year National Park Service study reported Mammoth Cave as having the worst visibility of the 40 national parks that monitor air quality. "E-85 and biodiesel are good choices for Mammoth Cave," remarks Switzer. "We have a relatively small fleet that travels mostly within the park. Outside travel primarily occurs within a 50-mile radius. Biodiesel helps reduce haze, and ethanol helps reduce air pollution. The change in our emissions certainly won't solve the region's air quality problems, but it shows we're doing our part."

Two million people—and their vehicles—travel to the park each year. "A common misconception is that most of Mammoth Cave's visitors go underground," comments Switzer. "In fact, 75 percent of our visitors stay on the surface." The park offers camping, picnicking, hiking, canoeing, fishing, horseback riding, as well as cave tours.

Oil, antifreeze, heavy metals, and gasoline from vehicles collect on paved roads and parking lots until rain washes them away to the underground. "In karst terrain, there is no slow percolation to the water table—runoff drains directly into caves, much like city storm sewers," explains Mammoth Cave Hydrologist Joe Meiman. "Lost River Cave under nearby Bowling Green had been severely degraded by parking lot runoff. We wanted to prevent that from happening at Mammoth Cave."

Runoff-filtering systems will be installed this year at major parking lots to stop pollutants from reaching Mammoth Cave and its delicate ecosystem. A gravity separator will first remove oil and solids, then a filter pack, similar to those used in water purifiers, will remove organics and metals.

NPS PHOTO BY VICKIE CARSON

Top: Superintendent Ron Switzer believes that sustainability is a cultural change that can become a positive force in park management.

Bottom: Biodiesel-fueled mowers are part of a commitment to cleaner, greener fuels by Mammoth Cave National Park concessioner and "green leader," Forever/NPC Resorts, LLC.

"Often, taking green action is more expensive at the outset," observes Switzer. "Cost must be viewed from the standpoint of whether it is worth the investment to protect and/or sustain something. The bottom line is whether the decision will protect resources over the long term and/or enhance public understanding of the need for stewardship. We call it the cost of doing business, better."

Mammoth Cave Hotel, operated by Forever/NPC Resorts, LLC, provides lodging and food services, and furnishes buses that shuttle visitors from the visitor center to outlying cave entrances for tours. "We have already switched to biodiesel for our mowers and other diesel-powered equipment," says Bill Butts, vice president of resort operations. "We join the National Park Service in a strong commitment to cleaner, greener fuels by converting our buses to propane and installing a propane refueling system in the park." With the help of the KCFC, Mammoth Cave Hotel has received one grant that will fund about half of the project, and the park is seeking another to complete it. The project will install a refueling system in the park and convert from gasoline to propane the first six of ten school buses used to transport more than 40,000 visitors per year. "This year we initiated an emissions inventory to quantify the pollution we produce," says Switzer. "Once all of the alternative fuels are in place, it will be interesting to repeat it. I look forward to sharing those numbers with the public."

"Whether it's pollution, interstate highways, or any number of other issues that affect national parks, you can bet they affect others in the tourism industry," he adds. "We constantly seek out partners and collaborators who are striving for similar goals." In September 2002 the Southeast Tourism Society (STS) met in Louisville, Kentucky, at the Federal/State Tourism Summit to explore public-private partnerships. The Summit, Switzer's brainchild, challenged participants to discover opportunities to work together in resource stewardship, transportation, marketing, and product development. The group resolved to form the Southeastern Tourism Policy Council, only the second of its kind in the nation, "to advocate managed growth in an environmentally and economically sustainable way, and to be a leader in all arenas of influence to ensure representation of tourism interests in the Southeast."

"Travel and tourism are big business in the Southeast," comments Bill Hardman, president of STS. "We are encouraged by the establishment of the Southeastern Tourism Policy Council, and the enthusiasm of the industry to promote careful use of public lands. The Federal Summit has proven the industry to be unified in bringing the federal, state, and private sectors together for the best interest of all concerned."

"We've made great progress, but we're really just getting started," reflects Switzer. "There are so many sustainable possibilities to explore in transportation and every other facet of park management, including new partners, new research, and new technology. All work toward improving—greening—the protection and management of Mammoth Cave National Park." ■

NPS PHOTO BY VICKIE CARSON

Quiet *in the* CANYON

By Diane T. Liggett, Harpers Ferry Center
Photos By Neal Herbert, Canyonlands National Park

"There is almost a hushed reverence when people get off the bus."

Massive multicolored cliffs echo the clear cadence of a canyon wren. Cottonwood branches bend and sway in a stirring breeze as the Virgin River smoothly swooshes through this peaceful place. Such natural background music should be no surprise to seasoned visitors seeking sanctuary in a national park renowned for wilderness, wildlife, and natural wonders. Nevertheless, visitors to Zion National Park are astounded by the subtleties revealed since a new transportation system commenced in May 2000.

Peak Popularity

Serenity in Zion slowly began to slip away as the canyon road built in 1917 became a full-fledged tourist route for the Utah Parks Company that, by 1926, operated daily shuttle buses from the Union Pacific rail hub in Cedar City, Utah. In following years, Mt. Carmel was linked to Zion Canyon when a tunnel and highway were constructed. After World War II, Americans independently toured Southwest national parks, monuments, historic sites, and recreation areas by private automobiles, which remained for decades the most popular way to experience Zion National Park.

So many visitors crowded Zion Canyon in the early 1990s that it became difficult to find parking along the 6.3-mile Zion Canyon Scenic Drive. Only 400 parking spots existed to accommodate the 5,000 cars touring the canyon each day. Traffic congestion, noise, and exhaust were common in Zion Canyon as well as in the gateway community of Springdale. Vehicle emissions of cadmium, manganese, and lead had accumulated in the soil. Trampling of vegetation had ruined Zion Canyon roadsides and the visual quality of the park headquarters area. Improvised social trails were prevalent, and visitor safety had declined.

Park managers were concerned about the resources and visitor experiences of the more than 15,000 people that tour the narrow canyon road each busy summer day to access unparalleled scenery, hiking trails, and Zion Lodge. Alternatives were considered, including increased parking in the canyon, closing the scenic drive once parking filled, and providing a voluntary or mandatory shuttle system.

Proposals and Partnerships

With local community input, park managers decided the best alternative to balance visitor demand and infrastructure needs with resource preservation would be a mandatory shuttle system using propane-powered vehicles during the busiest time of the year. This alternative would increase the ability to control the number and concentration of visitors through scheduling of buses and regulating the number of riders. The shuttle system also would reduce noise and pollution levels that may have been affecting plant and wildlife species. The number of commercial tour buses (the greatest source of traffic noise) would also be reduced during all or part of the year.

Former Zion Superintendent Don Falvey involved the community in the transportation planning process, and citizens of Springdale showed their support. Former Mayor Phillip Bimstein remembers, "There were a couple of citizens in town who went to the park and suggested the shuttle come into Springdale." The goal of extending the transportation system into the community was to encourage visitors to spend more time in town, which would boost the local economy.

At the first town meetings in 1995, people expressed concerns about raising taxes, creating traffic jams, and parking nightmares. Bimstein says, "There were lots of doubts about parking and how that would affect the town. Focusing on the benefits was important." The question for the residents was "Do we see the benefits of the shuttle system in the town?"

Springdale citizens understood that improved visitor experiences and increased sales at local businesses could result. A partnership developed between the town, the national park, and the Utah Department of Transportation (UDOT) to plan the new transportation system. Zion Natural History Association and UDOT collaborated to locate joint funding for the project.

Shuttle System Begins Operation

Construction included the new Pa'rus Trail, a pedestrian and bike path designed to offer an alternative mode of travel along the Virgin River. Building a new visitor center, bus maintenance facility, junction intersection, and shuttle stops followed, along with rehabilitation of the Watchman Campground. The project moved toward completion with construction of additional shuttle stops, and modification of an existing visitor center into a museum.

The first free shuttles started running on Memorial Day of 2000, and now operate throughout the busy months of April through October. Parks Transportation, Inc. operates the 30 NPS-owned propane-powered shuttle buses (with 21 accompanying trailers), each capable of holding 68 visitors (31 in the bus and 37 in the trailer unit). Fifteen stops (six in Springdale and nine in

The Pa'rus Trail bicycle and pedestrian path parallels the Virgin River, offering park visitors and gateway community residents a slower mental and physical alternative to exploring Utah's Zion National Park.

The town of Springdale provides ample free parking for shuttle bus riders to leave vehicles at locations convenient to restaurants and lodging. Springdale residents also find that the shuttle is an easy way to commute locally.

the park) are located to provide easy boarding for visitors, including those in wheelchairs or others equipped with bicycles.

The system consists of two loops. Private vehicles are not allowed on the 8.6-mile park loop that operates from the Zion Canyon Visitor Center to the north end of Zion Canyon. The Springdale loop runs from the visitor center to locations within nearby Springdale. During the height of the summer season, the accessible buses run every six minutes from 5:45 a.m. to 11:15 p.m., with visitors waiting no longer than five minutes to board. Spring and fall shuttle schedules are adjusted according park visitation.

The Zion Canyon Visitor Center provides a restful place for visitors to learn about the park and plan their visit using the shuttle system. Parking at the visitor center (which usually fills up between 10:00 a.m. and 3 p.m.) allows space for 400 vehicles, the number of spots up the canyon that were transformed into shuttle stops.

The 3.3-mile loop through Springdale features attractively landscaped shuttle stops convenient to shops, lodging, and other businesses. Visitors can leave their vehicles at one of the 1,000 sign-designated spaces along the street, by City Hall, or at their motel in Springdale rather than search for space at the Zion Canyon Visitor Center. Present Springdale Mayor Bruce Vander Werf says, "We spaced the parking through the town and hoped it would work. It did work. There is no parking issue." Although the town never built a single parking lot, a contingency plan was in place to level an alfalfa field next to the Zion Park Inn for additional spaces. However, Vander Werf adds, "Parking was never full, not even on Memorial Day."

Although some auto traffic congestion still occurs at the new visitor center parking area, greater use of the Springdale shuttle loop may alleviate the problem. Successful collaboration with the town to optimize parking for the entire area has already reduced parking at the visitor center by 54 percent from previous levels.

People appreciate the improvements. A visitor from Las Vegas, Nevada, remarked "Being able to park your vehicle at your motel and not worry about traffic is a godsend." Another commented, "The success of the system was reflected in the visitors we saw. Everyone looked stress-free from not having to fight for parking."

On Board the Shuttle

In anticipation of the new transportation system, the park's 1996 comprehensive interpretive

Top and Middle: Shuttle riders enjoy an exclusive tour of Zion Canyon during the "Ride With a Ranger" program presented daily during the busy summer season.

Bottom: Zion's free shuttle system consists of two loops. A transfer point at the Zion Canyon Visitor Center connects the Zion Canyon route to the Springdale loop. Shuttle service is not provided on Kolob Road or the Zion-Mount Carmel Highway.

plan required revisions because of the major change in the way visitors would use the park. Modifications were made to brochures, signs along State Highway 9, and the Zion National Park Traveler's Information System.

Visitors receive a card with shuttle system map and schedule information when they pay the park entrance fee. Park managers are satisfied that riders find the system easy to understand and use. Interpretive ranger Frank Hayde says, "It fell right into place for us. When the shuttle system started three years ago, we knew we had to adapt to it. We knew visitors were going to experience the park differently. Had we not had that information available in our publications and in our signage, there would have been a lot of confusion."

Visitors especially enjoy the daily interpretive program offered on summer shuttles. Frank Hayde remembers, "We came up with the idea of *Ride With a Ranger* before the shuttle system started. We had it in place right away. We knew that it would be successful, and it is. It has kind of rejuvenated interpretation in Zion in a way."

Free tickets available at the visitor center essentially provide reservations for 30 passengers on each ranger-led tour. According to Hayde, "They are stopping tours, not rolling tours." A sequence of stops allows visitors to disembark and enjoy a series of presentations. "We make stops that the normal shuttle does not make," adds Hayde. "Those who choose to go with us are getting an exclusive tour. They are seeing things they otherwise wouldn't."

Rangers discuss a variety of subjects while the bus is traveling, and visitors may interject at any time. "Our themes are built around the park resources, the same things we've been interpreting for years, including animals, plants, and geology," says Hayde. Although park interpreters do not concentrate on an alternative transportation theme, one ranger includes a prescient passage from *Desert Solitaire*, written in 1968 by Edward Abbey: "How to pry the tourists out of their automobiles, out of their back-breaking upholstered mechanized wheelchairs and onto their feet, onto the strange warmth and solidity of Mother Earth again? This is the problem which the Park Service should confront directly, not evasively, and which it cannot resolve by simply submitting and conforming to the automobile habit."

It seems Zion National Park has done its job. One visitor riding the regularly scheduled shuttle commented, "Compared to the traffic mess of a few years ago, the new system is a great improvement. Of course, we missed the freedom of driving to trailheads in our private vehicle. However, we did *not* miss the traffic jams which necessarily accompanied this little luxury."

Shuttle Bus Benefits

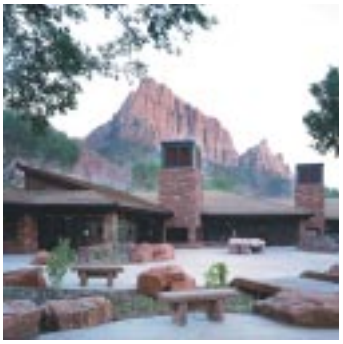
Now the clean-running propane buses are the lifeblood of a transportation plan that has restored tranquility to Zion Canyon. Present visitor use levels are somewhat regulated in the main canyon, and the shuttle system has eliminated much of the vehicle congestion, parking problems, and the cacophony in parking areas associated with raised voices, annoying car alarms and stereos, and doors and trunks slamming.

"Sometimes you don't exactly know why it is *not* quiet," remarks Assistant Chief of Interpretation Tom Haraden. "You could spend two or three hours grunting to the top of Angel's Landing, which is not an easy hike, and while you were up there relishing in your victory, the beautiful view, you would hear car alarms from down below. Now you just don't hear that. That to me was a real significant discovery."

Haraden observes that visitors recognize the quieter conditions now and behave accordingly. He adds, "There is almost a hushed reverence when people get off the bus." A visitor from southern California recently proved this point by remarking, "I stepped off a shuttle bus at the Grotto. After it pulled away, the incredible silence of those majestic canyon walls engulfed me. Zion is sublime now."

Natural quiet and natural sound environments are identified as important park resources in the Zion general management plan. The river sounds, although they are not audible far from their source, are identified in particular as a significant element of the natural history of the canyon. A noise impact assessment conducted in the spring of 1993 revealed that, before the new transportation system, most of the traffic noise originated from commercial tour buses. Noise monitoring instituted in the summer of 1995 cited recreational vehicle generators and aircraft as additional noise sources.

Researchers are conducting sound monitoring activities in the park to determine the effectiveness of shuttle buses on reducing noise levels. Noise levels were anticipated to increase at the visitor center, campground, and shuttle stops due to the addition of shuttle buses and associated human sounds. However, Zion's propane-



PHOTOS BY MICHAEL PLYLER

Top: Native stone and wood enhance the visual appeal of the Zion Canyon Visitor Center. Energy-efficient features make the building a model of sustainable design practices.

Bottom: Outdoor exhibits improve pedestrian traffic circulation at the visitor center while providing information about park resources, recreational opportunities, and the transportation system.

powered shuttle buses possess quieter engines than typical tour buses. Kirk Scott, General Manager of the Zion Canyon Transportation System for Parks Transportation Inc. says, "There's a big difference in air quality and a lack of noise. The propane buses are a lot quieter."

Breath of Fresh Air

Air quality is also identified as a significant park resource. Zion's clean air is affected by particulate matter sources including campfires, woodstoves, and vehicle emissions. According to the 2001 Draft Report on Air Emissions Inventory for Zion National Park prepared by the University of California at Riverside, the 2,994 individuals that used the shuttle daily during the first year of operation represent an elimination of 1,183 private vehicles from 10,877 miles of park roads each day.

University researchers estimated the total benefit to the environment from pollutant emissions avoided by operation of the shuttle bus system using the NPS vehicle fleet as a baseline. Although nitrous oxide levels increased because of the relatively high emissions associated with propane fuel compared to gasoline-powered passenger vehicles, the shuttle system was found to reduce on-road vehicle volatile organic compounds, carbon monoxide, and particulate matter emissions. Park officials presently estimate that about 75 percent of Zion's 2.5 million annual visitors ride the Zion Canyon shuttle, thereby improving air quality along the way.

Sustainable Visitor Transit Center

Park visitors encounter additional details about the benefits of the shuttle system at the Zion Canyon Visitor Center, where information about sustainable practices is integrated into the design of the facility.

Assistant Chief of Interpretation Tom Haraden recalls that when previous Chief of Interpretation Denny Davies initially met with NPS Denver Service Center (DSC) architect James Crockett about the project, the two discussed a variety of approaches to serve visitors and protect area resources. Davies and Crockett decided the best way to introduce visitors to the park would be for people to walk across a bridge over the river. "Then they realized," Haraden says, "We don't have to put the exhibits indoors. We can put them outside." This revelation started the course for the development of an award-winning visitor center that is, itself, a model of sustainable design practices.

Designers from DSC and the National Renewable Energy Laboratory (NREL) worked with state and local agencies to reduce the impact of the facility. Installing an exhibit plaza outdoors reduced the footprint of the building and the materials needed for construction. Overhangs are optimized to shield interiors from the high, hot summer sun, but windows allow low, winter light to provide solar heat. Natural daylight illuminates 80 percent of the building's interior.

"NREL provided important consultation on energy-efficient building design and management," says Zion Project Manager Dave Karaszewski. "Individuals from NREL were instrumental in the design and start-up of a Building Automation System that operates the visitor center, as well as in the training of park maintenance staff," he adds.

Other innovations include trombe walls that provide passive solar heating, and photovoltaics that produce 30 percent of the facility's power. Visitors often remark on the signature evaporative cooling towers that complement the verticality of Zion Canyon. A fractional horsepower pump is the only energy required to circulate water in the efficient air-conditioning system. Thermal mass concrete flooring absorbs and stores solar heat so that the building remains warm on cold nights and cool on hot days.

These and other features are highlighted in exhibits at the Zion Canyon Visitor Center. In fact, DSC architect James Crockett introduced the idea of an "Ecohunt" symbol that the park includes on exhibits. Consisting of a colorful house, sun, and shade tree, the graphic identifies ecologically friendly design in the visitor center area. The symbol invites people to explore the site and find a variety of examples of sustainability. Another interesting educational tool is a computer inside the facility that displays the current energy use of the building.

Beyond Park Boundaries

The Zion Canyon Visitor Center, Pa'rus Trail bicycle and pedestrian path, propane-fueled shuttle buses, and the Zion Canyon and Springdale shuttle loops surpass the definition of a transportation system. These are ways the park is adapting to natural and social change, and ways that Zion is collaborating beyond park boundaries as part of a greater ecological, social, economic, and cultural system.

Springdale Mayor Bruce Vander Werf says that planning the shuttle system with the park was a good experience. "They were magnificent to work with. It improved communications and has created a much nicer environment." The gateway community of less than 500 residents expe-

A pedestrian bridge over the Virgin River provides an atmosphere of peace and tranquility for visitors who approach the park from nearby Springdale.

rienced a five percent increase in retail sales during the first year of shuttle operation and retained its small town character, one of its greatest resources. Former Mayor Phillip Bimstein says, "We're the lucky beneficiaries. Springdale got to be the smallest town in the country with a free transit system." Bimstein worked with Vander Werf to assure that the relationship with the park was locked in and institutionalized so that it would become part of Springdale's culture. Bimstein adds, "I really enjoyed working with the national park. One of the things I'm proudest of is that we developed a partnership with the park."

Springdale officials are confident that continued measures to protect area resources will encourage visitors to stay longer to enjoy the park and patronize local businesses. Phillip Bimstein says "I've always taken seriously the park's mission from the Organic Act. I've often thought that Springdale takes its inspiration from that as well—to preserve the resources in the park and make them available in a way that doesn't impair them." A visitor from Minnesota who agrees with the former mayor remarked, "This is a marvelous way to protect the natural resources and at the same time let the public access the beauty of the national parks." ■

Zion Canyon Transportation System Funding

Street, landscaping, and sidewalk improvements surrounding the Springdale shuttle stops were financed by $923,000 in federal enhancement funds secured by the Utah Department of Transportation under the Intermodal Surface Transportation Efficiency Act (ISTEA). Funding also came from congressional authorization, the Transportation Equity Act for the 21st Century, the Recreation Fee Demonstration Program, Zion Natural History Association, and the National Park Service. Total cost of the project was $27,367,300, including $9,350,000 for shuttle buses and trailers, and $6,608,147 for the visitor center and comfort station buildings, interpretive exhibits, and site development (which includes construction of an outdoor exhibit plaza, shuttle stop shelter, park entrance station with river bridge, and a parking lot). The bus maintenance facility cost an additional $2,575,000.

Annual operating costs of the shuttle system are estimated to be $2.5 million, or about one dollar per visitor. The visitor center and comfort station buildings are expected to save $16,000 annually in energy costs resulting from additional innovations such as an energy-saving partnership with local utility Utah Power, which allows surplus solar-generated electricity from the visitor center to be "backfed" into the Utah Power system.

Q&A

John Reynolds

NPS PHOTO BY JUDY ROCCHIO

Former NPS Pacific West Regional Director John Reynolds test-drives a Ford electric vehicle with Ray Murray, Planning and Partnership Team Leader for the Pacific Great Basin Support Office. A donation from Ford Motor Company to the National Park Foundation allowed Golden Gate National Recreation Area to receive 46 of the clean, quiet, alternative vehicles.

As Director of the Pacific West Region of the National Park Service, John Reynolds pioneered environmental leadership practices that have been implemented Servicewide. Since his retirement from the NPS in August 2002, Reynolds has become a Senior Fellow with the National Park Foundation where he participates in program planning and serves as NPS liaison for land acquisition, fundraising, and grant-making efforts.

Reflecting on the past decade of the sustainability movement in the National Park Service, Reynolds says he is amazed at the success that has occurred. "Sustainability is now a commonly discussed principle. It was a word that many either did not know or shrugged off."

Reynolds notes that sustainable practices have become a routine way of doing business in many places. "In others, it is a guiding revelation to ever-increasing numbers of individuals," he says. "In many places, the applications are spreading faster than we can keep track of them. The NPS has affected other agencies and people, and continues to do so. I am very proud of what people throughout the National Park Service have achieved.

Is it enough? No. The great thing about sustainability is that thinking up and doing things that are better for our environment, our cultures, and our society is a forever calling, and *that* is an exciting prospect."

Sustainability News: You have credited the emergence of a sustainability movement within the National Park System to the grassroots dedication of NPS employees. How can NPS management support employees in further responding to this challenge?

Reynolds: Management in any organization has a responsibility to exhibit future-oriented but daily-responsible leadership, and in doing so, value the starburst of ideas on how to achieve the objectives that result from people on the ground who actually make things happen daily on the job. "Value" does not just mean saying, "That's a good idea." It means creating a climate

NPS PHOTO BY GREG LAWLER

NPS PHOTO BY KENT BULLARD

Top: Transportation Interpreter Jessica Shade shares information about park resources with boaters at Yosemite National Park.

Bottom: Channel Islands National Park's 58-foot Sea Ranger II uses 100 percent biodiesel fuel that is nontoxic to the marine environment. Vegetable-based hydraulic fluid, re-refined oil, and recycled wood flooring and carpet are additional sustainable features of the boat, which is used to transport staff and carry supplies from Ventura, California, to the park's five islands.

" . . . sustainability is a concept that is embodied in the NPS mission. Acting more sustainably is beneficial to park resources and can help others learn to be more sustainable in their lives as well."

in which employees actually can carry out those good ideas. Underlying this concept is my unshakable belief that a messy variety of ideas and solutions results in far more progress than a "neatly ordered" process dictated from above—which is usually sterile.

Management support requires defining and understanding objectives, actively and openly supporting them, creating a climate in which employees can figure out what to do, and then enthusiastically saying thank you for the results!

Sustainability News: Although the NPS is viewed as a leader in the field of sustainability, many believe the NPS can and should do more. Which elements of the sustainability movement have not been embraced fully by the NPS?

Reynolds: Although no single element of the sustainability movement has been embraced fully by the entire NPS, there is growing enthusiasm for an ever-widening understanding of what sustainability can be and the kinds of actions that can take place. There still is an incomplete understanding of what the core concept of sustainability is throughout the NPS, including in its leadership. There is not widespread agreement on what sustainability means for the NPS and individual operations.

I think that there is widespread understanding and agreement that sustainability is a concept that is embodied in the NPS mission. Acting more sustainably is beneficial to park resources and can help others learn to be more sustainable in their lives as well. Part of the reason for this condition is how we started. The NPS began dealing primarily with design, then maintenance. It was a facilities-oriented approach because that's where the interest and intellectual commitment was located at the time—first in the Denver Service Center, followed quickly by the Association of National Park Maintenance Employees. Naturally, that is where the first emphasis began, and that is the point from where the NPS is growing. And it's working—the concept is spreading rapidly.

Sustainability News: Your participation in developing the "Guiding Principles of Sustainable Design" at the Maho Bay, Virgin Islands, workshop in 1992 helped create a sustainability design standard used today by many organizations and individuals. What lessons can be learned from that event and its effect on the NPS?

Reynolds: The importance of that first Maho Bay event is that it was very focused, yet comprised of a highly diverse set of people. We ranged from journalists to engineers, resort operators to biologists, and poets to landscape architects. We all had ideas about sustainability. We were all committed and serious. Not one of us thought we had all the answers. We just wanted to do something useful.

We agreed to listen to each other, to discuss ideas seriously, to work hard, to have fun, and to write a book that would reflect all of us, even if it only covered one application—in this case design. And we agreed to commit resources and stay the course until we had a product. These are the lessons learned: be focused, be diverse, be committed, care, listen, and participate thoughtfully.

Sustainability News: You have guided numerous initiatives throughout your NPS career. As the successful pacesetter of the NPS sustainability movement, do you believe that a unique leadership style is required to implement sustainability as a concept? How do we create future leaders?

Reynolds: Each of us has our own unique leadership style. Learning to understand that style, its strengths and weaknesses, and how to use it effectively is the challenge. You have to consider everyone you come in contact with as your mentor, and listen to and observe how your actions affect that person. For instance, if you work with a secretary, he or she can be one of your most important mentors. So can a park ranger or anyone else you are with often. Why? Because they can tell you about how and when your style works well, or not so well, if you are willing to watch and listen. I think if one does that honestly, if one cares deeply and is humane and willing to engage intellectually and openly, many people can be superb leaders.

The National Park Service can create future leaders by giving people the chance to grow, stretch, and succeed. Be committed as an organization to coach anyone who aspires to be a leader of any kind.

NPS PHOTOS

Top: Incentives for vanpools and a car share program are part of a comprehensive transportation demand management system developed by the Presidio Trust transportation department.

Bottom: Prince William Forest Park Assistant Superintendent Kate Richardson introduces visitors to the concept of a human/electric-powered vehicle at a recent Founder's Day event. These passengers move toward a more sustainable future in a Kronosport *TAXI*.

Sustainability News: How will the NPS measure the effects of sustainability efforts on the health of national parks?

Reynolds: Sustainability is a principle more than it is a program. The real objective is to build a meaningful, inclusive principle of sustainability in all of us, and then work to apply the principle in every program, every action. Right from the beginning of the sustainability efforts over a decade ago, I said that sustainability is primarily an intellectual effort. That means that to understand and apply sustainability concepts requires constant organizational and individual learning followed by committed, thoughtful action, program by program, person by person. That intellectual, thoughtful, principled quest, pursued by as many individuals and organizational elements as possible, will lead to a National Park Service that is truly a model of sustainability and that is respected for it widely.

Sustainability News: Individual lifestyles are an integral factor in a more sustainable future. How can the NPS work with park visitors and others toward more sustainable thinking and living?

Reynolds: It is not the job of the NPS to convince others to be more sustainable, to preach a way of living. I think it is the job of the NPS to act in the most sustainable way possible and let others know what it is doing in accurate, factual, and interesting ways. This means communicating what the NPS does and why it is done without intimating that others must do it. As an agency, the NPS has neither the authority nor desire to tell others what to do. The NPS does have the opportunity, and I think the responsibility, to communicate its actions.

Sustainability News: How can the NPS develop a focused and innovative method to communicate about NPS sustainability efforts?

Reynolds: Consider which audiences should be expanded, whether it is interpreters, superintendents, concessioners, or rangers, and determine how they communicate. Participate in conferences and communication channels. Convey how sustainability is part of *their* mission and goals. It has to exist at least in part of their language. Sustainability must be viewed less as only related to development, hazardous materials, and regulation, and more as a better way to accomplish the NPS mission. Sustainability is a way of doing business that applies to everything. It is not a regulatory or specifications program. It may include both in applicable circumstances, but that is the end, not the beginning. Communication and inspiration to do better and to say what is being accomplished are really the beginning.

Sustainability News: How can the NPS evaluate educational and interpretive efforts along the way to ensure they result in progress?

Reynolds: Review periodically how much interpretive material is devoted to topics related to sustainability. For instance, ozone and visibility interpretive displays in some parks accomplish their objective of presenting air quality issues to the public. This does not address whether or not the public takes the message away, or personalizes it. However, the NPS cannot do that. I think we just have to go on faith that it does make a difference, and the evidence of the difference may not be immediate or easily seen. I do not think that should deter the NPS. The national parks should just convey the factual material. ■

Defining Sustainability

In August 2002 the Intermountain Region, the NPS, and the University of Denver entered into a formal cooperative relationship to establish the National Parks Center for Sustainable Conservation Ethics. Together they will explore and spread the principles of sustainable development, ethical and socially responsible conduct, shared values, and enlightened leadership and management practices through programs of education, research, convening, and on-the-ground projects. The concept of sustainability is being developed around the goal of the center, which is to create a sustainable region of parks and protected lands. Some of the following definitions are part of the emerging effort:

- "Development or progress that meets the needs of the present without compromising the ability of future generations to meet their own needs." *—World Commission on Environment and Development, 1987*
- "Development without growth beyond environmental carrying capacity, where development means qualitative improvement, and growth means quantitative increase." *—"Beyond Growth: The Economics of Sustainable Development," 1996*
- "Adoption of strategies and activities that meet the needs of the enterprise and its stakeholders today while protecting, sustaining, and enhancing the human and natural resources that will be needed in the future." *—International Institute for Sustainable Development, 1997*
- "Sustainability evolves around our connections to ideas, places and things, people, time, and the values we share in common around these things, particularly the value we hold in keeping places and things unimpaired." *—Rick Shireman, Superintendent, Chickasaw National Recreation Area, 2001*

National Park Foundation Transportation Recommendations for Park Visitors

- Park cars, and hike, bike, or walk while visiting a park.
- Ride on park-provided shuttles and buses rather than drive for an easy, relaxing way to see the most popular park areas.
- Carpool to and from parks with friends, or members of a traveling group. Fewer cars in parks make scenery easier to view.
- Travel to parks during non-peak seasons to enjoy scenery and view elusive wildlife.

Environmental Protection Agency Recommendations for Efficient Driving

- Consolidate trips.
- Carpool.
- Telecommute.
- Use public transit.
- Bike, walk, or roller blade to a destination.
- Drive an alternative fuel vehicle.
- Follow manufacturer's recommended vehicle maintenance guidelines.
- Have vehicles maintained by skilled technicians experienced with modern emission control systems.
- Do not tamper with vehicle emission control systems.
- Do not use leaded gasoline in a vehicle designed for unleaded gasoline.
- Park to enter restaurants, banks, and other routine destinations instead of idling in drive-up lanes.
- Do not idle for long periods to warm a vehicle in cold weather. Modern vehicles require little warm-up time.
- Plan trips outside rush hour and peak traffic times.
- Accelerate and decelerate gradually.
- Open windows or fresh air vents to minimize air conditioner use.
- Do not drive at high speeds.
- Do not rev vehicle engines.
- Do not carry extra weight in vehicles.
- Do not to spill gasoline when refueling vehicles or power equipment.

National Park Foundation Expands Ford Partnership

NPS PHOTO BY JEAN TABBERT

Newly refurbished historic red tour buses grace the lawn of Glacier Park Lodge in Glacier National Park.

NPS PHOTO

Transportation Interpreter Brandy Brooks presents information to park visitors on the Fort Sumter NM ferry.

Excited passengers spot a group of bearded mountain goats clinging to a cliff as a canvas-topped, fire engine red conveyance carries the visitors over the Continental Divide on Glacier National Park's Going-to-the-Sun-Road. Waterfalls glissade down ice-carved valleys, and steep wildflower-studded slopes call out to those with cameras. It seems like a 1936 national park experience, but this is a 21st-century tour on a clean-running propane historic red bus refurbished by Ford Motor Company through a partnership with the National Park Foundation (NPF).

Returning the vintage red tour bus fleet to Glacier after a three-year retirement induced by age, safety, and engine emission control concerns is one of many significant transportation solutions that Ford is contributing to the national parks. As part of the NPF's Proud Partner of America's National Parks initiative, Ford is sponsoring studies to develop alternative transportation systems for NPS staff and visitors. Ford's corporate citizenship also includes donations of alternative vehicles, planning grants, and scholarships, as well as sponsoring a program for transportation interpreters.

Ford recently donated 500 electric-powered vehicles to national parks in California. The zero-emission vehicles can zip around the parks at top speeds of 25 miles per hour transporting interpretive rangers, visitors with physical challenges, and maintenance personnel for up to 30 miles. Easily recharged in six to eight hours using standard household current, the electric cars reduce noise and air pollution emissions in Golden Gate National Recreation Area, The Presidio, and more than 20 other national parks in the state. Donation of an additional 100 vehicles is proposed for NPS sites in Massachusetts and New York.

Education is another important part of Ford's work to help reduce traffic, parking problems, noise, and pollution in the national parks. Sponsored by Ford, 36 college students were assigned to 17 NPS locations in 2002 as participants in the Proud Partner Transportation Interpreter Program. Graduates of an intensive training session in Washington, D.C., the participants worked on buses, ferries, and trains to inform visitors about park resources and transportation choices.

Ford also supports a partnership between the NPF, NPS, and the Eno Transportation Foundation to place Masters and Ph.D. level scholars in national parks to assist in the development of transportation planning and analysis, coordination with local communities, and environmental and traffic studies. In 2002 Ford transportation scholars started work at Buffalo National River, Glacier National Park, Gateway National Recreation Area, Dayton Aviation National Historical Park, and the NPS National Capital Region.

Further assistance from Ford lies just around the bend. Alternative transportation studies at Joshua Tree, Yosemite, and Great Smoky Mountains National Parks, Gateway National Recreation Area, and Point Reyes National Seashore continue to expand the innovative partnership between the NPS, the National Park Foundation, and Ford. ■

Collaboration | PARTNERSHIPS, COOPERATION, AND COORDINATION

By Donald E. Briggs, Potomac Heritage National Scenic Trail

PHOTO BY PAUL DEMAIO

Top: Bicyclists in Alexandria, Virginia, use portions of the Alexandria Heritage Trail and Mount Vernon Trail on "Bike-to-Work Day" while promoting non-motorized transportation.

Bottom: A newsletter published by the nonprofit Potomac Trail Council communicates information to the public and participating agencies about the network of trails, on land and water, that is developing between the mouth of the Potomac River at the Chesapeake Bay and the Allegheny Highlands in western Pennsylvania, as well as in portions of Maryland and Virginia on both sides of the Potomac and the District of Columbia.

Leave Your Car Behind in the Corridor

Designation of a corridor for the Potomac Heritage National Scenic Trail is establishing a range of sustainable transportation options while stimulating opportunities for outdoor recreation, education, and heritage tourism.

Local and state government agencies, along with citizen groups and federal agencies, are developing a network of routes for non-motorized travel—on water and land—between the Chesapeake Bay and the Laurel Highlands of western Pennsylvania, a corridor of approximately 425 miles. Besides an inherent recreational value, investments in such facilities provide access to destinations, connections among different modes of transportation, and opportunities to experience directly special places throughout the scenic and historic corridor.

The Potomac Trail Council, an alliance of nonprofit organizations and local agencies committed to the development, protection, interpretation, and celebration of the national scenic trail, publishes the Potomac Trail Communicator newsletter to convey updates about trail activities. The publication emphasizes traditional modes of transportation such as walking and bicycling to promote the health and enjoyment benefits of these physical activities. A recent issue of the publication features information regarding property values, liability, crime, maintenance, and privacy, important trail-related issues to those interested in trail development such as adjacent homeowners and landowners.

In Prince Georges County, Maryland, local trail and bicycling organizations coordinated by county staff recently completed research and publication of a guide to an on-road segment of the trail between Oxon Cove Farm and Piscataway Park. The route connects residential areas with historic town centers, historic sites, recreation centers, trails, and parks. Similarly, trail organizations and leaders of homeowner associations in northern Fairfax County and eastern Loudoun County, Virginia, are coordinating trail development and construction efforts to provide a seamless network of routes on public and private lands.

On the Northern Neck of Virginia, the regional planning organization has designated a network of bicycling routes, providing residents and visitors with clear transportation choices to river access sites, parks, ferries and historic towns and sites—including George Washington Birthplace National Monument. Upriver, in Alexandria, Virginia, a 21-mile hiking and bicycling trail provides access to Metro subway stops and invites exploration of the city's prehistory, history, waterfront, and parks.

Connecting with the Chesapeake and Ohio Canal Towpath (C&O), the Great Allegheny Passage National Recreation Trail between Cumberland, Maryland, and Pittsburgh, Pennsylvania, soon will provide 335 miles of off-road bicycling and hiking with links to stations on Amtrak's Capital Limited service between Union Station in Washington, D.C., and Pittsburgh. The C & O also connects with a set of "heritage trails" being developed in the District.

Similarly, a trail system in Prince William County Virginia, will provide connections among stations for the Virginia Railway Express commuter train, local parks, Mason Neck National Wildlife Refuge, Leesylvania State Park, and Prince William Forest Park, providing an opportunity for a weekend stay in a historic Civilian Conservation Corps cabin in Prince William Forest Park while avoiding the congestion of Interstate 95.

With the passage and reauthorization of landmark federal transportation legislation in 1991 and 1996, transportation and trail planning at municipal and regional levels has been essential to the success of these developments. Projects have benefited from Transportation Enhancements, the Recreational Trails Program, Transportation and Community and Systems Preservation Program, and the Surface Transportation Program. Developments also are based on local community needs, and planning involves extensive public participation using the significance of the trail corridor as an organizing principle.

According to Karen Zachary, author of *Cultural Landscapes of the Potomac* and a founding board member of the Potomac Trail Council, "The Potomac Heritage Trail is about recreation, exploration, and discovery of special places. But it's also about building communities." ■

For maps and more information about the scenic trail and the "Potomac Trail Communicator," visit www.nps.gov/pohe and www.potomactrail.org.

NPS PHOTO

DOI Honors Outstanding Environmental Achievers

Hauling solid waste, sorting recyclable materials, and shredding recovered plastic may not seem like glamorous work, but it is to the DOI Office of Environmental Policy and Compliance, who recently acknowledged a variety of Departmental environmental achievements.

Each year the Department of the Interior recognizes DOI bureaus, offices, employees, and contractors for their exceptional efforts to demonstrate conservation of resources through cooperation, consultation, and communication. Cooperators spotlighted at the fall 2002 awards ceremony in Washington, D.C. included Evelyn Hill Inc., concessioner at the Statue of Liberty National Monument, and Veterans of Foreign Wars (VFW) Post 9431 of Yucca Valley, California. In 2001 Evelyn Hill Inc. recycled more than 361,000 pounds of material and eliminated 10,000 pounds of waste at Liberty Island. Volunteer VFW crews at Joshua Tree National Park *(pictured above)* have collected 87 tons of recyclable materials to date.

Other NPS recipients include Kent Bullard of Channel Islands National Park, Don Durbin of Dinosaur National Monument, the Death Valley Sustainability Committee, the Joshua Tree Trail Crew, and the Pacific Coast Learning Center Team based at Point Reyes National Seashore.

Greening Workshops Guide Future Actions

National Park Service Centers for Environmental Innovation are the focus of agency efforts to increase knowledge about the best environmental, sustainable, and conservation practices and products that enhance the agency mission. Multidisciplinary greening workshops conducted in upcoming months at these NPS locations will provide sustainability planning models for other parks throughout the nation.

The greening workshops are a joint effort by the National Park Service, National Recreation and Park Association, and the Environmental Protection Agency's Environmentally Preferable Purchasing program to introduce sustainable practices into every aspect of park operations. The greening workshops emphasize using environmentally preferable purchasing as a fundamental tool to achieve sustainability goals in every park operation from administration and planning to interpretation to maintenance.

Two workshops have already produced positive results. The first, conducted at Big Cypress National Preserve in March 2002, served as a pilot test of the workshop and charette design. After an optional tour of the preserve, 43 participants reviewed approaches to Big Cypress operations including facilities, operations and maintenance, transportation, planning, concessions, interpretation and education, and procurement, contracts, and leasing. Baseline conditions were identified, and a vision for the future was discussed. Specific goals and actions were targeted, and measures of success were determined. After two days of intense interaction, participants produced a summary of results intended to guide future actions within each park function.

Boston National Historical Park provided the backdrop for a second greening workshop conducted in October 2002. Since the Big Cypress event had revealed that an introductory tour was integral to understanding park operations, Boston participants enjoyed a mandatory inspection of the Charlestown Navy Yard, *USS Constitution*, Bunker Hill, and other remarkable sites before reviewing individual park operations. Field area experts provided brief overviews of specific sustainability efforts, and participants followed in the footsteps of Big Cypress to create a summary of results to usher Boston National Historical Park operations into a sustainable future.

Results from both workshops indicate that successful implementation of sustainable plans and practices requires support not only from park management, but also from employees at all levels of park operations. Workshop participants will likely comprise the foundation of park "green teams" to maintain momentum and monitor implementation of green strategies. Such efforts include providing access to educational information and tools for park staff, engaging interpretation in communicating sustainability stories to employees and visitors, and pursuing environmentally preferable purchasing, contracting, and leasing opportunities. ■

Education for Sustainable Development Toolkit

Author Rosalyn McKeown, Ph.D. was inspired to develop the *Education for Sustainable Development Toolkit* after attending the United Nations Commission on Sustainable Development (CSD) in 1998. "I returned from the CSD meeting with the sense that community leaders and educators needed an easy-to-use manual that would help them get started in the business of educating for sustainable development," she says. Working with educators from the University of Tennessee and York University, McKeown produced a detailed guide that is an essential tool for achieving sustainability in schools and in communities.

McKeown attributes the slow progress of education for sustainability programs to the lack of agreement about sustainable development and visions for sustainable communities. The author admits that sustainable development is evolving and difficult to define, but the *Toolkit* provides abundant information on principles of sustainable development that apply to diverse initiatives ranging from reorienting educational perspectives to creating community sustainability goals.

The *ESD Toolkit* works on the principle that collaboration is necessary between communities and educational systems to achieve sustainability goals. Components featured in the manual include an introduction to sustainability, a method to introduce sustainability at the school level, a case study, management techniques for initiating change in schools, public participation methods, exercises for communities and schools to create and implement sustainability goals, and links to related educational websites. The *ESD Toolkit* is available on the Internet at www.esdtoolkit.org.

Extension of the heritage trolley system at Lowell National Historical Park will brighten historic downtown and boost business opportunities.

Photo by James Higgins

Replica open-car trolleys transport visitors between sites at Lowell National Historical Park where plans are underway to develop a new heritage trolley light rail system and a living history museum. Park visitors presently comprise the greatest trolley ridership, but an expanded system would extend service to local residents and improve access to businesses in the downtown Lowell, Massachusetts, historic district. Connecting the business district to existing rail and bus systems will reduce congestion, parking problems, and vehicle emissions while focusing growth toward the city center where underused mill complexes and historic structures are available for new business opportunities. Local students will also benefit as they participate in original streetcar restoration as part of the "Learning on Wheels" educational program. ■

Calendar | 2003

EVENTS AND OPPORTUNITIES

January 27-30

Air Quality and Global Climate Change Conference
Tucson, Arizona, is the location for this sixth annual event that features EPA workshops, training courses, and presentations. Phone for information at 520.615.3535 or go to www.euec.com.

January 30-31

Education for a Sustainable and Secure Future
This third national conference on science, policy, and the environment takes place at the International Trade Center in Washington, D.C. For more information go to www.ncseonline.org.

February 24-26

Waste Reduction, Recycling, and Composting Symposium
This annual gathering of industry leaders takes place in Orlando, Florida. For full details phone 301.585.2898 or go to www.swana.org.

March 13-14

World Resource Institute Sustainable Enterprise Summit
Partnerships that transform the concept of sustainability into concrete actions are the focus of this Washington, D.C. event. Phone 202.729.7635 or go to www.wri.org/wrisummit.

March 30-April 2

Solid Waste Technology and Management
Speakers from 25 countries present papers on various solid waste topics at this Philadelphia, Pennsylvania, conference. Phone 610.499.4059 or go to www.widener.edu/solid.waste.

April 14-18

George Wright Society Conference
The theme of the interdisciplinary joint conference of the GWS and NPS in San Diego, California, is "Protecting Our Diverse Heritage: The Role of Parks, Protected Areas, and Cultural Sites." Phone 906.487.9722 or go to www.georgewright.org.

April 22

Earth Day
Celebrate the anniversary of the modern environmental movement. Go to www.earthday.net for updates on events.

April 30-May 2

EnviroDesign®7
Real-life challenges and concrete solutions are presented at this conference in Washington, D.C. that showcases recent developments in environmental stewardship in mainstream corporate America. Phone 231.755.9672 or go to www.isdesignet.com for more information.

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Internet
Sustainability News and additional NPS information about "green" practices appears at www.nature.nps.gov/sustainability. Detailed NPS Environmental Leadership Program information is located on the Internet at www.nps.gov/renew.

National Park Service
The National Park Service is a bureau within the Department of the Interior. We preserve unimpaired the natural and cultural resources and values of the National Park System for the enjoyment, education, and inspiration of this and future generations. We also cooperate with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world.

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