



PARK SCIENCE

INTEGRATING RESEARCH AND RESOURCE MANAGEMENT

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A socioeconomic atlas for park management

By JEAN MCKENDRY AND NINA CHAMBERS

The natural and cultural landscapes adjacent to national park system units are experiencing dramatic change. Many parks once considered remote and distant from cities are now surrounded by an expanding urban and suburban matrix; parks in rural areas often attract gateway community development. For example, the Seattle, Washington, metropolitan area has expanded eastward toward Mount Rainier National Park; Tucson, Arizona, abuts Saguaro National Park; roads through Manassas National Battlefield Park in Virginia have become key commuter routes to and from Washington, D.C.; and Jackson Hole, Wyoming is a growing gateway community adjacent to Grand Teton National Park.

Changing activities and socioeconomic conditions in regions adjacent to park units can affect resources and visitor use within these parks. For example, increased development can lead to habitat fragmentation, contribute to degraded air and water quality, and intrude on historic settings and scenic values. Approximately half of the 62 park units that requested new general management plans in FY1999 were "seriously concerned about changes in surrounding land use" (Associate Director 1998). Population changes related to growth, aging, immigration, and mobility can alter traditional visitor use patterns and shift impacts on resources and demands for interpretive and recreation services.

Hence, park managers need systematic information about contemporary conditions and trends in human activities—socioeconomic trends—in the regions that surround individual units. Such informa-

tion can be used to anticipate and help address complex park management challenges that originate outside park boundaries. Maps are powerful tools to help managers visualize spatial patterns related to these socioeconomic trends (Machlis and McKendry 1996). For example, a map that shows projected population change in a broad region surrounding a national park also reveals where development will likely occur, and where park managers might actively collaborate in land-use planning decisions. A collection of maps of regional socioeconomic trends (i.e., related to population, resource use, commerce, land use, and so forth) can be organized into an atlas. Such an atlas can contribute to a better understanding of the changing character of adjacent lands and potential impacts on national parks, and provide managers with a critical planning, management, and public participation tool.

Regional socioeconomic atlases for park management may be valuable and necessary. This article describes a project that was recently initiated by the NPS Social Science Program to develop such an atlas.

Objectives and criteria

The objectives of the atlas project are to: (1) develop a *prototype* atlas of regional socioeconomic trends; (2) test the atlas at four units of the national park system; and (3) evaluate the usefulness of the prototype atlas through a review by superin-

tendents, resource managers, and others.

Each atlas should: (1) provide usable knowledge to park managers; (2) be cost-effective and efficient, with limited impact

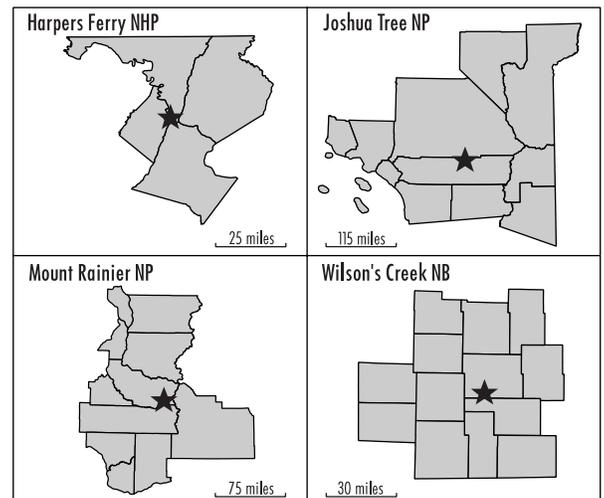


Figure 1. Regions of interest for the four pilot parks include aggregates of counties and were selected by park staff.

on park staff; (3) include the best available data sets from public and private sources that are easily updated in the future; and (4) include standard data sets that will allow comparisons among parks at the cluster, regional, and national levels. Using these criteria, a regional socioeconomic atlas for park management could potentially be developed for any unit.

Progress in developing the atlas

Four units were invited to serve as pilots for the project: Harpers Ferry National Historical Park (West Virginia), Joshua Tree National Park (California), Mount Rainier National Park (Washing-

See "Atlas" on page 13

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IN THE NEXT ISSUE...

Look for articles on the continuing fossil discoveries at Curecanti National Recreation Area, an interview with Point Reyes Superintendent Don Neubacher, additional social science features, and others.

*Other than the departments, this article stands alone this issue as the only one that is not part of the special emphasis on the social sciences.

Special issue, guest editor

This is the first issue of *Park Science* in nine years to explore in depth a specific resource management issue or related field of research. Let me thank our guest editor, Jared Ficker, for pulling together the feature articles for this issue and presenting several contemporary applications of the social sciences in park management. You'll note, however, that the publication's departments and the update on the National Natural Landmark Program represent *Park Science* "business as usual" and have not been tailored to reflect the social science emphasis. If you have a proposal for a special issue and would like to serve as guest editor in the future, please let me hear from you. Happy reading!

—Jeff Selleck, Editor

Applying the social sciences

This special issue of *Park Science* demonstrates the diversity of the social sciences and their contribution to park management. Increasingly, park and resource managers are faced with issues that require social science research. Such issues include development adjacent to parks, public participation in park management decision making, visitor perceptions of their experience, socioeconomic impacts of park management decisions, urban park problems, demographic trends, and program evaluation, among others. There are a growing number of social science researchers, primarily at universities, who are working closely with managers to deliver “usable knowledge” to address these issues. Social science disciplines such as economics, geography, political science, psychology, and sociology are providing useful insights to managers. This special issue highlights ongoing social science research in the national park system and discusses opportunities for new research.

Balancing use and preservation are decisions made by park personnel everyday. Park managers can attest to the growing complexity of the National Park Service mission—to preserve park resources unimpaired and provide for public use and enjoyment. This balance is often controversial and difficult, especially with limited information and increasing threats to the quality of park resources. Understanding the relationship between people and parks is essential. Social science research is a tool park managers can use to help provide useful information to achieve their goals. This issue of *Park Science* is intended to familiarize readers with the breadth of social science contributions to park management. It contains a sampling of social science research; however, there are many other social science projects occurring throughout the national park system.

I encourage you to consider how the research presented in this issue can be applied to your park or program. The National Park Service Social Science Program can assist in connecting park managers with researchers to address social science research needs. As park managers are faced with increasing controversy, particularly in working with diverse stakeholders, social science research will likely play an important role in decision making. I recall a conversation I had with Wayne Brewster (Yellowstone National Park) last year. Brewster attributed much of the success of the wolves reintroduction in Yellowstone to an early investment in social science research. At Yellowstone, the biological research of the reintroduction program was complemented by social science. Perhaps other natural science research efforts could also benefit from such a social science complement. I hope you enjoy this social science special issue of *Park Science*. While I served as guest editor, the efforts and contributions of Nina Chambers, Gary Machlis, and Jeff Selleck were all essential to this special issue.

—Jared D. Ficker
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Correction

The website address given for the white-tailed deer bibliography in the December 1999 issue of *Park Science* (19[2]:9) was in error. The “c” was left off “pwrc,” which stands for Patuxent Wildlife Research Center, the website host. The correct address is www.pwrc.usgs.gov/library/bibs.htm.



Tumor rumor

The editor received a brief, unsigned note that pointed out an error two issues ago in the article entitled “Persistent expression of tumors in Lake of the Arbuckles gizzard shad” (19[1]:34-36). The note refuted the claim that “cancer in fishes has been previously reported at various locations in North America ... but never in a national park.” It asserted that gray (mangrove) snapper with tumors have been recorded in the waters of Dry Tortugas National Park.

Dr. Robert Werner, Director of the Department of Laboratory Animal Resources at Florida State University, has been studying fish with tumors and other abnormalities from south Florida waters, and elaborated on the facts in an e-mail exchange with the editor. Dr. Werner reports that subcutaneous tumors, primarily single, but occasionally multiple, have been tentatively diagnosed as neurofibroma in gray snapper (*Lutjanus griseus*) from Florida waters, including those of Dry Tortugas National Park. A moat surrounding Fort Jefferson in the national park that harbors a semi-isolated population of the fish species was monitored every six months from August 1995 to August 1997. The tumor prevalence at this site ranged from 0 - 4.9% over the three-year study.

Dr. Michael Schmale of the University of Miami’s Rosenstiel

School of Marine and Atmospheric Sciences also participated in the study. He reports that gray snapper with tumors have also been documented in Biscayne National Park. While this study has not been published in a scientific journal, Schmale has published in several journals about his work on cancerous tumors in bicolor damselfish that were collected in both Biscayne and Dry Tortugas National Parks¹. Regarding the geographical error in *Park Science*, Schmale stressed that “oftentimes scientists do not realize which published studies were carried out in national parks because [this information] is not normally mentioned in the professional literature.”

William B. Robertson II

Pioneering Everglades scientist and ornithologist, William B. Robertson II, died at his home in Homestead, Florida, in January. He was 75.

Robertson was a graduate student in 1950 when he came to the Everglades to study the park’s breeding birds. The following year, he was hired by the Park Service and began a 46-year federal career studying the ecosystems of south Florida. His research on wildfire during the 1950s was revolutionary and paved the way for incorporating fire in the management of the park’s pinelands and grasslands. His work was also influential in changing the way park managers across the nation view the ecological role of fire.

Robertson was dear to his colleagues, who often called him, simply, “Dr. Bill.” Gary E. Davis, NPS Senior Scientist at Channel Islands National Park (CA), summed up his passing this way: “We can all learn from his farsighted examples of thoughtful study and compassion for nature. The clarity of his vision and depth of his understanding will be missed.” ^P₅

¹For example: Schmale, M. C. 1991. Prevalence and distribution patterns of tumors in bicolor damselfish (*Pomacentrus partitus*) on south Florida reefs. *Marine Biology* 109:203-12.

ALLEGHENY-CHESAPEAKE

Fort Necessity restoration begins

Tucked away in the Allegheny Mountains of western Pennsylvania is a small patch of land where the first shots of the French and Indian War were fired. Today the site is known as Fort Necessity National Battlefield, and a new effort is under way to restore the park to its 1754 historic scene.

The National Park Service is assisted by Peggy Johnson (paj6@psu.edu), Associate Professor of Civil Engineering at Pennsylvania State University, who will lead the portion of the project that involves restoration of the stream that runs through the park. "Over the last 200 years there have been a lot of changes made to that piece of land," Johnson says.

John Karish, Chief Scientist with the NPS Philadelphia Support Office, says, "A lot has happened to that land since the battle was fought in 1754. It became a farm, the stream was dredged and straightened, and some land was drained."

Johnson explains that the site was originally a natural meadow fed by a winding stream. When the land was turned into a farm, the stream was straightened and drain tiles were installed to dry out the marshy stream.

Johnson's yearlong mission will be to assess the park's current conditions and make recommendations on how best to restore the meadow so that it will look more like it did in Washington's time.

The battle at Fort Necessity occurred on July 3, 1754, marking the beginning of the French and Indian War where the English and French battled for control of the North American continent. The war ended

with the French expulsion from North America in 1763.

"Washington originally chose that site because it was one of the few areas where he could build a fort and see the area around him," Karish says. The site, also known as the Great Meadows, was described by Washington as "a charming field for an encounter."

The fight marked Washington's first major military engagement and the only time he ever surrendered to an enemy.

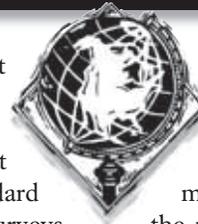
Birds surveyed at Pennsylvania parks

Large tracts of public land, such as national parks, have become more isolated because of increased development and urbanization, changing land uses, and habitat fragmentation within the eastern United States. These tracts of land are valuable for the long-term maintenance of biological diversity and the functional integrity of ecosystems. Therefore, the National Park Service has determined the need for in-depth inventorying and monitoring of animals and plants within national parks and historic sites in Pennsylvania. The Park Service, in conjunction with Pennsylvania State University, is conducting a comprehensive inventory program for birds at Allegheny Portage Railroad National Historic Site, Eisenhower National Historic Site, Gettysburg National Military Park, Hopewell Furnace National Historic Site, Johnstown Flood National Memorial, and Valley Forge National Historical Park.

The objectives of this research project are to obtain a comprehensive inventory data set on birds at the parks and to develop guidelines for establishing a long-term sampling plan to monitor birds at

the parks. To meet these objectives, two years of bird surveys are being conducted at the parks using standard methodology. Bird surveys will be based on special needs, taxonomic groups of interest, habitats, and the infrastructure of each park. Ultimately, guidelines for establishing long-term sampling plans to monitor birds based on these inventories will be developed. Selecting protocols to survey birds, establishing permanent sampling points, and collecting data on bird populations will lay the groundwork for developing a long-term sampling plan to monitor birds at the parks.

Researchers completed breeding season and fall-migratory bird surveys between 25 May and 10 October 1999 (table 1), and also conducted inventories of winter bird communities at the six parks. Researchers also recorded a total of 15 species during the breeding season and 14 species during fall migration that have been identified as birds of management concern by the National Audubon Society and the U.S. Fish and Wildlife Service (table 2). Bird inventories for the research project will continue to



be conducted during all seasons through spring of 2001. Information on bird communities obtained from the research and guidelines for continuing the bird inventories will be valuable for monitoring bird populations and for sampling specific taxonomic or functional groups of birds within units of the national park system in Pennsylvania in the future.

Reptiles, amphibians, and invertebrates inventoried

Researchers at Penn State University—Katharine L. Derge (kld8@psu.edu), Richard H. Yahner, Ke Chung Kim, and John R. Grehan—in cooperation with NPS natural resource staff, are conducting a two-year inventory of reptiles, amphibians, and terrestrial invertebrates at Gettysburg NMP and Eisenhower NHS. The inventory is part of the NPS Inventory and Monitoring Program, and is being funded both by it and Eastern National Parks and Monuments Association. The data will be used to evaluate the impacts of proposed landscape rehabilitation outlined in the new general management plan for Gettysburg.

Table 1.
Number of bird species detected during the 1999 breeding and fall season surveys at six units of the national park system in Pennsylvania

Park Unit	Number of Bird Species	
	Breeding Season	Fall Migration
Allegheny Portage NHS	53	45
Eisenhower NHS	65	48
Gettysburg NMP	82	74
Hopewell Furnace NHS	64	46
Johnstown Flood NM	47	33
Valley Forge NHP	83	74

Inventory sites for reptiles and amphibians are distributed throughout the parks in a variety of habitat types. These sites have been and will continue to be visited regularly over the two-year period and surveyed using standardized methods in order to calculate relative abundances of species found and analyze habitat relationships. Methods of inventory include natural substrate searches, artificial cover boards, trap and release, and frog and toad calling surveys. In addition to the standardized sites and methods, researchers are canvassing the parks with general searches to document the presence of as many spe-

cies as possible. In the first year (1999) of the survey, researchers documented 26 species of reptiles and amphibians. One species of frog was not previously recorded in the park or the county.

Lepidopterists from Penn State collected butterflies and skippers from a series of sites in the parks in 1999. The collection contains 28 species of butterflies, one of which, the Baltimore (*Euphydryas phaeton* Drury 1773), is found only in wetland habitats. Surveys in the second year will target additional areas and particular species that have not yet been documented but are likely to occur.

At two forested sites, the researchers spent a week collecting invertebrates from as many microhabitats as possible. They used a combination of 12 different trapping methods in order to capture invertebrates from each part of the forest, including the soil, leaf litter, trunks of trees, air, and canopies of trees. Work is now concentrated in the museum, where entomologists are identifying the more than 22,000 specimens collected, representing 30 orders.

At the conclusion of data collection and analysis, the parks will have species lists, distributional data and maps, recommendations for long-term

monitoring strategies, as well as comments on the impacts of landscape management on the targeted fauna. Results from the inventory will be submitted for publication in a future issue of *Park Science*.

NATIONAL CAPITAL

Interagency cleanup of a former Army camp at Oxon Run

Bullets, munitions, and lead-contaminated soils are part of the World War I Camp Simms legacy for Oxon Run Parkway in Washington, D.C. To address this restoration challenge, a joint effort by the National Park Service, U.S. Army Corps of Engineers (COE), and USDA National Resource Conservation Service (NRCS) utilized restoration techniques to mitigate soil contamination and erosion in a rare and sensitive natural area. Oxon Run Parkway is a stream corridor park that contains several northern magnolia bogs and a rare wetland complex, the only such example in the national park system.

The discovery of an unexploded mortar shell during a 1994 survey for a city subway began a two-year effort by the Corps of Engineers that located and removed over two dozen unexploded ordnances. Careful coordination with National Park Service, community leaders, and local emergency preparedness organizations protected public safety and sensitive natural areas.

The National Park Service contracted the Natural Resource Conservation Service to propagate plants from seed, spores, and cuttings taken from the site. Munitions re-

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Table 2.
Bird species of management concern identified during the 1999 breeding and fall seasons at Allegheny Portage Railroad National Historic Site (ALPO), Eisenhower National Historic Site (EISE), Gettysburg National Military Park (GETT), Hopewell Furnace National Historic Site (HOFU), Johnstown Flood National Memorial (JOFL), and Valley Forge National Historical Park (VAFO)

Bird Species	Breeding Season	Fall Migration
Black-throated blue warbler ¹	ALPO	ALPO, GETT, HOFU, VAFO
Blue-winged warbler ²	GETT, VAFO	— —
Canada warbler ¹	— —	ALPO
Cerulean warbler ^{1,2}	— —	HOFU
Chestnut-sided warbler ²	ALPO, JOFL	ALPO, EISE
Eastern meadowlark ²	EISE, GETT, JOFL, VAFO	EISE, GETT, VAFO
Field sparrow ^{1,2}	All parks	ALPO, EISE, GETT, JOFL, VAFO
Grasshopper sparrow ²	EISE, GETT, VAFO	GETT
Kentucky warbler ¹	VAFO	— —
Loggerhead shrike ^{2,3}	EISE	— —
Louisiana waterthrush ^{1,2}	ALPO, HOFU, VAFO	— —
Northern flicker ²	All parks	ALPO, EISE, GETT, JOFL, VAFO
Prairie warbler ¹	GETT	GETT, VAFO
Red-headed woodpecker ²	EISE, GETT, HOFU	EISE, GETT
Red-shouldered hawk ²	— —	EISE, JOFL
Veery ²	HOFU, VAFO	ALPO, EISE
Wood thrush ^{1,2}	All parks	ALPO, GETT, HOFU, JOFL, VAFO
Worm-eating warbler ^{1,2}	EISE, HOFU, VAFO	HOFU, VAFO

¹ Listed on the 1999 State Watchlist for Pennsylvania by the National Audubon Society.

² Listed as a species of management concern in the Migratory Nongame Birds of Management Concern for 1995 released by the United States Fish and Wildlife Service.

³ Listed as state endangered by the Pennsylvania Game Commission.

"Highlights" cont'd from page 5

removal holes were refilled with their soil, and the vegetation recovered passively. However, the restoration of larger disturbances, such as access roads and construction areas, required planting with site-collected materials grown by the Natural Resource Conservation Service.

One ongoing 1999-2000 restoration project involves an approximately 0.5-ha (1-acre) former rifle range with substantial lead-contaminated soils left from years of target practice. Bullet casings wash down slope where they are easily collected by local children, creating a primary public safety problem. Standard EPA mitigation procedures for this steep, eroded hillside would involve trucking away tons of contaminated soil, which would threaten rare plant communities. However, the EPA analysis found that the lead was tightly bound to the soil with little migration through groundwater to the adjacent creek and sensitive wetlands. It supported the NPS decisions to stabilize and revegetate the eroding area despite the proposed COE engineering solution of cement and stone terraces. A cap of coconut "bio-logs" and matting sculpted to fit tightly over the site's topography holds down imported topsoil and cov-

ers the bullet casings (figure 1). The local rain of seeds from the surrounding native communities will contribute to the natural revegetation and stabilization of the area. In order to assist establishment of the vegetation and its ability to outcompete and shade out possible exotic species, the Natural Resource Conservation Service is growing and installing site-collected cool and warm season grasses.

Catoctin addresses exotics

Catoctin Mountain Park (Maryland), in cooperation with Hood College, initiated an exotic plant research project funded by a Canon-National Park Foundation Expedition Into the Parks grant awarded during 1999. The goal of this project is to develop a park management plan for exotic plants. During the 1999 field season, extensive survey work was completed of the park boundary, roadsides, and interior areas with the assistance of the Youth Conservation Corps. Permanent vegetation plots were established to monitor the spread of exotics.

Four experimental plots were also established to evaluate control measures of hand pulling, herbicide treatment, and torching for three invasive species; Japanese barberry, garlic mustard, and Japanese stilt grass. Data analysis is underway, and

the success of the control techniques will be assessed in 2000 following the next growing season. Preliminary results indicate a strong correlation between the spread of Japanese stilt grass and disturbance in the form of roads and trails.

PACIFIC WEST

Alcatraz bird census... or the ABC program

Alcatraz Island, part of the Golden Gate National Recreation Area in San Francisco, California, attracts 1.5 million visitors each year who come from around the world to visit the famous prison (figure 2). Far more than a cultural resource, Alcatraz is home to many colonial nesting birds in the spring and summer, and a refuge to migrating or over-wintering birds in the fall and winter.

In 1993, Park Ranger Brett Woods initiated a program where volunteers conducted a census of these fall and winter birds. However, Ranger Woods moved on and the program languished. In 1998, new Park Ranger and Natural Resource Coordinator Brett Carré revitalized the program. First, a major recruitment obtained 40 volunteers. Then, methods were changed in order to conduct a systematic area search of the 22-acre island. Each census day a pair of volunteers surveyed the island, moving clockwise one day, counter clockwise the next. The island was divided into 12 sections of roughly equal countability with each section being censused for exactly 10 minutes. This allowed presence and frequency data to be obtained (i.e., percent of census days that a species was detected on the island, by month, or by island section). Abundance data (number of birds per section by species), while not accurate because of the possibility of multiple



Figure 2. Alcatraz Island.



Figure 3. Black oystercatcher.

counting of birds between sections, was still recorded for potential use as very general year-to-year trend data.

Of the 108 census days during the 1998-99 season (mid-September through January), 89 bird species were detected. Bird species that made up the 20 highest frequencies of detection were as follows (in decreasing order): western gull, white-crowned sparrow, song sparrow, double-crested cormorant, common raven, Anna's hummingbird, black phoebe, fox sparrow, European starling, yellow-rumped warbler, house finch, hermit thrush, black oystercatcher (figure 3), golden-crowned sparrow, black turnstone, wandering tattler, Heerman's gull, Brandt's cormorant, western grebe, American kestrel, brown pelican, and golden-crowned Kinglet.

The data were useful in writing the Alcatraz Environmental Impact Statement, due out this year. Park staff hope that the ABC program can continue for years as it provides an excellent opportunity to collect meaningful wildlife data and provides a meaningful recreation experience for the volunteers. **P**



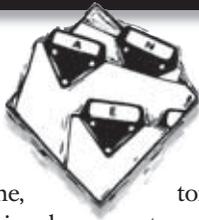
Figure 1. The site at Oxon Run was stabilized with coconut "bio-logs" and matting.

Paleo volume published

The Fourth National Park Service Paleontological Research Volume, edited by Vince Santucci and Lindsay McClelland, has been published. The volume includes 20 original papers representing 12 different units in the national park system (Badlands, Bighorn Canyon, Canyonlands, Channel Islands, Chesapeake and Ohio Canal, Curecanti, Denali, Florissant Fossil Beds, Fossil Butte, Petrified Forest, Timpanogos Cave, and Walnut Canyon), plus one multipark article describing the Morrison Ecosystem Project. The volume is a Geologic Resources Division (GRD) technical report (NPS/NRGRD/GRDTR-99/03) and is dedicated to Dr. Michael Soukup, NPS Associate Director for Natural Resource Stewardship and Science, whose leadership in building support for science-based decision making has strengthened the management and protection of all park natural resources. Fossils have been key beneficiaries of these policies as parks increasingly recognize the value of these resources and the importance of paleontological research. The volume will soon be available electronically on the GRD Paleontology website at www.nature.nps.gov/grd/geology/paleo.

Proceedings available

The George Wright Society recently published proceedings of its biennial conference held during March 1999 in Asheville, North Carolina. Like the conference, the volume is entitled "On the Frontiers of Conservation" and presents 87 papers given at the gathering. The papers address many top-



ics of importance in resource management and include partnerships, restoration, visitors and impacts, ecosystem management, coastal environments, building an inventory and monitoring program, vegetation dynamics, and managing scientific research, among others. The proceedings are available on-line at www.georgewright.org.

Calling all panthers

Numbering less than 100 in south Florida, the Florida panther (*Puma concolor coryi*) is one of the most endangered mammals in the world and presents numerous research challenges. The species' recovery and management depend on data from radio-collared individuals, particularly data about productivity and survival of kittens. Obtaining such information is tricky, because kittens must be examined in dens during the absence of their mothers. Mothers are usually in the den during daylight hours and depart and arrive during dusk or dawn. Formerly, an investigator had to be stationed near a den to detect the departure of the mother before data on the kittens could be collected. The amount of time and effort required for this made monitoring remote dens impractical. However, three researchers put cellular phone technology to work to remotely detect the absence of a mother lion in a den.

Writing in the Wildlife Society Bulletin (26[1]:29-31), E. D. Land, D. R. Garman, and G. A. Holt mounted an auto-answering cellular telephone in a listening post near a den. Also in the listening post were an antenna and receiver used to

pick up the signal pulse from the radio-collared female. The receiver, cellular phone, and the battery that supplied power for the telephone were placed inside a weatherproof case and located within 200 m of the den. A caller to the listening post heard either the signal pulse generated by the collar of the mother lion in the den or background static if the mother was out of radio range, i.e., away from the den.

The researchers used listening posts at four dens of radio-collared mothers and examined seven 2-3-week-old kittens. The listening posts substantially decreased the time in the field to examine neonatal kittens and maximized the efficiency of limited field staff. The cost of travel and labor by 2-3 researchers for one unsuccessful trip to a den could exceed the cost of developing one cellular listening post.

Listening posts with cellular phones may be used for monitoring radio-collared animals in nests, foraging grounds, breeding areas, or other known areas of visitation.

Pepper spray: an attractant?

People in brown bear (*Ursus arctos*) country have long sought nonlethal repellants for protection from bear attacks. A liquid spray with the chief irritant in red pepper (oleoresin capsicum) was developed in the 1970s and since then has been commercially manufactured. It is known under the generic name *red pepper spray* and carried by many hikers, campers, and other outdoor enthusiasts. Some states and many national parks recommend that back-country users carry the spray for self defense in encounters with aggressive bears. Al-

though aggressive spraying of the compound has been an effective repellant in encounters with bears, Smith (1998. Attraction of brown bears to red pepper spray deterrent: caveats for use. Wildlife Society Bulletin 26[1]:92-94) demonstrated that bears are attracted to objects with red pepper spray residue.

Smith treated one-square-meter areas of beach gravel in nine locations with four-second bursts of commercially available bear deterrent spray (two different concentrations) and observed the treated areas from blinds at 10-200-m distances. During his observations, 13 independent brown bear groups approached the sites a total of 40 times (seven single bears of unknown sex, three adult bears, one sow with two dependent yearlings, one sow with three cubs of the year, and one sow with two cubs of the year). Interest in the spray of both concentrations ranged from no response (40%) to slight (20%), moderate (12%), and high (28%). None of the bears was ever repelled by the spray residues. Responses included 25 bouts of sniffing, nine pawing bouts, 10 licking bouts, 16 head rubbing bouts, and 11 bouts of bears rolling their entire body on the spray residues. The bouts lasted for 0.1-2.5 minutes.

Smith explains that bears rely on olfaction to locate food. A pungent odor such as that of red pepper spray would therefore be of interest to bears. The relatively high percentage of no response to the spray in Smith's study may be explained by strong winds that carried the scent of the spray away from the location of the

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bears. Smith and his field crew had observed bears in the area of the test sites during more than 750 hours and had not seen bears rubbing their heads on the ground, pawing and licking soils, or rolling on their backs as in the red-pepper-spray test sites. He therefore attributed such novel behavior directly to the exposure to red paper spray.

Smith's findings suggest that people should not test spray in hiking or camping areas, should carefully remove all residues from fired canisters, and should not store canisters in sleeping areas. The attraction of bears to red pepper spray warrants prudent use and storage of canisters.

Rock climbing and nesting birds at Joshua Tree

A recent study at Joshua Tree National Park (California) recommended that "in areas of widespread climbing activity, monitoring programs should be instituted to evaluate spatial and temporal fluctuations of bird species and changes in numbers of invasive species that may threaten the integrity of native bird communities" (Camp, R. J., and R. L. Knight. 1998. Rock climbing and cliff bird communities at Joshua Tree National Park, California. *Wildlife Society Bulletin* 26(4):892-98). The study revealed that bird species and bird behavior differed among moderately climbed cliffs, cliffs with many popular climbing routes, and cliffs that were not climbed. The study sites did not differ in height, length, verticality, or exposure. However, the unclimbed cliffs were at greater distances from park-

ing lots and campgrounds than the climbed cliffs.

Four bird species were seen on cliffs where no one climbed, five on moderately climbed cliffs, and three on cliffs with many popular climbing routes. Species with broad ecological niches such as the American robin and invasive species such as the house finch, the European starling, and the brown-headed cowbird were seen only on climbed cliffs. For example, house finches were 69% more numerous on popular cliffs than on unclimbed cliffs. The distribution of birds in front of cliff faces was not uniform. The percentage of birds on cliff faces was higher on unclimbed cliffs than on popular cliffs. On unclimbed cliffs, birds more often were seen perched on the cliff face. On popular cliffs, birds were seen flying regardless of the presence or absence of humans. In the presence of humans, more birds were at a distance from the cliff faces, suggesting anthropogenic changes in the spatial distribution of the birds and anthropogenic disruption of breeding, foraging, and predator detection by nesting birds and their fledged young.

Vegetation trampling by hikers and pack stock

Disturbance by trampling of protected areas is a concern in national parks. But little is known about the variation of such disturbance by type, and this lack of information keeps managers from applying appropriate restrictions. In backcountry and wildernesses without motorized traffic, hiking groups and groups with pack stock are the two primary users. Pack stock have

been horses, mules, donkeys, and more recently llamas. Trampled areas are trails, campsites, and off-trail areas.

To obtain more information about the effects of trampling, Cole and Spildie (Hiker, horse, and llama trampling effects on native vegetation in Montana, USA. 1998. *Journal of Environmental Management* 53: 61-71) studied the relative effects of hiker, horse, and llama traffic on vegetation and ground cover at two trampling intensities (25 and 150 passes at one time) on two previously undisturbed forested vegetation types (forest with understory of predominantly erect forbs and forest with understory of predominantly low shrubs). These types were selected because they are widespread in the northern Rocky Mountains, are not highly resistant to trampling, and may be widely divergent in their responses to trampling.

The effects were assessed immediately after application and one year later. Trampling by horses caused the greatest disturbance. The effects of trampling by llamas and hikers could not be differentiated statistically. The forb understory was highly vulnerable to trampling but recovered rapidly. The shrub understory was more resistant to disturbance by trampling but lacked resilience. Differences between effects from trampling by horses and llamas or hikers persisted for at least one year.

Managers may use this information variously. For example, they can zone-protect areas to separate different types of users or to confine the more damaging user types to more durable areas, or they can make the difficulty of obtaining a permit proportional

to the specific environmental impacts by a user group.

Vanishing night skies

Like clean air, clean water, wildlife, and the sounds of nature, a clear, dark, night sky and, weather permitting, the view of more than 2,500 stars and the Milky Way should be a part of a visitor's experience in national parks now and in the future. Overnight visitation is permitted in 130 national parks. However, light pollution increasingly obscures clear views of night skies even in parks. Such pollution is often from excessive or misdirected outdoor lighting and from highways, homes, office buildings, and other developments that can be as far away from a park as 100 miles. Some concession facilities in national parks may also add glare to the night sky. Unless light pollution is remedied, views of dark night skies may disappear from national parks.

Concerned about the issue of vanishing night skies, the National Parks and Conservation Association conducted a survey of National Park Service managers to obtain more information about problems with light pollution in parks. The responses from 189 of 376 national park system units, assumed to be representative, are profoundly disturbing.

Most of the 94% of the parks that offer overnight visitation and consider dark night skies an important resource offer some type of night-sky interpretive program. Nearly two-thirds of the units that offer overnight visitation consider light pollution a problem, and nearly 70% of the parks in four of five U.S. regions report

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West by Northwest workshop restores spirit

Biennial gathering unites far-flung staff, inspires problem resolution in the 21st century

BY THE EDITOR

Note: Transcriptions of all plenary presentations at the West by Northwest 2000 conference will be made available on the Web at www.nps.gov/pwro/wxnw2000.htm as they are transcribed.

San Diego, California, provided a relaxing venue for more than 350 resource managers, interpreters, superintendents, and other NPS staff and partners to come together for a lively discussion of what it takes to preserve and interpret park resources in the new millennium. Held twice previously in 1996 and 1998 by the Pacific West Region, this workshop was co-sponsored by the Alaska Region and was held in mid-March several miles from Cabrillo National Monument. By joining with Alaska, the workshop presented a much wider variety of resource management and interpretation issues, solutions, and discussions, and provided greater opportunity to interact with colleagues on these issues. Similarly, participation by staff from several Pacific island parks, including their performance of traditional island music, enriched the gathering and gave it a distinct regional flavor.

The week opened with presentations by Regional Directors John Reynolds and Bob Barbee, who charted the challenge of the conference—to get to know one another and to listen, learn, and exchange new and better ideas as resource stewards. Reynolds also charted the challenge of the coming century, explaining that parks must be relevant to all Americans, important to their personal well-being, and perceived as valuable to American society “if we are to have a national park system 100 years from now that means as much to us as it does today.” Talk soon turned to sustainability, a familiar theme at recent conferences, which was addressed by Shawn Norton and George Turnbull in their very provocative plenary presentation on environmental leadership.

But the big buzz for the week was the Natural Resource Challenge, launched last August at Mount Rainier National Park by

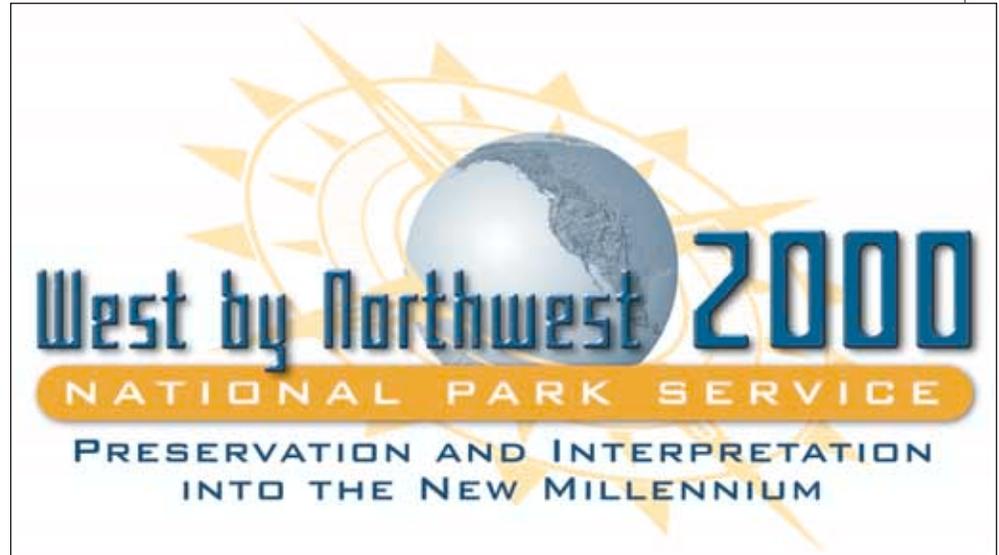
Director Stanton. Deputy Director Galvin explained that “the challenge for the 21st century is to preserve resources.” The Natural Resource Challenge is necessary to help us meet these responsibilities; it is a catalyst for change. We must begin to “see the parks as part of a system” and “make them more useful to society at large,” he said. Certainly, we must engage science for the answers it can provide us in making better management decisions. But, he explained, we must also come to see scientific information about parks as valuable to society, and we must develop institutions for sharing that information. We need to develop a web of co-operators and capitalize on their influence. And we must bring science and education together to build a constituency of support for resource management.

A dinner gathering and festive ballet folklorico dance performance at Cabrillo closed out the day, setting the stage for the approximately 150 individual presentations, plenary sessions, posters, training sessions, or field trips that followed over the next four days.

For the concurrent sessions, the workshop organizers opted for broad themes as a way to integrate park operational and scientific disciplines in the discussions. For example, the week-long theme exploring

“innovative problem resolution” brought together presentations about natural and cultural resource management, interpretation, wildland fire, archeology, hydrology, geology, exotic species management, paleontology, and many others aimed at improving resource preservation and interpretation. “Park futures and a changing public” focused on exploring ways to develop constituencies through education programs designed for diverse audiences. “NPS leading the way” reviewed park management techniques that embody the spirit of recent NPS resource stewardship and education initiatives. This thematic, organizational strategy fostered interaction between attendees regardless of technical specialty. Additionally, starting times for individual presentations were intentionally not published, which encouraged the audience to stick with entire two-hour sessions, rather than hop from room to room. In the sessions I attended, the moderators did a good job of holding presenters to their appointed time limits, benefiting everyone. Future improvements can be made in the more widespread and competent use of microphones so that all can hear the substance of the sessions and in the computer-setup skills

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required for Microsoft PowerPoint presentations, several of which failed or were delayed because of technical problems.

Were the ideas new? Were the sessions valuable? Certainly, many resource management problems and the disciplines needed to deal with them are now routine parts of our discussions at these kinds of gatherings, albeit with new circumstances or other advancements being reported. Dealing with nonnative vegetation and animal species, for example, were common and familiar subjects during the week as were various ecological restoration activities and fire management. However, a new concept for many was the significance of park soundscapes and how to go about preserving them. Sounds not only have ecological significance, such as communication among whales, but they also signify physical processes that shape a park, such as surf and wind. And they represent cultural values to humans. In a time when human-caused noise is on the rise, many park soundscapes are threatened and their protection is fast becoming another responsibility for resource managers. The provocative presentation went on to describe a sound recording and inventory technique and a related database structure that may be useful in documenting, understanding, and raising the awareness of the significance of park sounds. Another novel idea at the conference was the management of hazard trees by converting them into safe, but standing, natural-looking snags that preserve valuable wildlife habitat.

Some of the other things we heard about were the need to establish "vital signs" monitoring strategies that show accelerated or unacceptable ecological change and some approaches being taken in this regard in various parks. Determining what is natural as a baseline to manage for can be problematic as one presentation pointed out, but some parks are figuring this out and are devising useful vital signs monitoring approaches. We also heard about computer software and modeling applications and Web-based technologies, including resource databases and GIS, that are in the works or are being refined as ways of sharing information broadly. Many other themes related to natural and cultural resources, NPS

history, and interpretation emerged, too, and showed new twists in the ways in which familiar disciplines are being applied in solving both common and new problems.

Out of this rich collection of presentations and interactions emerged a few trends. Not long ago, we were talking about the need to reduce divisions in park operations and encourage cooperation among all park staff for resource preservation. This gathering demonstrated that in many parks we are practicing what we preach. For example, strategic planning sessions have helped some parks unite behind resource preservation goals. Additionally, the "greening" of the National Park Service is a very good sign of the integration of all park operations toward a goal of resource sustainability, led, perhaps, by facility managers and administration staffs in parks. Conference organizers recognized the need to integrate park operational disciplines at this workshop; they coupled interpretation with natural and cultural resource management this time around. Next time, they plan to pair either the maintenance or visitor and resource protection function with resource management to stimulate discussion on such things as resource-sensitive facility management practices or technical aspects of resource law enforcement.

Another observation is that geology, not long ago perceived widely as irrelevant to park management by many, has come to a focal point at these gatherings. In San Diego, participants were given several opportunities to consider the role of geology in providing the foundation for ecological processes in many parks. Additionally, during a plenary session on closing day, a panel of U.S. Geological Survey western regional managers seemed painfully aware of the need for their services to become more relevant to park managers. They offered parks their assistance in developing useful mapping products, providing biological technical assistance and research, conducting hydrological work, and sharing geological research results in formats well-suited to management application and public consumption. Additionally, a conference poster by the U.S. Geological Survey and a presentation by a geology professor from Oregon State University highlighted ways in which they have helped parks to tell their geological stories in simple, compelling ways.

A change of pace to the productive sessions at the West by Northwest workshop was offered by both the excellent field trips on Wednesday and a banquet held Thursday evening to honor, in part, resource stewards from the Pacific West Region and interpreters from both regions for their achievements during 1999. Director Stanton was on hand to pass out the awards and Regional Directors John Reynolds and Bob Barbee made the presentations.

The conference closed with a plenary session on what it will take to be effective in managing and interpreting parks this century. Bryan Harry, Superintendent of the Pacific Islands Support Office, offered the "ranger mystique," or that unwavering commitment, enthusiasm, and can-do attitude common to so many NPS employees, as an essential element in attacking the problems of the future. Alaska Associate Regional Director Judy Gottlieb described a complex era to come with its contingent predictable challenges and numerous surprises that will require anticipation and the rational, professional application of science. Point Reyes Superintendent Don Neubacher reminded us that the best opportunity to improve our lot as resource stewards is at our doorstep right now in the Natural Resource Challenge. If we succeed in getting the proposed \$100 million over five years, the National Park Service will be able to do its natural resource protection job much more effectively. "It's ours to lose," he said, stressing that we need to put aside any jealousies about which parks or programs will see the greatest increases and give the Challenge our full, unified support. Finally, Director Stanton closed out the week by reiterating this point and by revealing plans for the development of a Cultural Resource Challenge over the next several years.

At West by Northwest, I refueled my internal fire. I made new professional contacts and visited with old friends. I reflected on how my job affects others and how I can improve at it. I thought new thoughts, made new plans for work, renewed my commitment, and considered my place in this organization as a resource steward. Where do good ideas come from? Anywhere and everywhere, of course, but West by Northwest was certainly a potent source of them. Now, to take action on the many good ideas! **PS**



Figure 1. Located 49 miles southeast of Bend in Central Oregon, Fort Rock State Monument was designated a national natural landmark in 1976 for its “striking...circular, fort-like volcanic outcrop.” The site is owned by the State of Oregon and administered by the Oregon Parks and Recreation Department.

The National Natural Landmarks Program: A progress report

By CRAIG L. SHAFER

Administered by the National Park Service and established in 1962, the National Natural Landmark (NNL) Program recognizes and encourages protection of nationally significant natural areas in the United States (figure 1). Sites must exemplify a biotic community or geologic feature that is one of the best of its type in its physiographic region. Sites are designated on both public and private lands.

As many readers know, site designations were under an NPS-imposed moratorium from November 1989 to May 1999. The moratorium was lifted on May 12, 1999, when new NNL program regulations were published in the *Federal Register*. The moratorium had been expected to last only a few years. Why did it last ten? Primarily because obtaining all essential, official sign-offs was impossible. This delay was a reaction to pervasive private land rights political ideology. Officials who are mindful of the potential political consequences of actions of the Department of the Interior apparently did not wish to add fuel to this fire.

The decade needed to finalize program improvements was tumultuous. Public hearings on the regulations were held, new administrations with differing ideologies came on board, successive freezes on government regulations were imposed, new regulation writing requirements were

put in effect, and so on. Park Service staff, in coordination with the Office of the Solicitor, the Department of the Interior, the Office of Management and Budget, the Secretary's Advisory Board, and others, considered public comments and revised the regulations. Anne Frondorf, now with the U.S. Geological Survey, and Bill Commins, with the National Park Service, were key to summarizing public comments, achieving consensus on most regulation decisions, drafting regulation language, and initiating other program improvements. By 1993, program staff had prepared a handbook, contacted NNL owners and verified their names and addresses, improved the electronic database, and had gotten program controls approved. Additionally, hundreds of Congressional inquiries and Freedom of Information Act requests were answered; eight annual *Section 8 Reports*, required by legislation (HR 94-458), on threatened and damaged national natural landmarks were sent to the Congress and distributed around the country; six NPS national program meetings were held; program files were organized and archived; natural region theme study inventories were made available through the National Technical Information Service; program literature was updated; a *Section 9 Report* (surface mining threats) was prepared; and more.

The program also made progress in FY1992 when the National Park Service secured an additional \$775,000 and four FTEs (i.e., full-time staff) for the program. The program was then able to pay the salaries of two Washington Office staff and 10 regional coordinators. The regional coordinators oversee the annual *Section 8 Report* inspections, fund some special projects using the NPS Challenge Cost Share Program, assure that development planners consider NNLs, publish newsletters, convene public meetings, participate in NNL ceremonies and media events, testify at public hearings, write responses to newspaper editorials, draft news releases, enlist support for endangered species issues, guide EIS preparation, present NNL plaques to landowners, and communicate with NNL property owners. They also assisted with key moratorium tasks—the handbook, owner identification, and database improvement. When the Park Service reorganized in 1995, the future of the program was unknown. After the dust settled, the program budget and all 12 support positions remained intact.

After being published last May, the new NNL regulations were mailed to approximately 2,279 NNL landowners, mostly private. Another mailing went to those holding multiple NNL properties, such

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as federal and state agencies and private conservation organizations. (For those NNLs with more than 50 owners, staff notified landowners using local newspaper announcements.) The mailings included the regulations, a brochure, and a letter from the Director of the National Park Service. The letter encouraged continued participation in the program but informed landowners of a 90-day opportunity to withdraw their property from NNL designation. In all, the Park Service received 971 requests for withdrawal of properties from NNL designation a month after the September 9 deadline, and they continued to be received. The vast majority of these requests, some 741, occurred in just three areas (Baraboo Range, WI; Lance Creek Fossil Area, WY; and Canaan Valley, WV), and were the result of locally generated misinformation about the NNL Program coupled with existing local resentment stemming from other past or present government activities. Withdrawal requests are being processed. Because not all NNL landowners could be reached, additional withdrawal opportunities and mailings are being considered.

The new regulations clarify the role of the federal government in designating NNLs and managing the program. They also address landowner concerns. For example, three owner notifications will occur including the opportunity to voice concerns during a public comment period; no owner need have the designation against his or her wishes, any possible land use ramifications are discussed; benefits of the designation are outlined; written permission from the landowner must be secured before evaluating a site on private property; and so on. After all withdrawal requests have been processed and boundary alterations made, the program can resume designations. This is the method used to pursue the program goals established in 1962: identifying, recognizing, and encouraging preservation of special ecological and geological sites, enhancing their scientific and educational value, strengthening cultural appreciation of natural history, and involving individuals, private organizations, and all levels of government in a cooperative undertaking to conserve the country's natural heritage.

The 1996 "sunset legislation" targeted dozens of "unnecessary" government reports for elimination, including the *Section 8 Report*. Sent annually to Congress, this report identified NNLs (and National Historic Landmarks) that were threatened or damaged. Since the New Year, the legal mandate to send the *Section 8 Report* to Congress has expired. This report, given to the Congress 20 times since 1977, helped prevent many NNLs from being damaged or lost. Few realize that four NNLs, reviewed in the *Section 8 Report*, were later added to the national park system. Without this formal reporting mechanism, future problems with NNL sites may not come to the attention of as many parties as occurred in the past. Fortunately, the mandate was reinserted in HR 3002, being considered by the Senate. Without this mandate, many of the last, best examples of the country's various ecological and geological features may vanish because of pressing demands for "progress."

In 1987, Edward O. Wilson, a famous Harvard biology professor, became the academic community's leading advocate for preserving "biodiversity." In his 1992 book *The Diversity of Life*, Wilson argued that the day will come when the flora and fauna of a country will be thought part of its natural heritage, just as important as its art or language. The founders of the National Natural Landmarks Program in 1963 were not so eloquent, simply noting the importance of preserving sites that illustrate the ecological and geological character of the country. However, they apparently recognized that retaining NNLs, which by definition possess "national significance," provided a benefit to all citizens. Program staff will continue to address problems with the program as they arise and encourage landowners to preserve their NNL properties. **PS**

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light pollution. More than 35% of parks with such problems considered the problems to be moderate or very serious. The source of light pollution in 70% of such parks is from both specific and diffuse sources.

Actions to reduce light pollution by the National Park Service and by adjacent communities have been extremely limited. Few parks have reduced light pollution in all their areas. The National Park Service has done nothing in nearly 21% of the units that report problems. In addition, communities are not supporting the protection of night skies. Only 10% of the parks that offer overnight visitation have reported helpful ordinances in nearby communities.

Yet, parks that offer overnight visitation could increase public awareness about light pollution and reduce light pollution within their own boundaries. Solutions to the problems may not require simply shutting off all lights. For example, low-pressure sodium lamps can reduce glare, and cutoff shields can eliminate horizontal and upward projections. Changing lighting systems may be cost-effective. For example, park officials at Chaco Culture National Historical Park in New Mexico cut energy costs by 30% by changing the lighting system in the unit.

Additional impacts from light pollution in the parks and potential solutions to the problem are discussed in the report on the NPCA website at www.npca.org/readaboutit/nightskies.html.

Yellowstone publishes state of the park report

Yellowstone National Park recently published its "State of the Park 1999" report, an ambitious effort to analyze the status of the park's natural and cultural resources and the ability of the National Park Service to properly manage them and public use. At 285 pages, the handsome report features eight chapters that examine wildlife, science and technology, public use, infrastructure, staffing and funding, and aspects of the Yellowstone landscape such as the physical environment, water resources, vegetation, the role of fire, and preserving the natural regime. Each chapter, and an executive summary, is available in PDF format from the Yellowstone website at www.nps.gov/yell/stateofthepark.htm. **PS**

ton), and Wilson's Creek National Battlefield (Missouri). These parks are diverse in size, geography, and type of unit. Superintendents at these parks expressed interest in the project and agreed to participate.

An inventory of socioeconomic indicators has been developed. Data for these indicators, available at the county level, have been collected from a variety of public sources, such as the U.S. Census Bureau. Data sets that include projections to the year 2020 have also been purchased from a private firm. Where possible, census tract-level data have also been collected.

The socioeconomic indicators are divided into two groups: a standard *core* set and *additional* indicators. The core indicators will be mapped for all four pilot parks. Staff at each park have selected additional indicators of interest from another list. The goal is to create a total of approximately 30 maps for each atlas.

The core and additional indicators are organized into six broad categories: general population characteristics, social and cultural characteristics, economy and commerce, administration and government, land use, and recreation and tourism. Examples of core and additional indicators by category are provided in table 1.

The staff at each of the pilot parks have identified a "region of interest" around their park (i.e., the geographic area around the park that may influence or impact the park's management). Regions of interest include aggregates of one or more contiguous counties and represent the area for which the core and selected additional indicators will be mapped. The regions of interest for the pilot parks are presented in figure 1 (cover).

A draft version of the prototype atlas will be developed for each pilot park and reviewed by park staff and others. Figure 2 provides a preliminary example of what an atlas page might look like in one of the prototypes. The draft will be revised and 10-20 copies of a bound, color atlas of regional socioeconomic trends will be distributed to the pilot parks along with a brief technical report describing the project.

The staff at each of the pilot parks will provide a written evaluation of the atlas that describes: (1) its overall utility to the park, (2) the usefulness of the socioeconomic data presented and atlas format, (3) how the atlas could be improved, and (4) the potential benefits of such an atlas for other parks.

Table 1. Examples of core and additional indicators

(Core indicators will be mapped for all pilot parks, and park staff will select 15 additional indicators.)

Category	Core Indicators	Additional Indicators
General Population Characteristics	• total population • projected population change	• elderly population • rural population
Social and Cultural Characteristics	• ethnic diversity • educational attainment	• projected ethnic diversity • crime
Economy and Commerce	• employment by industry • poverty	• change in employment by industry • unemployment
Administration and Government	• congressional districts • federal expenditures	• local government revenues • local government expenditures
Land Use	• ecoregions • change in farmland	• domestic water use • growth
Recreation and Tourism	• recreation/tourism employment • recreation/tourism revenue	• recreation/tourism establishments • seasonal housing

Based on these evaluations, additional and improved atlases may be created for other units.

Conclusion

The prototype atlas of regional socioeconomic trends will benefit each park in tangible ways. Through the use of selected socioeconomic indicators, the atlas can provide systematic information about the spatial character of human activities and changing land use in the region of interest surrounding a park. There are several potential uses. The regional socioeconomic trends information and maps could be integrated into the general management planning process. The atlas could be used as a tool to educate new park staff (and central office staff) about the region surrounding the park, and share information about socioeconomic trends with the public, gateway communities, media, and Congress. The atlas could be an important public participation tool, helping park staff work with local communities on planning and management decisions that affect both the park and the adjacent region. Using the methods described above, an atlas of socioeconomic trends could be developed for any unit, leading to an atlas *series* for the entire national park system. **P**₅

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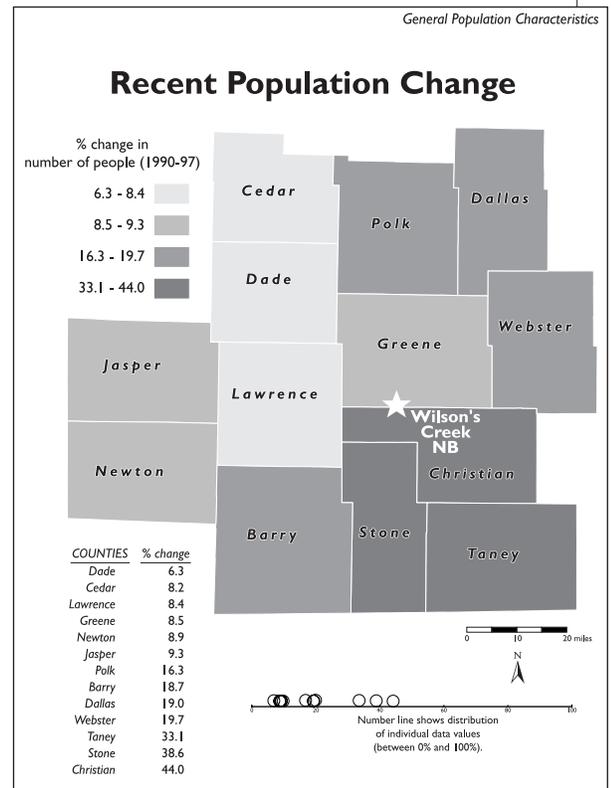


Figure 2. A preliminary example of an atlas page (showing population change for the region near Wilson's Creek National Battlefield).

Thinking outside the lines:

Parks and the quality of life in area communities

By JONATHAN G. TAYLOR, NINA BURKARDT, LYNNE CAUGHLAN, AND BERTON LEE LAMB

Many national parks, national forests, and other public land units exist in highly changeable regional environments. Often the parks and forests themselves serve as important catalysts of change in the levels of tourism, outdoor recreation participation, and contribution of traveling publics to local and regional economies. Resource managers are called upon to protect lands in their jurisdictions while juggling a variety of inputs and expectations. In each agency, resource decisions are bound by law and agency policy. In this context, the decision space of the national park manager is quite different from that of those in the multiple-use land management agencies. Management actions must stand up, not only to law and policy and to scientific scrutiny, but they must also be sensitive to the needs of residents in surrounding communities, to county and state governing bodies, and to visitors from across the nation and around the world. Balancing these needs while protecting resources is an ongoing challenge made more difficult as the mix of stakeholders grows.

Increasing tourism adds to the challenge. As new players emerge and existing players become more intensely involved—complicating communication networks and altering balances of power—the workload of management agencies increases markedly. For example, explosive growth in tourism has led to rapid population growth and economic change in southeast Utah. Recreational activities are often in conflict with traditional uses such as grazing and mining. Impacts from all these land uses contribute to deterioration of the region's sensitive natural resources, and potentially diminish residents' quality of life, especially in areas where such uses are concentrated.

Understanding how "what I do on my patch" affects interdependent interests requires an intensive, focused effort to discover what is at stake, and how internal decisions influence those surrounding factors. Managers need to know, first, how actions interrelate with other institutional jurisdictions and authorities; second, what local values really are (what is held dear by

the area resident population); and third, how rapid changes in tourism and outdoor recreation affect the economy of surrounding populations, and how land and resource management decisions affect those changes.

Institutional analysis, public preference measures, knowledge and value assessment, and economic effects modeling can provide valuable insights into interactions between human communities and national lands and resources. A five county area of southeast Utah: Carbon, Emery, Wayne, Grand, and San Juan Counties; was one of two Colorado Plateau areas selected for coordinated social science investigations from 1996 to 1998.

Institutional Atlas

Analysis of participating institutions, their structures and authorities, helps land managers answer the question: "What are the institutional opportunities and obstacles for local, state, and federal agencies to manage for sustainable ecosystems and commerce?" This question is important because land management on an ecosystem scale implies—in fact, requires—coordination among land managers, property owners, and other stakeholders. When agencies and institutions with differing goals and processes work together, the results can be disappointing, especially if there is a lack of understanding about the involved players, their goals, and how they are likely to go about achieving their goals. Our hypothesis in beginning this research project was that overlapping jurisdictions and mandates for recreation management are associated with reduced ability of local, state, and federal land managers to implement these policies. The tool we used to analyze this problem is the Institutional Atlas.

We created an institutional atlas of the Colorado Plateau using ArcView GIS (geographic information system) software. The atlas shows county boundaries, cities, land ownership, hydrology, and other standard map features. In addition, the atlas displays map layers depicting parties with a role in recreation management decision processes, although many of these parties do not actually own or manage land. The sheer size of their land jurisdictions in southeast Utah lend government land management deci-

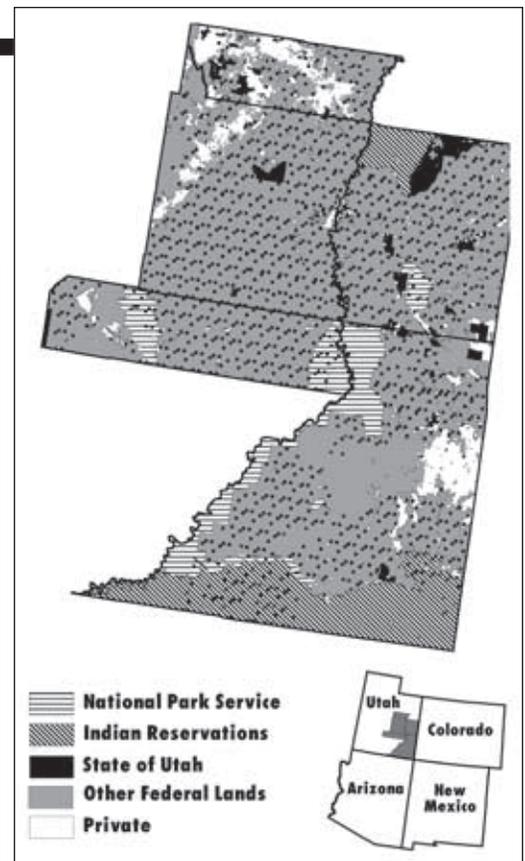


Figure 1. Map of land ownership in southeast Utah.

sions great weight in the region. Federal agencies manage nearly 70% of the total land area (Bureau of Land Management more than half), the State of Utah manages 10%, and an additional 12% is in Indian reservations (figure 1). Private deeded lands make up only 9.5% of the land surface area. Therefore, every local federal agency decision—especially those of the Bureau of Land Management (BLM), National Park Service (NPS), or U.S. Fish and Wildlife Service (USFWS)—has enormous influence on area economies and ecosystems.

In the southeast Utah subregion, the National Park Service alone is quite complex: it has three national parks (Arches in Grand County, Capitol Reef in Wayne County, and Canyonlands in San Juan and Wayne Counties); the Glen Canyon National Recreation Area; plus three national monuments (Hovenweep, Natural Bridges, and Rainbow Bridge in San Juan County), all reporting to the same regional or cluster office in Denver, but under the jurisdiction of three superintendents.

The National Park Service is not alone in its organizational complexity. Within the five county area we studied are four BLM field offices, each reporting to the state office in Salt Lake City; two Indian reservations, dealing with two different area offices for the Bureau of Indian Affairs; and three na-



Figure 2. Community aesthetics photo.

tional forests, with the Manti La Sal National Forest divided into three separated land areas. On the state level there are two regions of the Department of State Parks and Recreation reporting to the Utah Department of Natural Resources (DNR) in Salt Lake City; two regions of the Department of Forestry, Fire, and State Lands, also reporting to the DNR in Salt Lake City; and two districts of Region 4 of the Utah Department of Transportation. At the next level are five counties with their associated governance; several towns and municipalities; and approximately 32 special districts. Add to this list the Utah Travel Council, reporting to the Economic Development Appropriations Committee in the state legislature; the San Juan County Economic Development and Tourism Board; the Utah Association of Counties; and the Utah League of Cities and Towns. Still more groups become involved when issues close to their missions are under discussion.

The key is to understand who is likely to be involved in specific issues and how the mix of players is likely to affect both process and outcome. The next phase of the Atlas project will involve an analysis of the groups in southeast Utah to determine likely strategies, obstacles, and opportunities for setting and implementing recreation management policies. We anticipate that the complexity of the recreation management decision arena, coupled with the large value differences about appropriate land uses and economic development issues, will support our hypothesis that overlapping and conflicting jurisdictions hamper the development of recreation management policy. One point of conflict that we expect to be of paramount importance in this analysis is the debate about the proper level of decision-making authority and the distribution of costs and benefits among federal, state, county, and local governments.

Quality-of-life photograph elements

A critical element of the lifestyles of residents of local communities is their *quality*



Figure 3. Public facilities photo.

of life. Just what area residents mean by that term, however, has not been readily discernable up to this point. To operationalize the meaning of quality of life, we administered a camera survey, using “resident-employed photography.” This involved giving one-time-use cameras to residents of southeast Utah, and asking them to *show us* which places and features of their communities and of the surrounding landscape were essential to their quality of life. That exercise was followed up by a short mail-back survey.¹

The majority of quality-of-life photographs (57%) were taken in the towns while 43% were taken in the surrounding countryside. Two-thirds of the respondents took pictures of community aesthetics: positive elements such as homes, subdivisions, yards and gardens (figure 2) and a few negative attributes such as junk cars and run-down property. Nearly two-thirds of the participants took photos of public buildings and facilities (figure 3), in particular schools and libraries. Open places of business, public parks and open space, cultural facilities such as museums, churches, and the people of this region were also identified as important community quality-of-life elements.

Over 60% of the participants took pictures of landscape vistas (figure 4), the most frequently photographed *positive* quality-of-life category, which includes mountains, canyons, desert, and red-rock formations. Water bodies (figure 5) were important in the landscape, and so were farms and ranches, outdoor recreation areas and activities. Nearly three-quarters of all photos were of positive elements and fewer than 20% were focused singly on negative quality-of-life elements.

Diverse values were used to describe *why* these features or places were important to quality of life. The most predominant value (150, 19% of all statements) was “anything

¹The responses to this experimental research technique were fairly low: 144 cameras (41%), and 87 surveys (60%).



Figure 4. Landscape vista photo.



Figure 5. Water body photo.



Figure 6. Value: children.

to do with *children*.” (figure 6) safe for children, good schools for children, children growing up with nature, etc. The next value was “*beauty*,” nearly three-fourths describing the landscape or countryside. Values of “education and learning,” frequently related to children, were third, followed by “family”—living and recreating together, and family connections nearby and across generations.

Specific elements or locations that were selected by 10% or more of each county sample were identified as perceptually important nodes, or “PINs.” PINs include city parks, lakes and reservoirs, mountains, schools and museums, and three national parks and the national recreation area in the study area, etc. Locations of PINs are being entered into a GIS so that public land managers and county or municipal planners can identify special places that local residents want to ensure are protected, or corrected if an eyesore.

See “*Outside Lines*” on page 16

These southeast Utah residents are quite satisfied with their communities as places to live, rating them 5.6, on average, on a 7-point satisfaction scale. In reporting "what was especially good about living in their communities," 29% cited the natural environment, 23% community character, and 23% people and neighborhood qualities. Respondents rated the "importance of the natural environment to their quality of life" very important (6.4 on a 7-point scale).

Grand and Wayne Counties, which have popular national parks, rated tourism highest in importance among the counties, 6.0 on the 7-point scale. Area residents, overall, would prefer slightly more tourism (4.5 on a 7-point scale) than present levels.

In rating *changes* that could affect their quality of life, residents wanted *increases* in traditional jobs, mining, and agricultural zoning, but also in attracting tourism, tourism jobs, parks and open space, and levels of tourism and outdoor recreation. Only "the amount of wilderness area in southeastern Utah" was rated as needing to *decrease* to improve quality of life, especially by Emery and San Juan county residents.

Older residents (over 65) were more likely than young to middle-age adults to complete the photo exercise and survey, suggesting that retired persons participated more than others in the quality-of-life study. Some 35% of the follow-up survey respondents reported being retired, and their average length of residence was 35 years. This research produced 1,550 photographs, showing both community and landscape elements that need protection or correction to keep and enhance quality of life for local residents of southeast Utah.

Quality of life & post-materialist values

In a survey of the general public and opinion leaders on the Colorado Plateau, conducted during the summer of 1998², we evaluated (1) the effect of several recreation management scenarios on quality of life and (2) residents' feeling of post-materialism. Post-materialism is defined as the feeling that needs such as "belonging," "self expression," and "quality of life" are among the most important personal values (Inglehart

1995). Residents were selected at random in two regions: southeast Utah; and southwest Colorado/northwest New Mexico. Opinion leaders, defined in this study as persons attentive to policy issues and actively involved in community affairs, were a targeted group. They were selected because of their influence and involvement in recreation and resource management issues.

Our study of recreation and quality of life in southeast Utah showed residents to be decidedly outdoors oriented. We found that at least occasionally 69% fish, 78% camp, and 78% view wildlife or nature; fewer reported that they at least occasionally hunt (41%). When we asked questions about the affect of specific management activities we found general agreement that restrictions on use of public lands would reduce the quality of life: half (51%) of the respondents believed that their quality of life would be negatively affected by "limiting access to popular camping areas" or "closing some recreation access roads." However, only 34% believed their quality of life would be negatively affected by "designating certain areas for specific recreation uses;" 29% saw this as positive (the remainder were neutral). Opinion leaders were far less likely to link reduced quality of life with these activities. For example, although 25% of opinion leaders believed their quality of life would be negatively affected by "closing some recreation access roads," 44% believed their quality of life would be positively affected.

Once basic needs have been met, people's priorities turn to such post-materialist values as "belonging, esteem, and intellectual and esthetic satisfaction." Prominence of these values reflects a "subjective sense of security" (Inglehart 1981). More than a feeling of economic well-being, post-materialism is a long-term sense that life's basic needs have been met; people with these values emphasize self-expression, the quality of life, and protection of the environment (Inglehart 1995). Our study provides an understanding of how post-materialist values are expressed by the general public and opinion leaders. This is important to federal managers in a region noted for controversies over public land management.

We found that 24% of southeast Utah respondents expressed post-materialist values. Although this is not a majority, it contrasts with only 8% who expressed materialist values, emphasizing economic and physical security. Sixty-eight percent of the general public sample expressed

"mixed" values. This picture was quite different for opinion leaders who were markedly more post-materialist (45%) and less materialist (3%). The significance of this finding is that post-materialist values will likely lead the public toward a need for inclusion in resource decisions and a greater sense of belonging between the community and public lands.

Economic analyses

Information on how spending by tourists affects the southeast Utah regional economy is needed for defining management and policy options that can best provide economic opportunities while sustaining the region's fragile natural ecosystem. To understand the impacts of tourism on the southeast Utah economy, we constructed a detailed inter-industry model of the regional economy to track the changes in economic activity from spending by visitors, as these dollars ripple through different sectors of the economy. Economic input-output (I-O) models are commonly used to predict the total level of regional economic activity that would result from a change in spending (Jackson et al. 1992). The Impact Analysis for Planning (IMPLAN) model, developed by the U.S. Forest Service, was used to construct a regional input-output model of the southeast Utah economy (Minnesota IMPLAN 1998).

A tourist usually buys a wide range of goods and services while visiting an area. Major spending categories include lodging, food, transportation, and recreational equipment. Tourism spending generates considerable economic benefits for local businesses that provide services to them. Average daily travel-related spending estimates used in this study were created by the U.S. Forest Service from the 1991 National Survey of Hunting, Fishing, and Wildlife-Related Recreation (U.S. Department of the Interior 1991).

Approximately three million people visited the southeast Utah region in 1995 (State of Utah 1996). Estimated 1995 spending by visitors amounted to nearly \$99 million in terms of total gross output and resulted in 2,006 jobs (table 1). The services and trade sectors of the economy are the most impacted, accounting for a combined total of 76% of total output and 89% of the jobs created by visitor spending. Agriculture, mining, and construction are the least impacted, accounting for a combined total of 3% of total output and less than 2% of the jobs created by visitor spending.

²This study covered 15 counties on the Colorado Plateau. In the five-county southeast Utah part of the study there were 447 respondents and a response rate of 53.6%. There were 118 opinion leaders with a response rate of 76.1%.

A 1992 study by the Governor's Office of Planning and Budget projected that the number of visitors to Utah's national parks will grow at a long-term rate of about 3.5% per year (State of Utah 1992). At this rate, visitation to southeast Utah would increase to 4.23 million visitors per year by 2005. Projected spending by visitors in the year 2005 would account for \$139.6 million in terms of total gross output and 2,829 jobs (table 2). This increase in tourism would result in over \$40 million per year increase in total output and 823 new jobs, as compared to 1995.

Information on how changes in tourism level affects the southeast Utah economy provides one of the pieces needed for defining the optimal allocation of publicly managed resources there. This information needs to be combined with information on sensitivity of the region's natural systems to tourism levels, provided by local resource managers, to find the level of tourism that

is best for the local economy and for conserving the area's natural resources.

Implications for national parks

The results of these social science studies have important implications for the several units of the national park system in southeastern Utah. First, the decision arena in this region is extraordinarily complex, with sometimes conflicting, sometimes mutually supporting objectives among various players. Interactions in resource and land management issues occur among different levels of government; between government and the private sector, with business and active nongovernment, special interest organizations (NGOs) in the region.

Quality of life for local residents has a balanced focus between their communities and the unique red-rock, canyon country environment of the Colorado Plateau. What the people have built for themselves—their homes, neighborhoods, communities, family and human relations, and church communities—are essential and provide safe, secure environments for their children. They want their children to inherit this valuable social-cultural resource at a level of quality of life comparable to their own. The natural beauty of the region is also essential to residents' quality of life: the mountains, cliffs, canyons, lakes and rivers, the clean air, the rural character, and the close but uncrowded natural environment. Many of their "special places" are, inevitably, on national forests, parks, or other public lands. Post-materialist values are evident in a sizeable segment of the general population and seem to be held by nearly half of the opinion leaders. As residents of this area of the Colorado Plateau find sufficient financial resources to get by on, they focus on belonging to this intriguing region, the aesthetic satisfaction of it, and the quality of their communities and landscape, their quality of life.

Residents of southeast Utah welcome tourism somewhat hesitantly. They would like increases in "traditional industries," but recognize that the tourism and outdoor recreation that the region attracts are doing more for the general economy. However, many in the region see object lessons in tourism, for example, in the sudden, overwhelming popularity of Moab: "Be careful what you ask for because you just might get it." Economic input-output assessment shows that tourism has some real positive potential, although it is not, as projected, transforming for the region. A 10-year in-

crease in revenue of \$40 million per year plus 825 new jobs does not seem overwhelming to the region, but the populations of several of these counties is relatively small. Given the probability that the revenue and jobs generation would be concentrated in some locales, the effects could be significant.

Communities in southeast Utah want to see controlled growth in tourism and outdoor recreation: growth that brings visitors into town to eat, shop, and stay overnight, but not take away the local sense of community. Managers can help local governments or regional collaboratives develop strategies for stimulating steady tourist and outdoor recreation visitation growth, while avoiding the boom and bust cycles that can come with high-tech outdoor recreation or with sudden destination fads. Working "outside the lines," in partnership with regional communities and consortia, national park and other public land managers can understand the values of their neighbors; determine where they have shared values; and find ways to de-emphasize differences, while still being responsive to the laws and missions that guide them. **P**₅

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Table 1. Current output and employment for southeast Utah

Sector	Total Output (\$ Millions)	Employment (# Jobs)
Agriculture	0.338	8.98
Mining	1.385	5.74
Construction	1.208	15.10
Manufacturing	4.317	34.06
Transportation	8.751	35.80
Trade	18.005	431.63
F.I.R.E.	5.841	45.65
Services	57.293	1371.19
Government	1.829	57.86
Total	98.967	2006.02

Source: Minnesota IMPLAN, 1998 (in 1995 dollars)

Table 2. Projected output and employment for southeast Utah

Sector	Total Output (\$ Millions)	Employment (# Jobs)
Agriculture	0.476	12.7
Mining	1.953	8.1
Construction	1.704	21.3
Manufacturing	6.089	48.1
Transportation	12.344	50.5
Trade	25.398	608.9
F.I.R.E.	8.239	64.4
Services	80.818	1934.2
Government	2.580	81.6
Total	139.602	2829.7

Source: Minnesota IMPLAN, 1998 (in 1995 \$)



Figure 1. Ecosystem management calls for collaborative decision making and adaptive management to deal with the problems presented by fragmented landscapes.

Ecosystem management: Political challenges for managers and scientists

By HANNA J. CORTNER AND MARGARET A. MOOTE

Traditional resource management grew out of the conservation movement at the turn of the 20th century. That movement created professional, scientifically-based resource management disciplines and agencies such as the National Park Service dedicated to reversing the previous century's practices of resource abuse and waste. But over time the laudable conservationist concept of sustained yield became institutionalized as a politics of maximum sustained yield. Policy and agency budgets came to stress commodity production and outputs, whether timber in case of the U.S. Forest Service or visitor services (e.g., roads and parking areas, trails, visitor centers) in terms of the National Park Service. The "use and enjoy" side of the National Park Service's 1916 mandate gradually overshadowed its resource preservation side. While the environmental decade of the 1970s witnessed legislation such as NEPA (National Environmental Policy Act) that provided more public access to agency decision making, strong, competing national interest groups dominated the policy debate. That debate became increasingly polarized, full of acrimony, and absent civility, as exemplified by protracted battles over spotted owls and future plans for Yellowstone and Yosemite. Moreover, managers clung to an outmoded professional ethos that fundamental allocation decisions regarding resources should be entrusted to experts, i.e., themselves. This created a per-

ception of aloof and elitist bureaucrats that further separated managers and the public.

Admittedly, the conservation movement of the 20th century can claim many significant accomplishments. Nevertheless, in the face of changes in social values, technology, demographics, and scientific knowledge, the governance framework that evolved out of that movement does not currently fare well under critical assessment. It is increasingly being recognized as not sufficient for achieving either ecological or democratic sustainability. Thus, ecosystem management, which is organized around the concept of long-term ecological sustainability, is being proposed and applied as an alternative. Our research (*The Politics of Ecosystem Management*, Island Press, 1999) examines the patterns of politics that gave rise to the call for ecosystem management, the criticisms it faces, and the political challenges that successful implementation of such an alternative will necessarily entail.

A paradigm shift?

The principles and ideals of ecosystem management differ so much from traditional resource management that several observers have called ecosystem management a paradigm shift, i.e., a revolution in the ideas, values, assumptions, and methodologies that guide scientific inquiry and management practice. Unlike traditional management, ecosystem management does not begin with enumerating outputs; in ecosystem management objectives are related

first and foremost to the condition of the ecosystem. Ecosystem management makes ecological sustainability—long-term maintenance of ecosystem productivity and resilience—a primary goal. Levels of use are adjusted to meet that goal. Protection and restoration of ecosystem structures and processes, particularly biodiversity, is paramount. Ecosystem management further recognizes a critical interdependence between social and ecological vitality and includes humans and human societies in resource management to an unprecedented extent. It breaks new ground by insisting that the social and political basis of natural resource management goals be made explicit and by encouraging their development through an inclusive and collaborative decision-making process (figure 1). Ecosystem management is based on an ecosystem science that integrates many disciplinary approaches. Given the recognized complexity and dynamic nature of ecological and social systems, ecosystem management embraces the concept of adaptive management, which requires constant reassessment and revision as new information becomes available.

While the principles of ecosystem management certainly imply a dramatic shift from the patterns of politics that came to characterize much of natural resource management, it is nonetheless premature to declare ecosystem management the new paradigm. First, ecosystem management faces strong and wide-ranging criticisms from both sides of the political spectrum.

Critics say that it is fuzzy, ambiguous, and untested, politically and legally untenable, full of contradictions, an effort by resource experts to recapture the ground they have lost since extensive public participation was institutionalized in the 1970s, a plot to turn all public land into nature preserves and parks, and a threat to private property rights. Second, while substantial information has been accumulated regarding ecological processes and the political dysfunction of the traditional paradigm, the values, theories, methodologies, and tools of the old paradigm have not yet been fully discarded. Maximum sustained yield and "expert" decision making by resource managers are still the norm in many cases. Agencies remain wedded to traditional public involvement programs that feature one-way communication and focus more on meeting legal thresholds and gaining support for proposed agency plans than on meaningful public deliberation. Utilitarian human-use values and demands continue to trump efforts to preserve park resources and protect biodiversity. Major decision-making entities such as Congress remain committed to the traditional paradigm. The politics of interest still dominates.

Clearly there are a number of major philosophical and institutional hurdles to be addressed and overcome before ecosystem management can be fully accepted and implemented as a new paradigm. Profound changes in the American governance system in its philosophy, institutions, notions of citizenship, politics, and resource management practices will be necessary. These changes range from redefinition of the values defining relationships among humans and nature and between citizens and government, to creation, reform, or even dismantling of traditional resource management institutions. This will entail, at a minimum, reexamining laws and policies, rethinking property rights (both public and private), changing administrative organizations, aligning market operations with the goal of sustainability, and building social capital for more effective public engagement. Changes by all players in all institutions will be necessary. If resource professionals, for example, are unwilling or unable to withstand a radical revision of their own values, management practices, and institutional structures, a paradigm shift seems unlikely. Instead the rhetoric of ecosystem management will be applied without any meaningful shift in management

attitudes and practices and lasting results on-the-ground. National Park Service managers will therefore need to reexamine management practices and standard operating procedures to ensure that they promote behaviors that advance the principles of ecosystem management, learn to share power with a variety of community groups and sister agencies, more actively engage citizens in park decision making, and align budget priorities to achieve the ecosystem management goals. Likewise, park scientists will need to embrace changes in the institution of science.

Changes in the institution of science

Changes in scientific inquiry will mean new methods, new research questions, and new roles for park scientists and managers. Innovative ways to provide more avenues for direct public participation in the scientific enterprise will need to be developed. Adaptive management will require greater use of lay people and volunteers to assist with monitoring, analysis, and evaluation. Such a "civic science" will encourage citizens to serve as lay scientists and managers. This will also require science to make a renewed commitment to providing policy-relevant information as society makes the social and ethical decisions that shape sustainability. Park Service scientists and managers, for example, will need to learn new ways of working with the public (including park visitors and nearby communities) in the process of developing and interpreting scientific data and analysis (figure 2). Science, therefore, will be used to inform a more public and fully deliberative decision-making process.

Ecosystem management will also require scientists to address more effectively the split between the social and natural sciences. Because ecosystem management stresses the importance of humans in the ecosystem and socially derived goals and objectives, park science will need to reflect a larger social science role. Park social science will need to focus both on issues internal and external to the parks, determining, for example, how visitors relate to park resources and services, how management decisions affect, and are affected by, social, economic, and political conditions in surrounding communities, and how incentives can be devised and barriers removed for managing across ownership boundaries. Monitoring will include social analysis and evaluation of lessons learned

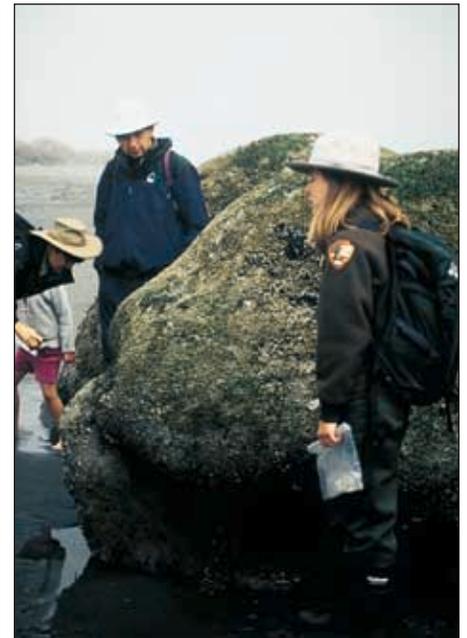


Figure 2. Visitor education programs will have expanded roles in ecosystem management.

through experimentation with new institutional arrangements and policy tools.

Organizational change

The importance of organizational change, especially in how resource agencies relate to one another and the public, is crucial to adoption of an ecosystem approach. Ecosystem management means management across ecological, political, generational, and ownership boundaries. Defining management units ecologically rather than politically will require recognition of the mutual responsibility for ecosystem processes that transcend conventional boundaries and coordination to an unprecedented degree (figure 3, next page). The greater Yellowstone ecosystem is perhaps the most frequently cited example of a complex set of multiple resource problems originating from a system that divides ecological processes into distinct units for management by multiple entities. But in countless other park areas, new institutional arrangements and collaborative processes will also be necessary to manage park problems originating from other jurisdictions. Such problems, for example, range from the urban and commercial development pressures on nearby lands that is affecting Saguaro National Park, Blue Ridge Parkway, and Gettysburg National Military Park, to the air pollution from distant sources that is imperiling Mount Rainier, Grand Canyon, and Big Bend Na-

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Figure 3. When management units are defined ecologically rather than by arbitrary political boundaries, greater coordination will be required to deal with the realities and impacts of different ownership objectives.

tional Parks. While working from an ecosystem management perspective may certainly mean more Park Service input into management of lands adjacent to its units, it may also mean less agency control over management and science within park boundaries. Consequently, similar organizational adjustments will be required to enable Park Service personnel to more effectively explore with adjacent communities and interested stakeholders off-park problems arising from proposed changes in park operation, such as road and campground closures, species reintroduction, or the use of fire.

Bureaucratic efforts to protect agency domains, however, have long been recognized as one of the impediments to effective coordination. Turf battles persist among agencies and different levels of government; specialists in one agency lack trust in similar specialists in another. Cultural barriers divide managers and scientists. Even within agencies there may be competition among specialists or different parts of the agency; better external coordination can occur only when there is better internal coordination. Coordination is both a process and a structure of relationships that distributes power, access, and resources.

The recent upsurge in the formation of a number of collaborative, community-based conservation and watershed groups is an

encouraging sign. These groups present one means of addressing both environmental concerns for ecological sustainability and democratic concerns for justice and economic equity. Citizens involved in collaborative efforts, however, often cite bureaucratic barriers such as agency inertia, administrative red tape, lack of inter-agency coordination, jurisdictional conflicts, and "reactionary policies" as impediments to their efforts to work collaboratively with agencies. Moreover, agency personnel at the local level who want to be involved in community processes frequently find that they lack support from administrative superiors. The Park Service has been involved

Citizens often cite bureaucratic barriers such as agency inertia, administrative red tape, lack of interagency coordination, jurisdictional conflicts, and "reactionary policies" as impediments to their efforts to work collaboratively with agencies.

in a number of large-scale, ecosystem efforts at the regional level, e.g., Everglades and Yellowstone, as well as in several community-based efforts. More needs to be done, however, and much more needs to be learned about how to make the agency more effective participants in such collaborative groups. In this regard, allocating time and dollars for developing and fostering relationships with communities outside park boundaries will need to be recognized as just as important as administrative work inside park boundaries.

For change to occur, agency incentives and rewards systems will need to be adjusted to ensure that they encourage and reward behaviors consistent with an ecosystem approach. National Park Service managers will need to ensure that agency culture fosters a spirit of cooperation and a willingness to share power with other agencies, nongovernmental organizations, and private citizens. Social science that focuses on the processes and consequences of organizational change can assist park managers in revamping their units to create a learning organization that operates in an adaptive management mode.

Conclusion

Ecosystem management is not just about science—more science, better science, needed science. It is also about politics and political choices; new patterns of politics will be required. Political choice will determine how ecosystem management evolves in the future—whether it creates new and viable patterns of politics to supplant traditional modes and how it progresses toward the goal of long-term ecological sustainability. Neither Park Service managers nor scientists can thus afford to ignore the political nature of ecosystem management. The political challenges of ecosystem management must be recognized and confronted if ecosystem management is to move beyond theory and the noteworthy, but limited, applications made to date. In meeting these political challenges park science—including social science disciplines working in concert with other scientific disciplines, park managers, and the public—has a significant role to play. **P**

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Figure 1. Sign of the times—warm weather and rains combined to melt the alpine snowpack in Yosemite National Park in early 1997, resulting in widespread damage to park facilities, park closures, and reductions in local, regional, and state tourism spending.

Economic analysis of national park issues:

An assessment of the impacts of the 1997 floods in Yosemite National Park

By CHRIS NEHER AND JOHN DUFFIELD

For anyone who has visited small towns such as West Yellowstone, Montana, or Mariposa, California, one thing quickly becomes evident. Communities that are adjacent to large national park units have economies that are highly dependent on travel spending by park visitors. This degree of dependence can vary dramatically from park to park depending on such factors as location and annual visitation to the nearby park and the size and complexity of the local economy. The highest level of economic dependence is found in small tourism-oriented communities in relatively rural areas. It is not surprising, therefore, that when either natural events or shifts in park policy lead to substantial changes in visitation to these parks, local residents can become quite concerned. The issue of how declines in park visitation will impact the local economy is of more than just academic concern for these tourism dependent communities. Because of the close ties between some park units and local economic activity, it is important for park managers to have an understanding of the tools and methods used to explore this type of economic interdependence.

The National Park Service (NPS) has long had an in-house tool (called the Money Generation Model or MGM) to estimate the economic impacts of visita-

tion changes. A recent review of this model identified limitations in the parameters used by the model, including multipliers, expenditure estimates, and assumptions concerning measures of visitation changes (Duffield et al 1997a). This article provides a brief overview of an NPS-sponsored 1997 study (Duffield et al 1997b) that utilized tools other than the MGM to analyze the impacts of the 1997 flood in Yosemite National Park on economic activity in surrounding communities and counties.

Between January 1 and 3, 1997, Yosemite National Park was struck by the largest flood in the park in over 40 years (figure 1). Heavy rains combined with a large snowpack led to high water that immersed much of Yosemite Valley and washed out roads and utilities in the park and downstream along Highway 140 to El Portal. The flood caused significant damage to the park infrastructure, buildings, roads, employee housing and visitor services. The park was fully closed in January and only partially open in February and March. By late January 1997 (just one month after the onset of the flood) the park was able to provide a preliminary damage assessment and outlined a \$178 million estimate of the costs to fully restore roads, trails, utilities, buildings, and grounds (NPS 1997). Damages to private property (primarily park concessioner

property) were estimated at \$7 million (Yosemite Concession Services Corporation 1997).

Because of the substantial economic impacts of the flood, visitor closure, and proposed recovery actions, the National Park Service chose to conduct an economic assessment of the flood. This assessment identified, described, evaluated, and estimated the economic impacts of the flood, park closures, and the reconstruction spending on the local, regional, and state economies. Economic impacts associated with the flood were expected to fall into two general classes: (1) negative impacts on local economic activity and on the visiting public due to park closures and travel restrictions, and (2) positive impacts on local economic activity due to reconstruction spending within the park.

Our study used two very different but complementary economic perspectives to examine these impacts: regional economic modeling and models of demand for outdoor recreation. Regional economic modeling was used to identify the relationship between changes in expenditures (in this case expenditures by visitors to Yosemite, on food, lodging, and other retail items) and overall activity in the local economies. The usual measures of expenditure impact are changes in personal income, em-

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ployment, output, and tax revenues. Regional economic modeling describes the impacts of local expenditure changes on individuals and business. Our study used the basic input-output models and data sets provided by the impact analysis planning (IMPLAN) software (Minnesota IMPLAN Group, 1996).

The impacts of park closure or travel restrictions on people unable to visit Yosemite, or the Yosemite area, are not measured within the regional economic framework, but rather using models of demand for outdoor recreation. Regional economic models are based only on market transactions (the buying and selling of goods or services). The impacts associated with consuming services, such as entry into Yosemite National Park, that are not priced in the market (or are only marginally priced) cannot be fully measured within the regional economic framework. Visitation to Yosemite is only minimally priced (until March 1997 at only \$5 per car, and \$20 per car today) and does not reflect the full value of the service derived. When individuals will pay upwards of \$100 per day for golf green fees or \$50-\$100 per day to fish rivers in areas such as Montana or Idaho, one can be sure that the market price to visit Yosemite is not \$5 or even \$20. Recreation demand models such as travel cost models or contingent valuation models can be used to estimate the value associated with these nominally priced services. (An overview of these types of models is provided in Ward and Duffield 1992, and Braden and Kolstad 1991).

Our analysis of the regional economic impacts associated with reduced visitation to Yosemite National Park required two primary data: (1) the estimated reduction in visitor days due to the flood impacts, and (2) the estimated expenditures per day for these types of visitors. Information on park visitors and their expenditures was collected in 1990-91 by James Gramann (1992a, 1992b). Estimates of visitor expenditures per day were developed based on Gramann and other sources. Yosemite National Park visitation statistics were obtained through NPS staff at the park and at Lakewood, Colorado.

Estimates of visitation reductions

In undertaking this analysis, there was some uncertainty in projecting the timing and scale of both the recovery activities and future visitation to the park. Similarly, it was difficult to project exactly how visitation levels would respond to interrelated factors including reductions in lodging and camping units, ongoing road construction, and changes in visitor fees associated with the Fee Demonstration Program.

Based on the combined effect of the reductions in lodging, campsites, and road capacity, we estimated that the flood effects would result in between 204,000 and 630,000 fewer recreational trips to the park in 1997, depending on the set of assumptions concerning when facilities would be repaired and available for use. We further estimated that in 1998, 122,000 fewer recreational visits would be made to Yosemite National Park due to flood impacts.

Regional economic models and findings

Using IMPLAN, regional economic models were developed for the state of California and four counties surrounding the park: Mariposa, Merced, Tuolumne, and Madera. In the most heavily impacted county, Mariposa County, we estimated that 1997 personal income would be reduced by \$1,159 per capita (\$18 million for the entire county). Additionally, Mariposa County was estimated to lose 956 jobs and \$1.67 million in county occu-

pancy and sales tax revenues. The personal income loss amounts to a 6.6% decline in this measure of economic activity. The remaining three counties we studied all showed much lower income losses (the estimated per capita personal income losses for Madera, Tuolumne, and Merced Counties were \$27, \$50, and \$7 respectively). This result is consistent with our finding that among the four counties Mariposa County has, by far, the highest percentage of its output and employment tied to tourism-related economic sectors.

The spending associated with the 1997 emergency action and reconstruction activities in the four-county area to some extent offset the decline in visitor spending. However, even assuming that 20% of direct reconstruction dollars went to businesses in the four counties, losses from visitation reductions still lead to large net personal income losses in 1997. Considering net losses associated with reduced visitor expenditures and gains from reconstruction spending within the counties, we estimated that net aggregate 1997 personal income in the four-county area would be reduced by \$24.23 million and that 1,301 jobs would be lost. It is important to note that these estimated losses are annual averages. While employment may have been down significantly during the January-March shutdown period, it may have largely recovered later in the year.

Recreation demand model and findings

Our recreation demand analysis focused on losses suffered by visitors who *would have* visited Yosemite except for the flood-related closures (estimated to be between 204,000 and 650,000 in 1997). Based on estimates of visitor benefits derived from previously published studies, the value per recreational visitor trip was estimated to be between \$124 and \$358 in 1997 dollars (Walsh 1990, Clawson 1959, and Duffield 1992). The 1997 visitor losses were estimated to be within the rather wide range of \$26 million to \$233 mil-

We estimated that net aggregate 1997 personal income in the four-county area [surrounding the park] would be reduced by \$24.23 million and that 1,301 jobs would be lost (annual averages).

lion. These loss estimates are an upper bound since they do not take account of substitute activities a visitor may have chosen to pursue instead of visiting Yosemite.

While those would-be visitors who were prevented from visiting the park due to the flood suffered economic losses, in the longer-term (post-recovery), it is likely that the total benefits visitors derive annually from the park will be *increased* by the change associated with the recovery activities. It is expected that Yosemite Valley will be more aesthetically pleasing and better organized due to a reduction and

reorganization of structures. In addition, the shift of some lodging, camping and administration activities outside of Yosemite Valley should reduce congestion as noted in the General Management Plan (NPS 1980).

Estimates in retrospect

From the perspective of two years after our initial report, we know that the actual decline in Yosemite National Park visitation between 1996 and 1997 was 375,000 visitors. This estimate falls well within our estimated range of visitation losses. At the time of our 1997 analysis there was a great deal of uncertainty regarding the speed of infrastructure re-

Those counties and communities closest to and with the strongest economic ties to tourism and tourist spending were the most heavily impacted by visitor reductions.

construction within the park and the response of visitors to the flood damage and constraints imposed by reconstruction activities. Our 1997 report assumed that all park lodging constraints would be removed by July, 1998, and the park would be back to full visitation levels that month. Conversations in January, 1999, with Mike Osborne (the fee coordinator for Yosemite) indicated that the park still has not fully recovered from the flood. The park currently has 200 fewer lodging units and 350 fewer campsites than before the flood. Additionally, road closures and traffic delays continue to cause difficulties for park visitors. Actual visitation to Yosemite in 1998 was about 389,000 below visitation for 1996. It is clear that negative impacts of the 1997 flood in Yosemite are still affecting visitation levels to the park. A complicating factor is that beginning in 1997 fees were increased in Yosemite. However, preliminary analysis of other similar parks such as Yellowstone indicate that any price response to fee changes to date has been negligible (Duffield et al. 1999).

While our 1997 report relied on previously published data and value estimates, in 1998, an NPS-sponsored visitor survey in the park asked questions on visitor willingness to pay for their trip to Yosemite National Park. From these survey question responses we estimated that the median willingness to pay for a trip to

Yosemite in 1998 was \$196. This estimate is near the midpoint of the range of estimates used in our 1997 study.

Conclusions

The results of our study of the economic impacts of the 1997 Yosemite floods underscored the strong linkages between visitation to the park and employment and income in the counties and communities surrounding the park. Those counties and communities closest to and with the strongest economic ties to tourism and tourist spending were the most heavily impacted by visitor reductions. However, a tentative conclusion of our study is that *on aggregate* the net losses to

potential visitors from the Yosemite flood and travel restrictions substantially exceeded the losses suffered by employees and business owners in the adjacent counties. The most heavily impacted specific *individuals*, however, were undoubtedly among the local business owners and their employees rather than visitor populations. The per trip loss for the average visitor was on the order of \$200 but the per capita losses in Mariposa County, the most heavily impacted county, (allocated over the entire county population) was approximately \$1,200. This latter estimate would be much higher if computed for the most affected subpopulations—business owners and employees in tourism-related sectors. **P**

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Public participation:

Relevance and application in the National Park Service

By SETH TULER AND THOMAS WEBLER

Government agencies are under increased pressure to conduct policy planning and decision-making activities in more transparent and inclusive ways. The clear trend is toward broader and more frequent public involvement and collaboration. For example, the U.S. Fish and Wildlife Service organizes deliberation among stakeholders for endangered species recovery planning (Clark et al. 1994, Clark and Wallace 1998). The Army Corps of Engineers has experimented with a variety of collaborative problem solving and public participation techniques (Creighton et al. 1998). The U.S. Forest Service continues implementation of a variety of approaches to public participation, including "collaborative learning" and adaptive management planning (Gericke et al. 1992, Sarvis 1994, Shindler and Creek 1997). At its nuclear weapons production sites where cleanup is the major issue, the Department of Energy has set up site-specific advisory boards (Bradbury and Branch 1999). Throughout many parts of the federal government, and within state governments as well, involvement of stakeholders and citizens is becoming a priority issue.

To "conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same" (NPS Organic Act, 1916, 16 U.S.C. sec. 1), the National Park Service must accommodate a multiplicity of values and interests among those who would use, enjoy, and protect park resources in much the same way as other agencies must accommodate diverse values and interests in their decision making. In fact, enabling legislation for new parks, such as Boston Harbor Islands National Recreation Area and Death Valley National Park require involvement of major stakeholders in park management decisions. Park and resource management planning as well as the National Environmental Policy Act (NEPA) process are other areas where parks are increasingly incorporating participatory activities. Voyageurs National Park has used extensive public involvement activities to develop a new gen-

eral management plan. Opportunities for public involvement include, for example, public hearings, advisory committees, and working groups.

Responding to these new demands presents important challenges, including how to run processes that: (1) make use of the best science available; (2) are widely seen as fair and legitimate by all involved; and (3) use financial and staff resources in a responsible manner. In this article we review the reasons why public participation should play a growing role in National Park Service activities as we enter the next century. We also describe how recent social science research can provide lessons to guide managers' efforts to design and implement public participation.

Rationales for participation

In the past decade, social science research has made a great deal of progress on two questions:

(1) *why* public participation should occur. For example, people still disagree about whether lay people should be involved in agency decisions at all.

(2) *how* to best design and implement a participation process. For example, there is uncertainty about how to best involve, meaningfully, diverse lay people and scientists in an efficient, effective decision-making process.

In 1990, Daniel Fiorino provided a wonderful approach to answering the "why" question when he outlined three kinds of reasons for involving the public in decision making: instrumental, substantive, and normative.

Instrumental reasons for public participation

These reasons are associated with achieving program goals. For example, a park may promote participation by recreation interest groups in management planning because it helps ensure that resource use guidelines are followed. In some instances self-enforcement may be the only option available to parks. Instrumental reasons for public participation are that it helps achieve mandate

and goals, reduces legal challenges, enhances legitimacy and trust, reduces costs, and reduces conflict.

Participation can enhance legitimacy and build trust (Renn 1998, Tuler and Webler forthcoming). They can help an agency or organization achieve programmatic goals when people are more likely to defer to decisions that are viewed as being legitimate and when the decision maker is trusted. Recent social science research has revealed that important attributes leading to trust are how much an organization is seen as caring and committed to the people affected by it (Kasperson et al. 1992; Peters et al. 1997).

Finally, public involvement can reduce costs and conflict associated with a decision. Although participation can be costly in terms of staff effort and time, it is not as costly as the legal challenges and delays that can come about from inadequate involvement. Parties who feel included in the decision making may be less likely to see legal action as necessary. Conflict reduction is another benefit. Some groups or individuals opt to intervene through external political means such as protests, backdoor politics, or public confrontation. Experience has shown that these strategies can be disabled by offering these parties a meaningful role in the process (Bleiker and Bleiker 1995). If they refuse to participate, the group can lose its public legitimacy. For instance, many believed that northern New England avoided a spotted owl-type controversy because of the extensive, inclusive process undertaken by the Northern Forest Lands Council (McGrory-Klyza and Trombulak 1994).

Substantive reasons for public participation

These reasons are associated with making better decisions. For example, when Rocky Mountain National Park wanted to improve the scenic experiences of visitors, social science researchers handed out returnable cameras to visitors, asking them to photograph positive and negative scenes. This provided direct access to visitor pref-

erences (Taylor 1998). Substantive reasons for public participation included more knowledge, new ways to define the problem, new ways to envision solutions, and solutions that are more acceptable.

While technical experts can generate sound alternatives, they can also miss important information or suggest options that are not acceptable to the public. The following illustrations from transportation planning and public health protection illustrate how public participation can improve the quality of decision making:

- In Holland, when faced with a number of unacceptable alternatives, citizens brainstormed a solution that experts missed—using the breakdown lane—to solve a temporary traffic problem (Pestman 1998).
- On Cape Cod, Massachusetts, conservationists and fishermen are collaborating to design gill-net breakaway devices that meet the needs of fishermen while also ending incidental takings of endangered right whales (Wiley 1998).
- In western Nevada, Department of Energy scientists ignored a key pathway of exposure to Shoshone Indians from nuclear weapons testing fallout because they failed to recognize that the Shoshone eat wild hare, including the hares' thyroid gland, which increases the exposure to radioactive iodine (Frohberg 1999).

Normative reasons for public participation

These reasons are associated with concepts of right and wrong. In a democratic society, we assume that citizens should have some say in decisions that affect them (Cvetkovich and Earle 1994, Rosenbaum 1978, Wellman and Tipple 1990). Some social science researchers have linked this to the idea of informed consent—that government has the responsibility to obtain the consent of the governed (National Research Council 1996, Shrader-Frechette 1993, Bleiker and Bleiker 1995). Normative reasons are extremely important to members of the public, while agency staff may be more focused on instrumental or substantive reasons. Normative reasons for public participation are respectful of the individual, give people a chance to be heard, and involve citizens in governance.

Applying social science research to public participation

Now we turn to the “how” question: how should public involvement be done? Recently, this has been the subject of some interesting social science research. Foremost is the publication of a report by the National Research Council called *Understanding Risk: Informing Decisions in a Democratic Society* (1996). While the report is about risk decision making, it is widely applicable to a range of issues, including park management.

The committee that wrote the report stressed the need to distinguish between two fundamentally different ways of making sense about the world. They called these *analysis* and *deliberation*. Analysis includes science, but also systematic investigation and reasoning by citizens or stakeholders. Deliberation includes political debates about preferences, but also the talk that goes on among scientists as they evaluate each other's work or design studies. Both citizens and experts need to participate in analysis and deliberation (Webler and Tuler 1998). It is important to understand that the report does not make and less legitimate the importance of science and technical analysis in policy making. Rather, it sees analysis and deliberation as equally important and mutually supportive ways of building understandings.

Many of the activities conducted by the National Park Service, such as developing resource management plans, are appropriate for an analytic-deliberative process. In a recent article in *Bioscience*, Dietz and Stern (1998) argued that broadly based deliberative processes to guide and interpret scientific analysis are appropriate for situations characterized by:

- *Multidimensionality*. For example, park management plans can have many effects on local communities, park resources, and visitors' experiences. The benefits and costs of different decisions are not equally shared by all.
- *Scientific uncertainty*. For example, there are many uncertainties associated with ecosystem functioning, wildlife population dynamics, and visitor behaviors and preferences. Parks must address such uncertainties and find ways to cope with them.
- *Value conflict and uncertainty*. For example, people differ in the importance they attach to the outcomes of decisions. Some

people wanted Olympic National Park to maintain exotic populations of mountain goats, while others were more concerned with the impacts of the goats on native wildflowers.

- *Mistrust*. For example, local communities may not trust a park if they perceive it to have been established through an illegitimate taking of private lands.
- *Urgency*. For example, it is often not feasible to wait for additional scientific certainty or resolution of value conflicts.

The challenge, of course, is to find the right combination of analysis and deliberation at each step of a decision-making process. Conducting competent science is clearly a key part of a successful process, but so is getting the relevant science. Even the best analysis may be useless if it does not relate to what people care about. Getting the participation right means doing the outreach correctly, so that the appropriate parties are involved. Getting the right participation means finding the appropriate way to involve stakeholders and citizens in the process. The National Park Service and individual park units will not be served well by dedicating all resources and staff to public participation. Rather, we suggest that NPS managers should consult with a wide range of affected parties. Together they can best decide when and how to conduct a participatory process. Certainly, caution must be exercised to avoid implementing an elaborate process when a more simplified (and less costly) one will suffice, and vice versa.

Lessons from prior research

The *Understanding Risk* report offers some initial guidance for matching policy problems with process designs through a diagnostic activity. Just as a medical doctor diagnoses a patient's condition, staffers can diagnose a policy environment and propose an appropriate policy making instrument. As with medicine, “cookbook” clarity is impossible (National Research Council 1996, see also Earle and Cvetkovich 1991, Webler 1997). On the other hand, we do not need to reinvent the wheel every time.

During the past 10 years social science researchers have learned much about how to do public participation better. Lessons can be learned from prior experiences, including those of other federal agencies such

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as the Environmental Protection Agency, U.S. Forest Service, Army Corps of Engineers, Centers for Disease Control and Prevention, and Department of Energy. These experiences can help NPS and park managers make judgments about the appropriate amounts of analysis and deliberation throughout a process. Like any judgment, a number of needs must be balanced. Among them are: How to gather and use the best information? How to ensure broad and meaningful participation? How to make a decision with available—but limited—resources? And how to reduce the uncertainties inherent to a tolerable level?

For example, a key lesson from prior research is that everyone measures success differently, both in regard to process *and* outcomes—and not everyone may agree with each other (Carnes et al. 1998, Landre and Knuth 1993, Lauber and Knuth 1997, Moore 1996, Shindler and Neburka 1997, Tuler and Webler 1999). Thus, conveners of a process should identify the ways that different participants define success. While "success" can be defined in many ways, in the context of federal and state agency efforts the definition should at least in part be related to the need to show that resources (e.g., funding, staff time) are being used effectively and that the greatest amount is being done for the least amount of effort.

Other lessons have to do with the opportunities for participation and the forms of interaction that are created among the participants. For example, to effectively ensure that participation is meaningful for all, convening organizations must do more than focus simply on balanced representation and opportunities for participation. They must also *support* participation and the *balancing* of influence, so that prejudice, preferential treatment, or imbalance in resources necessary to participate effectively are eliminated (Kasperson 1986, Renn 1992, Renn et al. 1995). The best processes ensure proactive outreach to those who may be affected by a decision (Bleiker and Bleiker 1995, Tuler and Webler forthcoming). Conveners of a process should conduct a preliminary investigation into their expectations and find a way to involve at least the most outspoken of these parties in the design of the process. This can require that agencies learn who they need to talk with about a decision (e.g., Force and Williams 1989). Agencies are often judged for their respon-

siveness and accountability on the basis of how well potentially affected parties are kept informed of activities and decisions. Lastly, participants care about the quality of their discussions and interactions, including being treated respectfully and being heard or listened to (Becker et al. 1995, Bradbury and Branch 1999, Hartley 1998, Tuler forthcoming, Tuler and Webler 1999). Because of their pivotal role, facilitators should ask that participants agree to basic ground rules about how questions are asked and information presented.

Conclusion

Social science research offers a tremendous resource to NPS managers as they engage in participatory planning and decision-making activities. Both planners and participants will benefit by developing greater familiarity with the participation techniques and resources that are available. Public participation consultants offer courses and training in these areas. Some offer "coaching" to help planners work through problems that arise. In addition, there is a wealth of case studies describing innovative and exemplary participation processes. Familiarity with that literature will enhance the ability of NPS managers to think creatively about how to design processes. They should adapt what is known to the specific needs in the National Park Service. For example, the National Park Service could benefit from developing its own diagnostic guidelines for matching process features with problem types.

At the same time, the National Park Service may face constraints that others have not, and careful attention will need to be given to which lessons are relevant. The Park Service has a narrow mission as defined by the Organic Act to conserve resources and provide for their enjoyment. Thus, for example, the lesson that a process should be inclusive of all concerns may not always be possible. Public participants may want to include issues that are outside of this mission.

Yet, the National Park Service cannot hide behind its narrow mission. The political culture is evolving toward greater public accountability and participation in governance. As the National Park Service responds to this change, it can find much usable knowledge from social science research. **PS**

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Social impact assessment:

Understanding how outside development alters the park experience

By RABEL J. BURDGE

Attempts at modernization in both first and third world countries have altered the physical environment and created untold financial problems, disrupting the lives of countless millions of the world's population. When the developments were few and the numbers of people small, concern was less and the impacts on life-sustaining ecosystems fewer. However, accelerated growth has brought the earth's resources and its people closer to sustainable limits. As a result, community leaders, government agencies, legislators, and even the average citizen want to know the consequences and impacts of developmental change prior to project approval and the permit to go ahead.

By *Social Impact Assessment* (SIA), I mean the systematic analysis *in advance* of the likely impacts a development event (or project) will have on the day-to-day life (environment) of persons and communities. We do social impact assessment to help individuals, communities, as well as government agencies and private sector organizations understand and be able to anticipate the possible social consequences on human populations and communities of proposed project development or policy changes. Social impact assessment allows people to understand *in advance* the consequences of a proposed action or policy change. Like a biological, physical, or economic impact, a social impact has to be pointed out and measured. It may impact big numbers of people as would restricting auto traffic in Yosemite or fewer numbers, as for example, the closing of a hospital in a rural community. It may be required by law, as in the case of the National Environmental Policy Act (NEPA), which is triggered when federal funds, land, and legislation are involved. It may simply be seen as prudent, as for example, evaluating the positive and negative benefits of promoting tourism to Chaco Culture National Historical Park in New Mexico.

What started social impact assessment?

President Richard Nixon signed the National Environmental Policy Act on December 31, 1969. Under that law, proponents of development projects and policies are required to file an environmental impact statement (EIS) detailing the impacts of the proposal, as well as project alternatives, on the physical, cultural and human environments. The NEPA legislation also requires mitigation measures for impacts and a monitoring program to ensure that mitigation is actually working (NEPA, 1969). Henry "Scoop" Jackson, the late senator from the state of Washington, was responsible for including the *triggering mechanism* in the NEPA legislation, which required an Environmental Impact Assessment (EIA) if federal land, laws, or monies were involved. The inclusion of the triggering mechanism was a unique legislative requirement and ensured that EIS statements would be written. Subsequently, the courts have ruled that if a biological or physical environmental change leads to an alteration in human communities an SIA must be completed as part of the environmental impact assessment process (IOCGPSIA 1994).

NEPA legislation and the trans-Alaska pipeline permit

In February 1970, the Bureau of Land Management of the U.S. Department of the Interior submitted a six-page EIS to accompany the application for the trans-Alaska pipeline permit. Two days later the Wilderness Society, the Friends of the Earth, and the Environmental Defense Fund filed suit contending that the EIS was inadequate because it did not consider the implications to the permafrost of pumping hot oil through a pipe on the ground. In addition, no provision was made for a disruption of the annual migration of several caribou herds due to the pipeline and the road to be built beside it. Although not specifically mentioned in the litigation, some observers

wondered where all those construction workers and their families would be housed who came north to work on the pipeline (Dixon 1978). Three years later the permit to build the pipeline was issued and most of the potential environmental problems had been addressed to the satisfaction of the courts, the plaintiffs, and the Alyeska Pipeline Company (a collection of U.S. and Canadian oil companies that owned leases on Prudhoe Bay). Anticipatory planning had worked and all sides agreed that the NEPA process had allowed project proponents to deal with issues that might otherwise have been overlooked.

After the permit to build the Trans-Alaska pipeline was approved, one of the Inuit Chiefs commented "...now that we have dealt with the problem of the permafrost and the caribou and what to do with hot oil, what about changes in the customs and ways of my people?... (Dixon 1978)." Would the traditional cultures and way of life be changed by such a massive construction project? What about the influx of construction workers who spoke different dialectics (of English) and brought with them a distinctive lifestyle? Obviously, with a total population of 350,000 (in 1973) the Alaska could provide only a fraction of the estimated 42,000 persons that would work on the pipeline during peak construction. Because of these and other related events the impacts of development on the human populations began to be included with biophysical and economic assessments (Dixon 1978). Social impact assessment differs from other types of social science analysis in that it is *anticipatory*. The goal is to measure the consequences of the project or policy change before the event actually takes place.

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A case study in scoping for SIA: What would be the social impacts on Biscayne and Everglades National Parks if Homestead Air Base were converted to a commercial airport?

In 1996, the Metropolitan Dade County Commission (Florida) approved a plan to lease a large portion of the Homestead Air Force Base for 70 years for development by the Homestead Air Force Base Developers, Inc., to build and operate a commercial airport (figure 1). However, the project has been delayed pending additional federal and state assessments of the impact of the proposed aviation facility on nearby, environmentally sensitive Biscayne Bay and the Everglades. A Supplemental Environmental Impact Assessment (SEIS) for the Reuse of the Homestead Air Force Base (HAFB) in south Florida was to be prepared by the U.S. Air Force and the Federal Aviation Administration (FAA). As a cooperating agency in preparing the scoping document for the SEIS, the National Park Service was

asked to identify and recommend the scope of work related to social impacts of concern to the National Park Service.

As part of the EIA-SIA scoping process, Gary E. Machlis, Visiting NPS Chief Social Scientist, Paul George of Miami-Dade Community College, and I were asked to do the SIA scoping as part of the agency response to a need for an SEIS (Machlis et al. 1998). We were asked to consider three alternatives, but our efforts focused on what was called "full capacity" or "maximum possible usage" condition for the former Air Force Base. This alternative is based on the Dade County Airport Master Plan, the FAA Airport Layout Plan, and estimates by consultants and interested parties. It assumes the potential (not existence) of an additional runway, and further alters the mix of flight operations. Estimates of flight operations are based on maximum capacity for one-runway peak flight operations in 2014, approximately 240,000 per year. Another runway could expand that number up to 380,000 per year.

The SIA guidelines (IOCGPSIA 1994)

call for analysis of "primary, secondary, and cumulative social impacts."

Primary impacts are directly caused by the proposed action. *Secondary impacts* are those that indirectly result from the proposed action. *Cumulative impacts* are those that are a consequence of the proposed action in combination with other local and regional changes that might be ongoing as a result of the conversion to a full-scale commercial airport.

We examined social impact variables under the general categories of (1) population characteristics, (2) community and institutional change, (3) political and social resources, (4) individual and family changes, and (5) community infrastructure resources (Burdge 1999). These variables provided

work along with variables of concern that reflect the special purposes and uses of Biscayne National Park, Big Cypress National Preserve, and Everglades National Park as part of the national park system (NPS 1979 and 1983), and their role in the South Florida Ecosystem Restoration Project (Harwell 1997).

Potential *primary social impacts* include but were not limited to:

1. significant increase in passenger landings (e.g., number of passengers, particularly non-local tourists) as part of commercial aviation flight operations,
2. significant increase and change in noise levels, timing, distribution, and quality (particularly in Biscayne and Everglades), as part of the increased and altered mix of flight operations leading to changes in the visual environment related to haze, and night-sky light,
3. significant increase in both density and spread of urbanized development, as part of the build-out of the commercial facilities and residential areas, and accompanying commercial expansion beyond the current urban development boundary (UDB) near Biscayne, and
4. significant changes in community identity and industrial focus as a result of the shift from a military/retirement- to commercial-based air transport economy within the primary zone of influence.

Possible *secondary social impacts* include:

1. an increase in visitor numbers (as well as a change in visitor types) to Biscayne and Everglades, resulting from increased passenger landings and urbanized growth and development,
2. a significant change in the visitor experience and park preservation values as a result of the deterioration of natural quiet or natural sounds due to increased noise levels, haze, and night-sky lighting,
3. a significant change in infrastructure needs (roads, sewers, schools, etc.) in the primary region of influence (ROI), beyond the UDB, and particularly near Biscayne,

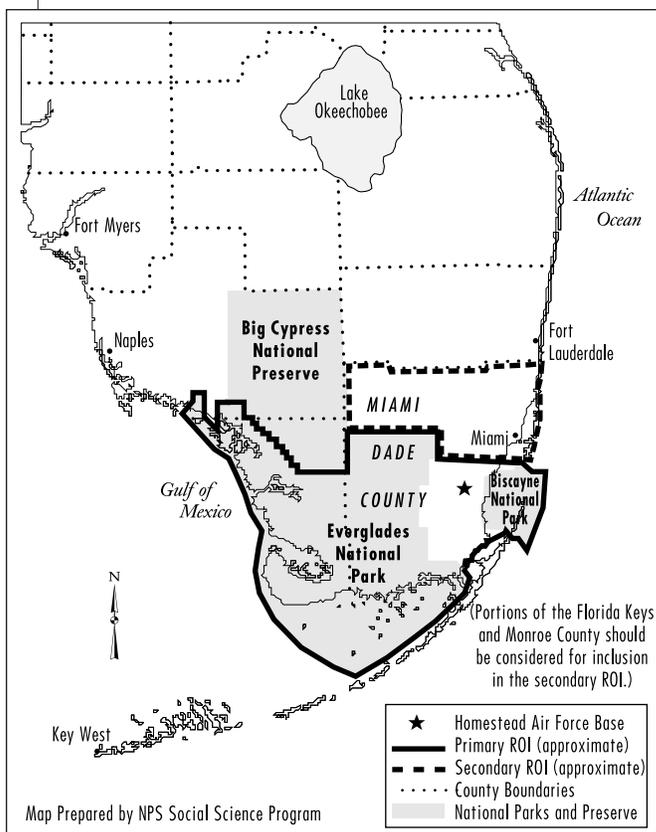


Figure 1. Location of Homestead Air Force Base, Biscayne and Everglades National Parks, and Big Cypress National Preserve, Florida.

4. an increase in visitors to Biscayne and Everglades due to an increase in population in the primary ROI, particularly near Biscayne, and
5. a change in community cohesion and local culture, due to changes in community identity, industrial and commercial focus, and park preservation values.

Examples of *cumulative social impacts* include:

1. a significant increase in park management activities (particularly at Biscayne), including resource protection, environmental monitoring, visitor protection, and maintenance, due to changed visitation and urbanized development,
2. an increase in park infrastructure needs (particularly at Biscayne), due to increased and changed visitation patterns,
3. a significant change in recreational uses, visitor types, and visitor distribution (particularly at Biscayne), due to increased noise levels,
4. an increase in complexity and intensity of required park-regional-local governmental cooperation, due to population influx leading to urban development, and
5. a reduction in park preservation values gained by visitors and the general public, due to deterioration of natural quiet or natural sounds, visual impacts, and urbanized development.

In March 1998, we forwarded to the Director of the National Park Service suggested social impact variables to be addressed in an SEIS. We also pointed out that many of the social impacts of concern to the Park Service are also potentially related to the South Florida Ecosystem Restoration Project (Harwell 1997). The director combined our analysis with that from the ecosystem team and forwarded the recommendations to the U.S. Air Force and the Federal Aviation Administration for inclusion in the scoping document for the supplemental environmental and social impact assessment.

Assessing social impacts of development outside park boundaries

Social impact assessment is a tool to help park managers understand how development outside park boundaries changes management procedures inside. Remember, SIAs are completed *before* the development event. If a supplemental SIA were to be done, the two superintendents could develop management plans based on good population projections in both the primary and secondary ROI and knowledge about the type of urbanized development (particularly near Biscayne and affecting Biscayne Bay). The SIA would address how increased noise and air emissions due to expanded flight operations and urbanized development affect both the park experience and preservation values and detail the requirements for a buffer zone between the current urban development boundary and Biscayne.

The two superintendents would also know about the occupational mix of a commercial sector based on air transport and the infrastructure needs (water, roads, sewer, schools, etc.) that would be required for urbanized development and population growth. The assessment would address how a reduction in park preservation values might alter the local and regional tourism industry. These and other changes would be known in advance of the permit to expand the air base.

Epilogue

On December 18, 1998, the Third District Court of Appeals in Florida ruled that the construction of a commercial airport on the old Homestead Air Force base could not proceed until a full environmental and social impact assessment study of the impact of completion and operation of a commercial airport on nearby Everglades and Biscayne National Parks. The Appeals Court said Miami-Dade County had rushed through development plans at the expense of its obligation under state law to prepare management plans to protect natural resources. In their ruling, the court cited the problems of noise, lack of quiet, urban congestion, alteration of the visual environment, and increased visitor use as suggested by the three NPS social scientists in their portion of scoping for a supplemental EIA-

SIA. A draft EIA-SIA should be available for comment by Park Service personnel by early 2000. **P₅**

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The national park system public use statistics

By TOM WADE

The National Park Service has been reporting recreation visits to its park system units since its creation in 1916. During those eight decades, the annual visitation has increased from 358,000 to 286.7 million in 1998. Many factors influence visitation to the 378 units including national and international economic conditions, local and national weather, and the ever-changing demographics of the population. So how did 1998 visitation compare to previous years?

The national park system received 286.7 million recreation visits in 1998. This was a 4.2% increase in public use or 11.5 million more visits than in 1997. The 1998 increase was directly influenced by major changes in the method of counting public use at six units in the Washington, D.C., area. These changes caused a higher annual percentage change for the park system than would have normally occurred.

The units in Washington, D.C., obtain their visitor counts by sampling the attendance at their units and not by trying to count every visitor. The physical layout of the monuments and memorials make counting every visitor an impossible task. Before 1998, staff counted visitors by making just one pass through the area, not by counting visitors for the entire 15-minute sample period. The correction for the proper sample period resulted in a 33% increase in reported visitation.

Without this administratively induced increase, the National Park Service would have received 274.7 million recreation visits (0.2% decrease). Because of the changes in counting procedures, the national visitation should be viewed as an adjustment and not as an actual increase in visitation. Visitation trends will have more value when examined on an individual park basis.

The national park system received 16.0 million more recreation visits from 1994 through 1998 (using the adjusted national total for 1998). This was a 6.1% increase over the five-year period or an average of 1.2% per year. When the last 10 years were examined, the rate of increase remained the same at 1.2% per year (256.1 million adjusted recreation visits were recorded during 1989).

Since January 1998, parks experienced an increase in visitation in 22 months when compared to the same month in the previous year. Except for September 1997, and December 1998, the park system had more recreation visits in every month than it received in the previous year. This increase occurred despite the influences of variable weather in the United States (affecting at least 50 units across the nation) and the troubled global economic condition, especially in Asia.

Recreation visits are skewed

Visitation to the national parks is highly skewed as the 10 most visited units (3% of the system) receive over 30% of the nation's visits and the 25 most visited units (7% of the system) receive 50% of the nation's visits. The full range of visitation to individual units extend from Blue Ridge Parkway's 19.0 million recreation visits to Aniakchak National Monument and Preserve's 209 recreation visits (table 1).

Recreation visits by region

The national park system is administratively divided into seven regions. This allows the agency to respond quickly to changing conditions within a limited geographic area. The change in recreation visits from 1997-98 ranged from +10 million in the National Capital Region to -847,000 in the Pacific West Region (table 2). Following is an overview of some factors that influenced the changes in the different regions.

Alaska—experienced its first year of decreasing visitation since 1989. The ongoing construction of a parking lot affected Kenai Fjords National Park (-43,000 visits) while a decline of 110,000 visits to Sitka National Historical Park was the result of an administrative change in the method of counting public use. Of course, the annual decrease for this region was only 23,000, which is less than half of the average daily visitation at the most visited unit of the national park system (Blue Ridge Parkway's average daily visitation is 52,000).

Intermountain—had its fourth year in a row with decreased visitation, as 66% of the units reported fewer visits in 1998 than in 1997. Grand Canyon National Park attributed its decrease of 552,000 recreational visits to inclement spring weather and the variable global economic situation.

Midwest—had 67% of the units report an increase in visitation, as it had beautiful weather in 1998 when compared with the El Niño weather-related problems in 1997. Indiana Dunes National Lakeshore (+625,000) is typical of this region as it had increased visitation in 11 of the 12 months.

National Capital—had the six major units in downtown Washington, D.C., report a combined 12.0 million more visits than they reported in 1997. The increase was the result of changes to the individual unit's counting procedures and should not be viewed as 12.0 million more people. All previous years, including 1997, were significantly under-reported. If the six units had received only

Table 1.
Most and least visited units of the national park system during 1998

Ten Most Visited Units	Ten Least Visited Units
19,026,498 Blue Ridge Pkwy	4,451 Yukon-Charley Rivers NPres
14,046,590 Golden Gate NRA	3,740 Bering Land Bridge NPres
9,989,395 Great Smoky Mountains NP	3,616 Eugene O'Neill NHS
8,788,055 Lake Mead NRA	3,293 Alibates Flint Quarries NM
7,124,022 Gateway NRA	3,034 Thomas Stone NHS
6,584,802 George Washington Memorial Pkwy	2,960 Cape Krusenstern NM
5,810,094 Natchez Trace Pkwy	2,100 Noatak NPres
5,200,633 Statue of Liberty NM	1,282 Nicodemus NHS
5,019,175 Delaware Water Gap NRA	462 Rio Grande WSR
4,804,185 Cape Cod NS	209 Aniakchak NM & Pres

Table 2.
National park system regional visitation statistics

Region	1998	Difference from 1997	% Change
Alaska	1,991,864	-22,986	-1.1
Intermountain	43,634,110	-631,333	-1.4
Midwest	22,140,343	1,208,121	5.8
National Capital	41,158,219	10,910,012	32.9
Northeast	54,629,311	1,186,428	2.2
Pacific West	57,737,486	-847,825	-1.4
Southeast	65,447,782	419,363	0.6

Table 3.
Visitation to national park system units by population center

Population Center	1998	Difference from 1997	% Change
Urban	89,963,908	11,589,831	14.8
Suburban	24,362,630	-537,763	-2.2
Outlying	51,152,721	-191,263	-0.4
Rural	90,809,767	30,365	0.0
Remote	3,629,097	90,905	2.6
Mixed	26,820,992	520,705	2.0

as many visits in 1998 as they reported in 1997, the region would have decreased by 5.8%.

Northeast—had its entire increase in four units: Castle Clinton National Monument (+281,000), Delaware Water Gap National Recreation Area (+267,000), Statue of Liberty National Monument (+462,000), and Gateway National Recreation Area (+316,000). The region would have decreased by 0.3% without the increase in the four units.

Pacific West—experienced the largest decrease of all regions, reflecting the double influences of variable weather and the troubled global economy. Muir Woods National Monument (-686,000) had the largest decrease in visitation in the national park system but the decrease was the result of changes to its method of counting public use, not actually 686,000 less people.

Southeast—region and the nation was, as always, dominated by Blue Ridge Parkway (19,026,000), which accounts for 29% of the region's and 6.6% of the nation's recreation visits. Excluding Blue Ridge Parkway, the rest of the region decreased by 0.5%. Canaveral National Seashore was severely affected by the summer wildfires (-665,000), while Gulf Islands National Seashore (-403,000) also had weather-related problems. Meanwhile, Timucuan Ecological and Historic Reserve (+512,000 or +422%) opened up some new areas. This region received more recreation visits than the combined visitation

to the three least visited regions (Alaska, Midwest, and National Capital).

Recreation visits by population center

A major factor influencing visitation at all units of the national park system is their proximity to population centers (table 3). The more people who live within a day's drive of a unit and the ease with which people can get to a unit certainly affect the number of visits that a unit would receive. Following is a partial explanation as to what influenced visitation at the various geographical categories.

Urban—(located within the central city). The units in downtown Washington, D.C., that had counting procedure changes belong to this category. Because of these administrative changes and the inclusion of two new units in 1997 (Franklin Delano Roosevelt Memorial and Korean War Veterans Memorial), this category has increased 29% or 21 million recreation visits over the last two years.

Suburban—(located outside the central city but still within an area of greater than one million people). Of the nine units with more than one million visits, six reported a decrease in visitation. The combined visitation to the suburban and urban categories is 40% of the entire national park system.

Outlying—(located in an area of less than one million people). This category has a disproportionate number of units receiving

more than one million recreation visits (26%) resulting in a per unit average of over one million recreation visits.

Rural—(accessible by paved highway, scheduled air or marine transportation service). One hundred sixty-seven units, or almost half the national park system, are assigned to this category. As the largest and most visited group of units, its growth remains slow but constant, increasing by 4% over the last 10 years.

Remote—(requires special travel arrangements to reach). The 25 units that comprise remote units have the lowest average annual recreation visits (145,000) of any population center category. Despite the extraordinary measures that must be taken in order to visit these units, this category has grown by 86% over the last 10 years. Almost all the Alaskan units are in this category.

Mixed—(a mixture of urban, suburban, outlying, and remote areas). Blue Ridge Parkway dominates this category as it does in every category it is associated with. This is especially true of mixed units since there are only two other units designated as mixed (Chesapeake and Ohio Canal National Historical Park and Natchez Trace Parkway). This category has decreased by 7% over the last 10 years.

Recreation visits in the future

The national park system has recorded approximately 11.2 billion visits (8.4 billion recreation visits and 2.8 billion non-recreation visits) from 1916-98. This means that the park system has received over 190 visits every second for the last 82 years. Assuming the current rate of increase, it should receive its 12 billionth visit some time in 2000. As the pressure increases to both maintain park resources and simultaneously provide the high quality of service that the public deserves, the sheer volume of visits to the national park system will be a major factor in the decision-making process. The need to control the number of people entering parks and provide for their safety will be an important aspect of future managerial decisions. **P**

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Visitor opinions and park resources

By MARGARET LITTLEJOHN

How many park resource managers have used visitor opinions in making a management decision about park resources? Visitor opinions about park resources and the quality of their national park visits vary, as do the visitors themselves. Visitors sometimes share verbal feedback or write letters to National Park Service (NPS) employees. Often, these comments are not scientifically collected, sometimes not compiled, and therefore have little impact on improving park operations. Many park managers, recognizing the importance of obtaining more scientific and collective feedback on how well visitors are being served, request visitor studies.

Resource managers are beginning to realize that through visitor studies, visitor opinions about resource management issues can be scientifically gathered. Managers often choose to query visitors about issues such as crowding, the importance of park qualities (such as air quality, recreational activities, solitude, and wilderness), resource issues that interest visitors, and the impacts of other visitors and their activities on people's visits.

One NPS research program that conducts visitor studies is the Visitor Services Project (VSP), based at the University of Idaho Cooperative Park Studies Unit. The VSP develops different tools that provide the National Park Service with valuable visitor feedback. One of these tools, the in-depth visitor studies at individual park units, began in 1982. Up to 10 in-depth visitor studies have been conducted each year since 1988. Since then, over 85 VSP in-depth visitor studies have been conducted, with an average response rate of 79%.

VSP in-depth visitor study questionnaires are customized to allow park managers to ask visitors questions about the most important issues facing the park. The questionnaires gather standardized demographic information, and customized information about trip planning, opinions about park visits, park issues, and feedback on individual and overall service quality. This direct and collective feedback from visitors is valuable information for

park managers, who can use it to make operational changes or better plan for the future, ultimately benefiting the visitors.

Recent VSP in-depth visitor studies reveal some interesting information about visitors' views on natural and cultural resources and use of those resources in the parks. Some comments show visitors' increasing awareness and concern for park resources. Several examples follow.

A visitor's comment:

"This park is a magnificent treasure, which merits bold and even controversial measures to safeguard it for future use as a natural haven, protecting the environment and enriching the people who experience it."

Crowding

A number of VSP visitor studies have addressed visitor opinions about crowding in parks. During a 1998 VSP visitor study, Cumberland Island National Seashore (Georgia) visitors were asked to give their opinion about the current limit of 300 people per day allowed on the island. As shown in figure 1, most visitors (82%) felt that the current limit is "about right."

Resource management objectives

Visitors have occasionally been asked whether they support particular resource management objectives in parks. At Fort Bowie National Historic Site (Arizona) in 1996, visitors were asked if they supported the following objective: "The current National Park Service objective is to manage Fort Bowie National Historic Site in its remote setting with minimal improvements." Most visitors (88%) said they supported that objective, while 5% did not support that objective and 7% were not sure. When asked if they felt the Park Service has achieved that objective, 92% said "yes," 4% said "no," and 4% were "not sure."

Impact of modern conveniences on historic setting

Park managers may be interested in finding out if visitors perceive certain resource-related issues as problematic. For example, during the 1997 Lincoln Boyhood National Memorial (Indiana) visitor study, visitors were asked, "Do you feel that automobile and train traffic within the park impacts the historic setting of the Living History Farm?" Many visitors (63%) said that automobile and train traffic did not impact the historic setting. Twenty-two percent were not sure and 14% said automobile and train traffic did impact the historic setting.

Appropriateness of activities

Park managers may want to gauge visitors' knowledge of the appropriateness of certain activities in a park setting. In the 1995 visitor study questionnaire at Bandelier National Monument (New Mexico), visitors were asked to rate how appropriate certain activities were in the monument. The activities visitors were asked to rate included: walking or sitting on ruin walls, collecting artifacts (such as potsherds), walking off trail among the ruins, exploring ruins in caves, feeding animals, and collecting plants (picking flowers, collecting pine cones, etc.). Visitors used a 4-point scale to rate the appropriateness as follows: 1=always, 2=usually, 3=sometimes, 4=never. Figures 2 and 3 show examples of the responses. More visitor groups feel that collecting artifacts in the park is never appropriate (91%) than walking off trail in the ruins (65%).

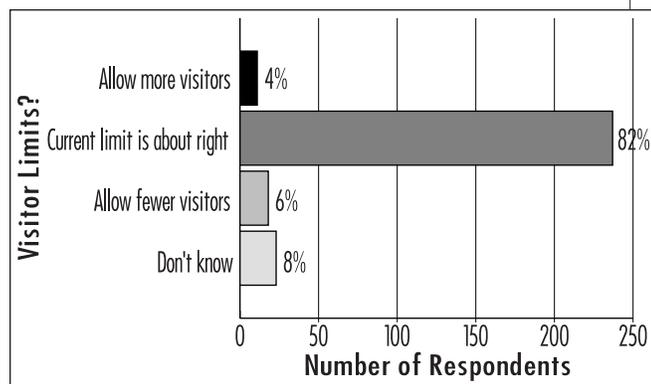


Figure 1. Visitor opinions about current visitation use limit, Cumberland Island National Seashore, 1998. (n=289 visitor groups.)

Importance of park features or qualities

How important are selected park features or qualities to visitors at the parks they visit? At Grand Teton National Park (Wyoming) in the 1997 visitor study, visitors were asked to rate the importance of native plants and animals using a scale from 1 (not important) to 5 (extremely important). Most visitor (87%) rated native plants and animals as “extremely important” or “very important.”

Visitor Services Project visitor studies were conducted at Great Smoky Mountains National Park (Tennessee and North Carolina) during July and October 1996. Visitors were asked to rate the importance of the following park features and qualities to their visit to the park: native plants and animals, clean air, scenic views, recreational activities (such as hiking, camping, fishing, etc.), solitude, and historic buildings. In the summer study, visitors gave the highest “extremely important” or “very important” ratings to scenic views (95%), clean air (90%), and native plants and animals (80%), as shown in figure 4. In the fall survey, the same three features or qualities received the highest importance ratings from visitors: scenic

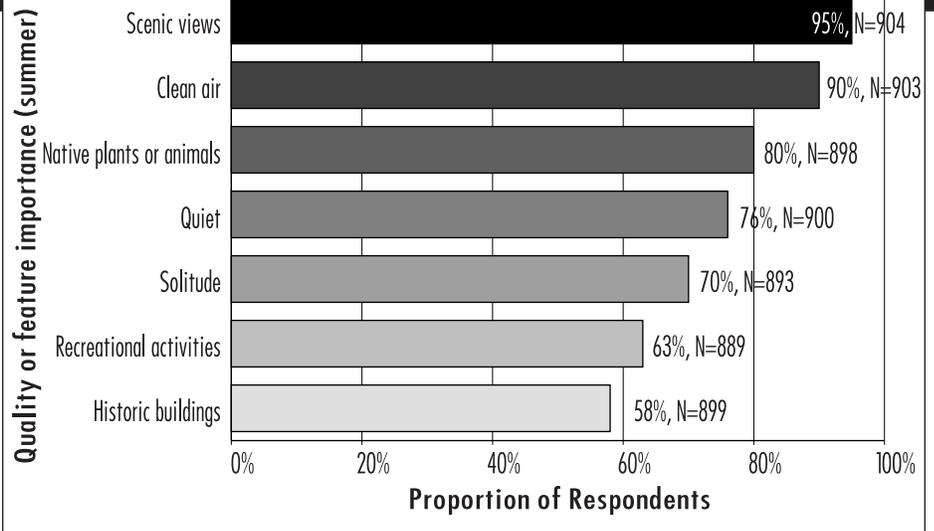


Figure 4. Combined proportions of “extremely important” or “very important” ratings of park qualities or features at Great Smoky Mountains, summer, 1996.

views (95%), clean air (87%), and native plants and animals (74%). In both of the studies, the two features that received the highest “not important” ratings were recreational activities and historic buildings.

Other visitors’ impacts

Sometimes, visitors’ enjoyment of park resources is impacted by other visitors and their activities. During 1997, Voyageurs National Park’s (Minnesota) visitor study showed that visitors were disturbed by other visitors using personal watercraft. Noisy people, loud music, or motorboats were also cited as ways visitor groups disturbed others.

Resource subjects of interest

Resource issues are often discussed in interpretive programs with the recognition that informed visitors are less likely to damage resources. Having visitors identify the resource subjects that they are most interested in learning about results in more informed visitors and more wisely spent park funds. In the spring 1996 Chiricahua National Monument (Arizona) visitor study, visitors were asked to identify subjects they were most interested in learning about from the following list: threatened and endan-

gered species, animal protection, air quality, wilderness, historic resources, role of fire, or any other subject the visitor wanted. The most common answers were wilderness (67%), historic resources (61%), and threatened and endangered species (46%). Air quality (23%) was the least requested subject.

Using visitor opinions

These examples show a few types of resource management information that park managers can learn from visitors. While visitors cannot be expected to make management decisions regarding park resources, they can provide information that is useful for park managers to incorporate into their decisions regarding resources. Some visitor responses may point out the need for better visitor education on resource management issues, while others support management objectives of protecting park resources. In designing survey questionnaires, it is important to recognize that visitors do not always come to parks with preconceived expectations—many visitors are not subject experts and may not be well informed about specific subjects. Ultimately, resource management decisions need to be made by well-informed managers who incorporate visitor opinions into their decisions. **P₅**

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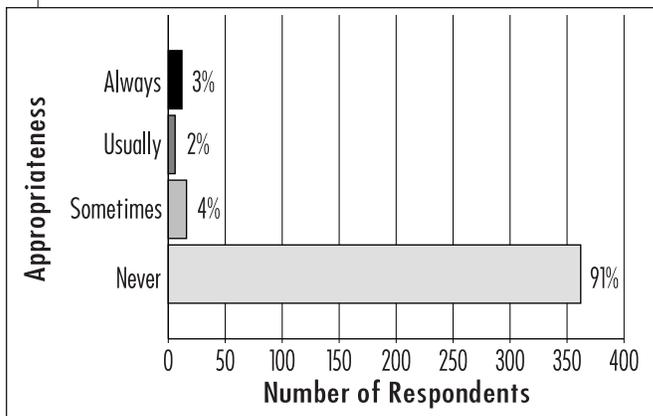


Figure 2. Appropriateness of collecting artifacts in the monument, Bandelier National Monument, 1995. (n=396 visitor groups.)

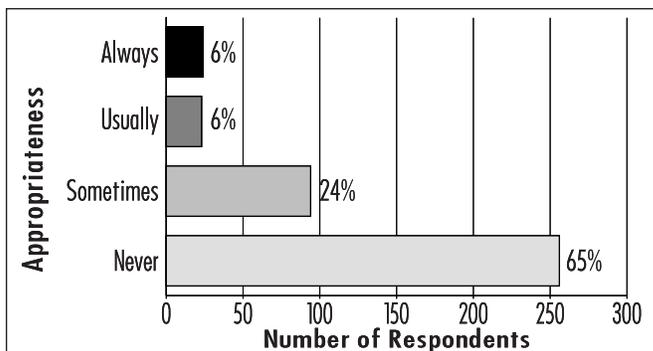


Figure 3. Appropriateness of walking off trail in the ruins, Bandelier National Monument, 1995. (n=397 visitor groups.)

Protecting park resources using interpretation

JAMES H. GRAMANN

Park staff use two general approaches to protect natural and cultural resources from purposeful or unwitting damage by visitors. Under a “direct approach,” a park’s staff manages visitor behavior overtly through surveillance, by enforcing regulations, and by physically channeling visitors away from sensitive areas. “Indirect approaches” use information and interpretation to promote voluntary conformance with rules. This article reviews the theoretical basis for indirect management, presents research evaluating its effectiveness, and discusses gaps in current social science knowledge related to indirect management as a resource-protection tool.

Theoretical basis

Several experiments have tested the effectiveness of interpretation and information in reducing rule violations and damaging behavior in outdoor settings. The results of many of these are consistent with predictions of prosocial behavior theory (Gramann et al. 1995). “Prosocial behavior” is defined as voluntary behavior done to help others, without the incentive of material rewards for helping or the threat of probable punishment for not helping. In many cases, obeying protective rules in parks is prosocial behavior. This is because no tangible reward for rule obedience exists, and the likelihood of being caught and punished for disobedience is often small.

Two propositions form the core of prosocial behavior theory (Schwartz 1977). First, other things being equal, prosocial actions should be more likely when people are *aware of the consequences* of their helping (or not helping) for others or for the environment. Second, persons should be more likely to behave prosocially when they *feel personally responsible and qualified to help*. The first of these conditions is called “awareness of consequences” and the second “ascription of responsibility.”

Applying prosocial behavior theory to resource protection requires an understanding of the reasons for damaging actions. Gramann and Vander Stoep (1987) described several motives for these actions and

Figure 1. An NPS interpreter greets hikers at the Shiloh National Military Park trailhead to deliver one of three test messages designed to reduce damaging behavior during hikes.



how they could be addressed using interpretation and education within the framework of prosocial behavior theory.

One reason visitors violate protective rules is that they are unaware that certain regulations exist. Obviously, interpretation and information—if it reaches the relevant audience—can play a major role in making people more aware of protective regulations in parks.

However, sometimes visitors violate rules, even if they are aware of them. One reason for this is that they may not realize the negative consequences of their actions for other users or for the environment. Many impacts on resources are cumulative, becoming evident only after many damaging actions occur over long periods. Because visitors’ time in parks is short, people may not connect their behavior with damaging effects. However, they might refrain from harmful actions if this cause-effect relationship were explained in an “awareness-of-consequences” message. Interpretation is one way to make people aware of the consequences of their behavior for a park’s resources.

Sometimes, visitors are aware of a rule and its reasons, but obeying it in a particular circumstance may seem unreasonable or even impossible. This leads to “responsibility-denial,” a situation in which people deny having a reasonable obligation or the skills to comply with rules. For example, prohibitions against dumping waste from recreational vehicles may be ignored if sanitary dump stations are full or if the fee for use seems excessive. Responsibility-denial can be countered by publicizing reasonable alternatives to prohibited actions or by making people feel qualified to help in certain situations. The latter dynamic underlies many adopt-a-site programs, including

litter cleanup campaigns and archeological site-protection efforts. In a prosocial-behavior framework, these programs increase people’s ascription of responsibility to protect natural and cultural resources.

Of course, people sometimes damage resources willfully and vindictively. Although such malicious behavior may be relatively uncommon in many parks, a single instance can produce significant and costly damage. Willful violators are fully aware that their actions are wrong, but they persist because they are pursuing goals that are in fundamental conflict with resource protection. Willful vandalism almost always requires direct and forced compliance with regulations. However, research shows that providing interpretation and information about rules, and enlisting visitors in resource protection, can be very effective as indirect approaches to changing many other types of harmful behaviors.

Research

The effectiveness of interpretation and education in resource protection was demonstrated in several experiments conducted in national parks and other recreation areas during the 1980s and early 1990s (Gramann et al. 1995). Unfortunately, little research evaluating indirect management has been done since, leaving key questions unanswered. These are discussed at the end of this article.

The following study describes an evaluation of interpretation’s effectiveness in reducing cultural resource damage at Shiloh National Military Park (figure 1), a Civil War battlefield in Tennessee (Vander Stoep and Gramann 1987). Other demonstrations of indirect management’s effectiveness have been done in national forests (Martin 1992,

Roggenbuck and Berrier 1982) and at reservoirs operated by the Army Corps of Engineers (Oliver et al. 1985). Therefore, the utility of indirect management as a resource protection tool seems to generalize across a variety of outdoor settings.

Cultural resources at Shiloh consist mainly of monuments, statues, and cannons. Although some resource damage in the park is caused by weathering and aging, visitors also contribute to the deterioration of cultural resources. At the time of the study, much of the destructive behavior was linked by NPS staff to organized youth groups who hiked through the park. Damaging behavior ranged from graffiti and defacement (a relatively rare problem) to more common actions, such as climbing or sitting on statues (figure 2). To combat the problem, three experimental treatments and a control condition were tested over 12 fall weekends. The behavior of hikers at four different locations in the park was monitored using time-lapse photography.

In treatment 1, the awareness-of-consequences (AC) treatment, hikers were met by a uniformed interpreter as they arrived at the trailhead that was the starting point for most of the hikes. They were welcomed to the park and told about specific behaviors, such as touching or rubbing bronze statuary and striking and climbing on monuments that caused damage over a period of time. They were asked to help protect the park's resources by setting an example for others, and then allowed to proceed. This treatment was in effect on three randomly assigned weekends and was intended to promote awareness of protective rules and the reasons for them.

Treatment 2 was the awareness-of-consequences plus resource protection treatment (AC + RP). Hikers received the same AC message as those in the first treatment, and were then asked to participate in a "Heritage Guardian" program. This involved returning a form on which hikers recorded any damage to cultural resources they observed during their visit (fresh scratches, breaks, marks, and missing pieces) and listed conditions they felt encouraged others to behave destructively. Groups were told they were distinctively qualified to help the National Park Service because they hiked in areas seldom reached by other visitors. Participation was voluntary, but no groups declined to take part. This treatment was designed to reduce responsibility-denial by promoting ascription of responsibility.

In Treatment 3, the AC + RP + I treatment, incentives were added to the first two messages. Two incentives were awarded for returning a completed Heritage Guardian form to the park. The first was a 24-inch streamer similar to those scouts attach to troop banners. The streamer was blue, printed in gold, and marked with the words "Shiloh NMP Honor Award/Heritage Guardians." The second incentive was a certificate signed by the park superintendent. This treatment was also in effect on three randomly assigned weekends. Although not based on prosocial behavior theory, it was thought that incentives might be an effective external motivator for young people who had not yet developed internal codes of appropriate behavior.

Finally, on three other weekends, a control condition was in effect. Groups were welcomed to the park and then allowed to proceed on their hikes. This control served as a baseline against which the effectiveness of the other three treatments was measured.

The amount of damaging behavior on each weekend was scored by two judges who independently reviewed each roll of film. The judges were "blind" to the treatments, i.e., unaware of the experimental conditions in effect on any weekend. Scoring was done by analyzing the film frame-by-frame using a stop-action projector. For ease in identification on camera, all persons included in the treatments and control condition were given bright orange stickers to wear that read "I'm a 25th Anniversary Trail Hiker."

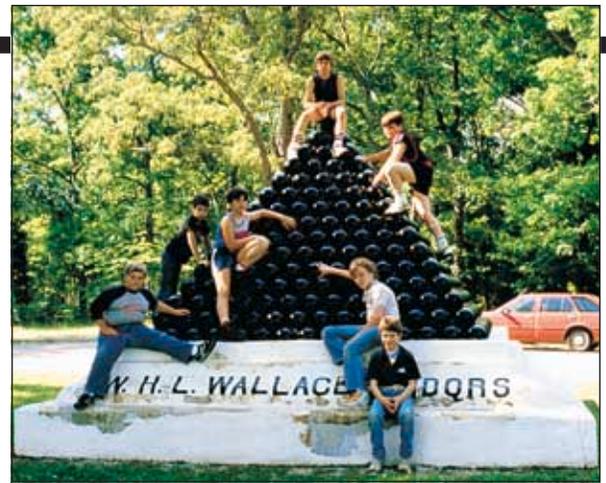


Figure 2. Hikers climb on a large headquarters monument at Shiloh. Besides damaging the monument, this behavior exposes youth to risk of injury if they fall or are pushed.

Results

All treatments significantly reduced damaging actions when compared to the control condition (figure 3, following page). This was especially true for climbing and hitting, the most harmful activity. Table 1 shows that the three treatments were equally effective in this case, reducing hitting and climbing by about 88% compared to the baseline condition. The treatments were least effective in reducing touching or rubbing of monuments. This may have been because the Heritage Guardian program required hikers to examine monuments to identify scratches and other damage. This would appear as touching and rubbing on film.

Statistical analysis showed that the treatments did not differ significantly from each other in their effectiveness in reducing the most damaging behaviors. The simplest and least costly measure—a simple awareness-of-consequences message—was as effective as the Heritage Guardian program and the incentives.

Table 1.
Percent change in damaging behavior vs. control (combined sites)

Behavior	Experimental Treatment		
	AC	AC+RP	AC+RP+I
All behaviors	-77.7*	-73.6*	-58.7*
Sitting on base	-70.8*	-78.2*	-52.2
Touching	-65.4*	-24.4	+4.6
Climbing, hitting	-87.9*	-87.6*	-87.1*

*difference from control condition significant at $p = 0.05$

See "Interpretation" on page 36

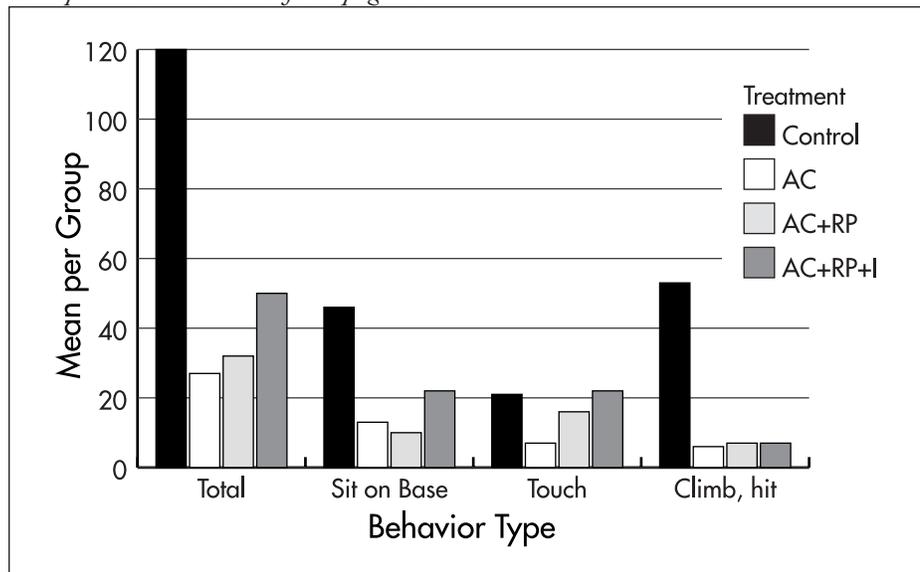


Figure 3. Change in damaging behavior by treatment (combined sites).

Applications to other situations

In other experimental research utilizing control groups, interpretation (either in verbal or printed form) has been used to significantly reduce littering in a highly developed Corps of Engineers campground (Oliver et al. 1984), camping at overused national forest wilderness sites (Roggenbuck and Berrier 1982), wildlife feeding at Crater Lake National Park (Schwarzkopf 1984), off-trail hiking at Mount Rainier National Park (Johnson and Swearingen 1992), and pumice removal at Mount St. Helens National Volcanic Monument (Martin 1992). In none of these circumstances was the targeted behavior completely eliminated; however, the situation was dramatically improved compared to baseline conditions in which no actions were taken.

The Shiloh messages did not threaten punishment for rule violations, but other field experiments support the effectiveness of these types of "sanction" messages. This is especially true if visitors feel punishment for violations is serious and likely (Gramann et al. 1995, Johnson and Swearingen 1992). Unfortunately, this condition is often hard to satisfy in many areas of the national park system.

An interesting question raised by indirect management research in rural parks is how well such techniques would work in urban areas. At more remote parks, many visitors seem predisposed toward resource protection. In communicating rules, interpreters are often working *with*, rather than *against*, visitors' basic values. But in urban parks, visitor populations are more diverse,

The simplest and least costly measure—a simple awareness-of-consequences message—was as effective as the Heritage Guardian program and the incentives.

The messages at Shiloh were delivered verbally by a uniformed interpreter with excellent social skills. This probably contributed to their effectiveness. Even so, other studies suggest that written messages in brochures and signs that state and explain rules can be effective in changing visitor behavior (Christensen et al. 1992). However, limited research indicates that written messages are not as effective as verbal messages in doing this (Gramann et al. 1992).

and many users may not share as strongly in the underlying value of resource protection. In these areas, a combination of indirect and direct management approaches would seem to be the most effective approach, but no research in urban park settings has been published on this topic. Nevertheless, despite these gaps in the knowledge base, in many situations common to the national park system, social science research shows that interpretation can be an effective resource-protection tool. **P**

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The NPS Visitor Survey Card:

First year survey and implications for park management

By TERRY R. BERGERSON

In 1993, Congress passed the Government Performance and Results Act (GPRA), which directs federal agencies to join the “performance management revolution.” For the past several years, the National Park Service has been working to implement GPRA, to make it “fit” the agency and mission and to make it useful. As mandated by GPRA, the Park Service has developed national park systemwide standards for a broad range of key performance measures including both annual and long-range goals. One of these goals involves the annual measurement of visitor satisfaction in units of the national park system.

In 1997, the National Park Service assigned the Social Science Program the task of developing a standard GPRA survey that could be used annually by all park units to measure visitor satisfaction. The survey was given the name Visitor Survey Card (VSC)—a GPRA-based, customer evaluation system for the National Park Service modeled after “the best in business.” The project is being conducted by the University of Idaho Cooperative Park Studies Unit (UI CPSU), under the direction of Dr. Gary Machlis, NPS Visiting Chief Social Scientist. Terry Bergerson coordinated the project.

The overall objectives of the project were to develop a visitor service evaluation system that:

1. is efficient and cost-effective to implement,
2. is appropriate for use in all units of the national park system,
3. allows for comparison at various NPS organizational levels,
4. is timely for managers,
5. is scientifically sound, and
6. provides useful information to managers—for meeting GPRA reporting requirements and improving visitor services.

The VSC is similar to mail-back customer satisfaction surveys successfully used in major U.S. corporations (figure 1).

The card addresses 12 indicators of visitor satisfaction, allowing visitors to rate the quality of park facilities, visitor services, and recreational opportunities. Visitors rate the services using a 5-point scale (“very good,” “good,” “average,” “poor,” and “very poor”). For GPRA reporting purposes, the card includes an overall quality question used as the primary measure of visitor satisfaction.

Methods

The VSC studies are based on a systematic survey of park visitors. Four-hundred survey cards are distributed to a random sample of visitors in each park during a 30-day study period. Visitors at selected locations that are representative of the general visitor population are sampled. For each survey, park staffs select an interval sampling plan based on the previous year’s visitation. Park staff are trained to carefully hand out survey cards according to an approved set of survey instructions and guidelines.

Survey administration

After a 45-day collection period, all returned survey cards are electronically scanned, and the data coded and analyzed. A standard VSC data report is generated and delivered to each park

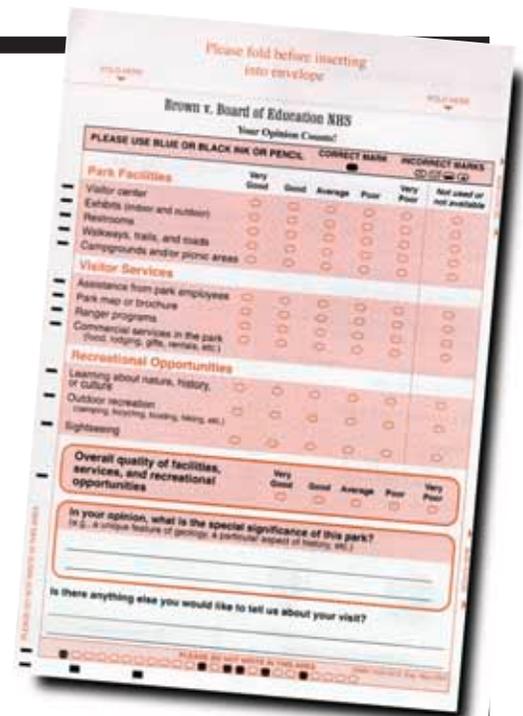


Figure 1. 1999 Visitor Survey Card.

approximately three months after the completion of their survey. At the end of the year, reports at the cluster, region, and systemwide levels are generated and delivered to the National Park Service.

Results

A 1998 VSC survey was completed in 281 national park sites. The average response rate for these park surveys was 24%.

Each park report contains three categories of data—park facilities, visitor services, and recreational opportunities. Within these categories are graphs for each indicator evaluated by park visitors (table 1). Responses for indicators within

Table 1.
Visitor Response Categories and Indicators

Service Categories	Service Indicators
Park Facilities	Visitor center Exhibits (indoor and outdoor) Restrooms Walkways, trails, and roads Campgrounds or picnic areas
Visitor Services	Assistance from park employees Park map or brochure Ranger programs Commercial services in the park
Recreational Opportunities	Learning about nature, history, or culture Outdoor recreation Sight-seeing

See “Survey Card” on page 38

each service category are averaged into a combined graph for the category.

For GPRA-reporting purposes, each report contains a rating of the park's overall quality of facilities, services, and recreational opportunities. A visitor is "satisfied" if their response is either "very good" or "good." Based on evaluations by park visitors, there is strong evidence of excellent customer service in the national park system. Of the 281 parks that completed a 1998 VSC survey, 275 (98%) successfully met the annual systemwide goal of 77% visitor satisfaction.

In addition, survey results are summarized at the cluster level. Table 2 shows the percentage of park visitors satisfied overall with appropriate facilities, services, and recreational opportunities for 12 clusters in the national park system. Some regions include a single cluster or do not have a cluster designation. These areas

Table 2.
Percent of visitors satisfied, by cluster, in 1998

Cluster	% Visitors Satisfied
Allegheny	96
Appalachian	96
Chesapeake	96
Gulf Coast	96
Atlantic Coast	95
Colorado Plateau	95
Columbia Cascades	95
Rocky Mountain	95
Southwest	95
New England	94
Pacific Great Basin	93
Pacific Island	90

(n=281 parks, 22,913 respondents)

Table 3.
Percent of visitors satisfied, by region, in 1998

Region	% Visitors Satisfied
Midwest	96
Southeast	96
Intermountain	95
Northeast	95
Alaska	94
National Capital	93
Pacific West	93

(n=281 parks, 22,913 respondents)

are not included in table 2. Overall satisfaction scores for these clusters ranged from 90%-96%.

Survey results are also summarized at the region level. Table 3 shows the percentage of park visitors satisfied overall with appropriate facilities, services, and recreational opportunities for each of the seven NPS regions. Regional overall satisfaction scores ranged from 93%-96%.

Finally, survey results are summarized at the systemwide level. Visitor responses for each of the 12 service indicators (table 1) are combined and averaged at the systemwide level. Table 4 shows the percent of visitors satisfied with these service indicators. Direct employee services such as assistance from park employees and ranger programs received high visitor satisfaction ratings. Commercial services in the park received the lowest visitor satisfaction rating of the 12 service indicators.

Visitor responses for indicators within each service category (table 1) are also combined and averaged at the systemwide level. Table 5 shows the systemwide percentages of visitors satisfied with park facilities, visitor services, and recreational opportunities. Recreational opportunities received the highest visitor satisfaction ratings of the three service categories.

Twenty-two thousand nine-hundred thirteen (22,913) respondents in 281 units of the national park system rated the overall quality of facilities, services, and recreational opportunities at the park they visited. Ninety-five percent of these respondents were "satisfied" with the overall quality of services provided. This high level of visitor satisfaction is strong evidence of the agency's willingness to serve the public.

Survey response rate and nonresponse bias

The project's research and development effort included an investigation to determine a typical survey response rate for similar mail-back customer service cards. Of the firms contacted, typical response rates for similar mail-back customer service cards without financial incentive ranged from 10%-30%. A review of the customer satisfaction literature confirmed this range to be reasonable (Varva 1997, Hayes 1997). The 24% average response rate for the 1998 VSC project is compa-

rable to the best in private-sector customer service evaluations and acceptable for general performance measurement.

Although nonresponse bias is a potential problem in the VSC project, a number of steps were taken to deal with it. Nonresponse bias is a function of many factors within a survey—not just the final response rate (Dillman 1978). These include the *survey instrument*, *survey methodology*, and the final *response rate*. The VSC project carefully addressed each of these factors to reduce the potential for nonresponse bias in survey results. In addition, a test was conducted to identify nonresponse bias within the VSC survey results.

To test for nonresponse bias, the University of Idaho CPSU compared survey results from three VSC studies with the results from three 1998 VSP studies. These VSP studies contained the same

Table 4.
Systemwide percent of visitors satisfied, by service indicator, in 1998

Systemwide Service Indicators	Percent Visitors Satisfied
Assistance from park employees	96
Sight-seeing	95
Learning about nature, history, or culture	93
Park map	93
Ranger programs	93
Visitor center	93
Exhibits	91
Outdoor recreation	91
Walkways, trails, and roads	91
Campgrounds or picnic areas	83
Restrooms	81
Commercial services in the park	74

(n=281 parks, 22,913 respondents)

Table 5.
Systemwide percent of visitors satisfied by service category, in 1998

Systemwide Service Indicators	Percent Visitors Satisfied
Recreational Opportunities	93
Visitor Services	91
Park Facilities	89

(n=281 parks, 22,913 respondents)

Table 6.
Comparison of overall satisfaction within 1998 VSP
and VSC survey results

1998 Units	Visitor Services Project		Visitor Survey Card Project	
	% Satisfied	N Size	% Satisfied	N Size
Acadia NP	96	996	95	86
Chattahoochee River NRA	80	658	85	107
Jean Lafitte NP & Preserve	95	528	95	79
Average	90		92	

overall satisfaction question included on the visitor survey card for GPRA measurement of visitor satisfaction. The average response rate for these three VSP studies was 76%. These VSP studies were conducted at the same park, season, and survey locations as the VSC studies. Table 6 shows the percentage of visitors satisfied overall from these three parks for both the VSP and VSC studies. This compari-

son identifies similar results for the two types of studies. The comparison suggests that nonresponse bias is not a significant factor within the 1998 VSC results.

Feedback from the NPS

In an effort to improve the VSC survey, each park staff had an opportunity to evaluate the 1998 survey and reporting process. An evaluation card was provided for each participating park unit. Fifty-six percent of the parks completing a VSC survey returned an evaluation card. Figures 2 and 3 show the results of this evaluation.

The evaluation results suggest that park staffs found the VSC instructions and guidelines easy to use (figure 2). The results also suggest that park staffs were satisfied with the quality of services provided by the VSC staff (figure 3).

Using the VSC survey results

As part of the GPRA process, the National Park Service has developed a hierarchy of mission statements and goals to guide the performance management process. This planning framework provides the structure for measuring park performance across the system. At the park level, long-term and annual goals are tools for performance evaluation. The long-term and annual goals for visitor satisfaction state the desired future condition of the visitor's experience at units within the national park system.

In 1999, the annual goal for visitor satisfaction will be increased to establish a reasonable systemwide standard. In future years, the annual and long-term goals will be used as a tool to increase the level of visitor service in all units of the national park system.

Conclusion

The 1998 VSC survey results provide the National Park Service with useful information for managers, staffs, and the public on customer satisfaction. The results also allow the agency to monitor performance on customer service standards in accordance with the National Performance Review. In addition, survey results provide the Park Service with the ability to transfer the usable knowledge gained from the evaluations into improved customer service at the local, regional, and systemwide levels.

While the National Park Service is providing excellent customer service, there are still opportunities for improvement. The survey results show that visitors rate certain service indicators lower than others. Although the majority of parks have high customer service ratings, an effort is needed to bring all units of the system to this high level of visitor service. Finally, there is the long-term challenge of maintaining a consistently high level of visitor service in all units from year to year.

In future years, additional benefits will be realized as VSC survey results accumulate from year to year. Baseline data at the individual park, cluster, region, and systemwide levels can be compared with each new year's survey results. In addition, annual and long-term goal performance will continue to be monitored at all parks across the system. And perhaps most importantly, continuous measurement of customer service performance will become a part of the agency culture. P₃

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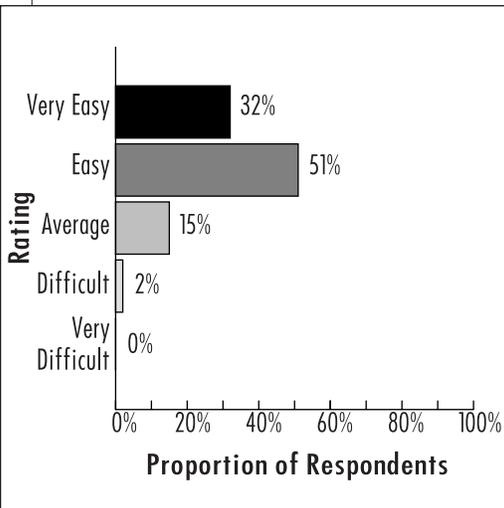


Figure 2. VSC evaluation: ease of use (n=156).

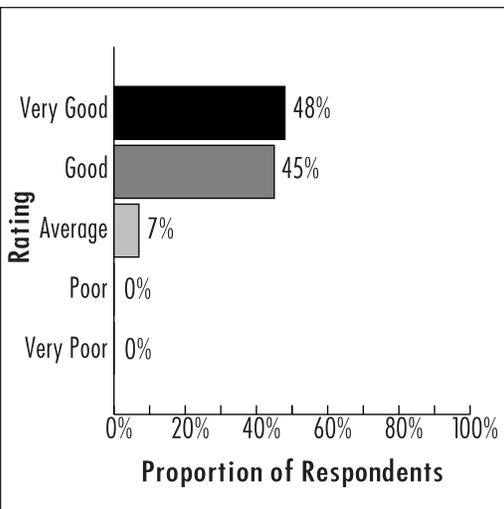


Figure 3. VSC evaluation: quality of services (n=156).

National Park Service managers' views of the Recreation Fee Demonstration Program

By A. E. LULOFF, CRISTINA PRATT, RICHARD S. KRANNICH, DONALD R. FIELD, AND BRIAN W. EISENHAUER

As part of the Recreation Fee Demonstration Program, the National Park Service (NPS) and the three other federal land management agencies (U.S. Fish and Wildlife Service, U.S. Forest Service, and Bureau of Land Management) are required to evaluate the impact of this new program on park visitors and park operations. The Park Service is the only agency that has initiated a detailed study of how management personnel at individual park units evaluate the effects of the program on their units, and how these individual units are responding to the program. A study team represented by social scientists from The Pennsylvania State University, University of Wisconsin-Madison, and Utah State University was commissioned to conduct a three-year survey of managers' perceptions of impacts from the Recreation Fee Demonstration Program on park operations.

This article reports on the methodologies utilized and findings from the FY1997 evaluation, which had three purposes. These were to assess NPS management personnel reactions to the implementation and operation of the Recreation Fee Demonstration Program on their park units; assess management perceptions of the program's efficiency, including costs of management, revenues, and impact on visitation; and assess how funds generated from the Recreation Fee Demonstration Program were used within individual participating units.

Methodology

In May 1998, questionnaires were mailed to all national park system units participating in the Recreation Fee Demonstration Program. Follow-up letters and phone calls were made until a 100% response rate from participating parks was achieved. While 100 individual projects had been authorized in the NPS Recreation Fee Demonstration Program, in some cases two or more park units par-

ticipated jointly in the program. Therefore, a total of 109 surveys were returned for analysis.

Findings

Key findings include the following highlights from park managers' opinions and perceptions of the Recreation Fee Demonstration Program's effects on park visitation and management. First, most managers perceived no overall effect on visitation patterns. Seventy-five percent of the managers felt that the Recreation Fee Demonstration Program had not affected visitation patterns, such as the number of visitors coming to their park by season of the year, or on weekends versus weekdays. Fifteen percent believed the fee increase caused a shift in visitation patterns, and 10 percent did not have an opinion.

Second, community and visitor reaction to the Recreation Fee Demonstration Program was perceived to be favorable. Managers believed the local business community, local area citizens, and local park users were most likely to shift their views about the Recreation Fee Demonstration Program, with 11%-15% of managers indicating that these constituencies' views had shifted from initially negative to positive. However, for these three local area constituencies, managers were most likely to indicate consistently positive (24%-29%) or consistently neutral (25%-37%) opinions. According to managers, visitors supported the fee program under two conditions: (1) if the funds collected remained in the unit where they were generated, and (2) if these funds were used to improve facilities and visitor services. Ninety-four percent of the parks were engaged in public information and communication activities to explain the Recreation Fee Demonstration Program to park visitors and the general public.

Third, the fee program was perceived to have a positive effect on park base budgets. Sixty percent of the managers had a positive view of the Recreation Fee Demonstration Program's contribution towards their park's base budget situation.

These managers indicated that the program allowed for greater flexibility in budget allocations. Thirty-four percent indicated that the program had no effect on their base budget, attributing this to the program's newness. Six percent indicated somewhat negative effects on base budgets, citing start-up costs and program operating expenses.

Fourth, managers were beginning to perceive a positive effect of the fees on the quality of visitor services. Forty-three percent of the managers indicated that the Recreation Fee Demonstration Program improved the quality of visitor information services at their parks. These managers believed there was general improvement in funding availability and spending flexibility, which they attributed to the program. Twenty-eight percent indicated improvements in visitor facilities. Twenty-nine percent said visitor center operations had improved.

Fifth, it was found that initial delays in the transfer of fee revenue to parks were a source of some concern, though in most cases these problems appeared to be reduced by the end of the program's first year of operation. Sixty-three percent of the managers said they did not receive funds in time to spend them during FY1997, a key problem in implementing the Recreation Fee Demonstration Program. Of this group, 25% attributed allocation delays to park-level management, 25% attributed delays to regional-level management, and the remaining 50% attributed these fiscal problems to national-level management. Nevertheless, 60% of participating units reported receiving their FY1997 funds in sufficient time to allocate them effectively for use in FY1998.

Finally, the study found that fee program funds were used for priority projects as determined by park staff. At the beginning of the Recreation Fee Demonstration Program, park managers were required to identify proposed projects for which to use additional fee revenues. Eighty percent indicated desires to expend funds on priority, maintenance, infrastructure, and resource management projects.

Two areas of park operations in 1997 stood out in terms of receiving funding emphasis from the Recreation Fee Demonstration Program: infrastructure and information services (figure 1). In addition, 67% of the units utilized some funds to support the operation of the Recreation Fee Demonstration Program, and 25% of these parks reported that the projects funded had been identified in their general management plan.

Utility of findings

There are several benefits of this study for park management. First, it meets an important need for sharing information about the Recreation Fee Demonstration Program with the public. Such information can help the individual units, as well as the National Park Service, maintain an active dialogue with the public about their responses to the Recreation Fee Demonstration Program. It helps foster an environment based on public awareness about the program and the many positive effects it is having on park services, facilities, and programs. Further, it is apparent that there is generally widespread support for and acceptance of this program by the public, as evidenced by managers' reports of only minor adverse effects on visitation patterns. Such information should prove invaluable in making the case to the Congress for continuation of the program.

At the same time, by engaging in an evaluation process from the outset of the program, this study provides insights into aspects of the National Park Service's Recreation Fee Demonstration Program that require attention and fine-tuning. Our study revealed concerns with fiscal problems and allocation delays, particularly with those viewed as originating at the national level. These issues suggest the need for some restructuring and streamlining of procedures to help insure more timely fund allocations and more efficient program administration procedures.

At the unit level, this study allows park managers to share information or results with their staff on how the program has been perceived by other units in the Recreation Fee Demonstration Program. As a result, it can act as a barometer on how any given unit is doing relative to other participating units. Similarly, the study provides managers with a window into

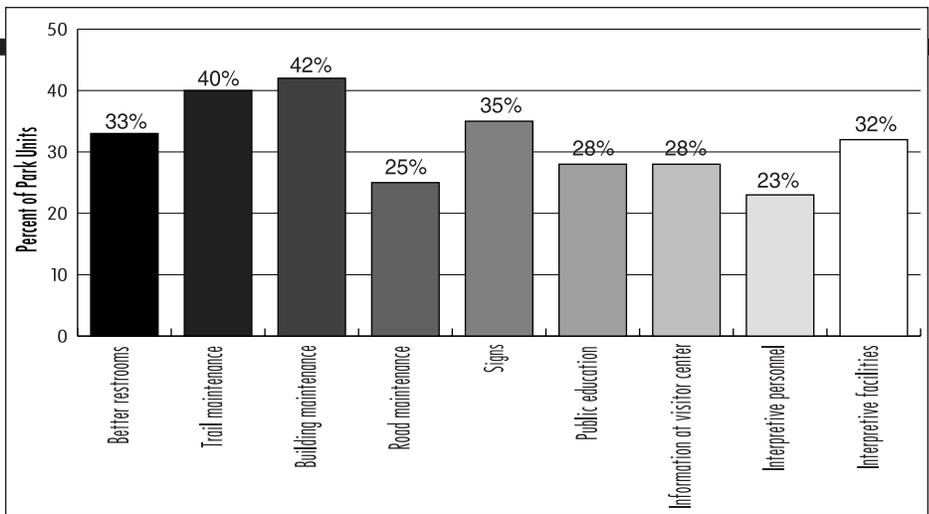


Figure 1. Managers' responses indicating various uses of FY97 Fee Demonstration Program revenues.

how different units are allocating their fee-related resources and the kinds of problems being encountered in these units.

Next steps

Our project is responsible for examining changes over time in the perceptions of managers toward the Recreation Fee Demonstration Program and its operation. To accomplish this task, we have completed a second study of participating units (in October 1998) and have compared the results of this study with those reported here. We have provided senior park management with the results of this comparison for their report to Congress. Finally, we are completing the design of the final survey (to be conducted in October 1999), which will be used to compare manager perceptions of program operation over a two-year period. The results from this analysis will be available in late spring 2000. **P**

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Social Science Needs Assessment:

A survey of NPS urban park managers

By RONALD A. HARRIS AND ALFREDO B. LORENZO

A needs assessment is a process for gauging the current situation in an organization (or a community), reaching value-based judgments, and prioritizing the status of needs (Carter and Beaulieu 1992). The Social Science Needs Assessment (SSNA) is a survey instrument developed by the Urban Recreation Research Center (URRC) for assessing the social science needs of urban park managers in the National Park Service. The Urban Recreation Research Center was established on October 1, 1998, at Southern University and A&M College, Baton Rouge, and is part of the NPS Social Science Program.

Survey approach

The survey is a commonly utilized approach to assess need. Visiting every urban park to interview the superintendents would be very costly. Instead, all NPS urban park managers were surveyed to minimize data collection costs. The Social Science Needs Assessment is a 108-item survey designed to assess the social science needs of NPS urban park managers. The Social Science Needs Assessment asked managers to rate their current need for (1) research tasks, (2) technical assistance activities, (3) training opportunities, and (4) delivery methods. Many of the research items on the survey came from *Usable Knowledge* (Machlis 1996).

The first 107 items in the instrument are scaled from 2 to -1. Respondents were asked to rate the importance to their park of the items that were described by circling the most appropriate number. The rating scale is 2 for *very important* (VI), 1 for *important* (I), 0 for *don't know/no opinion* (DK), and -1 for *not important* (NI). Ratings indicate the manager's "intensity" of need. When a manager marks an item "very important," we infer that he or she really needs this social science item. The responses were rank-ordered by average weight, using the mean for each item. The

calculation includes all responses to the survey items: positive, negative, and zero values. Discussion of these results follows.

These results are limited to NPS urban park managers with sites that are either inside or within 100 miles of metropolitan statistical areas or else consolidated metropolitan statistical areas. The national park system had 377 total sites when the survey was distributed on December 10, 1998, and completed by February 9, 1999. One-hundred sixty (42%) park sites were classified as urban parks (n=120) or parks adjacent to urban areas (n=40). The response rate to the survey is 83% (133 of 160). This high response rate supports our statistical inferences about NPS urban park managers. We suspect that superintendents often delegated responsibility for completing the survey to key informed staff members, which remains valid. The few missing responses to the survey make the results reliable.

Survey results

The survey results are presented in sections: (1) research tasks, (2) technical assistance activities, (3) training opportunities, (4) delivery methods, and

(5) comments. Using figures, we discuss the top ten rated items for each part of the survey, with mean ratings.

Research tasks

The NPS urban park managers were asked to rate 49 research tasks on their importance. The top ten rated research tasks are shown in figure 1. The top four items, which follow, have a mean rating, on a scale from -1 to +2, of higher than 1.5—trending towards "very important."

1. Assess interpretive programs, media, and public contact activities in urban parks.
2. Develop strategies for integrating visitor and community-based perspectives into decision making.
3. Analyze visitor expectations and evaluate experiences.
4. Identify critical visitor impacts on natural and cultural resources in urban parks.

For example, item 18 (second item in figure 1) on the survey has a mean response rating of 1.59. Therefore, this item

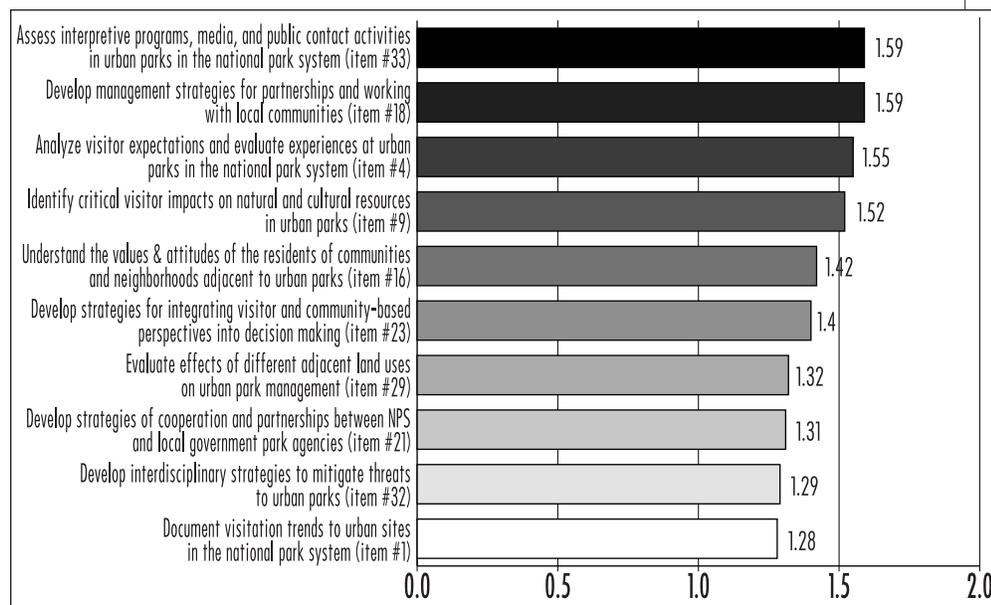


Figure 1. Ten most important research tasks rated by NPS urban park managers.

ranges between “important” and “very important,” according to managers surveyed.

The mean rating for items 18 and 33 (first item in figure 1) reveals a need for research on interactions between and among urban parks and relevant local publics. For example, working with partnerships and local communities, concern with media and public contacts, are shown. The response to items 4 and 9 (third and fourth items in figure 1, respectively) indicate the need for research on visitation. For example, visitor expectations and resource impacts need to be better understood for urban parks.

The managers of urban parks have provided useful information by rating the importance of what they need and do not need among the research task items offered. The managers indicate the importance of partnerships and working with communities toward effective delivery of park programs. There is an overwhelming need to conduct research on analyzing visitor expectations and evaluating their experiences at urban parks.

Technical assistance activities

The respondents were asked to rate a list of 24 technical assistance activities under four main subject areas: (1) social science research methods, (2) information technology, (2) management consultation, and (4) program evaluation. Manager ratings should prove useful for developing technical assistance programs tailored to urban park needs in the national park system. The top ten rated items are shown in figure 2. The four top items that follow have a mean rating greater than 0.9. This suggests that these items are “important” technical assistance needs.

1. Improving visitor relations, e.g., customer service
2. Impact analysis, e.g., measuring outcomes
3. Assistance with conducting visitor surveys
4. Assistance with interpreting survey results

The survey results indicate interest by managers of urban parks in the national park system for technical assistance. The highest-ranking technical assistance needs

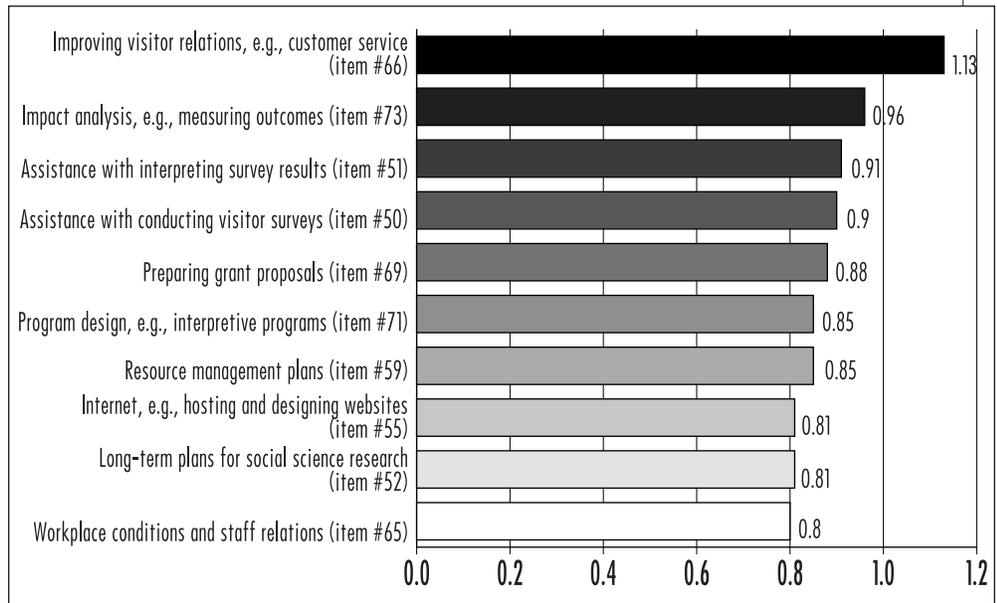


Figure 2. Top ten needs for technical assistance activities rated by NPS urban park managers.

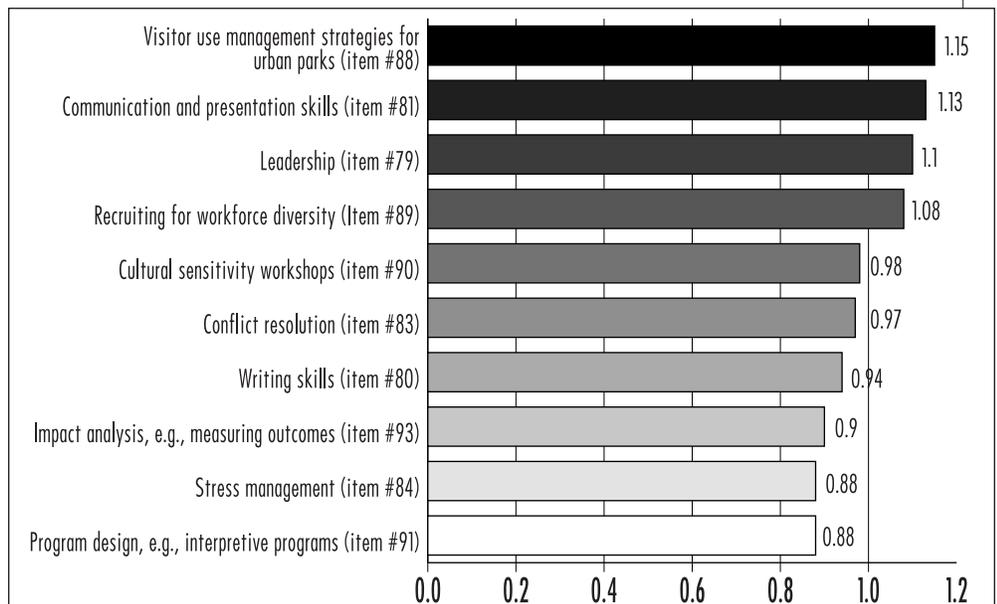


Figure 3. Top ten needs for training opportunities rated by NPS urban park managers.

range from improving visitor relations (i.e., customer service) and measuring outcomes to interpreting survey results.

Training opportunities

The respondents were asked to rate a list of 19 training opportunities in three areas: (1) information technology, (2) short courses in management, and (3) program evaluation. The manager ratings should prove useful for developing specific programs designed to target the training needs of urban parks. The top ten rated training opportunities are shown in figure 3. The four top items, which fol-

low, have a mean rating greater than 1, which suggests they are “important” needs.

1. Visitor use management strategies for urban parks
2. Communication and presentation skills
3. Leadership
4. Recruiting for workforce diversity

The respondents expressed interest in receiving training in all topics, excepting the Internet. The survey results indicate need by NPS urban park managers for

See “Needs” on page 44

training opportunities in several areas. Ratings can be used to develop and implement training programs and continuing education opportunities for areas managers deem important.

Delivery methods

The survey respondents were asked to rate 12 delivery methods, ranking their usefulness. The ratings should prove useful for developing programs that will best deliver research findings, technical assistance, and training opportunities to urban parks. The top ten rated delivery methods are shown in figure 4. The top four items, which follow, have a mean rating of 1 or more, indicating that they are "important."

1. Internet
2. Fact sheets
3. Reference handbooks
4. Workshops

Prioritizing preferred delivery methods should help to facilitate a cost-effective transfer of information and technical assistance to urban parks in the national park system. The survey results indicate strong preferences among the respondents for delivery methods. These delivery methods should receive priority for training opportunities, technical assistance activities, and dissemination of research information.

Conclusion

This needs assessment is an important first step by the Urban Recreation Research Center to support the National Park Service and its Social Science Program. Understanding the needs of managers of urban parks in the national park system is vitally important to meeting the NPS legislative mandate to conduct scientific research in social sciences. The survey results will help the URRC prioritize the needs of urban parks to develop its research agenda, provide specific technical assistance and training programs, and improve delivery of usable knowledge, while minimizing costs.

The survey results indicate that the majority of respondents need social science research, technical assistance, and training opportunities. We find overwhelming need for research on visitor expectations and an evaluation of experiences. Just 3% of NPS urban park managers rated this item of need "not important." Urban park managers with the National Park Service agree on the importance of developing partnerships and working with their communities for more effective delivery of park programs. These results reveal managers' needs for technical assistance, such as improving visitor relations and interpreting survey results. Respondents expressed an interest in getting training for every topic, except the Internet. Prioritizing delivery methods should facilitate cost-effective transfer of information and technical assistance to urban parks in the national park system. There are strong

preferences among managers for the delivery methods: Internet, fact sheets, workshops, reference handbooks, and "how-to" information brochures.

The managers' comments indicate need for economic research, impact analysis, and opinion surveys. They also cite the need for technical assistance on management issues. The need for further research on resource impacts from visitation was echoed by many key informants during the interviews that we conducted at the site visits to urban parks. This social science needs assessment of NPS urban park managers provides the Urban Recreation Research Center and the NPS Social Science Program with usable knowledge to develop and deliver research, technical assistance, and training programs. The results prioritize the current needs of NPS urban park managers for social science.

At this juncture, the Urban Recreation Research Center has developed a comprehensive strategic plan based on the survey results. In the next few years, while many of the initial research, technical assistance, and training programs are completed, the Center will resurvey NPS urban park managers to see if any distinguishable changes in the values, priorities, and needs of NPS urban park managers occurred and whether changes can be attributed to URRC programs. **P**

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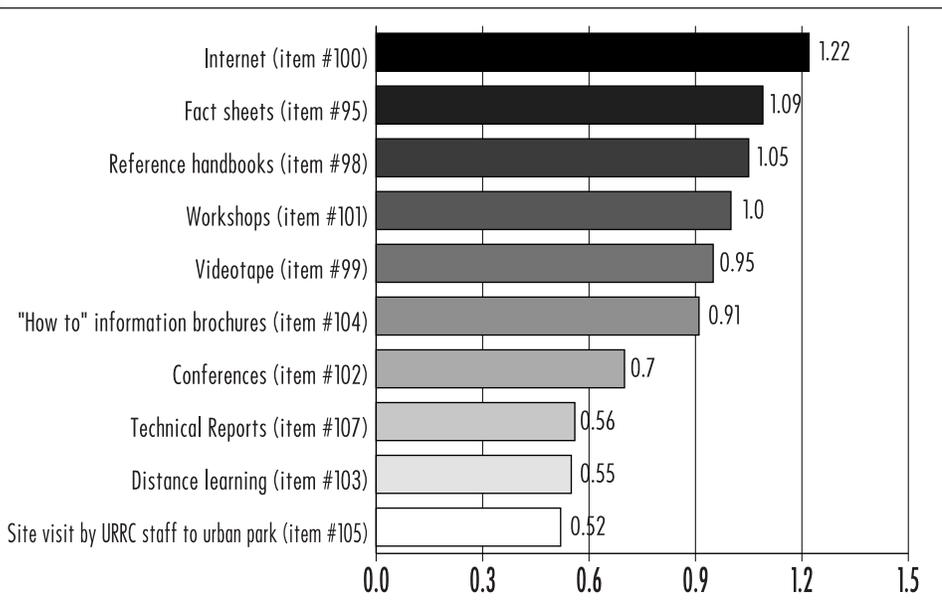


Figure 4. Top ten delivery methods rated by NPS urban park managers.

Usable Knowledge:

A progress report on the NPS Social Science Program

By GARY E. MACHLIS

Understanding the relationship between people and parks is critical for protecting resources and providing for public enjoyment. Hence, social science research is critical to the mission of the National Park Service, and it is an important function of the agency.

In 1996, the National Park Service (NPS) approved a plan for an expanded program of social science. *Usable Knowledge: A Plan for Furthering Social Science and the National Parks* was the work of many individuals and groups: NPS managers and university scientists participating in several workshops across the country, a social science committee established by the National Park System Advisory Board, the Associate Director for Natural Resource Stewardship and Science, the newly appointed Visiting Chief Social Scientist, a review committee of park superintendents, and the NPS National Leadership Council. The plan outlined a specific and ambitious set of tasks to be accomplished in FY1996-99.

This article briefly reviews the progress made in achieving the objectives set forth in *Usable Knowledge*.

An overview of the plan

Usable Knowledge defined the scope of the program and its role within the National Park Service. The program's scope includes economics, geography, psychology, political science, and sociology, as well as interdisciplinary research. (Archaeology, anthropology, and ethnography programs are active within the Park Service, and located in the Cultural Resource Stewardship and Partnerships directorate.) The objectives of the program are to "conduct and promote state-of-the-art social science related to the mission of the National Park Service, and deliver usable knowledge to NPS managers and the public."

The plan inventoried current social science infrastructure and activities, and made several key recommendations for improving social science in the national

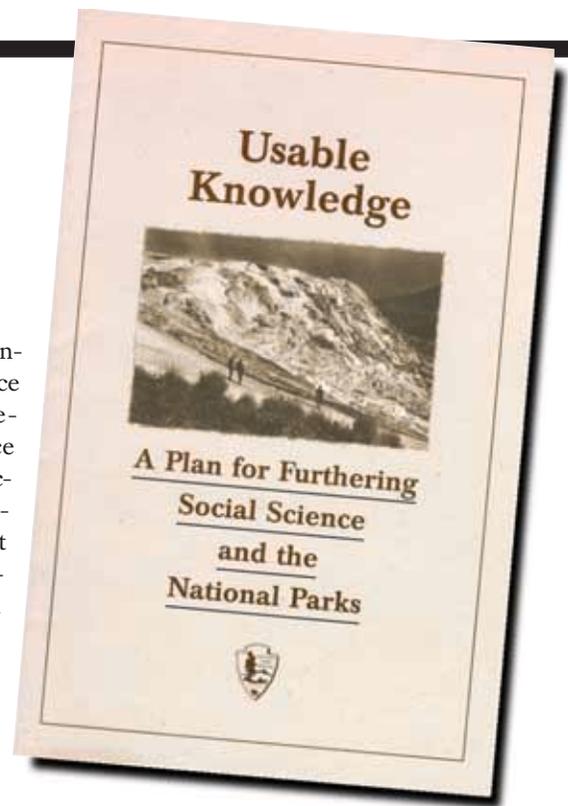
parks. These recommendations included integrating the social science program into the Natural Resources Stewardship and Science directorate, implementing key recommendations of the 1992 National Research Council's report on science in the parks, establishing a small social science program office within the Washington Office (WASO), expanding the cadre of social scientists working with the National Park Service through research competitions and other initiatives, and restructuring university partnerships to systematically include social science research.

The recommendations were followed by a detailed action plan that included specific tasks, an annual schedule, and a targeted budget for FY1996-99. Tasks were organized around three strategic areas: creating the WASO social science office, implementing new and critical initiatives, and improving existing programs. These are discussed below. (It is important to note that numerous other programs, activities, and cooperative partnerships are ongoing—the University of Minnesota's active social science partnership with the Midwest Region is an example—and that many social scientists are engaged in individual projects with units of the national park system.)

NPS Social Science Program

A small Washington, D.C., office was established. The position of Visiting Chief Social Scientist was created, to be filled by a university or government social scientist for a multiyear term. Responsibilities of the position include managing the overall program, conducting research, working with other agencies and the scientific community, and serving as a social science advisor to the NPS leadership.

An NPS social science specialist position was created to assist in managing the program. A university scientist works with the staff through a cooperative agreement. A graduate student internship



was established, and students from four universities have spent a semester in Washington, D.C., working with the National Park Service.

The WASO office has implemented several activities to serve NPS park managers. A website (www.nps.gov/socialscience/intro.htm) was created and is on-line, to provide current information and assistance to managers and scientists. The Office of Management and Budget (OMB) survey approval process—required for all federally funded surveys of the public—has been streamlined. For basic visitor surveys, a new "expedited" process has reduced the time required from five months to two weeks, and now saves money. To provide NPS managers with "state-of-the-art" social science, a *Social Science Research Review Series* has been inaugurated. Each issue reviews the scientific literature on a specific topic of interest to the National Park Service. The first issue (Winter 1999) dealt with the effect of noise on visitor experiences; the second issue explored minority use of parks (Spring-Summer 1999); the third covered employee safety (Fall 1999). Additional issues will address carrying capacity and public involvement.

The Washington Office provides technical assistance to parks, clusters, and regions as requested; a common example

See "Knowledge" on page 46

is conducting peer reviews of draft research reports or research proposals submitted to park staffs. The office has been commissioned to prepare social science plans for parks and program centers. Research plans have been completed for the Harpers Ferry Center, the South Florida parks and preserve, and the Risk Management Division. The program has also provided assistance on selected international projects—including water conservation activities with South Africa, visitor surveys in Slovakia, and social science planning in Costa Rica and Poland.

Critical initiatives

A key recommendation of *Usable Knowledge* was to expand the cadre of social scientists working with the Park Service, and develop several competitive research programs. An agenda of research on national needs was developed (with input from park superintendents), to support research projects critical to the entire national park system, and unlikely to be funded by any one region, cluster or park. The program distributes to the scientific community a periodic request for proposals, and interested researchers submit detailed study plans to a review panel that includes social scientists and NPS managers, and which selects the winning study teams. The research covers a wide range of important topics, including:

- improving the Money Generation Model (used by many park managers to estimate the economic impacts of parks),
- evaluating the impact of the Fee Demonstration Program upon park operations, visitors and local communities,
- developing carrying capacity management methods supportable by science,
- conducting a national public survey (focusing on citizens that do not use the parks), and
- learning from special "events" that can teach the National Park Service valuable insights on park management—such as the 1995-96 government shutdown's impact on park gateway communities, or the socioeconomic impacts of the 1997 Yosemite flood.

To encourage and develop the next generation of scientists working in the national park system, a scholarship program was developed. While managed by the social science office, and including the social sciences in each year's competition, the Canon National Parks Science Scholars Program is broadly aimed at the biological, physical, social, and cultural sciences. The program is underwritten by Canon USA, Inc. Partners include the National Park Foundation (NPF), the National Park Service, and the American Association for the Advancement of Science (AAAS). Canon USA has contributed over \$2.5 million dollars to fund Ph.D. dissertations on topics selected by park superintendents, and announced to the nation's universities each fall. Eight Canon Scholars were selected in 1999, and the first class of new scientists will graduate in 2000.

Over 40% of the visits to the national park system take place in urban parks, and many parks once remote are increasingly surrounded by metropolitan regions. To provide NPS managers of urban parks with needed social science research, technical assistance, and education, an Urban Recreation Research Center (URRC) was established through a competition among nine historically black colleges and universities. Southern University—Baton Rouge was selected, and has begun its activities with a needs assessment of NPS managers, to ensure that

in park planning, operations, resource management, and working with local communities. An annual report, *Serving the Visitor*, is produced, and widely distributed.

Beginning in 1998, the Visitor Services Project was assigned the task of conducting visitor surveys needed to report performance toward Government and Performance Act (GPRA) goals. A short visitor survey card was developed, tested, and used in over 280 parks in 1998, and customized reports prepared for each park, cluster, and region. Based on the first year experience, the survey card was improved, and is currently being used in parks throughout the country.

A key component of *Usable Knowledge* was restructuring partnerships between the National Park Service and universities, so that the agency could effectively employ university social science to meet park needs. This objective is included in the development of the Cooperative Ecosystem Studies Units (CESU) concept. Each CESU includes a host university, partner universities and institutions, and several federal agencies. They are interdisciplinary in scope (including the social sciences), and will provide research, technical assistance, and education to park managers. The first round of the CESU network includes six federal agencies, 23 universities, and additional partners, and became operational in FY1999. Additional CESUs will be established this year.

Not yet achieved

Not all of the tasks listed in the 1996 social science plan have been achieved. The plan called for several inter- and intra-agency working groups to more effectively coordinate social science activity; these have not succeeded. The social science website was initially conceived as including social science databases that could be used by managers and scientists; this has not yet happened. The plan called for regular meetings between managers and social scientists; social science sessions at last year's George Wright Society meeting were fruitful examples of the value of such interchanges, but they remain *ad hoc*.

The plan called for developing a sub-battal program for social scientists interested in working in units of the national park system, providing technical assistance, conducting their own and park-

The OMB survey approval process has been streamlined.

its future research projects meet NPS needs. An added, important benefit of the URRC is to increase the opportunity for minority students to gain experience with the National Park Service, and the URRC has a job fair, diversity training, and other activities planned and underway.

Improving existing programs

The Visitor Services Project (VSP) has, since 1982, conducted visitor studies at selected units of the national park system. An advisory committee of NPS managers receives nominations from the parks and regions, and selects up to 10 parks for a VSP study each year. Over 110 parks have undertaken a VSP study since the project began. These in-depth visitor studies are used by parks to assist

sponsored research, and offering training to park employees. The limited program has been replaced with a broader Sabbatical in the Parks Program now being developed. It will act as a "match-maker," bringing together available university faculty in all sciences with interested park staffs—providing usable knowledge at low cost and high value.

Next steps

Beyond the 1996 plan, there is much more to do to fully deliver social science to NPS managers and the public. The plan focused on developing a national program, and this has largely been accomplished. An important strategic step is to now increase the social science capabilities of the National Park Service at the regional, cluster, and park level. Only a few parks have social scientists on staff or duty-stationed on-site. Only a few regions have efficient access to social science expertise through the U.S. Geological Survey or cooperative agreements with universities. Funding for park-specific social science research is largely not available, and must be increased, if park managers are to have the necessary information required for science-based decision making. Several social science disciplines—economics and geography in particular—are vital to the National Park Service, yet not well represented among available researchers.

Usable Knowledge represented both a practical definition of applied social science for park managers, and a detailed "road map" for the first several years of the new NPS Social Science Program. In this and following years, new directions and ways of serving park managers, the scientific community, the public, and the parks need to be explored and tested. Yet the basic rationale for NPS social science—that understanding the relationship between people and parks is critical to effective park management—remains a scientific and management constant critical to the National Park Service. **P**

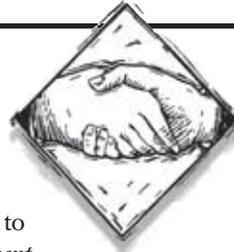
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Meetings of Interest*



May 16-18

The Third Conference on Research and Resource Management in the Southwestern Deserts will convene in May in Tucson, Arizona, to discuss *Creative Cooperation in Resource Management*. Sponsored by five federal bureaus (including the National Park Service), two state agencies, and a cooperating association, the sessions will focus on creative collaboration in land use, research, and resource management. Specific topics include: ecological research and management; conservation collaboration in the upper Gulf of California region; physical science; species recovery and conservation; cultural resources; conservation and monitoring of southwestern herpetofauna; and Sonoran Desert conservation plan partnerships. A poster session is also planned. For more information about registration contact Lee Benson at lee_benson@nps.gov; program information is available from Bill Halvorson at halvor@srnr.arizona.edu. Further details about the conference are available at www.srnr.arizona.edu/nbs/meetings.html.

October 16-20

The Natural Areas Association is planning its 27th annual conference, *Managing the Mosaic: Connecting People and Natural Diversity in the 21st Century*, to be held in St. Louis, Missouri. Celebrating the bicentennial of the Lewis and Clark Expedition, the banquet address will explore the historical and future implications of their trip, while plenary and concurrent sessions will focus on different aspects of biodiversity and how humans fit into the new century of management. Session topics planned include: insects in natural communities; economic values of natural diversity; monitoring; ecoregional planning; conserving caves, streams, and urban lands; partnerships; and many others. Further information is available from the Natural Areas website at www.natareas.org ("conferences" link) or from conference coordinator Kate Leary (573-751-4115, x183; learyk@mail.conservation.state.mo.us).

October 18-22

The Eleventh International Conference of the Society for Human Ecology will meet in Jackson, Wyoming, to discuss *Democracy and Sustainability: Adaptive Planning and Management*. The meeting will build on discussions about adaptive planning and management decisions, introduced at the tenth conference, by focusing on the interrelationship between democratic institutions and ecosystem sustainability. The conference will bring together researchers from around the world whose concerns are the enrichment of human well-being and the concomitant protection of environmental quality. These scholars are working on issues such as: (1) the relationships between human activities and environmental change; (2) the effects of environmental changes on human health and well-being; (3) the dynamics of human adaptation to societal, technological, and environmental change; and (4) methods by which environmental planning and decision making can be improved. Jonathan Taylor, whose article appears in this issue on page 14, is the program contact (jonathan_taylor@usgs.gov). Forms for submitting abstracts are available on-line at www.societyforhumanecology.org/conference.htm.

* Readers with access to the NPS NR Intranet can view a comprehensive listing of upcoming conferences and meetings at www1.nrintra.nps.gov/ (click "conferences, meetings, and training").

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