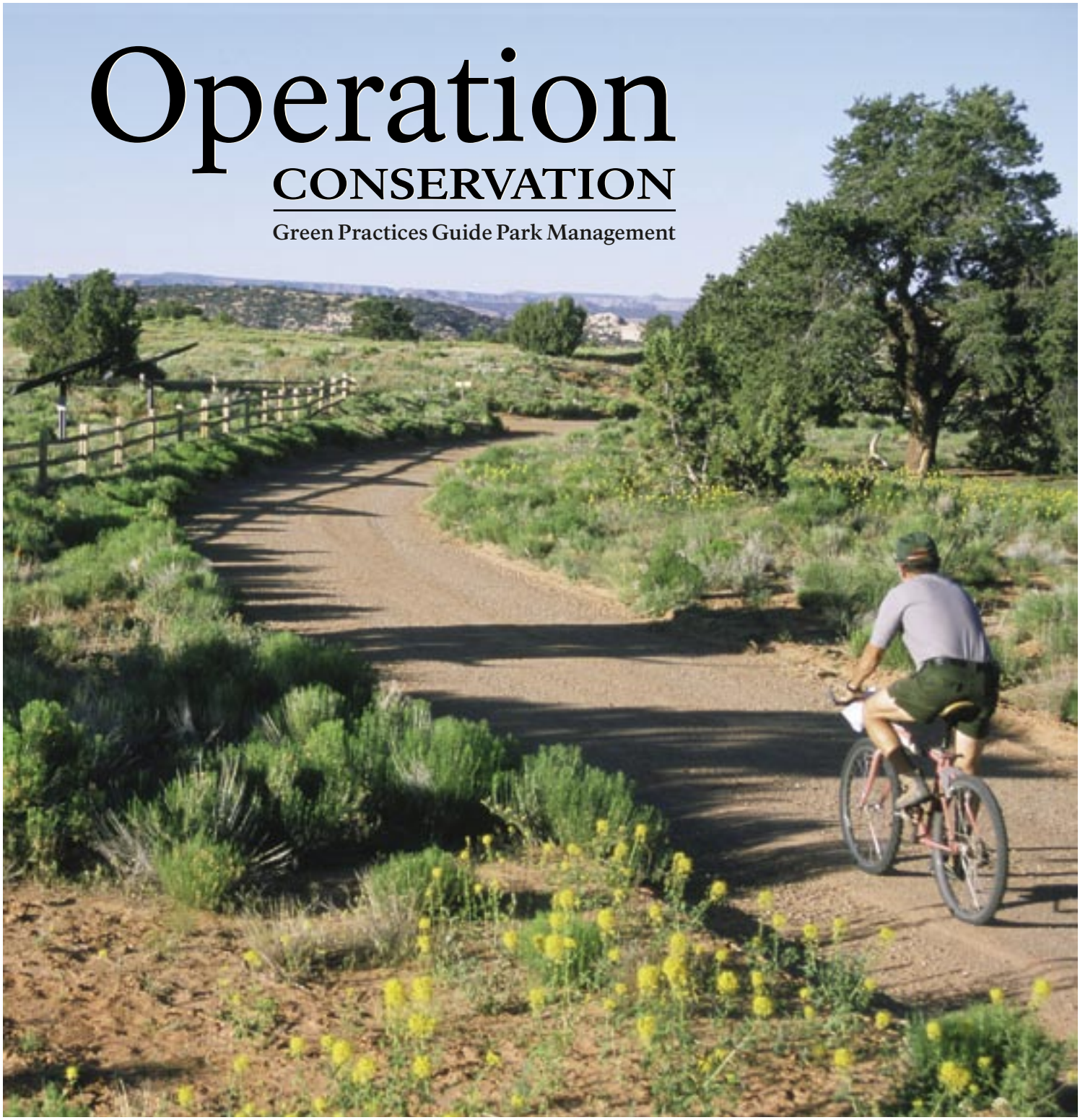
National Park Service
U.S. Department of the Interior

Sustainability news

Summer 2004



Operation CONSERVATION

Green Practices Guide Park Management

In This Issue

Departments

Forum	3
Innovations	4
Q&A	14
Collaboration	19
Connections	20
Outlook	22
Calendar	23

Sustainability News
Summer, 2004
Volume 3, Number 1

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

Cover: Maintenance Supervisor Bill Foreman bicycles to work on a service road next to a state-of-the-art solar array in the Maze District of Canyonlands National Park. PHOTO BY NEAL HERBERT

Features

8
Canyonlands Guru Advances Conservation Culture
By Neal Herbert
Employees at the remote Maze District of Canyonlands National Park make a practice of saving water and energy on a daily basis.

PHOTO BY NEAL HERBERT

10
Green Esteem Builds for Zion
By Lisa Ogden
The new Emergency Operations Center showcases environmentally friendly features as part of the Zion legacy of green design.

PHOTO BY LISA OGDEN

17
Nature and Culture Meet at Historic Crossroads
By Judith J. Bischoff, Ph.D.
Preserving historic structures for the future requires developing sustainable techniques for eliminating intrusive vegetation.

PHOTO BY JUDITH J. BISCHOFF, PH.D.

NPS Greening Charrettes Result in Plans for Parks

National Park Service greening efforts are on the rise, from an increase in the use of biobased products and fuels to the use of U.S. Green Building Council LEED™ criteria in our building design process. One method that parks are using to get green is the NPS Greening Charrette. Borrowed from the architectural profession, the term "charrette" implies a building design exercise.

NPS Greening Charrettes bring together park stakeholders to design comprehensive green plans. Ten parks have now undergone this process: Big Cypress NP, Boston NHP, Bandelier NM, Point Reyes NS, Yellowstone NP, Mammoth Cave NP, Grand Canyon NP, Gateway NRA, Glacier NP, and Zion NP. Their efforts have produced a new way to demonstrate and communicate NPS stewardship responsibilities internally and to the public. Resulting plans have provided significant information that can be applied to all parks. Here are some important ideas emerging from these plans:

- Establish a multidisciplinary park green team to focus on greening all park operations.
- Start with achievable goals. Walk before you run.
- Quantify energy and water use and implement aggressive conservation practices.
- Seek out and utilize renewable and biobased energy solutions.
- Inventory maintenance chemicals used in cleaning and other operations. Replace them with non-toxic alternatives when possible.
- Put a green filter on all procurement practices. Green alternatives exist for virtually everything we buy.
- Communicate efforts routinely to staff and the public.

—Shawn Norton, Coordinator National Park Service Environmental Leadership Program

New York Harbor Parks Engage Public Interest

In this issue of **Sustainability News**, I am proud to be able to share recent developments at the National Parks of New York Harbor, as well as our greenprint for the future. These 10 parks in northern New Jersey and New York, representing 27,000 acres on or near the waterfront, welcome more than 12 million visitors each year and reside at the heart of the most populous metropolitan region in the nation. As a result, we have the opportunity to effect positive change and broadcast the National Park Service message to a diverse audience.

Our partners have stepped forward to help. Evelyn Hill, Inc., concessioner for the Statue of Liberty store, operates a model of greening principles by selling fabric bags made from shredded plastic recycled at Liberty Island. The accelerating loss of tidal saltwater marsh in Jamaica Bay, an important destination for migrating birds along the Atlantic flyway, is being addressed by a public-private coalition initiated by a concerned citizens group and the NPS, with support from New York State and the U.S. Army Corps of Engineers. And all of Gateway National Recreation Area, which includes this critical habitat, is currently developing a new Environmental Management Program that recently featured a "Climate Friendly Parks" workshop in cooperation with the U.S. Environmental Protection Agency.

The post-9/11 period presents an opportune time to advance stewardship, parks as classrooms, and urban national parks as places of respite and renewal. New recycling exhibits at our National Parks of New York Harbor Education Center, intended for school-age children, help them to assess the impacts of their daily actions and inspire them to become young stewards of the earth. Exhibits at Federal Hall, which were destroyed during the events of September 11, 2001, are being replaced this fall and will feature environmentally friendly structures in a new visitor contact station operated in partnership with the local tourism board.

These are notable examples of our civic engagement in the arena of sustainability. The National Parks of New York Harbor are committed to reconnecting the people of New York and New Jersey to their heritage and their harbor, which is the birthplace of the city and its ideals, and where we can turn for future inspiration. We will continue to address larger issues such as regional transportation, the Hudson-Raritan estuary restoration, and environmental education for all.

At recent public workshops regarding the future of Governors Island, which is managed by the NPS in conjunction with the City and State of New York, participants repeatedly initiated discussions about the principles of sustainability. Such dialogue offers optimism that our message is effective and that we are working with a public that embraces the role of environmental responsibility in helping us achieve our vision. ■

—Maria Burks, Acting Commissioner for National Parks of New York Harbor

NPS PHOTO BY KEVIN LEICHNER

Burks at Fort Wadsworth, overlooking New York Harbor.

Our ideals, laws and customs should be based on the proposition that each generation, in turn, becomes the custodian rather than the absolute owner of our resources and each generation has the obligation to pass this inheritance on to the future.

—CHARLES A. LINDBERGH, *NEW YORK TIMES MAGAZINE, MAY 23, 1971*

Innovations | NPS SUSTAINABILITY PRACTICES AND PROJECTS

NPS PHOTOS

Top: NPS Alaska Support Office Planning Team Leader Tim Hudson shows the workings of a fuel cell unit at Kenai Fjords National Park.

Bottom: Interpretive programs at Chesapeake and Ohio Canal National Historical Park promote alternative methods of transportation through guided bicycle tours.

Opposite: Community members and NPS staff joined forces to redesign a playground using sustainable materials in a historic Washington, D.C. neighborhood.

Nature Center Features Fuel Cell Technology
Each summer, thousands visit Kenai Fjords National Park to view marine wildlife, dramatic inlets, and the 300-square-mile Harding Icefield. Completed in late 2003, the park's new Exit Glacier Nature Center provides visitors with an opportunity to learn not only about unique coastal environments, but also about providing energy to places without commercial power.

In 2002 the potential for demonstrating an alternative energy source was realized when plans for the Exit Glacier Nature Center included an operational fuel cell available for public observation. A five-kilowatt fuel cell (the first in Alaska to operate in an off-grid location) was installed and activated in May 2004, one day before formal dedication of the facility. Located inside the nature center, the fuel cell features interactive screens to explain fuel cell operation and to show real-time data. Visited by 150,000 people each year, Exit Glacier provides an opportunity for the project to receive broad exposure. Great interest is expected in the resulting data, as well as in reactions to the interactive educational experience.

The solid oxide fuel cell produces electricity and heat by converting hydrogen and oxygen into water, avoiding emissions associated with traditional combustion. The oxygen comes from air, and the hydrogen is supplied by propane. Propane is well-suited for this application since a distribution system already exists, and the fuel does not have the potential spill and clean-up problems associated with diesel. Funded through the NPS Fee Demonstration Program, a $70,000 grant from the Propane Education and Research Council, and a $25,000 grant from the Alaska Energy Authority through the Denali Commission, the unit will provide all electricity, heat, and a water pumping system for the Exit Glacier Nature Center.

Pedal Pushers Tour C&O Canal
At Chesapeake and Ohio Canal National Historical Park, interpretive programs such as "Pedal Through the Past" and "Washington Waterways" offer visitors a different way to enjoy area resources while experiencing alternative transportation in a park setting. Using their own bicycles or mountain bikes donated by Ford Motor Company, participants tour park sites guided by a ranger or a Ford "transportation interpreter." Day trips range from five to twelve miles, and include opportunities to learn about the Potomac River, Rock Creek, and natural and cultural features along the way. Ford Motor Company helps national parks demonstrate environmental leadership in transportation in various ways, including the donation of more than 100 mountain bikes to NPS units in 2002.

NPS Redesigns Lincoln Park Playground
Inspired examples of the federal government partnering with community-based organizations continue to expand the National Park Service repertoire of sustainability success stories. One such achievement is the recent reconstruction of the new Lincoln Park playground located within the Capitol Hill area of Washington, D.C. From its inception, NPS staff and a community organization called "The Friends of Lincoln Park" worked together to incorporate an eco-friendly design utilizing recycled and sustainable materials into new construction, while preserving the character of this cultural landscape treasure.

The newly constructed playground is situated to preserve the historic integrity of the park as are the design palette, materials, and the selection of colors for the new play equipment and safety surfacing. Each component of the new Lincoln Park playground incorporates recycled materials. All wooden members of the benches are fabricated from certified plantation grown and harvested purple heartwood; all new play equipment is fabricated from recycled metal; and low solvent-by-volume paint was used on the wrought iron fence. A resilient rubber play safety surface constructed of recycled tires with a virgin, custom-colored rubber top layer is used throughout the playground.

By defining goals beneficial to the entire community, the Lincoln Park partnership proved a success for the NPS and the local neighbors. Encouraged by the cooperative endeavor, The Friends of Lincoln Park plan to donate $30,000 towards the construction of a new fence around the playground area.

Renewable Resources Ring Bell at Independence
At Independence National Historical Park, the Liberty Bell Pavilion, First Bank, Todd House, and the maintenance shop are powered with 100 percent renewable energy. Overall, the park obtains more than 12 percent of its power from a combination of wind, biomass, water, and so-

Environmental Purchasing Guiding Principles
The EPA has developed five principles to guide environmentally friendly purchasing:

- **Environment + Price + Performance = Environmentally Preferable Purchasing**
  Environmental considerations should become part of normal purchasing practice, consistent with such traditional factors as product safety, price, performance, and availability.
- **Pollution Prevention**
  Consider environmental effects of a product or service early in the acquisition process. Choices should be rooted in the ethic of pollution prevention, which strives to eliminate or reduce potential risks to human health and the environment.
- **Life Cycle Perspective/ Multiple Attributes**
  Environmental preferability of a product or service must consider its entire life cycle from manufacture and use to disposal.
- **Environmental Impacts**
  Consider possible environmental impacts when choosing a product or service. In comparing such impacts, federal agencies should consider: geographic scale of the environmental impacts, degree of difference among competing products or services, and the importance of protecting human health.
- **Environmental Performance Information**
  Comprehensive, accurate, and meaningful information about the environmental performance of products or services is necessary to determine environmental preferability.

Excerpted from "Environmental Purchasing in the National Park Service: A How-to Guide," by NPS Pacific West Region and Northwest Procurement Institute, Inc. For further information contact Sonya Capek at 206-220-4271 or sonya_capek@nps.gov.

NPS PHOTO

lar-generated energy purchased through Green Mountain Energy Company. Commitment to sustainability is so exemplary at Independence that the company recognized the park for its use of renewable energy by dedicating a 200-foot-tall wind turbine located at their facility in Garrett, Pennsylvania, to the Liberty Bell.

Concerned with reducing energy costs in a sustainable manner, Independence installed new light fixtures in maintenance buildings. Cooler-burning fluorescent tubes possess a longer life cycle than metal halide lamps, reduce risk from fire or injury, and produce an annual electricity savings of almost a thousand dollars. Independence also participates in a closed-loop program for the purchase, disposal, and recycling of motor oil. Recyclable oil is purchased in 55-gallon drums; a contractor retrieves the used oil and properly disposes of it upon request. The vehicle garage at the maintenance facility includes a parts washer maintained by the contractor, and solvents and grease collected on a quarterly basis are disposed of in an environmentally safe manner.

Diverse initiatives at Independence are also reducing by-product pollution. Early efforts included installation of benches made of recycled detergent bottles. Exceptionally durable, the benches look like wood, as in the case of another project involving placement of artificial mulch in tree wells. Made of old tires, the artificial mulch resembles shredded wood mulch, but maintains its shape and earth tone color for 10 years. Like natural mulch, it allows water to reach tree roots and reduces weed growth. In the future, recycled wood will be used to resurface the basement at the Second Bank of the United States. The lumber will be supplied by CitiLog™, an urban logging company that recovers used lumber and fallen trees and turns them into attractive, finished products, reinforcing the park's continued dedication to using renewable resources.

Corn Greens Battlefield at Wilson's Creek
Green operations at Wilson's Creek National Battlefield include keeping a cultural landscape alive by reintroducing corn to the Civil War battlegrounds. The local Republic High School Future Farmers of America have already shown great success with a five-acre demonstration field that produced corn eight feet high. In the future, fields will be planted using long-term hay leases with local farmers. In another partnership with the Department of Agriculture, development rights have been purchased to maintain an agricultural zone around the park.

Wilson's Creek manages its natural and cultural resources by applying sustainable development principles to all long-term planning. A new addition to the visitor center completed in 2003 incorporates recycled carpet, automatic toilets and faucets, tube lights, overhangs, low-emissivity windows, sensor lighting, and Energy Star® appliances. Other improvements include using Isole™ products in park soda machines to reduce the amount of energy required to cool drinks. In addition, the park is working with the General Services Administration and Toyota to use hybrid and electric vehicles for road maintenance. A technical review of park energy use has also been completed to determine additional methods for greening the battlefield.

NPS PHOTOS

Top: Independence Assistant Superintendent Dennis Reidenbach (left), former EPA Administrator Governor Christine Whitman (center), and Independence Chief of Maintenance Jean Marra (right) stand next to a scale model of a wind turbine dedicated to the Liberty Bell.

Bottom: Grand Canyon Integrated Pest Management Coordinator Tanya Holigay checks the placement of a new wildlife-proof trash container.

Below: Boardwalks at Cape Cod National Seashore are made of sustainable materials such as recycled plastic lumber.

Pest Management Benefits Canyon Community

Grand Canyon National Park encompasses more than a million acres, but most park staff, concessioners, and their families reside in a small neighborhood on the South Rim that includes a school and post office. Situated amid habitat for deer, elk, and mountain lions, wildlife and pest concerns are inevitable in a setting which includes new and historic hotels and stores. As a result, integrated pest management strives to sustain harmony between the community and environment.

Integrated pest management is a problem-solving method that examines concerns on a case-by-case basis. Each pest issue is first approached using a non-chemical method to treat pests before infestations occur. Situations at Grand Canyon range from treating ant invasions to trapping feral cats. Wildlife roams freely and may sometimes enter buildings, necessitating humane trapping and release back into natural habitat.

Wildlife-proof trash containers were recently installed to manage one of the most significant sources of pest and wildlife problems. Previous receptacles featured flip-top lids that provided easy access to overflowing trash for squirrels and ravens, or even mule deer that ingested plastic and paper. At times, squirrels, ringtails, and raccoons became trapped inside half-empty containers. New bins with secure closures eliminate entrapment of wildlife, decrease trash overflow, and prevent animals from eating foreign objects.

Successful integrated pest management at Grand Canyon minimizes pesticide use and emphasizes non-chemical practices. Special attention to historic structures is necessary to ensure that adequate inspection, pest exclusion, invertebrate control, and small mammal trapping is conducted in accordance with NPS guidelines and policies. South Rim residents have learned that proper sanitation and reduced access to food and water sources is the best approach to tackling pests. Understanding the biology and identification of potential pests is also important to avoid treating the wrong pest with the wrong product. For example, cockroaches or other insects attracted to dark, warm areas can be eliminated using boric acid, which is environmentally safe for humans and animals.

Cape Cod Follows Green Path

Cape Cod National Seashore continues to emphasize green operations, especially recycling. Since receiving a grant eight years ago from Lever Brothers Corporation to build walkways from recycled plastic lumber, Cape Cod has rebuilt most of its 2.5 miles of boardwalks. Recent reconstruction of the White Cedar Swamp and Old Harbor boardwalks completed the replacement of all main boardwalks with sustainable materials.

More than 10 years of a solid waste reduction program shows that recycling at Cape Cod does not stop with boardwalks. The park recently purchased new recycling containers and continues a contract with a disability work program organization to sort and redeem returnable cans and bottles. Payments fund the next year's work. Cape Cod also maintains a parkwide recycling program that includes all offices, facilities, and housing. Recycled and retread tires are used on all highway vehicles, including heavy equipment, and recycled oil products service the entire auto and equipment fleet. ■

NPS PHOTO

Concessioners Offer Park Visitors Sustainable Cuisine

Xanterra Parks & Resorts Sustainable Cuisine Program Highlights and New Offerings

- Serving wild Alaska salmon instead of farmed salmon in several national park locations including Yellowstone and Bryce Canyon.
- Guaranteeing that wild Alaska salmon menu items can be traced to their fishery source through Marine Stewardship Council "Chain of Custody" certification.
- In partnership with Green Mountain Coffee Roasters, Inc., offering organic Fair Trade Certified™ coffee (purchased from local farmers at a fair price) in many restaurants. Shade-grown beans preserve the rainforest and protect wildlife and bird habitat without harsh pesticides.
- Offering Oregon Country Natural Beef® (raised using sustainable practices without growth hormones and feed additives) at Grand Canyon and Mount Rushmore.
- Offering Silk® brand organic soy milk at Yellowstone.
- Serving Conservation Beef® in Yellowstone restaurants. Cattle are raised on natural grasses without growth hormones or antibiotics. Program supports wildlife habitat conservation in partnership with The Nature Conservancy.
- Serving Kurobota pork, Kobe-style beef, farm-raised abalone, locally grown produce, farm-raised trout, and hormone- and antibiotic-free bison, elk, and venison.
- Serving wine produced from organically grown grapes at Grand Canyon.
- Implementing a Foodservice Energy Awareness Program that teaches employees ways to conserve energy.
- Developing a green procurement program to ensure paper products and chemicals used in company operations are environmentally sound. Participating fully in recycling and waste reduction efforts.

PHOTO COURTESY MESEREAU PUBLIC RELATIONS

Diners at the El Tovar Lodge enjoy views of the South Rim and appetizing sustainable menu offerings.

PHOTO COURTESY ALASKA SEAFOOD MARKETING INSTITUTE

An environmentally friendly seafood choice, Alaska salmon is abundant and managed for sustainability.

National parks are the perfect place to find inspiration for any sustainability effort. "When you're here next to Jackson Lake, it's not hard to adopt sustainable principles," says Kieran Gallagher, Assistant Manager of Food and Beverage for Grand Teton's Signal Mountain Lodge. Gallagher has spearheaded Signal Mountain's sustainable cuisine initiative, making the Forever Resorts concessioner a leader in environmentally friendly food service. "We have a goal to be a leading example for any national park, and we're searching for new ideas to stay ahead of the pack," he adds.

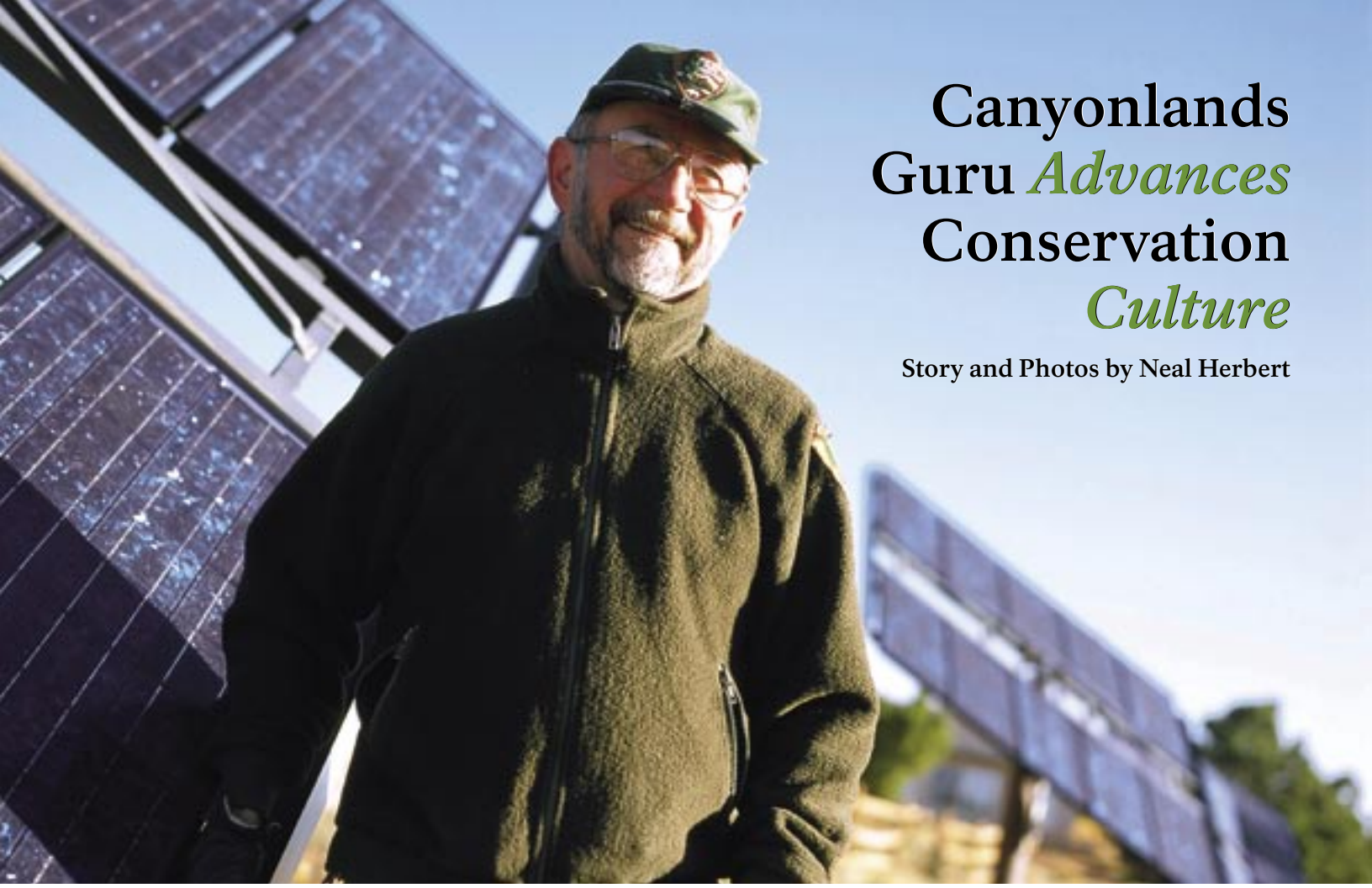
Ninety percent of the main ingredients in Signal Mountain's western-themed menu are either organic or all-natural. Diners at The Peaks Restaurant enjoy Idaho trout, Oregon Country Natural Beef®, Snake River Farms® pork, Great Northern Roaster® shade-grown coffee, Montana Mills® oatmeal, and other regional specialties. "Elk chili has been a staple on our menu for over 15 years," says Gallagher, explaining that some of the elk is farm-raised in Colorado, while farm-raised buffalo meat used in sausage adds flavor to favorites such as mountain man omelets. Buffalo burgers are available at Trapper Grill, which offers convenience foods such as all-organic rice salad, organic pastas, all-natural beef burgers, and sustainably harvested halibut in fish and chips.

Signal Mountain Lodge works closely with NPS concessions staff to integrate sustainable menu offerings. "We have a really good relationship with the NPS," says Gallagher. "I consider the NPS concession management as friends. They are very interested in what we do."

Chefs at Aramark Parks & Resorts have made a competition out of providing sustainable dishes at national parks. Twenty-one Aramark chefs competed in February 2004 to increase the company's list of sustainable menu items. Winning combinations include pan-roasted free range chicken and herb-crusted Hearst Ranch grass-fed sirloin. "Our guests appreciate and request local and organic foods," says Doug Bradley, Director of Culinary Standards at Aramark. "It's an easy decision to make—the food is fresher, the local community benefits from our business and, most importantly, we meet our guests' demands."

Xanterra Parks & Resorts maintains a company-wide policy that promotes using sustainable seafood. Xanterra recommends fish from Marine Stewardship Council-certified sustainable fisheries and those harvested using sustainable practices, following the Monterey Bay Aquarium Seafood Watch protocol, and the Audubon Society's Living Oceans Seafood Guide.

"Our employees throughout the country are tuned in to local sustainable cuisine opportunities, so we are often finding new and innovative ways to use food that is harvested using practices that protect the environment," remarks Tim Stein, Director of Food and Beverage for Xanterra Parks & Resorts. "From the beginning, our goal has been to educate our guests and employees around the country about the importance of making environmentally responsible cuisine decisions. Xanterra has greatly benefited from the effect of increased awareness and the resulting ideas for additional initiatives." ■



Canyonlands Guru *Advances* Conservation *Culture*

Story and Photos by Neal Herbert

Bill Foreman has transformed operations at the remote Maze District of Canyonlands National Park from business-as-usual to state-of-the-art sustainable practices.

Few places are farther from the bright lights and big cities of urban America than the Maze District of Canyonlands National Park. Located in the least populated part of southeast Utah (one person per square mile according to the 2002 census), the Maze offers a level of isolation uncommon in the lower 48 states. This creates many challenges—and opportunities—for park employees living at Hans Flat, the Maze District headquarters. With the nearest corner store more than two hours away, it is a long trip to town for a loaf of bread, a container of milk, and a stick of butter.

Such remoteness also affects park management. The nearest power transformer is 45 miles away. No potable groundwater exists. For years, diesel generators supplied power to the small community of eight residences, maintenance shop, ranger station, and laundry. Tanker trucks delivered fuel and water at considerable expense. High operating costs meant that facilities were closed and rangers furloughed every winter. The need to conserve Maze District resources has always been a priority.

Residents of Hans Flat have responded to this challenge with remarkable thrift and restraint. They began a recycling program to reduce waste in the 1980s, long before there were even "local" drop-off points. On their weekends, employees would transport discarded aluminum cans, bottles, and cardboard to Salt Lake City or other urban centers that they happened to be visiting.

In the early 1990s, employees living at Hans Flat began composting and established organic gardens, which now produce mixed greens and vegetables year-round. Their measures to conserve power and water are extreme: when was the last time you flushed the toilet with water saved as your shower warmed up?

"It's called a Navy shower and should take about two minutes. Turn the water on and get wet. Turn it off and soap up. Turn it on again, rinse, and you're done. I started saving the start-up water in a bucket because it seemed wasteful to let it go down the drain."

Bill Foreman offers these instructions for showering at Hans Flat to all new employees. As part of his district orientation tour, the maintenance foreman and conservation guru also explains how to brush your teeth, shave, wash the dishes, and when to flush the toilet. Forget about cheating: Bill watches the utility meters and posts monthly use statistics for each household. At

Top: Isolated by hundreds of square miles of mesas, buttes, and canyons, Maze District facilities rely on power produced by an array of 120 solar panels. The system is so efficient that backup diesel generators run only about 400 hours a year.

Bottom: Power is an important commodity at Hans Flat, where electricity from the solar panels is stored in a series of 12-volt batteries. Initial studies indicated that costs would be recovered in less than 10 years, but this prediction was surpassed when costs were recovered in only 6 years.

Right: Hillary Hudson and other residents of Hans Flat produce vegetables year-round in organic gardens grown with captured rainwater and used dishwater.

Hans Flat, it is a matter of pride to stay at the bottom of these lists. A volunteer recently tried to beat Bill at his own game, but was unsuccessful over his three-month tenure.

Foreman encourages this level of discipline out of principle, and because water still must be trucked to the Maze. Each 5,800-gallon load costs the park about $700, or 12 cents per gallon. There is no car washing. The gardens are watered with captured rainfall and used dishwater stored in barrels. Utah residents use an average of 269 to 325 gallons of water per day (the national average is 179). Hans Flat residents use fewer than 20 gallons. Water conservation saves Hans Flat more than $10,000 a year, almost enough to cover the salary of a seasonal ranger.

Hans Flat now draws electricity from a state-of-the-art solar array that has completely changed life at the Maze. Installed in 1995 as the result of a partnership between the NPS and the Utah Office of Energy and Resource Planning, the system delivers up to 7.2 kilowatts of power. As 120 solar panels mounted on 12 frames follow the sun's path across the sky, electricity is stored in 10 batteries which supply current to an inverter that controls the entire system. If the batteries fall below a certain point, two backup diesel generators automatically charge them.

Bill Foreman is the system's heart and soul. He was instrumental in its creation and diligently monitors its efficiency. The solar array has reduced the use of diesel generators at Hans Flat by 95 percent. This not only reduces fuel costs, but eliminates the noise and exhaust pollution typical of such equipment. However, living on a solar array requires an uncanny awareness of power consumption. Mainstream concepts of conservation such as turning off lights in unoccupied rooms and using compact fluorescent fixture are mandatory practices at Hans Flat. But the real struggle of solar living is eliminating "phantom" loads. Phantom loads include the infamous blinking display on VCRs, glowing bulbs on surge protectors, and even doorbell buttons. If they are plugged in, these devices use electricity constantly. Enough phantom loads create a significant drain on a power supply limited by daylight. Unplugging everything can be enough to prevent the diesel generators from running at all.

Aside from the administrative details, Bill Foreman's orientation tour is unlike any other in Canyonlands, and perhaps the entire National Park Service. Bill began his NPS career working on the trail crew at Mt. Rainier National Park in 1964. He has since worked at Fort Clatsop, Gateway, Zion, Yellowstone, Yukon-Charley, and Gates of the Arctic, before coming to Canyonlands in 1989. The habits he has developed over the years in these many locations not only save money, but promote a lifestyle that is a model of sustainability. In a world of dwindling resources, this sort of restraint may become increasingly necessary in households nationwide. ■

Neal Herbert is a Visual Information Specialist at Canyonlands National Park.

Surrounded by colorful rock formations and diverse plant communities, Zion National Park's Emergency Operations Center is the latest addition to the park's environmentally friendly construction legacy.

Green Esteem Builds for ZION

Story and Photos by Lisa Ogden

Zion National Park is already a leader in sustainable design. The Visitor Center and Alternative Transportation System, which opened in 2000, created a legacy of environmentally friendly construction that continues today. With the recent opening of a new emergency facility, Zion proved once again that the park is dedicated to epitomizing the green mission of the National Park Service.

"The concept of an Emergency Operations Center (EOC) in Zion surfaced in 1989," says Zion National Park Chief Ranger Aniceto Olais. "A facility was needed to house all the emergency vehicles and personnel in one location to better serve an ever-increasing visitor population and accommodate rising numbers of personnel." In due course, the Denver Service Center initiated a building-use program and selected an appropriate site.

Conceptual design for the facility commenced in May 2001. Campbell and Associates Architects of St. George, Utah, worked closely with National Park Service Landscape Architect Jim Butterfus to further develop a program and floor plan for the building.

Much of the design was driven by a recent trend towards sustainability, utilizing the U.S. Green Building Council Leadership in Energy and Environmental Design (LEED™) Ratings System as a gauge. According to Butterfus, "the building is worthy of at least a Silver LEED™ designation."

One major defining feature of the project is the inclusion of sustainability from its inception. "Sustainability was not an afterthought," emphasizes Butterfus.

Planning Builds Foundation for Success

Construction began in November 2002, and the building was completed 18 months later. The split-level, 13,167 square-foot facility sits on a two-acre site, with an 8,900 square-foot footprint.

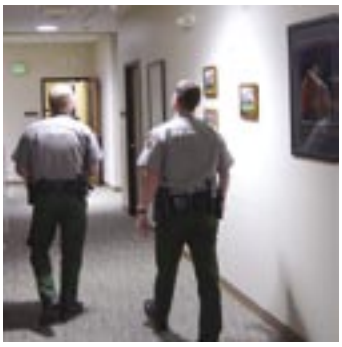
Zion National Park's Emergency Operations Center accommodates up to 45 employees and includes a conference and training room, storage, and emergency vehicle bays. The building serves as the field office and headquarters for both wildland and structural fire crews, as well as medical services, search and rescue, and law enforcement personnel.

The well-equipped Emergency Operations Center also features a fitness room and climbing wall that can be used by all park employees and family members over age 13. "These facilities assist rangers in maintaining the fitness level required to adequately perform their jobs," explains Chief Ranger Olais.

During the planning process, Butterfus and other designers visited traditional fire houses to determine average costs for similar projects in the region. Butterfus discovered that projected expenses for the Zion Emergency Operations Center were quite comparable, even with the desired level of sustainability. "It definitely wasn't an outlandish cost," comments Butterfus.

"We were challenged to do the best we could at a comparable cost to other facilities of this type. We could have designed a [LEED™] platinum building with all the bells and whistles, but the cost was one we weren't willing to pay," remarks Butterfus. "What we wanted was a sustainable project that was cost-effective and met our needs. I think we achieved that."

Funding for the $3.5 million project was obtained from the Recreation Fee Demonstration Program (3 percent), FIREPRO (23 percent), and Park Pass funds (74 percent).



Top: Zion's Emergency Operations Center includes exercise facilities such as a climbing wall, which helps rangers stay fit.

Bottom: Daylighting is achieved in main corridors with solar tubes, which serve as ultra-skylights to brighten dark hallways.

"Now we need to make it part of our culture and focus on how to become more sustainable ourselves."

Conservation Commitment Reduces Impacts
During the schematic phase of the project, designers hired ENSAR Group, Inc. to perform an energy analysis of the performance of the proposed building in concurrence with the value analysis required for approval by the National Park Service Development Advisory Board. Various design elements, including heating and cooling loads, building layout and orientation, and glass usage, were analyzed to determine how such components would affect energy consumption.

According to the ENSAR study, the high-efficiency and alternative heating and cooling systems, coupled with maximized daylighting, thermal massing, and other site considerations are expected to reduce energy consumption by 70 percent and energy costs by 51 percent. According to Butterfus, "this is one of the most sustainable projects both in the Park Service and the state of Utah."

Site design for the EOC emphasized proper solar orientation to maximize daylighting capabilities while reducing heat gain in the summer months. The site was graded to balance cut and fill, and construction limit fencing was installed to minimize impacts to the area. Silt fencing prevented excessive runoff and erosion both during and following construction.

Native plantings, together with a drip irrigation system, will reduce water use while providing ambient cooling and aesthetics. Kim® brand low-level bollard lighting minimizes light pollution and provides security.

The building shell is constructed of split-face concrete block, creating a thermal mass, and enhanced insulation throughout the structure reduces temperature fluctuations. Partial earth-sheltering of the lower level also reduces heating and cooling loads. A white Johns Manville® thermoplastic membrane system with tapered insulation on the roof increases reflectivity and efficiency.

Perhaps the most noticeable example of sustainability in the building is the use of daylighting. Viracon® low-emissivity insulating windows in nearly all the office spaces provide light and views out, but minimize solar transmittance. Light shelves and louvers bounce light from clerestory windows, increasing light penetration into rooms and reducing glare. Solar tubes in the main corridors and stairwell effectively direct large amounts of natural light into spaces where standard skylights are not practical. Occupancy light sensors are used to turn on light fixtures, and dimming sensors adjust light levels depending on the amount of daylight entering the room. Energy-efficient task lights are used to supplement natural lighting at individual desks.

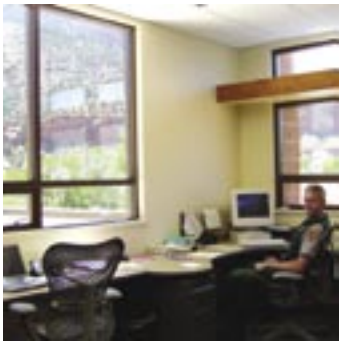
Photovoltaics provide 10 percent of the total power load for the building. A DC inverter is included in the control panel, and orange electrical plates designate those outlets connected to the clean energy system. Energy Star®-rated appliances are used throughout the building, and a ground-source heat pump reduces energy loads by providing alternative heating and cooling. Solar water heaters preheat all the hot water for the building, lowering energy consumption as well. The restrooms utilize Kohler® brand low-flow or automatic fixtures to save water. Waterless® Co. waterless urinals in the men's restroom further reduce water use.

An extensive ventilation system and operable windows provide air exchange and increase user comfort. Paints, adhesives, and sealants containing low levels of or no volatile organic compounds (VOCs) were used to reduce emissions. The Terra Green® brand tile used throughout the building contains 58 percent recycled glass, and Mohawk® brand modular carpet was chosen based on environmentally friendly factors such as polyester yarn made from recycled plastic bottles.

Even the Herman Miller® office chairs are green—both literally and symbolically. The Mirra™ chair was named one of GreenSpec®'s Top-10 BuildingGreen products in 2003.

Superintendent Jock Whitworth believes the project is a success. "We took the opportunity to design a state-of-the-art facility that will keep operating costs low, and reduce emissions and our impact on the environment. It's a great example of the National Park Service's commitment to conservation."

Work Environment Favors Productivity
Beyond energy and resource considerations, the sustainable features of the Zion Emergency Operations Center creates a healthier, more comfortable, and productive environment for employees.



Top: Employees appreciate the Emergency Operations Center work environment, which includes spacious work stations, natural lighting enhanced by light shelves and louvers, and inspiring views of Zion.

Bottom: Building orientation and low-emissivity windows minimize solar gain and maximize natural lighting and views.

"Previous working conditions were cramped," says Olais, with multiple employees sharing small, basement offices. Park emergency vehicles were stored at various locations inside and outside Zion and were exposed to the elements. "The new facility will cut response time by up to five minutes, and equipment will be easier to maintain, simply because everything is now housed in a one location," estimates Olais.

Ergonomic work stations in the new building increase employee comfort and reduce job-related strain. Ample storage, in both the office spaces and the storage areas on the lower level, allows for greater productivity and organization. Carbon monoxide monitoring in the vehicle bays also helps to create a safer work environment.

Low-emission finishes result in fewer toxins in the air, and automatic fixtures are more sanitary, which positively affects employee health and safety.

Lee Jones, a park administration clerk whose office now resides in the EOC, comments that being in the building is a health improvement in itself. "Walking between buildings gets me out and moving more, and the workout room is an incentive to exercise. I'm already feeling better," remarks Jones.

Park employees appreciate the improved work environment. One ranger said the facility is the "best ranger station in the National Park Service!"

Some employees cite the "feeling of welcome" the building conveys, while others comment on the amazing views provided by the extensive use of windows. Zion Program Management Assistant Anita Lindsay regards the views out of the office windows as breathtaking. "It's just such a strong feeling. There's this huge mountain, magnified. It's inspiring," says Lindsay. "Working here is refreshing. Things seem more productive. It just flows better."

Fire Information and Education Specialist David Eaker lightheartedly offers other park employees the chance to sit in his office chair and appreciate the view "for a dollar a visit."

"Everyone who comes in the building—walks through it, or works in it—is favorably impressed. Our goal was a good and sustainable end product that people enjoy using. I think we've definitely achieved that. People genuinely enjoy working there. Everyone in the park wants to work there," emphasizes Butterfus.

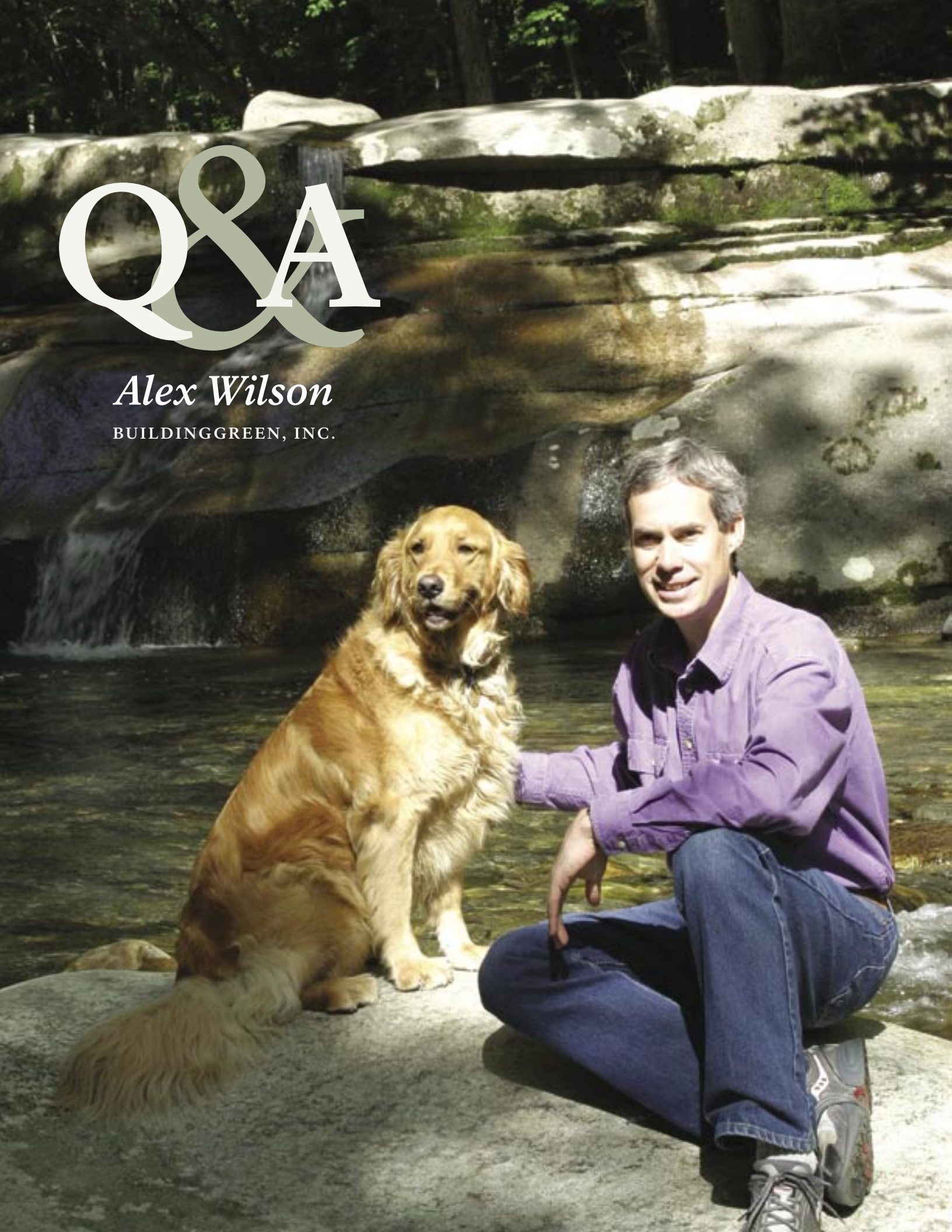
Zion's commitment to sustainability is far from finished, though. Superintendent Whitworth says he sees the movement enduring indefinitely. "We'll absolutely continue the trend," adds Whitworth. "Now we need to make it part of our culture and focus on how to become more sustainable ourselves." ■

Lisa Ogden is a Landscape Architect at Zion National Park.

Q&A

Alex Wilson

BUILDINGGREEN, INC.



Alex Wilson works at the forefront of sustainable design and operations. He is the founder of BuildingGreen, Inc. (an essential resource to practitioners), publisher of *Environmental Building News*, and the coauthor of *Green Development: Integrating Ecology and Real Estate*, and *The Consumer Guide to Home Energy Savings*. An acknowledged expert, Wilson serves on the board of directors for both the U.S. Green Building Council and the Vermont Chapter of the Nature Conservancy. He also enjoys quiet-water paddling in the Blackstone River Valley National Heritage Corridor and other scenic locations.

"The key is communication: providing signage and educational displays that explain issues like sustainable design. Nobody knows better than the National Park Service how to create educational experiences as a part of park visits."

Sustainability News: What sustains your daily involvement with green building and operations?

Wilson: I'm inspired by the natural world, and always have been. I spend time in parks, wildlife refuges, and other wild areas whenever I get a chance. Spending time in pristine outdoor areas rekindles my desire to do what I can to protect our natural heritage.

Sustainability News: At this time, what would you identify as critical training and resources for would-be practitioners?

Wilson: BuildingGreen's *Environmental Building News* and the *BuildingGreen Suite* are excellent resources. There are dozens of great publications that will help designers and builders. Just as importantly, regional workshops and conferences bring together experts and practitioners. These events provide wonderful networking opportunities. The U.S. Green Building Council's LEED™ [Leadership in Energy and Environmental Design] workshops come to mind.

It's important to point out that the time commitment needed to keep up with green design is significant. Practitioners should recognize that this commitment to education could be expensive. And keep in mind, you don't necessarily have to be a practitioner to be a proponent. For example, program requirements could specify a certain level of LEED™ certification, which mandates achieving overall sustainability goals while leaving substantial flexibility in the actual design.

Sustainability News: You have indicated that sometimes the greatest achievements in green operations actually arise during the design process. What is the best way to facilitate this?

Wilson: Integration is key. We always emphasize the importance of getting all members of a design team together early on in the design process. This facilitates design solutions that often go beyond what the project architect or an engineer could imagine on their own. Design for daylighting, for example, affects heating and cooling loads, so it's critical to have the architect, mechanical engineer, and lighting designer working together. Facilities staff should participate as well, because early design decisions can influence how much maintenance will be required in a building.

Sustainability News: You cited National Park Service green practices leadership in the Executive Summary of the *2001 Greening Federal Facilities* handbook. In terms of sustainable practices, where do you think the National Park Service is now and where do we need to go next?

Wilson: I've always felt that the National Park Service has a tremendous opportunity—perhaps unsurpassed by any other agency or organization—to advance green design. Much of the NPS mission relates to protecting scenic and ecologically important wild areas. By making the connection between how we develop land and the role of stewardship, the Park Service can play a hugely important role. How many million visitors are there each year in our national parks?

Simply implementing sustainable design isn't enough for our national parks. The Service must also communicate well so that visitors can learn from what is being done. Explain why a composting toilet is protecting the aquifers and why recycled-plastic lumber decking is used in place of treated wood.

Sustainability News: As an author, keynote speaker, expert who has provided testimony to Senate committees, and director of an award-winning news service, what do you find is critical to effectively communicating green practices?

Wilson: In my efforts to communicate to the public or to architects and builders—whether through *Environmental Building News*, or through our *GreenSpec*® product directory, or

Publisher of *Environmental Building News*, Alex Wilson gains inspiration for his work from the national parks and other natural environments.

***Environmental Building News* and a wealth of additional sustainability resources are located on the Internet at *www.buildinggreen.com*.**

through public speaking—I am always conscious of the *quality* and the *integrity* of the information I provide. That's why none of our publications carry advertising. I want the people we are communicating with to trust what we have to say. Now more than 12 years old, *EBN* has built up a good reputation. I want to keep it that way.

It's important not to alienate the people we're trying to reach. Sure, I'd like to see all buildings be models of sustainability, but that's not going to happen any time soon. It's important that practitioners recognize that even small steps towards sustainability are important. Many little steps can have a bigger impact than one or two huge leaps.

Sustainability News: You value collaboration and partnership, which is essential but not easy. What advice would you offer in this arena? How can it support education, funding, and construction?

Wilson: Try to keep an open mind. If I'm talking to someone who doesn't believe that global warming is happening, I might shift to health concerns or protection of scenic views. There's something in green design for everybody, and it's important to look for common ground that will get Republicans and Democrats, socialists and libertarians, young and old, black and white, working together to protect our environment. I want to see more collaborations between companies and nonprofits, between sportsmen and environmentalists, between developers and land preservationists. Some in the environmental arena have been unwilling to come to the table and work with their traditional adversaries, but it is only through such collaborations that we will be able to meet the tremendous challenges ahead.

Sustainability News: Constellations of urban national parks have emerged in the Twin Cities, Boston, Philadelphia, New York, and San Francisco, to name a few, and these parks present new challenges and opportunities. How best could these parks advance sustainability goals and be relevant to their communities?

Wilson: The key is communication: provide signage and educational displays that explain issues like sustainable design. Nobody knows better than the National Park Service how to create educational experiences as a part of park visits. Collaborations with schools must be a high priority. Look for opportunities to convey the message of sustainability, beyond just sustainability as it relates to buildings, but also how it relates to transportation infrastructure, trails, landscaping, and even publishing. In urban areas in particular, it is important to reinforce a connection to nature.

Sustainability News: Elaborate on the "outdoor" aspects of buildings: their sites, relationship to nature, their context in communities, and how this relates to thinking green?

Wilson: It's a high priority to create spaces that foster an appreciation for nature, whether it's an office building, home, or visitor center. Connect people to the natural world and they may feel more inclined to work to protect it. That's why green (living) roofs can be important in our inner cities, and why outdoor meeting spaces and large window areas can be important in office buildings. By making the outdoors part of the living area in homes, it's possible to build smaller, more compact spaces that feel big and use fewer resources to construct and operate. Green buildings themselves must be tied in to the broader community context. Try to create neighborhoods that will facilitate communication and cooperation and that can be supported by sustainable transportation, as transportation to and from a building can account for up to half of its environmental impact. The NPS has made great progress in reducing transportation impacts in areas where it has addressed congestion.

Sustainability News: What is next in the field of sustainability? What keeps you optimistic?

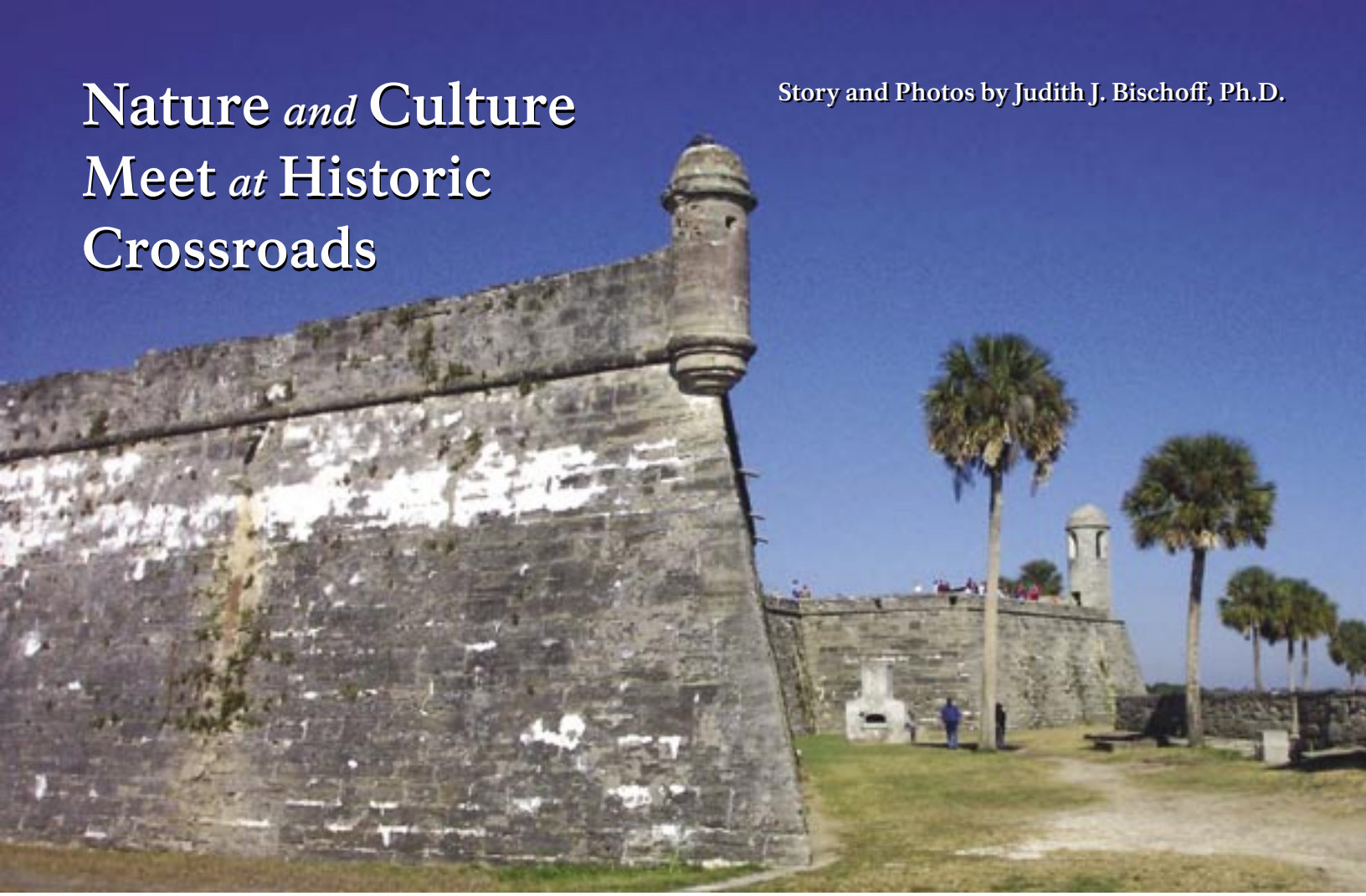
Wilson: The next big step in sustainable design will be increased quantification of benefits to the bottom line. In office buildings, we will see studies that demonstrate higher productivity. In schools, we will find out the learning is more effective. In retail stores, merchandise will sell more in green spaces. In homes, keeping hazardous materials out and controlling moisture will keep the homeowners healthier. Some studies of these benefits are beginning to be quantified, such as those by Pacific Gas & Electric (PG&E) and Heschong Mahone Group in California, but more are needed. Once those studies are available and publicized, we will see tremendous market penetration.

I am able to remain fundamentally optimistic because I see how many people appreciate the natural world. People visit national parks because they appreciate natural beauty, and I think they want to protect that. Protecting the Great Smokies means cleaning up power plants that generate smog which increasingly shrouds the distant hills, or replacing polluting vehicles with newer, hybrid vehicles. If people begin making those connections, I'm optimistic that they can be persuaded to change the way they live. Education is key. ■

Interview by Kevin Leichner, Public Affairs Specialist, National Parks of New York Harbor.

Nature *and* Culture Meet *at* Historic Crossroads

Story and Photos by Judith J. Bischoff, Ph.D.



Vegetation threatens the integrity of masonry along the southeast garrita of the Spanish fort at Castillo de San Marcos National Monument.

What do Castillo de San Marcos National Monument, Cane River Creole National Historical Park, and a church cemetery have in common with historic sites around the world? They all have vegetation that may be causing damage to the site. Many sites are challenged by the task of vegetation control and management to preserve and protect the cultural and historical significance of the location. This problem is enormous and requires creative solutions. Unfortunately, little or no guidance is presently available to assist historic sites contend with this daunting task.

It is known that vegetation at historic sites can cause damage and that this is a cyclic maintenance issue; however, no standards exist for managing vegetation in these areas. Safe and effective treatment and control measures are needed at historic sites, but studies to date have been limited in focus. A mechanism for decision-making protocol at such locations is also necessary.

Vegetation control and management is complicated by a wide variety of factors including the numerous choices in potentially useful vegetation control agents, the scale of the vegetation problem, budget, staffing, and other resource limitations, plant biodiversity, the nature of the substrate(s) bearing vegetative growth, and government regulations.

Decisions about vegetation management are generally based on cost, availability and ease of use of vegetation control products, and expertise and availability of staff required to implement vegetation control. Decisions are made less frequently based on the appropriateness of an action or on how safe a chemical agent may be for use on historic fabric. Site managers are often confronted with more questions than answers:

- Which vegetation presents the greatest threat?
- Are any of the organisms endangered species?
- What types of historic fabric are likely to be damaged by chemical treatments?
- What kinds of treatments are available and how should they be applied?
- What is the cost of vegetation control?
- What is the risk of human exposure in the short and long terms for the person applying the vegetation control agent? For the visitor?

To create desperately needed guidance in the form of draft protocols for vegetation control and management at historic sites, funding was received from the National Park Service South-

Top: A foaming test treatment is applied to vegetation growing at Castillo de San Marcos National Monument, the oldest masonry fort in the continental United States.

Bottom: Vegetation grows out of mortar joints in a mudbrick cistern at Cane River Creole National Historical Park, where French Creole architecture tells the story of a bygone era.

east Region and Castillo de San Marcos National Monument to support a March 2004 meeting in Bryan, Texas. Twenty-five participants of diverse backgrounds and expertise convened to establish the draft protocols. Areas of proficiency included archeologists, architectural conservators, building conservation engineers, conservation scientists, curators, industrial hygienists, integrated pest management specialists, nautical archeologists, ship conservators, environmentalists, National Park Service facility managers, plant ecologists, preservation architects, and product specialists. Issues and questions relevant to vegetation control and management were discussed, and the task of creating draft protocols for vegetation control and management was achieved with great success.

Research Provides Foundation for Meeting

What initiated the vegetation management meeting? A 1998 conference presented the issue of vegetation on the preservation of "tabby," a human-made building material composed of lime, shells, sand, and water that is poured into forms like concrete. A few years later, identical issues were raised at a meeting on the preservation of "coquina," a natural limestone found at a number of historic sites in the southeastern United States.

Recognizing that vegetation challenges introduced important questions for which few answers existed, the NPS Scientific Research and Analytical Support Laboratory at Harpers Ferry Center (HFC) initiated an in-lab study. With financial support from Castillo de San Marcos National Monument, the lab began to investigate the effects of chemical treatment agents on coquina stone. The first phase of the project, in-lab screening of chemical agents for vegetation control, would lead to two additional phases of the research: (1) development of protocols for vegetation control, and (2) management and implementation of protocols at pilot test sites.

It became clear early in the study that many questions could not be answered in the laboratory, and that field research was required. As a result, Castillo de San Marcos Facility Manager Dean Garrison and Superintendent Gordie Wilson invited staff from the HFC lab to conduct a pilot test at the fort. Marine Botanist Ronnie Dean, a recently-hired member of the park maintenance staff, was assigned to assist. Goals for the field research were twofold: (1) to assist Castillo de San Marcos National Monument with its specific vegetation issues, and (2) to use the data and experience gathered from the field research to create the desperately needed protocols for vegetation control and management. The pilot test provided the foundation for the March meeting.

Participants Develop Draft Protocols

The meeting was hosted by David G. Woodcock, FAIA, Professor and Director of the Historic Resources Imaging Laboratory in the College of Architecture at Texas A&M University. Presentations discussed conservation issues in vegetation control, on-site chemical agent testing, materials to control biological growth, and examples of vegetation damage. The group raised additional concerns by responding to a single, critical inquiry: "What question(s) must be addressed in a comprehensive guide for on-site testing of chemicals to control and manage vegetation on historic structures?" Such discussion led to the development of an outline for draft protocols.

Self-selected groups devoted the next two days to writing the document. In addition to accomplishing the primary task of establishing draft protocols, criteria were identified for selecting pilot test sites, document reviewers, ways to complete, publish, and disseminate the document, and approaches for obtaining funding to implement the protocols at pilot test sites. By the end of the week, a set of draft protocols had been created.

Vegetation Management Plans Will Result

What information will the new guidelines provide? Direction will be available for planning a vegetation control and management project—how to conduct a site evaluation and identify a course of action. Site managers will be able to choose treatment options and conduct on-site testing of those treatments. Also available will be guidance on health and safety issues, along with a standard procedure for monitoring and interpreting the effectiveness of chemical or other treatments. Finally, cultural and historic sites will be able to develop a cyclic maintenance program to manage specific vegetation issues.

Much work remains to complete the task of providing historic sites with the means to evaluate the site, plan and carry out a course of action, monitor and interpret results, and gather data to make decisions about best practices for management of vegetation. However, the expert team that met in Bryan, Texas, has established a strong foundation for protocols that will guide national parks (and other national and international sites) in future efforts to solve the difficult issue of controlling and managing vegetation with safe, appropriate, and innovative methods. ■

This article is dedicated to the memory of Castillo de San Marcos Facility Manager Dean Garrison, who passed away in June of 2004. Dr. Judy Bischoff is a Conservation Scientist at the National Park Service Scientific Research and Analytical Support Laboratory, Harpers Ferry Center.

Collaboration | PARTNERSHIPS, COOPERATION, AND COORDINATION

By Michael Cobbold

Denali Environmental Management Commitment Statement Highlights

- Comply with all environmental protection laws, regulations, requirements, policies, and Executive Orders.
- Maintain Denali's standing as NPS Center for Environmental Innovation and Green Star Program participant.
- Set a priority to purchase non-toxic, biodegradable, products made of recycled and recyclable materials.
- Minimize materials use and waste generation by re-use, recycling, conscientious purchasing, and proper disposal of remaining solid waste.
- Minimize or eliminate generation of hazardous waste.
- Plan, design, construct, and operate facilities to minimize adverse impacts.
- Select energy- and water-efficient, low-emission, appropriately sized vehicles and equipment (such as Energy Star® compliant appliances).
- Use clean, renewable energy sources, and encourage local production of green energy.
- Provide employees tools and training about sustainable practices and behaviors.
- Minimize disturbance to natural landscapes and ecosystems of Denali.
- Publicize Denali's sustainable practices and educate the public about the benefits and means of environmental protection.
- Involve local community and park partners in these goals.
- Review the Environmental Management Program annually and set goals to ensure continual improvement for the upcoming years.

NPS PHOTOS

Recycling is not so *ruff* at Denali, where shedded fur from sled dogs is used in crafts made by local artisans.

Sustainable mess kits are an eclectic collection of utensils, plates, and cups that reduce waste time and time again.

Denali National Park and Preserve cultures sustainability through a variety of programs, projects, and practices. When the call went out for Department of the Interior Environmental Achievement Awards last year, park administrators did not submit just one person or project, they nominated the efforts of the entire staff. The nomination was titled "It Takes a Team to Be Green," and Denali won the award.

The path to success began with the development of an Environmental Innovation and Leadership Program, which includes a *Sustainability Policy Statement* to guide energy conservation, renewable energy development, water conservation, environmentally preferable purchasing, recycling, waste minimization, and pollution prevention. Park management considers sustainability important enough to include in park priorities, which determine park operations for three to five years. Some sustainability objectives cross divisional lines, so identifying them as parkwide priorities encourages teamwork to achieve goals.

Everyone at Denali is included in these priorities—even the canines. Denali maintains the only working sled dog kennels in the National Park Service. Dogs assist rangers to conduct winter patrols, supply and clean backcountry project sites, and support research activities. Twenty-five pounds of waste per day (including bedding straw) are generated from feeding the 30 dogs about 14,000 pounds of dry kibble annually. The result is 9,000 pounds of material per year, which is composted and used for landscaping. Brushing dogs regularly also produces large amounts of shed fur which is saved for local artisans to spin, dye, knit, and make hats, ear bands, and other useful items.

Denali's interpreters devised a sustainable mess kit to reduce the use of disposable food service products at meetings, events, and potlucks. The retro-colored kit provides plates, utensils, and cups for groups of 25 people and jump-starts discussions on sustainable practices. All items in the assemblage were obtained from secondhand sources, a prime example of closing the loop.

Energy conservation and education have a combined effect in Denali's "Last One Out" program. "Last One Out? Please Turn Off the Lights: Saving energy makes good environmental and economic sense, at work and at home!" reads a green sign at many office and building doors. Some locations, such as a new visitor center presently under construction, do not require signs since motion sensors manage light use. A new facility located on the site of an old hotel to minimize resource impacts, the visitor center will incorporate daylighting and photovoltaic panels, while ventilation, lighting, and mechanical systems will showcase renewable energy technology. Interpretation of energy systems and sustainable design elements will be integrated into main exhibits. Four important messages will be presented: you are part of the natural world, you do things and make choices that affect the natural world, things you do locally (at home) have impacts that may be global, and things you do locally may affect Denali.

The recipient of the 2003 EPA Champions for Environmental Leadership and Green Government Innovation Award, Denali continues to lead the pack today with a commitment to new technologies, alternative energy, and team spirit. ■

Michael Cobbold is the Safety Manager and Sustainability Coordinator at Denali NP & Preserve.

Climate Friendly Parks

By Karen Scott

When Glacier National Park was established in 1910, one of its most famous glaciers, Grinnell, covered more than 500 acres on the eastern slope of the Continental Divide. Now it barely covers 200 acres of the alpine landscape. In another part of the American West, fly fishers familiar with the Yellowstone River report reduced angling success as warmer waters fail to support large numbers of trout, salmon, and other coldwater fish that once thrived there. Prairie pothole wetlands of the northern Great Plains are declining in number, and breeding duck populations show a similar downward trend. Sea level is rising to invade ecosystems along the Florida coastline, including Everglades National Park. Warming ocean temperatures are contributing to the decline of coral reefs around the world, possibly affecting the northernmost reef in the United States at Biscayne National Park.

Many researchers, park staff and visitors, hikers, anglers, hunters, scuba divers, coastal residents, and tourists have noticed these and many other changes. Most scientists believe that the key cause is global warming. According to the National Academy of Sciences, the Earth's surface temperature has risen about one degree Fahrenheit in the past century, with accelerated warming during the last two decades. Strong evidence exists that most of the warming over the last 50 years is attributable to human activities.

Human activities have altered the chemical composition of the atmosphere through the buildup of greenhouse gases—primarily carbon dioxide, methane, and nitrous oxide. Fossil fuels burned to run cars and trucks, heat homes and businesses, and power factories are responsible for about 98 percent of U.S. carbon dioxide emissions, 24 percent of methane emissions, and 18 percent of nitrous oxide emissions. Increased agriculture, deforestation, landfills, industrial production, and mining also contribute a significant share of emissions. The United States alone emits about one-fifth of the total anthropogenic greenhouse gases globally. Increasing concentrations of greenhouse gases are likely to accelerate the rate of climate change. Scientists expect that the average global surface temperature could rise 1.0 to 4.5 degrees Fahrenheit in the next 50 years and 2.2 to 10 degrees Fahrenheit in the next century, with significant regional variation.

NPS Strengthens Stewardship Commitment

National parks, because of their location and unique, protected resources, are places where the effects of these changes are particularly noticeable. With the establishment of the National Park Service in 1916, responsibility was given to the NPS to preserve and protect the resources within the parks for the enjoyment of future generations. As knowledge about climate change and its effects has accumulated, the need has been highlighted to maintain park resources through practicing not only good stewardship of the flora and fauna within park boundaries, but also through active protection of the natural environment on regional and global scales.

To reinforce this commitment to environmental stewardship, the National Park Service, with support from the U.S. Environmental Protection Agency (EPA), has initiated an effort to assist parks become more "climate-friendly." The Climate Friendly Parks Program was started in response to the President's February 2002 call for voluntary action on climate change. This initiative is one of several demonstration pilots within the NPS Environmental Leadership Program. The NPS also collaborates with EPA's Environmentally Preferable Purchasing Program with the goal of encouraging and enhancing green purchasing in parks through NPS Greening Workshops. The Climate Friendly Parks Program enhances NPS greening efforts by adding a focus on climate change mitigation and energy efficiency and providing visitors examples of environmental leadership that can be emulated in communities, organizations, and corporations.

Goals of the Climate Friendly Parks Program include measuring NPS greenhouse gas emissions that contribute to climate change, developing strategies to adapt to and mitigate changes in climate, and internal education and outreach. Pilot workshops have been conducted at three nation-

Opposite Top: A historic red tour bus refurbished by Ford Motor Company operates on clean-running propane fuel at Glacier National Park, where climate change mitigation actions are underway.

Opposite Bottom: At Fort Wadsworth in Gateway National Recreation Area, a colorful trash and recycling station shows students who visit the National Parks of New York Harbor Education Center how to make smart decisions about containers and packaging.

NPS PHOTO

Evidence of Global Change Makes Glacier a Good Choice for "Climate Friendly Park" Designation

The glaciers in Glacier National Park are shrinking. The million-acre park's largest glaciers are presently only about a third of the size they were in 1850, and many small mountain glaciers have disappeared completely during the last 150 years.

The park's prominence as the site of such notable climate change impacts made Glacier National Park an appropriate choice as the second pilot Climate Friendly Park. In addition, Glacier National Park's status as a Biosphere Reserve helps visitors understand the importance of the park's climate change mitigation actions, along with other park efforts in the areas of sustainability and ecological stewardship.

An action plan developed during the December 2003 workshop includes such innovative ideas as the use of red bicycles for employees to commute between outbuildings, the expansion of the famous "Jammers" (Glacier's widely-celebrated red buses) shuttle system along the Going-to-the-Sun Road, and collaboration with historical preservation specialists to achieve maximum energy efficiency in the park's many historical buildings.

Contact Shawn Norton, NPS Environmental Leadership Coordinator, at 202-354-1835 or shawn_norton@nps.gov for further information on how your park can become more climate-friendly.

al park sites: Gateway National Recreation Area, Glacier National Park, and Zion National Park. At each workshop, a broad range of park staff and community leaders participated in two days of presentations and discussions to produce an action plan to reduce greenhouse gas emissions in parks—by becoming more energy efficient, revitalizing recycling programs, solving transportation dilemmas, and providing public education.

Gateway Efforts Involve Kids

The first pilot workshop was held at Gateway National Recreation Area, where the urban setting and heavy local visitation enables the park to reach a large audience with messages about waste reduction, energy efficiency, and greenhouse gas abatement. Outreach to communities at Jamaica Bay and Staten Island in New York, and Sandy Hook in New Jersey, has always been important to Gateway staff. Now when school-age children visit the National Parks of New York Harbor Education Center at Fort Wadsworth, they can gauge their recycling knowledge while enjoying lunch. Lively graphics on lunchroom tables provide a maze of choices that kids can explore to understand sustainability issues. A recycling and trash station lets students observe how their choices make a difference. The station illustrates the benefits of making smart decisions about packaged or recyclable products. Such examples are reinforced when the children sort out recycled goods from their finished lunches, then weigh and record their trash before disposal so that total trash weights of each school group can be compared in an ongoing competition.

Zion Workshop Results in Action Plan

Life cannot exist without water, and residents of the Southwest are acutely aware of their connection to precious natural resources through yearly struggles with severe droughts and shortages. To help protect regional resources, Zion National Park has led the way in the implementation of environmentally conscious practices. From the Zion shuttle that removes thousands of vehicles from Zion Canyon each year, to the construction of two buildings qualified for LEED™ certification, Zion has made lessening environmental impacts a priority. As host for the third Climate Friendly Parks pilot workshop, Zion further intensified its commitment to reduce greenhouse gas emissions and preserve natural resources. The action plan developed includes water conservation through xeriscaping, alternative transportation for park employees through a partnership with the Utah Transportation Authority, and public education about sustainability issues.

Yellowstone Forges Climate Friendly Partnership

Staff at Yellowstone National Park are hitting the road in hybrid vehicles to educate visitors about alternative transportation, climate change, and sustainability. Four new Prius® hybrid vehicles were donated to the Yellowstone Park Foundation by Toyota Motor Sales, U.S.A. in recognition and support of the park's environmental stewardship, a commitment that already features biodiesel fuels and a rideshare program. ■

Karen Scott is a Communications Specialist with the EPA Climate Change Division.

EPA PHOTO

By Kevin Leichner

Saving Jamaica Bay's Shrinking Marshes

PHOTOS BY GEORGE FRAME

Left: Researchers determine the surface elevation of the wetlands before sediment is applied to raise the level of the marsh.

Right: Sand and sediment dredged from a saltwater creek bed is sprayed onto the pilot restoration plot using a high-pressure, barge-mounted jet.

Tracing an arc beneath an overcast sky, workers spray dredged sediment on subsiding tidal saltwater marshes as rumbling planes depart from JFK Airport in the distance. Managed by the National Park Service, Jamaica Bay National Wildlife Refuge lies within Gateway National Recreation Area and extends across 13,000 acres in Brooklyn and Queens, New York. A major destination along the Atlantic flyway, this ecosystem hosts more than 350 species of birds, as well as butterflies, diamondback turtles, and horseshoe crabs—despite degradation that occurred before Gateway was established in 1972.

By the 1970s, 90 percent of the original marshes had been destroyed by urbanization. Dredging borrow pits yielded fill for runways at Floyd Bennett Field and later at JFK. Channels were excavated for a proposed seaport, and various industries encroached over time. Suburbs of Brooklyn and Queens now crowd against the shoreline. Damaged and dying beds of cordgrass exist throughout the remaining marshy islands. Even with improvements in water quality and protection of remaining wetlands after Gateway was established, this habitat is vanishing at an accelerating rate. Contributing to the degradation is a shortfall of new sediment deposition, which prevents marshes from developing naturally at the same rate as sea level rise. According to 2004 GIS data, an annual loss of 10 acres recorded in 1924 has risen to 50 acres each year.

Concerned citizens known as "Jamaica Bay EcoWatchers" raised the alarm, leading to discussions with NPS scientists, the U.S. Army Corps of Engineers, New York City Department of Environmental Protection, New York State Department of Environmental Conservation, academic experts, and the public. A public-private coalition led by the NPS has since embarked on a course of research, protection, and restoration to save the remaining wetlands.

Active restoration started in fall of 2003 after a year of planning, environmental assessment, permitting, and biological inventory. A high-pressure jet sprayed sediment onto a two-acre pilot plot, raising the surface elevation. Volunteers then planted 20,000 cordgrass plugs in the new fill. Existing cordgrass rhizomes resprouted, additional seeds washed in. By spring of 2004, about 300,000 seedlings had germinated. Plans now exist to restore additional marsh, adding to baseline data that could benefit other endangered wetlands. Although the pilot program has shown some success, restoration is only a stopgap measure. Survival of this ecosystem depends on reversing the trend of marsh loss in the heart of the nation's most populous metropolitan region. ■

Kevin Leichner is a Public Affairs Specialist at National Parks of New York Harbor. Additional research was provided by Kim Tripp and Kathleen Cuzzolino of the Jamaica Bay Institute.

Calendar | 2004

EVENTS AND OPPORTUNITIES

August 29-September 1

National Recycling Congress Annual Exposition

Recycling coordinators, business and industry leaders, and others committed to recycling will attend this San Francisco event. Go to *www.nrc-recycle.org/congress* for details.

September 12-15

National Coastal and Estuarine Habitat Restoration Conference

Explore successful strategies for habitat restoration and learn how to fund a restoration effort at this Seattle, Washington gathering. Go to *www.estuaries.org* for details.

September 18-19

Green Festival '04

This public event in Washington, D.C., promotes green technology, renewable energy, green products, and other aspects of sustainable living. Exhibits will feature green businesses and practices. Go to *www.greenfestivals.com* for information.

October 1-2

Green Building/Hybrid Source Expo and Workshop

Learn more about renewable energy, alternative building materials, accessible design, water-saving systems, xeriscaping, and hybrid/fuel cell vehicles at this San Antonio, Texas, event. Visit *www.greenconnexion.com/expo* for further details.

October 4-6

Building for Greener Communities

This Nebraska City, Nebraska, conference focuses on planning, preserving, protecting, and enhancing our communities. Phone 888.448.7337 or visit *www.arborday.org/bfgcconference*.

October 29-November 2

ASLA 2004 Annual Meeting and Expo

Join the American Society of Landscape Architects in Salt Lake City, Utah, to explore the theme, "Natural Spaces, Public Places." Learn more about public-private partnerships and best practices through exhibits and workshops. Go to *www.asla.org*.

November 10-12

Greenbuild International Conference & Expo

The Greenbuild Conference features leading-edge green technologies in the building industry and promotes sustainably built environments. For full details on this Portland, Oregon, gathering, visit *www.usgbc.org*.

November 14-16

EnviroTech Summit

Focus on best practices in environmental management at this Colorado Springs event. Go to *www.envirotech-summit.com*.

Sustainability News is produced by Harpers Ferry Center and published by the National Park Service, Office of the Director, Environmental Leadership Program.

Send comments, articles, address changes, and information on conferences, training, and publications to Diane T. Liggett, Editor, diane_liggett@nps.gov. Send additional comments to Shawn Norton, Coordinator, Environmental Leadership Program, National Park Service, 1849 C Street NW, Mail Code 3316, Washington, DC 20240, 202.354.1835, shawn_norton@nps.gov.

Secretary of the Interior
Gale A. Norton

Director, National Park Service
Fran P. Mainella

NPS Environmental Leadership Program Coordinator
Shawn Norton

NPS Green Energy Coordinator
Terry Brennan

Editor
Diane T. Liggett

Assistant Editors
Neal Herbert, Canyonlands National Park
Kevin Leichner, National Parks of New York Harbor

Contributing Editors, Summer 2004
Wendy Berhman, NPS Environmental Management Program
Sonya Capek, NPS Pacific West Regional Office, Seattle
Bretnie Grose, NPS Pacific West Regional Office, Seattle
Ted Hillmer, Wilson's Creek National Battlefield

Internet
Sustainability News and additional NPS information about green practices appears at *www.nature.nps.gov/sustainabilitynews*. For further information, visit *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.

Sustainability News, Summer 2004 is printed on 100% recycled, 50% post-consumer waste paper processed chlorine-free using vegetable-based inks.

National Park Service
U.S. Department of the Interior

Environmental Leadership Program
1849 C Street NW
Mail Stop 3316
Washington, DC 20240