GWS2005 ABSTRACTS as of 1 February 2005
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PLENARY SESSIONS
Monday, March 14 • 8:00–9:30 am
Why the Division Between Natural and Cultural Resources in the National Parks Serves Neither Well: A Plea for Integration

William Cronon, Frederick Jackson Turner and Vilas Research Professor of History, Geography, and Environmental Studies, University of Wisconsin

Session abstract:
Professor Cronon offers insights from the field of American environmental history to argue that the national parks should adopt a more fully integrated approach to the protection and interpretation of natural and cultural resources, and that doing so will better serve the overall mission of the National Park Service. William Cronon's research seeks to understand the history of human interactions with the natural world: how we depend on the ecosystems around us to sustain our material lives, how we modify the landscapes in which we live and work, and how our ideas of nature shape our relationships with the world around us. His first book, *Changes in the Land: Indians, Colonists, and the Ecology of New England* (1983), was a study of how the New England landscape changed as control of the region shifted from Indians to European colonists. In 1984, the work was awarded the Francis Parkman Prize of the Society of American Historians. In 1991, Cronon completed a book entitled *Nature's Metropolis: Chicago and the Great West,* which examines Chicago's relationship to its rural hinterland during the second half of the nineteenth century; it was awarded several prizes. In 1992, he co-edited *Under an Open Sky: Rethinking America's Western Past,* a collection of essays on the prospects of western and frontier history in American historiography. He then edited an influential collection of essays entitled *Uncommon Ground: Rethinking the Human Place in Nature,* examining the implication of different cultural ideas of nature for modern environmental problems. He is currently at work on a history of Portage, Wisconsin, that will explore how people's sense of place is shaped by the stories they tell about their homes, their lives, and the landscapes they inhabit. He is also completing a book entitled *Saving Nature in Time: The Past and the Future of Environmentalism* on the evolving relationship between environmental history and environmentalism, and what the two might learn from each other.

In July 1992, Cronon became the Frederick Jackson Turner Professor of History, Geography, and Environmental Studies at the University of Wisconsin-Madison after having served for more than a decade as a member of the Yale History Department. In 2003, he was also named Vilas Research Professor at UW-Madison, the university's most distinguished chaired professorship. He has been President of the American Society for Environmental History, and serves as general editor of the Weyerhaeuser Environmental Books Series for the University of Washington Press.

A native of New Haven, Connecticut, Cronon received his B.A. (1976) from the University of Wisconsin, Madison. He holds an M.A. (1979), M.Phil. (1980), and Ph.D. (1990) from Yale, and a D.Phil. (1981) from Oxford University. Cronon has been a Rhodes Scholar, Danforth Fellow, Guggenheim Fellow, and MacArthur Fellow; has won prizes for his teaching at both Yale and Wisconsin; and in 1999 was elected a member of the American Philosophical Society.

Tuesday, March 15 • 8:00–9:30 am
Environmental Justice: What? So What? Now What?

Panelists:
Robert D. Bullard, Ware Distinguished Professor of Sociology and Director of the Environmental Justice Resource Center, Clark Atlanta University
Other panelists TBA.

Moderator:
Robert Stanton, former Director, National Park Service

Robert D. Bullard is the nation's leading expert on race and the environment. He is the author of thirteen books that address environmental justice, urban land use, facility permitting, community reinvestment, housing, transportation, suburban sprawl, and smart growth. His award winning book, *Dumping in Dixie: Race, Class and Environmental Quality* (Westview Press, 2000), is a standard text in the environmental justice field. A few of his other books *include Confronting Environmental Racism: Voices from the Grassroots* (South End Press, 1993), *People of Color Environmental Groups Directory 2000* (Charles Stewart Mott Foundation, 2000), and *Unequal Protection: Environmental Justice and Communities of Color* (Sierra Club Books, 1996). He co-edited with Charles Lee (Commission for Racial Justice) and J. Eugene Grigsby (UCLA) *Residential Apartheid: The American Legacy* (UCLA Center for African American Studies Publications, 1994). He also co-edited with Glenn S. Johnson *Just Transportation: Dismantling Race and Class Barriers to Mobility* (New Society Publishers, 1997) and, with Glenn S. Johnson and Angel O. Torres, *Sprawl City: Race, Politics and Planning in Atlanta* (Island Press, 2000). His most recent books are entitled *Just Sustainabilities: Development in an Unequal World* (Earthscan/MIT Press, 2003) and *Highway Robbery: Transportation Racism and New Routes to Equity* (South End Press, 2004). He is completing work on a new book entitled *Racialized Place: The Black Metropolis in the 21st Century* (Rowman & Littlefield, forthcoming 2005).

Thursday, March 17 • 8:00–9:30 am

"Science and History on the Landscape: Yellowstone in Fact and Fiction"
Diane Smith, author

Diane Smith is a novelist and science writer who lives in Livingston, Montana. Her first novel, Letters from Yellowstone, follows a scientific field study in Yellowstone Park in the 1890s. It won the Pacific Northwest Booksellers Association award for fiction, and was selected for the "campus-wide read" at Northern Arizona University in 2003. Her latest novel, Pictures from an Expedition, chronicles the history of paleontologists, artists, and Civil War veterans along the Missouri River, right after the Battle of the Little Big Horn. It won the first-ever Montana Book Award, which recognizes one book of any genre for its literary and artistic excellence, and was featured on the National Public Radio program, "Theme and Variation." Both books are part of the permanent collection at the Smithsonian Institution.

Friday, March 18 • 8:00–9:30 am
"Fire in the Parks: A Case Study in Change Management"
Norman L. Christensen, Jr., Professor of Ecology and Founding Dean of the Nicholas School of the Environment and Earth Sciences, Duke University

Norman Christensen came directly to Duke in 1973 from his doctoral studies on chaparral fire at the University of California, Santa Barbara. In addition to continuing studies on the ecology of fire, Norm's research interests include connections between land use history and ecosystem dynamics, biodiversity consequences of forest management activities and the application of basic ecological principles to ecosystem management. Over the past decade, Norm has served on the Sierra Nevada Ecosystem Project. He was co-chair of California Spotted Owl Federal Advisory Committee, and Chair of the National Academy of Sciences Committee on the Ecological Consequences of Forest Management in the Pacific Northwest and the National Commission on Science for Sustainable Forestry. Norm was launched on his career of advisory committee gadfly in the late 1980s, when he chaired a review of the fire management programs of National Parks in the Sierra Nevada and the Interagency Panel on the Ecological Consequences of the 1988 Yellowstone Fires. His plenary presentation will reflect in part on lessons learned from these experiences.

Concurrent Session Abstracts (listed chronologically by session number)

Monday, March 14 • morning concurrent sessions • 10:00 – 12:05

Session 1 • Contributed papers
Public Involvement in Critical Natural Resources Issues
Chair: John Reynolds, National Park Service (retired), Castro Valley, California

Public Understanding of Complex Natural Resource Issues
Constantine Dillon, Superintendent, Horace M. Albright Training Center, National Park Service, Grand Canyon, Arizona

A variety of issues related to parks can cause fear, anxiety, anger, or a perception of risk to the general public. At one time parks were viewed as places we needed to protect from the public. Now, in some cases, the public perceives the parks to be a threat to them. Examples include West Nile Virus, wildlife encroachment into urban areas, exotic and endangered species management, shoreline management, and the re-introduction of native animals. As the demographics of the country change to an increasingly urban population far removed from the natural world and with little understanding of natural processes, park managers may find it more and more difficult to garner public support for policies and practices that the public perceives to be a danger to them, inappropriate, or a waste of money. This session will look at the changing population, some of the issues causing concerns, and some techniques and approaches managers can use to overcome public perceptions and improve support for resource management activities.

Partnerships and Protected Landscapes: New Conservation Strategies that Engage Communities
Jessica Brown, Vice President for International Programs, QLF/Atlantic Center for the Environment, Ipswich, Massachusetts
Nora Mitchell, Director, Conservation Study Institute, National Park Service, Woodstock, Vermont

In North America, as in other regions of the world, conservation strategies are becoming more inclusive, recognizing multiple values, encompassing the interests of local communities and indigenous peoples, and relying on collaborative management approaches that involve diverse stakeholders. These new approaches are particularly relevant to protected landscapes/seascapes, whose distinctive natural and cultural values are the result of the interactions between people and nature over time. A growing element of park systems world-wide, protected landscapes rely on management partnerships with communities, landowners and others. Drawing on case-studies from a book to be published this fall by IUCN *(The Protected Landscape Approach: Linking Nature, Culture and Community),* the presenters will introduce the protected landscape concept, and will explore its application in the United States and Canada through examples of partnership areas, including national historical reserves, heritage areas and corridors, greenbelts, and national parks. The role of civic engagement in these partnership areas will be explored.

The Role of the U.S. Geological Survey in the Glen Canyon Dam Adaptive Management Program

Jeff Lovich, Chief, U.S. Geological Survey, Grand Canyon Monitoring and Research Center, Flagstaff, Arizona

The U.S. Geological Survey, Grand Canyon Monitoring and Research Center (GCMRC) is a key component of the Glen Canyon Dam Adaptive Management Program (GCDAMP). GCMRC studies the effects of Glen Canyon Dam operations on natural and cultural resources in Glen Canyon National Recreation Area and Grand Canyon National Park. The GCDAMP operates under the concept of adaptive management. This paradigm recognizes that management decisions are uncertain and offer opportunities to learn from mistakes and failures to adjust toward optimum management scenarios. GCMRC research has demonstrated that recent dam operations have not arrested the decline of the endangered humpback chub, not slowed the proliferation of non-native fish to undesirable population sizes, or stopped the flushing of critical sediment resources from the ecosystem. Twenty-five stakeholders, including the National Park Service, are members of a Federal Advisory Committee tasked with translating GCRMC research results into management recommendations to the Secretary of the Interior.

Public Participation GIS for Biosphere Reserve Zone Designation in Turneffe Atoll, Belize

Stefanie Egan, Graduate Student in Geography, San Francisco State University, San Francisco, California

This study demonstrates the effectiveness and applicability of a public participation spatial decision support system in the designation of biosphere reserve zones. Set in Turneffe Atoll, Belize, it examines the impact of the use of a Geographic Information System and the incorporation of local stakeholder input on how biosphere reserve conservation zones are delineated. Information obtained through interviews with local stakeholders is integrated with that of other data collected by scientists studying the atoll. The data are displayed spatially in overlaid layers and analyzed to determine which areas would best fit into each biosphere reserve zone, according to established criteria. Results indicate that the integration of local stakeholder knowledge with other scientific data, coupled with GIS's ability to display the data spatially in layers, makes possible very accurate and appropriate zone designation, with positive implications for the success of the biosphere reserve itself.

Who Let the Dogs Off-Leash? Negotiated Rulemaking at Golden Gate National Recreation Area

Michael Eng, Senior Program Manager, U.S. Institute for Environmental Conflict Resolution, Tucson, Arizona
Chris Powell, Public Affairs Officer, Golden Gate National Recreation Area, San Francisco, California
Sherwin Smith, Management Analyst, Golden Gate National Recreation Area, San Francisco, California

The 36 CFR prohibits pets from being off-leash in areas within the National Park Service

system. The universal application of this regulation has proven to be an extremely challenging management, community relations, and enforcement issue at Golden Gate National Recreation Area. The real conflicts began in 2000, when GGNRA rescinded its existing off-leash pet policy, realizing it was actually in violation of NPS regulations. Since then, GGNRA has been in turmoil with much of the community, including elected officials – from city Supervisors to U.S. Senators. After much internal NPS consultation, GGNRA is now proceeding with a Negotiated Rulemaking process to develop a unique regulation for GGNRA that will legally allow off-leash recreation in certain designated areas of the park. This session will discuss how GGNRA is using the Negotiated Rulemaking process to help resolve a long festering and at time highly volatile community conflict.

Session 2 • Invited Papers

Research Learning Centers I: The Mission, Success Stories, and Challenges

Chair: Leigh Welling, Director, Crown of the Continent Research Learning Center, Glacier National Park, West Glacier, Montana

Session abstract:

Research Learning Centers are now established in thirteen National Parks or regions. Funded under the Natural Resource Challenge, RLCs are part a broad initiative within the NPS to provide a vision and a mechanism for parks to revitalize and expand their natural resource programs. Learning Centers help to facilitate research in and about Parks and disseminate results to park managers and the public so that decisions and policies regarding these lands are based on the most accurate information available. This session is the first of a two RLC sessions that will present an overview of current RLC programs, what research the Centers are involved in, what challenges and opportunities are experienced by RLCs, and how these programs are connecting other components of the Challenge, to management, and to the public.

Research and Results at the Pacific Coast Science and Learning Center (Point Reyes National Seashore)

Benjamin Becker, Director and Marine Ecologist, Point Reyes National Seashore, Point Reyes Station, California

The Pacific Coast Science and Learning Center was established in 2001 to implement and facilitate research leading to science-based stewardship of coastal and marine resources. We: (1) focus on projects critical to near-term local conservation goals, (2) foster general research and inquiry into marine and coastal systems, and (3) integrate college and high school interns into university-based research projects. Our two flagship programs include marine protected area research and community discourse; and a research and fundraising partnership with a local community-based marine biodiversity, water quality, invasive species and restoration project. We support research projects integral to the inventory and monitoring program, resource management, and cultural resources, as well as provide educational materials for the interpretation division. We also present recent research findings during monthly seminars open to park staff and the public. I will discuss what works, some

challenges, and connecting our program to management, local stakeholders, and the public.

Continental Divide Research Learning Center — The First Four Years

Terry Terrell, Director and Science Officer, Continental Divide Research Learning Center, Rocky Mountain National Park, Estes Park, Colorado

During the Continental Divide Research Learning Center's first four years the number of research projects in Rocky Mountain National Park has increased 20%. Quality of research efforts and the documentation of research (science as history) have improved dramatically. Demand for logistical support for research and for providing information to interested lay audiences (including park staff) has increased more rapidly than the ability to meet it. Focus on providing information to decision-makers has resulted in changing policies to better reflect current scientific understanding. Challenges include the realization that there are limits on the amount and kinds of research that can occur, in addition to the limits imposed by logistics. The park is wrestling with questions of what limits to put in place, how to coordinate research so that samples can be used by multiple projects, and how to deal with researchers with funded research for which the limit has been reached.

Citizen Science Partnership: What it Isn't and What it Can Be

Paul Super, Science Coordinator, Appalachian Highlands Science Learning Center at Purchase Knob, Great Smoky Mountains National Park, Lake Junaluska, North Carolina

Susan Sachs, Education Coordinator, Appalachian Highlands Science Learning Center at Purchase Knob, Great Smoky Mountains National Park, Lake Junaluska, North Carolina

Citizen science is the involvement of non-scientists in scientific research. It is a tool for scientists and educators. It has existed for decades at universities where professors have used graduate and undergraduate assistants to collect data. National Parks can benefit from partnering with citizens from local communities to stretch research dollars and expand the scope of a project. In many parks, citizen scientists can collect specific kinds of data at times of year and locations most scientists cannot. Citizen scientist involvement can be used to extend a research project out to the surrounding landscape across the mosaic of landholders. As additional benefits, involving local citizens can increase public support for science-based management, increase scientific literacy of the public, and develop the scientists of the future. We present examples of citizen science projects at Great Smoky Mountains NP that illustrate how citizen science partnerships can help meet a park's research needs.

On the Learning (Center) Curve: The Challenge of Linking Scientific Research and Outreach

Regina Rochefort, Science Advisor, North Coast and Cascades Learning Network North Cascades National Park Service Complex, Sedro-Woolley, Washington

David Louter, History Program Lead and Science Advisor, Pacific West Region, National Park Service, Seattle, Washington

The North Coast and Cascades Research Learning Center was established in 2001 to link

research and educational activities across eight National Park Service units: Mount Rainier National Park, North Cascades National Park Service Complex, Olympic National Park, Ebey's Landing National Historical Reserve, Fort Clatsop National Memorial, Fort Vancouver National Historic Site, Klondike Gold Rush National Historical Park, and San Juan Island National Historical Park, with support from the Columbia Cascades Support Office. Our RLN links eight ecologically and historically diverse park units where research by non-NPS scientists ranges from non-existent to extensive. Our challenge has been to find a niche linking research and outreach opportunities for all park units. We have tried to forge partnerships between cultural and natural research interests and develop new avenues in outreach such as videos, a research catalog, and Science Days.

Inspiring Science Connections in the National Capital Region through the Research Learning Center

Diane Pavek, Research Coordinator, Urban Ecology Research and Learning Alliance, NPS National Capital Region, Washington, D.C.

Giselle Mora-Bourgeois, Science Education Coordinator, NPS National Capital Region, Washington, D.C.

The Urban Ecology Research Learning Alliance (UERLA) serves the 14 parks of National Capital Region by promoting unique scientific research and education opportunities throughout the greater Washington, D.C. area. Through Cooperative, Task, and Interagency Agreements, UERLA directly facilitated research and education projects; half of the projects hosted by UERLA were developed as Task Agreements through the Chesapeake Watershed CESU. For FY 2004, UERLA is directly involved in diverse projects, ranging from "Assessing Visitor Harvesting of Wild Morel Mushrooms in Two NCR Parks" to sponsoring a public workshop on "Promoting Pollinators in Public Places." UERLA has been especially successful linking research in the parks with the academic community by sponsoring graduate fellowships and Sabbaticals in the Parks.

Session 3 • Panel discussion

Preserving Community Character and Civic Engagement on the Outer Cape

Chair: Margie Coffin Brown, Historical Landscape Architect, Olmsted Center for Landscape Preservation, Waltham, Massachusetts

Session abstract:

This panel represents a melding of civic engagement, landscape preservation, planning, and education objectives. The panel will share recent and ongoing efforts to preserve the character of coastal communities, focusing on the Outer Cape, where six communities are adjacent to Cape Cod NS. The panel will describe a study by UMass entitled "People and Places on the Outer Cape: A Landscape Character Study" (2004), funded by NPS and completed in collaboration with NPS Olmsted Center for Landscape Preservation and Cape Cod NS, in consultation with NPS Conservation Study Institute(CSI). With community engagement and facilitation expertise from CSI, the NPS and UMass team sponsored a conference to involve a broader audience

and develop strategies for preserving landscape character. Staff at the Cape Cod NS convened a steering committee of local organizations to identify and prioritize theme tracks. Based on their input, the conference focused on working waterfronts, smart growth & redevelopment, regionalism & community character, and affordable housing. With an emphasis on moving from planning to action, the 130 conference attendees were able to use the landscape analysis done by UMass as a springboard for engaging multiple communities to find common issues and consider ways for developing regional solutions. By discussing affordable housing (renamed community housing), the group was able to relate the highly valued physical environment to associated the social conditions and needs. Each panelist will give short presentations, offering perspectives on civic engagement, landscape preservation, planning and park relations.

Panelists:
Delia Clark, Director of Community Engagement & Program Development, Conservation Study Institute, Woodstock, Vermont
Jack Ahern, Professor and Department Head, University of Massachusetts, Department of Landscape Architecture & Regional Planning, Amherst, Massachusetts
Mike Murray, Acting Superintendent, Cape Cod National Seashore, Wellfleet, Massachusetts

Session 4 • Contributed papers
Wilderness Stewardship
Chair: Rick Potts, National Park Service, Washington, D.C.

Conflict in Two Northeastern Wilderness Areas: The Influence of Previous Experience and Place Attachment
John Peden, Graduate Research Assistant, SUNY College of Environmental Science and Forestry, Syracuse, New York
Rudolph M. Schuster, Professor, SUNY College of Environmental Science and Forestry, Syracuse, New York
Visitors' evaluations of outdoor recreation experiences are influenced by a variety of factors. This paper utilizes a stress/coping framework to investigate the relationship between previous experience, place attachment, and perceptions of conflict in two northeastern wilderness areas. Previous research has demonstrated that those with higher levels of experience are likely to report higher levels of place attachment. Level of experience has also been shown to influence visitors' appraisal of conflict. This study synthesizes previous works by examining the relationship between these variables in a comprehensive framework. Data were collected through a combination of on-site interviews (n=60) and mail-back surveys (n=381) in the summers of 2003 and 2004. Results indicate: (1) visitors can be classified by level of experience and degree of attachment to the site; (2) multiple dimensions of conflict exist; and (3) level of experience and degree of attachment influence the type/intensity of conflict.

Managing for Multiple and Potentially Competing Values in the Okefenokee Swamp Wilderness

Steve Lawson, Assistant Professor, Virginia Polytechnic Institute and State University, Blacksburg, Virginia
Troy Hall, Associate Professor, Department of Resource Recreation & Tourism, University of Idaho, Moscow, Idaho
Joe Roggenbuck, Professor, Department of Forestry, Virginia Polytechnic Institute and State University, Blacksburg, Virginia

Wilderness recreationists value, to varying degrees, opportunities for solitude, pristine resource conditions, and freedom from management restrictions, yet it is often not possible to simultaneously maximize these values. Consequently, wilderness management decisions are complex and involve potential tradeoffs among competing values. This paper describes a study that used conjoint analysis techniques to examine the relative importance of social and managerial conditions of the Okefenokee Swamp Wilderness to current visitors. Differences in the relative importance of potentially competing wilderness values were examined among subgroups of current visitors based on characteristics of their most recent trip to the Okefenokee Swamp Wilderness. The results of this study provide managers of the Okefenokee Swamp Wilderness with a tool to identify common ground and differences among subgroups of current visitors and to assess the extent to which alternative management decisions are favorable to different types of visitors.

Managers' Perceptions of Wilderness Day Use: Impacts and Management Actions

J. Dan Abbe, Graduate Research Assistant, University of Vermont, Burlington, Vermont
Robert Manning, Professor, University of Vermont, Burlington, Vermont

Day use of wilderness is a growing and important use, and one that will require increasing management attention. It is an important topic to wilderness management because of its growing share of visitor use, and its associated impacts on wilderness and the quality of the wilderness experience. In order to better understand these issues, a survey of National Park Service (NPS) wilderness managers was conducted. Managers from 87 NPS units with wilderness responsibilities were asked to participate in a web-based survey endorsed by the NPS National Wilderness Steering Committee. The survey provided information regarding managers' perceptions of wilderness day use and their actions to manage this growing use. Results were analyzed and implications for future management direction will be discussed, including the idea that day users may be shaping future wilderness values.

Zoning Wilderness: Should We Purposely Manage to Different Standards?

David Cole, Research Biologist, Aldo Leopold Wilderness Research Institute. Missoula, Montana
Troy Hall, Associate Professor, Department of Resource Recreation & Tourism, University of Idaho, Moscow, Idaho

Ease of access varies among and within wildernesses. Some wildernesses are close to large metropolitan areas, while others are located far from population centers. Within any wilderness, places close to the edge of the wilderness and along trail corridors are more accessible than places in the interior or far from trails. In the absence of restrictions on access, this means that urban-proximate wildernesses and places accessible to day users will be more crowded and impacted than more remote

wilderness lands. To what degree should managers restrict access in order to limit this variability in conditions? This paper presents information on visitor opinions about the appropriateness of both internal wilderness zoning and managing urban-proximate wilderness to different standards. Data were obtained in surveys of wilderness visitors at 13 different Forest Service wildernesses in Oregon and Washington.
Results suggest substantial support for both types of zoning, with some important caveats.

Wilderness Advocacy from Aesthetic and Rational Grounds: From Contingency to Necessity in Wilderness Preservation

Jason Bausher, Wilderness Information Assistant, Olympic National Park, Aberdeen, Washington

Arguments for wilderness preservation take two primary and general forms differentiated in epistemological-ontological categories as (1) aesthetic and (2) rational. Aesthetic arguments are grounded in the aesthetic appeal of the manifold of contingent appearances constituting wilderness experience. Rational arguments abstract from contingent appearances to reflect the necessary laws under which all particular appearances are subsumed and thereby reveal the necessity of arguments for wilderness preservation. Having recognized the aesthetic and the rational as two necessary sides of knowing, advocacy appeals should always be oriented to both sides. This paper explores the aesthetic side in writings by John Muir, William O. Douglas, and Aldo Leopold before examining the rational side in writings by Immanuel Kant and G.W.F. Hegel. To capture the aesthetic and rational sides of an argument is to harness the power of both sides of living reality, and this offers the greatest promise for structuring theories of wilderness advocacy.

Session 5 • Invited papers

Monitoring in the Parks I — The NPS I&M Program: Providing Science to Support Park Management

Chair: John Gross, Ecologist, Inventory and Monitoring Program, National Park Service, Ft. Collins, Colorado

Session abstract:

Scientifically sound information on key natural resources is essential for the NPS to achieve its goals of protecting and maintaining natural and cultural resources for the enjoyment of future generations. The overriding goal of the NPS Inventory and Monitoring Program is to deliver information that leads to better management of Parks. To do so, monitoring networks collaborate with parks to identify and prioritize monitoring of park's vital signs — a suite of environmental indicators that tracks changes and trends in the overall health and ecological integrity of National Parks. This session describes key components of the NPS Monitoring program, ubiquitous threats to natural resources across the National Parks system, and efforts to ensure that information from monitoring programs is relevant to management decisions.

Monitoring the Vital Signs of Our National Parks

Steven Fancy, National Monitoring Program Leader, National Park Service, Ft. Collins, Colorado

Managers of national parks are confronted with increasingly complex and challenging issues that require a broad-based understanding of the status and trends of park resources. The intent of park vital signs monitoring is to enhance this understanding by tracking a subset of physical, chemical, and biological elements and processes of park ecosystems that are selected to represent the overall health or condition of park resources, known or hypothesized effects of stressors, or elements that have important human values. The elements and processes that are monitored are a subset of the total suite of a park's natural resources, including water, air, geological resources, plants and animals, and the various ecological, biological, and physical processes that act on those resources. This presentation will present an overview of the challenges and issues faced by the NPS, and the strategy and framework developed by the agency to initiate agency-wide natural resource monitoring.

Monitoring Invasive Species: Putting Your Ducks in a Row

Brad Welch, Ecologist, National Park Service, Ft. Collins, Colorado

Invasive species introductions are resulting in unprecedented alterations to native communities and ecosystem processes, with both ecological and socio-economic ramifications. For the National Park Service, plant invasions alone have infested over 2.6 million acres, presenting a significant challenge to the management of the agency's natural resources "unimpaired for the enjoyment of future generations." Park managers are confronted with a need to control existing invasions and a growing urgency to protect resources not yet impacted by current and future invasive species. Monitoring is an essential tool for natural resource managers, providing a means to ensure the sustainability of invasive species management efforts. Well-designed survey and monitoring strategies adequately use limited fiscal and human resources to evaluate the status of biotic invasions and the success of restoration efforts. To be effective, invasive species monitoring programs should include: explicit objectives, management priorities, statistical and opportunistic approaches, and a comprehensive partnership program.

Monitoring Landscape Dynamics to Protect Park Resources: Linking Pattern and Process

John Gross, Ecologist, Inventory and Monitoring Program, National Park Service, Ft. Collins, Colorado

Andy J. Hansen, Professor, Ecology Department, Montana State University, Bozeman, Montana

National Parks are crucial reserves for biodiversity, but landscape-scale changes inside and outside parks can have profound effects on the functioning of park ecosystems and preservation of biodiversity. At landscape scales, park resources can be threatened by a variety of processes that include habitat isolation or fragmentation, incursion of air- or water-borne pollutants, changes that increase invasion by exotic species, or changes in rates of disturbances. Despite widespread recognition of the

importance of these processes, many challenges remain to implementing broad-scale monitoring activities. We present a conceptual framework that provides a firm scientific foundation for identifying and linking landscape-scale changes to natural resources in parks. We review relevant Monitoring Program activities and vital signs, and suggest use of some widely-available data for monitoring landscape changes than can harm or benefit Park resources.

Data and Information Management for Resource Mapping and Monitoring

Joe Gregson, Natural Resource GIS Coordinator, National Park Service, Fort Collins, Colorado

Lisa Nelson, GIS Analyst and Geodatabase Administrator, Colorado State University and National Park Service, Fort Collins, Colorado

Resource inventories, ecological monitoring, and scientific studies collect and analyze data to provide critical information for protecting resources through informed decision making and education. Data managers and resource specialists are faced with the challenge of systematically discovering, acquiring, cataloging, processing, distributing, and archiving vast quantities of data and derived information. New integration tools, databases, information systems, and services are available to assist NPS staff with managing information resources. The Natural Resource Inventory and Monitoring and GIS Programs are working cooperatively to assess user needs and efficiently provide data, systems, and services that integrate and leverage both field and central office information resources. Examples presented include effective partnerships and projects that facilitate data acquisition, database and information system analysis and development, standards and enterprise architecture, and training. These examples illustrate how well-planned and integrated data management systems can help managers effectively use available information for park planning and management.

Integration of Science and Management into NPS Decisions

Robert Bennetts, Ecologist, NPS, Greater Yellowstone Inventory and Monitoring Network (GRYN), Bozeman, Montana

Science and monitoring programs are frequently justified by their ability to provide essential information needed to make better resource management decisions. Unfortunately, the number of examples where science has been effectively incorporated into the decision process of resource management agencies is depressingly low. More encouraging is that the integration of science and management is gaining increasing focus, and a myriad of approaches for such integration have emerged in recent years. In this paper, I will examine some of the major shortcomings of failed efforts, as well as some of the emerging ideas that show promise for the future. My intention will not be to promote any particular program or approach. Rather, I will focus on more general themes that seem to be shared among successes or failures. Such themes can serve as a foundation upon which to build a program that reflects the needs and constraints of individual organizations.

Ecological Economics: Fostering Park Protection, Ecological Integrity, and a Healthier, Sustainable Society

Chair: Richard Evans, Ecologist, Delaware Water Gap National Recreation Area. Milford Pennsylvania

Session abstract:

Despite enormous changes in the world over the past two centuries, the central concepts and assumptions underlying our economic system have not changed since 1776, when Adam Smith published "A Wealth of Nations." Protecting parks and preserving ecological integrity has been a constant battle in this economic environment, and increasingly seems to be losing proposition. One way to improve this situation is through "Ecological Economics," which seeks to reform our economic system by incorporating modern knowledge and social and environmental conditions. This session will present (1) a critique of neoclassical economics (Krall), (2) an illustration of the inherent conflicts between our current economic path and preserving parks and ecological integrity (Czech), (3) an introduction to ecological economics and the role of parks (Farley), and (4) real examples of ways to assess the economic values of ecological goods and services that parks provide to society. Twenty minutes for discussion at end.

A Critique of Neoclassical Economics

Lisi Krall, Professor and Chair, Economics Department, State University of New York–Cortland, Cortland, New York

The study of economic matters is dominated by the orthodox or neoclassical school of thought. In fact, so dominant has this 'framework' become that most people, economists among them, are unaware that alternatives to economic orthodoxy exist. Here I offer a critique of some of the pillars of economic orthodoxy concentrating on "the economic problem," economic efficiency, and the strange and misleading world of market failure. Beneath these pillars lies a hidden world of assumptions and 'misplaced concreteness' which limits our ability to rethink the relationship between the economy and the natural world and to remake our institutions.

The Role of Parks in the Ecological Economy

Joshua Farley, Assistant Professor, University of Vermont, Gund Institute for Ecological Economics, Burlington, Vermont

Economics addresses the allocation of scarce resources among alternative desirable ends. The market economy excels at creating market goods, but cannot create something from nothing — it transforms raw materials provided by nature into human made good ands services. Renewable raw materials are the structural building blocks of ecosystems. Depleting structure depletes ecological function, including functions essential to sustaining life. The use of non-renewable resources produces wastes that further deplete these functions. As a result of the market's success, goods and services provided by nature are now scarcer than those made by humans, yet our market economy is ill-suited for their efficient allocation. Assuming that the economic system is contained and sustained by the global ecosystem and therefore cannot grow without stop, ecological economics offers a new approach to

economics that can more effectively allocate our scarcest resources. Parks play a critical role in the ecological economy.

Maintaining the Ecological Integrity of the National Wildlife Refuge System and the Conservation Estate

Brian Czech, Conservation Biologist, U.S. Fish and Wildlife Service, Arlington, Virginia

The U.S. Fish and Wildlife Service is required to maintain the biological integrity and environmental health of the National Wildlife Refuge System pursuant to the National Wildlife Refuge System Improvement Act of 1997. Other agencies have similar mandates. Biological integrity and environmental health, integrated via the concept of "ecological integrity", imply the recognition of natural (i.e., intact, whole, non-degraded) conditions. A reasonable frame of reference for natural conditions begins with the Medieval Warm Period of approximately 800AD and ends with the advent of industrial economy approximately 1,000 years later. This frame of reference includes warm, cool, and average Holocene temperature regimes and a comprehensive set of species, communities, and successional pathways. The frame of reference for natural conditions acknowledges that the proliferation of the human economy occurs at the competitive exclusion of nonhuman species in the aggregate. However, some level of ecological integrity exists everywhere and may be maintained accordingly.

Valuation of Ecological Goods and Services from Watersheds with Headwaters in Mount Rainier National Park

David Batker, Director, APEX Center for Applied Ecological Economics, Tacoma, Washington

Economic tools for measuring and understanding the value of public goods and services provided by the National Parks have been limited. Thus economic measures have grossly undervalued the economic benefits of healthy ecosystems and National Parks. Healthy watershed ecosystems provide twenty-three categories of services and goods including drinking water, erosion control, flood prevention, refugia, biodiversity, climate regulation, cultural, historic, recreation, and aesthetic value. Valuing these services are important for fully understanding the value provided by National Parks. APEX has worked in the Green River and the Carbon River watersheds, which have their headwaters in Mount Rainier National Park. Ecosystems in the Green River watershed produce between $1.5 and 5.8 billion in ecosystem services annually. In the Carbon River Valley, we have worked with communities to preserve and protect healthy ecosystems and set aside critical habitat in a system of conservation lands in cooperation with Mount Rainier National Park.

Session 7 • Contributed papers

Managing Natural Resources in a Historic Setting

Chair: Stephanie Toothman, National Park Service, Seattle, Washington

Crossroads of Nature and Culture: Field and Laboratory Studies for Vegetation Management at Historic Sites

Judith J. Bischoff, Conservation Scientist, National Park Service, Harpers Ferry Center, Harpers Ferry, West Virginia
Ronald Dean and Jennifer Herrmann, National Park Service
Amy James, National Institutes of Health
Kyle LaFollette, Shepherd College
Steven M. O'Neill, National Park Service
Janna Scott, Shepherd College and Heather Smith, Shepherd College
Many cultural sites in the National Park Service and elsewhere are faced with the control and management of vegetation. Because of the site-specificity of vegetation and its potential for damage, it is important to have sound scientifically-based practices for vegetation control and management. Unfortunately, there are no standards of practice for appropriate management decision-making. The Scientific Research and Analytical Support Laboratory at Harpers Ferry Center has been involved in two complementary scientific studies that will help sites make appropriate choices for management of their specific vegetation problems. The first is a model study being carried out in the laboratory to examine the effects of chemical treatment agents for vegetation control on historic masonry. The second is a field study to investigate the effectiveness of various treatments against site-specific vegetation. We will discuss how these studies lead to science-based decision-making and best practices in the preservation and management of cultural sites.

The Nature of Gettysburg: An Evolving Mandate for Battlefield Preservation

Brian Black, Associate Professor, History and Environmental Studies, PSU Altoona, Altoona, Pennsylvania

I am working on a book manuscript titled "Contesting Gettysburg," in which I tell the landscape and environmental history of this space. Of course, an important portion of this story is the adoption of the 1999 GMP by the GNMP. In this landmark document, the NPS took a more active role than ever before in reconstructing the natural landscape of the battle era. In order to contextualize this watershed policy, I have culled through the documentary evidence relating to the NPS management of natural resources at GNMP from 1933-present. I would like to present my findings as an overview of the evolution of this preservation ethic at Gettysburg. In short, my research shows that NPS policy has always considered the natural landscape an important component of its preservation efforts. However, social and community shifts have limited the NPS ability to implement its mandate.

Can't We All Just Get Along? — Managing Cultural and Natural Resources at Historic Fortifications

David Hansen, Principal, Outworks, Consultants in Historic Preservation and Military Architecture, Olympia, Washington

Along the coastline of the United States, national, state and local park agencies manage large tracts of land that were developed late in the 19th century as components of a national system of fortifications. Today these areas are complexes of historic structures and landscapes as well as the environs of threatened plants and animals. Conventional wisdom — and perhaps the folklore of park management — tells us that what is good for cultural resources is almost always bad for natural resources and

vice versa. Recent experience with historic fortifications on San Francisco Bay and Puget Sound suggests that those gloomy expectations can be false, and that good management for one can also be good management for the other.

Native Plant Restoration at Stones River National Battlefield

John Vandevender, Plant Materials Center Manager, USDA-NRCS, Alderson, West Virginia

Stones River National Battlefield, located in Middle Tennessee, is the site of one of the significant battles of the War Between the States. The site is host to a number of rare and endemic plant species. The primary project objective is restoration of native plant communities within the battlefield park. Ecologists have targeted approximately twenty native plant species for use. Those species are: *Andropogon ternarius, Andropogon gyrans, Bouteloua curtipendula, Carex* spp., *Chasmanthium latifolium, Dichanthelium* spp*., Eragrostis spectabilis, Leersia virginica, Melica mutica, Schizachyrium scoparium, Asclepias tuberosa, Aster* spp., *Eupatorium* spp., *Lespedeza violacea, Rudbeckia* spp., *Solidago* spp., and *Forestiera ligustrina.* In 2003, Alderson Plant Materials Center personnel collected small quantities of seed from twelve species. Approximately 20,000 seedlings from the 2003 seed harvest were produced in 2004. Ecologists at Stones River National Battlefield will harvest and use seed from these seedlings to restore this historic site's circa 1862 floristic authenticity.

Session 8 • Contributed papers

Coral Reefs in the Pacific

Chair: Brad Barr, NOAA National Marine Sanctuaries Program, Woods Hole, Massachusetts

The NPS Pacific Islands Coral Reef Program (PICRP): Problems, Progress and Promise

Larry Basch, Senior Science Advisor / Marine Ecologist, Hawaii-Pacific Islands Cooperative Ecosystem, Honolulu, Hawai`i

Coral reef ecosystems and resources are globally imperiled by several natural and anthropogenic threats acting alone or synergistically at various scales. The NPS Pacific Islands Coral Reef Program is working with many partners to understand the basic nature of, and threats to, coral reefs, and related marine resources and ecosystems at Pacific Islands National Parks, and to develop strategies to conserve them. Primary marine resources stewardship concerns involve land-based human activities (climate change, coastal development, sedimentation), resources exploitation (recreational, commercial, traditional fisheries), and alien species (invasive algae). Given the nature of the resources and threats we are viewing and acting on problems using traditional ahupuaía or watershed perspectives and approaches. Some of our work — ranging from scientific advice and technical support, to inventory and monitoring and scientific research — to meet marine environmental and resource information needs for management decision making throughout tropical Pacific NPS units will be summarized.

Dirt and the Demise of Guam's Coral Reefs

Dwayne Minton, Ecologist, War in the Pacific National Historical Park, Piti, Guam
Ian Lundgren, Anna Pakenham, Jenny Drake, and Holly Tupper, War in the Pacific National Historical Park, Piti, Guam

Coral reefs on Guam, a significant natural resource at War in the Pacific NHP (WAPA), are being threatened by poor land management practices in adjacent watersheds. Poor enforcement of territorial non-point source pollution regulations and wildland arson have resulted in considerable upland erosion and nearshore sedimentation. A high rate of sedimentation can smother corals, undercutting the foundation of the marine ecosystem that supports an estimated 3,500 species (including two T&E species) within the park. Fifty sediment traps placed along the reef face were used to monitor sedimentation rates for one year. In addition to examining total sediment load, the percent of the sediment with a terrestrial origin was determined. Data were examined both spatially and temporally, with sedimentation patterns compared to seasonal weather patterns to elucidate reef areas at WAPA that are critically threatened by sedimentation.

Is Coral Recruitment Limited by Sedimentation at War in the Pacific NHP?

Ian Lundgren, Biological Sciences Technician, War in the Pacific National Historical Park, Piti, Guam
Dwayne Minton and Anna Pakenham, War in the Pacific National Historical Park, Piti, Guam

Coral reefs at War in the Pacific NHP (WAPA) are a significant and fragile natural resource. Evidence exists that sediments are a limiting factor for coral recruitment (settlement and survival), therefore investigating the interaction and relationship between sediment load and recruitment is vital to mitigate disturbance and to encourage future coral reef health. Coral settling plates are being deployed on the reefs of WAPA to measure natural settlement rates. In collaboration with the University of Guam, multiple coral species will be settled in aquaria and deployed at the established recruitment monitoring sites to monitor post-settlement survival rates. Data will be used to correlate the effects of sediments on coral recruitment, and will complement concurrent water quality investigations at the same sites. These research components are part of an integrated approach to study the effects of erosion and sedimentation on the current and future health of the coral reefs at WAPA.

Spatial and Temporal Oceanographic Variability at Kaloko–Honokohau National Historical Park, Hawaii Island

Curt Storlazzi, U.S. Geological Survey, Pacific Science Center, Santa Cruz, California
Eric Grossman, U.S. Geological Survey, Pacific Science Center, Santa Cruz, California
Larry Basch, Senior Science Advisor / Marine Ecologist, Hawaii-Pacific Islands Cooperative Ecosystem, Honolulu, Hawai`i

A cooperative study between the U.S. Geological Survey and the National Park Service is focused on water quality, circulation, and physical processes in the Kaloko-Honokohau National Historical Park (KAHO) on the island of Hawaii. Oceanographic measurements in park waters include high-resolution time series data

along the 12 m isobath and spatial surveys with a profiling instrument package. The time series measurements indicate that large waves and internal tides transport material across-shore with the park. High acoustic backscatter layers often form in the middle of the water column, concentrating what we interpret to be biologic material at a pycnocline. Results from the spatial surveys indicate substantial but variable inputs of fresh surface water and subterranean ground water discharge at KAHO. Further investigations will attempt to characterize where conduits for subsurface groundwater flow exist and to quantify the flux of groundwater geochemical constituents that may influence coral reef ecosystem health.

Preliminary Results of the U.S. National Park Service Pacific Islands Coral Reef Program Marine Spatial Database Efforts

Lisa Wedding, Marine GIS Database Manager, National Park Service Pacific Islands Coral Reef Program, Honolulu, Hawaii
Larry Basch, Senior Science Advisor / Marine Ecologist, Hawaii-Pacific Islands Cooperative Ecosystem, Honolulu, Hawai`i
Melia Lane-Kamahele, Cartographer, National Park Service Pacific Islands Support Office, Honolulu, Hawai`i
Sandy Margriter, GIS Specialist, National Park Service Pacific Islands Support Office, Hawaii National Park, Hawai`i
Gordon Dicus, I&M Data Manager, Hawaii Volcanoes National Park, Hawaii National Park, Hawai`i

The NPS Pacific Islands Coral Reef Program, in conjunction with the Pacific Islands Network Inventory and Monitoring Program, is building a marine spatial and relational database to provide decision support to resource managers at Pacific Islands National Parks. This project is being developed in collaboration with the Inventory and Monitoring Program and other major marine database efforts. The goals for the database include ease of use, interoperability and uniformity within NPS. Serving as a central source of information on marine data and metadata from within and around park units, this marine database will support inventory, monitoring and research efforts, and will enhance the scientific credibility and timeliness of NPS decisions regarding marine management and conservation. Preliminary results of this marine database effort will be demonstrated, focusing on examples from a network of National Parks and Marine Protected Areas on the Kona Coast of Hawai`i Island.

Session 9 • Invited papers

Ecological Effects of Air Pollution: Risks and Thresholds in National Parks

Chair: Tamara Blett, Ecologist, National Park Service, Denver, Colorado

Session abstract:

This session will focus on recent and ongoing research in national parks related to ecological effects of air pollutants (sulfur, nitrogen, and ozone). It will highlight studies developed and conducted in partnership between scientists and park staff. Presentations in the session will discuss research results and provide examples of how they are or can be used by managers and technical specialists to assess risk to resources from air pollution. The closing presentation will discuss the concept of

'critical loads' as a tool available for determining when pollution effects thresholds have been crossed; using examples from the previous four presentations. The format of the session will be: a 5 minute introduction from the Chair; four 20 minute core presentations; one 20 minute closing presentation (15 minutes per presentation with 5 minutes for questions); and 15 minutes for questions and discussion exploring management applicability of air pollution effects monitoring, research, and modeling.

Ozone Pollution Impacts on Native Trees and Wildflowers in Great Smoky Mountains National Park

Art Chappelka, Research Scientist, Auburn University, School of Forestry and Wildlife Science, Auburn, Alabama

Howard Neufeld, Appalachian State University, Department of Biology, Boone, North Carolina

Sandy McLaughlin, Oak Ridge National Laboratory, U.S. Dept of Energy, Oak Ridge, Tennessee

Susan Sachs and Jim Renfro, Great Smoky Mountains National Park, Gatlinburg, Tennessee

The purpose of this project was to obtain a significant new understanding of the impacts of ozone pollution on selected trees and wildflower species in Great Smoky Mountains National Park (GRSM). The study objectives were addressed through 1) tree ring analyses to relate tree growth to past ozone and climate variations, 2) high resolution analyses of daily growth patterns of mature trees related to variations in ozone and climate, 3) determination of the relationship between ozone and productivity of native wildflowers growing in GRSM (both in situ and in bioindicator gardens), and 4) education of the public to the rationales, approaches, and results of the proposed studies, implemented through strategic placement of bioindicator gardens with ozone-sensitive species in GRSM. Results of this study will be discussed relative to policy implementation for natural resource management in GRSM.

Assessing the Risk of Foliar Ozone Injury on Plants in U.S. National Parks

Robert Kohut, Plant Pathologist, Boyce Thompson Institute, Cornell University, Ithaca, New York

The US National Park Service needs to understand the risk ambient ozone poses to vegetation in the parks. Foliar ozone injury on plants is the result of the interaction of the plant, the ozone exposure, and the environment. Risk is maximized when plants are genetically predisposed to ozone, concentrations of ozone exceed thresholds for injury, and environmental conditions foster the uptake of ozone by plants. In conducting risk assessments for 270 parks, ozone-sensitive species were identified, Sum06 and W126 exposure indices calculated, counts of hours of exposure over 60, 80, and 100 ppb compiled, and monthly Palmer Z Index soil moisture data examined. The risk assessments evaluated the states and interactions of these variables and assigned each park a rating of high, moderate, or low risk. Park managers are using the assessments in deciding whether to commit resources to evaluate ozone impacts on plants in their parks.

A Novel Indicator of Ecosystem N Status: Ratio of DIN to DON in Annual Riverine Flux

Mark Williams, Research Scientist, University of Colorado at Boulder, Boulder, Colorado
Tamara Blett, Ecologist, National Park Service, Denver, Colorado
Kurt Chowanski, Research Assistant, University of Colorado at Boulder, Boulder, Colorado

We propose that the ratio of the annual flux of dissolved inorganic nitrogen (DIN) to dissolved organic nitrogen (DON) in streamwaters provides a robust and sensitive method of determining the N-status of ecosystems from a variety of biomes. Our results from many biomes suggest that N-limited ecosystems have DIN:DON ratios less than 0.5 and that ecosystems where N is no longer limiting have DIN:DON ratios greater than 2.0. We hypothesize that DON export from terrestrial ecosystems is controlled primarily by the standing stock of C and N in soils and hence will change only slowly in response to anthropogenic additions of N. In contrast, atmospheric deposition of N stimulates net nitrification and nitrate export in soil solution and stream waters. Therefore export of dissolved inorganic N responds directly and quickly to increases in anthropogenic deposition of N.

Modeling the Timeline for Surfacewater Acidification from Excess Nitrogen Deposition for Rocky Mountain National Park

Melannie Hartman, Research Associate, Colorado State University, Natural Resource Ecology Laboratory, Fort Collins, Colorado
Jill S. Baron, Dennis S. Ojima, and William J. Parton, Natural Resource Ecology Laboratory, Colorado State University, Fort Collins, Colorado

Nitrogen wet deposition of 3-5 kg N/ha/year along the Colorado Front Range in Rocky Mountain National Park is among the highest measured in the State and has been increasing 2-3% annually. Because nitrogen is a major nutrient as well as a potential cause of acidification, we developed a model that simulates plant and soil nutrient cycling processes as well as soil and water chemical equilibrium, DayCent-Chem. We used the model to ask how much nitrogen deposition it takes to acidify an alpine watershed. N deposition scenarios included current N deposition rates, and current multiplied by 1.25%, 2.5%, and 5.0% annually for 48 years. Acidification does not occur at current N deposition levels, but decreasing stream pH and ANC occur at slightly higher N deposition amounts.

Critical Loads: A Tool for Evaluating and Protecting Resources on National Park Service Lands

Ellen Porter, Biologist, National Park Service, Denver, Colorado

A critical load is the concentration or deposition of a pollutant below which harmful resource effects do not occur, including lake and stream acidification, nitrogen enrichment, biotic community changes or vegetation injury. Critical loads are widely used in Europe and other countries; in the United States, federal land management agencies are now adopting the critical load concept. Aquatic ecosystems in certain parks, including Shenandoah, Great Smoky Mountains, and Rocky are

currently affected by anthropogenic nitrogen or sulfur deposition. Other parks have terrestrial and aquatic resources at risk from deposition. Many parks contain ozone sensitive plants that may experience seasonal ozone injury. Critical loads will be useful to assess park conditions and set restoration goals, if needed. Federal land managers are refining critical load strategies, working with scientists to identify sensitive resources, define resource protection criteria that will meet management objectives, and estimate and implement critical loads.

Session 10 • Contributed papers

The Dynamics of Managing Surface and Ground Water

Chair: Joseph Meyer, Branch Chief, Physical Science and GIS, Yosemite National Park, El Portal California

For Peat's Sake: Meadows, Fens, and Groundwater Withdrawal at Crane Flat, Yosemite National Park

Joseph Meyer, Branch Chief, Physical Science and GIS, Yosemite National Park, El Portal California

The Crane Flat Meadow Complex is one of the largest mid-elevation meadow complexes in Yosemite National Park. Sierra Nevada meadows are biologically diverse, critical habitat for the Great Gray Owl, and largely sustained by groundwater. At Doghouse Meadow, which is a part of the Crane Flat Meadow Complex, a deep peat body constituting a fen was discovered. In 2004, groundwater monitoring nests (i.e. wells and piezometers) were installed at Doghouse Meadow, part of the Crane Flat Meadow Complex. These monitoring data suggest a connection between the domestic production well at Crane Flat and the groundwater at Doghouse Meadow, with implications for management and use of the area. Similar nests were installed at reference meadows in the Gin Flat Meadow Complex and the Mono Meadow Complex.

Point Source Water Management in the Upper Delaware River: Applied Anti-Degradation Strategies

Patrick Lynch, Chief of Research & Resource Planning, Delaware Water Gap National Recreation Area, Bushkill, Pennsylvania

This paper will outline an aggressive business-like approach to protect the "special protection (anti-degradation) waters" of the Delaware Water Gap National Recreation Area (DEWA).The Delaware River runs through the heart of DEWA for 42 miles. There has been a steady human exodus from nearby metropolitan areas to this rural area for several years now. To protect the anti-degradation waters of this section of river from water pollution associated with rampant, uncoordinated development, the NPS/DEWA has partnered with the Delaware River Basin Commission to sponsor a point source management plan effort with the three states that border the federal section of the river. The approach taken relies upon applied science techniques to model the problem and common sense to meet desired goals of ecological conservation and smart growth-development.

Evaluation of Water Quality Relative to Episodic Events Within the Maryland / Virginia Coastal Bays

Brian Sturgis, Ecologist, Assateague Island National Seashore, Berlin, Maryland

The delivery of excessive nutrients to the estuarine waters within and adjacent to Assateague Island National Seashore is the most significant long term threat to the park's aquatic environment. Three existing monitoring program sites, located in the Sinepuxent and Chincoteague Bays were investigated for short term, episodic perturbations during three separate times each year. Intensive sampling for nutrients were conducted every three hours during each ten day sampling period, while physical measurements (dissolved oxygen, pH, temperature, and conductance) were monitored every fifteen minutes. New data provided by this sampling regime supplemented existing monitoring information, and improved managers understanding of temporal, as well as short term variability in water quality conditions. A refined understanding of water quality in the coastal bays is enhancing the ongoing development and implementation of local/regional; management practices (e.g. TMDL) and regulatory mechanisms aimed at reducing nutrient inputs (e.g. agricultural best management practices, shoreline buffers).

Assurances of Environmental Benefits in Everglades Restoration

Elizabeth Crisfield, Water Resources Liaison, National Park Service Water Resources Division and Everglades National Park, Washington, D.C.

The first federal action to repair the Everglades came in 1970 with legislation that guaranteed a minimum delivery of water to Everglades National Park. Since then, several laws have confirmed the federal commitment to Everglades restoration. Of these, the Comprehensive Everglades Restoration Plan of 2000 (CERP) is the most recent and strongest commitment to environmental restoration in South Florida. In the CERP, Congress acknowledges the difficulties of implementing a restoration plan in the face of urban and agricultural pressures. Thus, CERP requires three safeguards to ensure the benefits of the authorized plan: state water reservations for the natural system, a savings clause to prevent backsliding as the plan is implemented, and interim goals that define the expectations of restoration success. This presentation will describe these three assurances tools and explain how they can be used to protect the goals and purposes of the CERP.

Measuring Change in Riparian Areas Following Removal of Cattle from Santa Rosa, Island, Channel Islands National Park

Joel Wagner, Wetland Program Leader, National Park Service, Denver, Colorado
Kate Roney Faulkner (presenter), Chief, Natural Resources Management, Channel Islands National Park, Ventura, California
Sarah Chaney, Restoration Botanist, Channel Islands National Park, Ventura, California
Michael Martin, Hydrologist, National Park Service Water Resources Division, Fort Collins, Colorado

The National Park Service and partners assessed the functionality of selected riparian areas on Santa Rosa Island, Channel Islands National Park with the Bureau of Land Management technique called "Process for Assessing Proper Functioning Condition" (Assessment). The Assessment was performed in 1995 and 2004. At the

time of the 1995 Assessment, approximately 5,000 cattle and 1,500 deer and elk, all non-native, were on the island. Major management changes occurred on Santa Rosa Island between 1995 and 2004. Cattle were removed in 1998 and deer and elk populations were reduced. The 2004 Assessment documented considerable recovery of stream channel geomorphology and riparian vegetation at the majority of the selected areas due to vegetation recovery in the watersheds, resulting decreased runoff and sediment delivery to the island's stream systems, and establishment of riparian vegetation. This technique is a rapid and repeatable method for evaluating the condition of riparian areas in terms of geomorphic stability. However, users must independently assess whether recovering riparian–wetland vegetation communities are on a trajectory toward desired future vegetation conditions.

Session 11 • Panel discussion

The National Park Service and the World Conservation Movement

Chair: Rick Smith, Organizational Quality Associates, Placitas, New Mexico

Session abstract:

Many senior National Park Service employees can remember when the National Park Service was a leader in the international protected area arena. NPS employees at all levels participated in short or long term assistance programs overseas. Various park staffs hosted delegations of protected area professionals who were studying the US park model to determine if it fit their own countries' priorities. The WASO Office of International Affairs was the hub of all these activities and served as the Service's principal contact with the world conservation movement. Sadly, events have conspired to reduce the NPS's international activities and our agency has lost its leadership role. Foreign travel budgets have been slashed, securing foreign travel authorization is agonizingly slow and bureaucratic, and successive administrations have paid scant attention to international conservation efforts unless there is a direct impact on US interests. It's not a pretty picture. This panel will look at rekindling interest in NPS professionals in international conservation efforts.

Panelists:

Jonathan Putnam, Office of International Affairs, National Park Service, Washington, D.C.: Putnam will detail the kinds of current activities that NPS employees are currently performing in other parts of the world.

Bill Wade, Organizational Quality Associates: Wade, former Superintendent of Shenandoah National Park, will relate the pluses and minuses of long-term foreign assignments, based on his assignments in New Zealand and Trinidad and Tobago.

William Supernaugh, Superintendent, Badlands National Park, Interior, South Dakota: Supernaugh will discuss the value of sister park relationships.

Rick Gale, Organizational Quality Associates*:* Gale, retired Chief of Fire and Aviation, will discuss his activity-specific consultancies in fire and incident management outside the U.S.

Rick Smith, Organizational Quality Associates: Smith, former Associate Regional Director, will detail the advantages of the kinds of short term consultancies he has

performed for other agencies such as the Peace Corps, the World Bank, the UN, and the Inter-American Development Bank.

Session 12 • Informal discussion

The Challenge of Interpreting Nature and Culture in the NPS — A Conversation with Bill Cronon

Chair: Bob Krumenaker, Superintendent, Apostle Islands National Lakeshore, Bayfield, Wisconsin

Session abstract:

Join plenary speaker Bill Cronon for a conversation about the challenges of interpreting and managing both nature and culture in the national park system. The format will be informal, interactive discussion, following up and expanding upon the ideas presented in the plenary.

Discussant:

William Cronon, Frederick Jackson Turner Professor of History, Geography, & Environmental Studies, University of Wisconsin, Madison, Wisconsin

Session 13 • Side meeting open to all

A Seamless Network of Parks: Using a Landscape Approach to Foster Cooperation in the Southeast

Chair: Mary Klein, Vice President, NatureServe Network, Arlington, Virginia

Presenters:

Gregory E. Eckert, Biological Resource Management Division, National Park Service, Fort Collins, Colorado

Loyal A. Mehrhoff, Biological Resource Management Division, National Park Service, Fort Collins, Colorado

Session abstract:

A challenge for park managers is to effectively account for, and manage in the context of, a complex landscape. But what if managers of nearby parks — from federal, to state, to private — could find the biological and recreational linkages, and seamlessly manage these resources across the landscape? This powerful vision sparked a cooperative project between the National Park Service (NPS) and NatureServe to create a Seamless Network of Parks in the Southeastern U.S. By the time of the GWS2005 Meeting we will have gathered together a number of datasets and begun our landscape analysis. Please join us to take an early peek at the results, and help us refine our thinking about: 1) the role NPS units play with respect to the region's native ecosystems and outdoor recreational opportunities, and 2) how this role can serve as a catalyst for cooperation with neighboring protected areas to conserve biodiversity by addressing common land management challenges.

Monday, March 14 • early afternoon concurrent sessions • 1:30 – 3:35

Session 14 • Panel discussion

Putting Numbers in Their Proper Place: The National Park Service Approach to Visitor Carrying Capacities

Chair: Linda Dahl, Program Manager, Gateway and Regional Planning (WASO), National Park Service, Denver, Colorado

Session abstract:

The National Park Service must address "visitor carrying capacity" for all areas of NPS units — it's critical to management and it's the law. How best to address capacity has been a long-standing issue in dealing with the inherent tension between use and preservation of parks. Initial efforts in the 1960s sought to find or "discover" an inherent, numerical carrying capacity. More recently, it has become clear that capacities are prescriptions rather than attributes.They are interrelated with other management goals and actions in complex ways. To respond, the NPS has been making important advancements in carrying capacity analysis and management to identify "desired conditions," monitor associated indicators and standards, and implement effective management actions, including techniques to accomplish all faster and more efficiently. The approach ensures General Management Plans, intended to serve 15–20 years, have the flexibility to address changes in use and the response of the resources over time.

Panelists:

David Cole, Research Biologist, Aldo Lepold Wilderness Research Institute, Missoula, Montana

Jim Hammett, Superintendent, John Day Fossil Beds National Monument, John Day, Oregon

Kerri Cahill, Community Planner, National Park Service, Denver Service Center, Denver, Colorado

Charlie Jacobi, Recreation Specialist, Acadia National Park, Bar Harbor, Maine

Session 15 • Invited papers

Research Learning Centers II: The Mission, Success Stories, and Challenges

Chair Terry Terrell, Director and Science Officer, Continental Divide Research Learning Center, Rocky Mountain National Park, Estes Park, Colorado

Session abstracts:

Research Learning Centers are now established in thirteen National Parks or regions. Funded under the Natural Resource Challenge, RLCs are part a broad initiative within the NPS to provide a vision and a mechanism for parks to revitalize and expand their natural resource programs. Learning Centers help to facilitate research in and about Parks and disseminate results to park managers and the public so that decisions and policies regarding these lands are based on the most accurate information available.

This session is the second of two RLC sessions that will present an overview of current RLC programs, what research the Centers are involved in, what challenges and opportunities are experienced by RLCs, and how these programs are connecting other components of the Challenge, to management, and to the public.

Great Lakes Research and Education Center: Progress, Challenges, Accomplishments

Joy Marburger, Research Coordinator, Great Lakes Research & Education Center, Indiana Dunes National Lakeshore, Porter, Indiana

Wendy W. Smith, Education Coordinator, Great Lakes Research and Education Center, Indiana Dunes National Lakeshore, Porter, Indiana

The Great Lakes Research and Education Center (GLREC) was established in 2002 at Indiana Dunes National Lakeshore. The center facilitates research and education in 11 Great Lakes national parks or monuments. Construction of the GLREC office, a 1941 historic structure, was completed in August 2003. Restoration of a 1908 Sears historic house was completed as a field laboratory in August 2004 and is currently being retrofitted with equipment. Researchers will be invited to use the facilities in spring 2005. The center initiated several projects and programs during the past two years including two multi-agency purple loosestrife conferences, two Wetlands in Parks (WIP) teacher training workshops, an ozone bio-monitoring workshop, Great Lakes teacher workshops, and citizen science monitoring of mollusks and tree health. Multi-park 2004 research projects in plant genetic diversity were funded through park-supported funding avenues. All Indiana Dunes National Lakeshore research permits are reviewed by the research coordinator.

Supporting Inquiry and Learning in the Crown of the Continent

Leigh Welling, Director, Crown of the Continent Research Learning Center, Glacier National Park, West Glacier, Montana

Sallie Hejl, Resource Education Specialist, Crown of the Continent Research Learning Center, Glacier National Park, West Glacier, Montana

The Crown of the Continent Research Learning Center is headquartered in Glacier National Park in the Crown of the Continent Ecosystem, a richly diverse, glacially carved landscape. Goals of the Center are to 1) facilitate research in the park and surrounding ecosystem, 2) encourage science-informed management decisions, and 3) develop education and outreach initiatives. The sensitive and pristine nature of the 16,000 square mile ecosystem presents an excellent baseline for world class research on a range of topics, including wildlife population and trends, climate change, fluvial and watershed processes, and fire behavior and ecology. While the Crown is a coherent ecological unit, its jurisdictional complexity challenges efforts to manage it as a system. Through seminars, workshops, and research applications projects, the RLC helps managers understand how decisions in one area impact another. Education and outreach programs include summer internships, teacher workshops, public lectures, and development of briefing papers for interpreters.

Atlantic Research Learning Center: Science through Collaboration and Integration

Carrie Phillips, Research Coordinator, Atlantic Learning Center, Cape Cod National Seashore, Wellfleet, Massachusetts

Development of the Atlantic Research Learning Center is guided by three fundamental objectives: to facilitate collaborative research on the Cape's resources and ecosystems; to translate research results so that they are useful to managers and interested publics; and to offer research, analytical, and educational assistance to other parks and partners. Our early efforts have focused on building the infrastructure needed to attract and support research partners. We have also started building research partnerships based on ARLC-supported housing and our existing technical and analytical capabilities. Integrating ARLC efforts with the North Atlantic Coast CESU, the park's Prototype I&M Program, and the Natural Resource Management Division's strong scientific knowledge and experience have been critical. In the coming years, as facilities near completion, we will increase our emphasis on building collaborative partnerships, building a strong information dissemination component, and expanding our capabilities to serve other parks and partners.

Schoodic Education and Research Center: A Nonprofit Approach for Science and Learning at Acadia National Park

David Manski, Chief, Resource Management, Acadia National Park, Bar Harbor, Maine

The National Park Service (NPS) at Acadia National Park is undertaking an ambitious and historic initiative to convert a former 100 acre navy base into the Schoodic Education and Research Center (SERC). The campus-like facility (36 buildings totaling > 200,000 square feet), includes a dormitory, apartment complex, cafeteria, clinic, meeting space, gymnasium and other buildings. With only limited new funding to operate this facility, park staff concluded that the most effective way to foster research and education partnerships and to manage the campus was through the assistance of a nonprofit organization (NGO). This presentation will review our strategy and accomplishments in transitioning from the former base to a NPS Research Learning Center. Topics to be discussed include: the SERC business plan, Acadia Partners for Science and Learning (our new NGO), facility rehabilitation to support learning center functions, and recent research, science education, and cultural heritage demonstration projects.

Science and Education Partnerships at the California Mediterranean Research Learning Center

Raymond Sauvajot, Chief of Planning, Science, and Resource Management, Santa Monica Mountains National Recreation Area, Thousand Oaks, California

Woody Smeck, Superintendent, Santa Monica Mountains National Recreation Area, Thousand Oaks, California

The California Mediterranean Research Learning Center is a science and education partnership designed to help understand and preserve southern California's diminishing Mediterranean-type ecosystems. The Center includes Cabrillo National Monument, Santa Monica Mountains National Recreation Area, and Channel Islands National Park. The Center facilitates partnerships in scientific research, as well as opportunities for long-term conservation. In addition, the Center helps disseminate learning to diverse audiences in southern California and build community

stewardship. The three national park units in southern California serve as sources of discovery and affirmation to support these science and educational endeavors. The Center is not facility-based, but a program of partnerships between the NPS, scientists, educators, and communities. Already, much has been achieved, including development of a web-based research prospectus, and support for international conservation exchanges, scientific and educational activities, and on-the-ground conservation work that links science and education.

Session 16 • Contributed papers
Sociopolitical Dynamics and Protected Lands
Chair: Jerry Emory, Gordon & Betty Moore Foundation, San Francisco, California

Visitor Impact on Protected Area Systems — Ecotourism or Ecoterrorism?
John Waithaka, Ecosystem Scientist, Ecological Integrity Branch, National Parks Directorate, Parks Canada, Hull, Quebec
Many protected areas that have great diversity of wildlife in relatively undisturbed ecosystems and fairly intact indigenous cultures are usually important ecotourist destinations. All over the world, ecotourism has been widely assumed to be inherently sustainable and in developing countries, it is seen as a means of overcoming underdevelopment, stimulating the growth of the local economies, providing improved infrastructure, and fostering social and cultural progress. However, little research has been undertaken to establish the environmental impacts of tourism. This paper presents research finding from a Kenyan Park where unregulated wildlife-based tourism is threatening to erode both cultural and environmental integrity of Maasai Mara National Reserve. Off-road driving, animal harassment, pollution, unplanned infrastructure and other human footprints are changing the ecology of entire ecosystem, disrupting feeding and breeding patterns of some species and impacting negatively on indigenous cultures. Scientific evidence shows that what is being described as ecotourism could pass for ecoterrorism.

Environmental Youth Programming in Chicago: Urban Parks Make Their Impact with Place-based Education
Dayna Decker, Program Specialist, Chicago Park District, Chicago, Illinois
Park systems are in a unique position wherein they naturally spread out across their city and reach out to urban communities; park districts can therefore take on a leading role in regards to managing and serving highly diverse audiences. Attending to the particular issues facing each community served by an educational program, including cultural, historical, racial, natural, and commercial, results in a tailor-made experience for each community that presents a stronger, more relatable message. This method of considering and integrating all aspects of a community when delivering educational programs known as “place-based education.” The best method is to create a program based in their community, taught by their neighbors, and located in their backyards. This paper will demonstrate the ways in which the Chicago Park District, located in Chicago, Illinois, has taken a leading role in place-based educational practices by offering exciting opportunities in the fields of science and education to teenagers.

Obstacles to Heritage Protection: the Sociopolitical Dynamics of the Machu Picchu Historic Sanctuary, Peru

Keely Maxwell, Lecturer in Environmental Studies, Bates College, Lewiston, Maine

The Machu Picchu Historic Sanctuary is a unique protected area since it aims to protect Peru's natural and cultural heritage. Yet it is also plagued by excessive tourism, ineffective institutions, impoverished residents, and altered ecosystems. Although its archaeological sites and landscapes are world-renowned, there is a paucity of scientific analyses of the protected area, why it faces the problems it does, and how management strategies may be improved. The presenters are some of the first researchers to utilize social science theories to understand Sanctuary problems. Since they come from different theoretical backgrounds, their papers provide a variety of perspectives on Machu Picchu. Combined, they illuminate disturbing trends involving Machu Picchu's role in national and international political economies and power relations, with negative consequences for its critical cultural and natural patrimony, including its residents. Our session would involve presentations of three papers with ample time for discussion about Sanctuary management strategies.

Between Utopia and Total Institution: Structural and Secondary Adjustments in the Andean Identity Market

Pellegrino Luciano, Graduate Student, Anthropology Department, City University of New York, Graduate Center, Astoria, NY

Keely Maxwell, Bates College Environmental Studies Department, Lewiston, Maine

Ramiro Campos, Department of Earth and Environmental Science, C.W. Post, Long Island University, Brookville, NY

This paper discusses dilemmas faced by inhabitants living in the district of Machu Picchu, Peru, in the well known nature and historic sanctuary. I examine state projects in the southern Peruvian Andes that are evolving from current neoliberal policies accommodating larger capital investments. My inquiry focuses on the intersection between governance and the market economy through the experience of dispossession. I use the concept of secondary adjustment as a way of understanding how people are disciplined to systematically skew economic conditions to favor more powerful interests. I describe how residents living in this national park adapt to and challenge the pariah practices of constituting people into discredited subjects. The findings show that the development of a neoliberal economy has led to a complexity of changing juridical relationships involving "takings" of property rights, civil-status and public resources. I hope to raise some questions about globalization, nature conservation and state relations.

Tourism, Globalization, and Spectacle: Park Management and the Villages in the Machu Picchu Historical Sanctuary

Ramiro Campos, Ph.D. Candidate, CUNY Graduate Center, Ridgewood, New York

This paper will examine some of the social and political challenges facing the management of the Machu Picchu Historical Sanctuary within an economic, historical and political framework. It will first present the Machu Picchu Historical Sanctuary as a product and catalyst of Peru's economic development strategy well as a central

subject and object of its "nationalist syntax." It will then examine the larger global economic forces that led to the areaís settlement almost 90 years ago and why it is a source of some of more recent problems. Finally, it will present its conflicting qualities as park and monument, commons and export commodity, sacred space and spectacle in which larger national and global forces compete over its nature and future while obscuring its unique histories and private political struggles between differing stakeholders (local and national) and differing ideologies.

Session 17 • Contributed papers
Large-Scale Landscape Change
Chair: TBA

Using Packrat Middens to Assess How Grazing Influences Vegetation Change in Glen Canyon NRA, Utah

Jessa Fisher, Student, USGS Colorado Plateau Field Station, Northern Arizona University, Flagstaff, Arizona (Kirsten Larsen, presenter)
Kenneth L. Cole, Research Ecologist, USGS Southwest Biological Science Center, Colorado Plateau Field Station, Northern Arizona University, Flagstaff, Arizona
R. Scott Anderson, Professor, Center for Environmental Sciences and Education, and Quaternary Sciences Program, Northern Arizona University, Flagstaff, Arizona

Plant macrofossils and pollen grains found in packrat middens can serve as an important proxy for climate, vegetation change, and anthropogenic influences on the environment in the arid southwestern US. This work examines a series of 44 middens from Glen Canyon National Recreation Area, spanning from 14,850 years old to present. Twenty-seven of the middens are dated as younger than 1,000 years, giving this project extra detail during the periods just prior to, and following the introduction of domesticated grazing animals. By comparing the vegetation in middens from before domestic sheep and cattle grazing was introduced, and after, it can be seen how this widespread practice has had an effect on the native plant communities of the area. Presence or absence of certain key plant species, such as Russian thistle, winterfat, and native grasses, indicates that grazing has had an effect on the composition of the native plant communities.

Persistence and Relative Abundance of American Pikas *(Ochotona princeps)* During a Warming Climate

Erik Beever, Ecologist, USGS-BRD Forest & Rangeland Ecosystem Science Center, Corvallis, Oregon
Chris Ray, Research Associate, University of Colorado, Boulder, Colorado

Recent changes in climate have been shown to affect myriad taxa, and biological effects are predicted to be most pronounced at higher elevations and latitudes. Re-surveys of 20th-century records of pikas from the Great Basin suggest that: populations have been lost from 36% of the sites; the rate of losses has apparently quickened in recent years; and distance to primary roads, habitat extent, and a climatic surrogate (maximum elevation) appear to influence extirpation risk. Protected areas in North America disproportionately occur at higher elevations and in rock- and ice-dominated

areas — areas that happen to favor pikas — yet the role of management in pika persistence remains clouded. Research on microclimatic and other characteristics of occupied and unoccupied taluses in the hydrographic Great Basin and in Lava Beds National Monument — using remote-temperature recorders, modeling, and population indices — may further illuminate drivers in this charismatic inhabitant of many western parks.

Predicting Future Plant Distributions in Parks: Some Park Names May Need to Change

Kirsten Larsen, Research Technician, USGS SBSC Colorado Plateau Research Station, Northern Arizona University, Flagstaff, Arizona
Kenneth L. Cole, USGS Southwest Biological Science Center, Colorado Plateau Field Station, Northern Arizona University, Flagstaff, Arizona

Plant species distributions are chiefly controlled by climate, and as climate has changed in the past, species have responded through dispersal and migration. Global Atmospheric Circulation Models predict drastic changes in temperature and precipitation in the near future. And, over the last decade, climates of the arid southwest seem to be already changing toward the predicted directions. At the same time, many plant species seem to be responding as would be expected. It is important for park managers to address likely future impacts to prepare management and monitoring strategies to adequately address them. We have developed a set of geospatial tools for modeling the relationships between plant species and climate, and for modeling the likely future areas of migration or extinction using GIS. These methods will be demonstrated using species such as Saguaro and Joshua Tree within the National Parks named for them.

The Tragedy of Fragmentation: A Conservation Landscape for the United States

J. Michael Scott, U.S. Geological Survey and University of Idaho, Moscow, Idaho
Dale Goble, College of Law, University of Idaho, Moscow, Idaho
Leona K. Svancara, National Park Service and University of Idaho, Moscow, Idaho
Thomas Loveland, U.S. Geological Survey, Sioux Falls, SD

The first calls for a protected areas system that was representative of the ecological diversity of the United States date to the second decade of the 20th century. Ninety years later we are still far short of achieving this goal. With a projected population of nearly 500 million by this country's tri-centennial ñ a population increase likely to be accompanied by an increase in use of natural resources, loss of habitat, and pollution loads ñ the country faces the loss of entire ecosystems and hundreds of species while relegating many of the remaining species to functional and evolutionary extinction in isolated fragments of ecologically dysfunctional ecosystems. In this paper, we provide an assessment of the representativeness of extant nature reserves and the resiliency of their resident populations. We also provide an assessment of the ecological distribution, content and context of the nations protected areas, e.g., National Parks, National Wildlife Refuges. We close by providing alternative visions for the ecological future of this country and a blueprint for creating a conservation landscape that is representative of the nation's rich biological diversity — a vision for the re-commoning of the North American landscape.

Ecosystem Response to Altered Disturbance Regime in Arid Protected Areas

Erik Beever, Ecologist, USGS-BRD Forest & Rangeland Ecosystem Science Center, Corvallis, Oregon

David A. Pyke, Research Rangeland Ecologist, USGS-BRD Forest & Rangeland Ecosystem Science Center, Corvallis, Oregon

Manuela M. Huso, Senior Faculty Research Assistant, College of Forestry, Oregon State University, Corvallis, Oregon

In arid and semiarid ecosystems, recovery from disturbances is uncertain — occurring only if biophysical thresholds have not been crossed, and on different time scales for various ecosystem components. The USDI-NPS has recently removed non-native herbivores from several southwestern "parks," and sought to monitor responses of soils and vegetation in Mojave National Preserve following removal of cattle and feral burros. Using distance from water as a surrogate for grazing intensity, we sampled at 100, 400, and 1,600 m from water within 10 blocks (i.e., wells) in the Preserve during 2001-2003. Sampling methods included: line-point and gap intercepts (for plant cover and vulnerability to erosion, respectively); penetrometers; aggregate soil stability; and belt transects (for abundance of woody and invasive plants and ant mounds). Whereas some variables exhibited strong interannual variability related to precipitation (ant-mound abundance, cover of invasive plants), other variables appeared to "recover" quickly after grazing ceased (soil stability, native-grass cover).

Session 18 • Panel discussion

Low-Carb Park Planning

Chair: Warren Brown, Chief, Park Planning and Special Studies (WASO), National Park Service, Washington, D.C.

Session abstract:

General Management Plans are often criticized for taking too long and costing too much. Proposals abound for ways to streamline the planning process. Some of these promise to produce leaner plans without giving up all of the goodies that parks and partners seek. Are leaner GMPs just another fad diet, or are they just what the doctor ordered? A panel will discuss previous and ongoing efforts to streamline the park planning process. Panel members will be asked to address a series of questions about General Management Plans highlighting the tensions between being visionary but realistic, comprehensive but site specific, on schedule but excellent in engaging the public, focused on resources or focused on visitors, responsive to partners and consistent with NPS policies, drivers for local economic development but setting limits on visitor capacity.

Panelists:

Linda Canzanelli, Superintendent, Biscayne National Park, Homestead, Florida

Deborah Darden, Deputy Superintendent, New River Gorge National River, Glen Jean, West Virginia

Robert McIntosh, Deputy Regional Director, Northeast Region, National Park Service, Boston, Massachusetts
Nat Kuykendall, Chief, Planning Division, Denver Service Center, National Park Service, Denver, Colorado
Dennis Schramm, Program Analyst, National Park Service, Washington, D.C.

Session 19 • Contributed papers
Bringing Civic Engagement into the Parks
Chairs: Cynthia MacLeod, Louis Hutchins, Gay Vietzke

What Does the Soviet Gulag Have to Do with the NPS?: International Civic Engagement
Louis Hutchins, Senior Curator, NPS Northeast Museum Services Center, Charlestown, Massachusetts
For the past two years, the NPS has been working to bring a traveling exhibit from Russia's Gulag Museum. This presentation will explore the role that international museums can play in the ongoing discussion of bringing civic engagement to our national parks. Both Russia's Gulag Museum and the Northeast Region of the NPS are partners in the International Coalition of Historic Site Museums of Conscience. Through this collaborative effort, the exhibit now under development will come to national parks which see civic engagement as central to their park mission. Hutchins will present the Gulag project as a model for raising awareness of civic engagement both here and abroad.

"Pride in Our Citizenship": Civic Engagement in the Sagamore Hill Planning Process
Gay Vietzke, Superintendent, Sagamore Hill National Historic Site, Oyster Bay, New York
Theodore Roosevelt often said of civic duty and community involvement, "Do what you can with what you have, where you are." Sagamore Hill NHS, the site of TR's permanent home and his Summer White House, is working on its first General Management Plan, and has tried to take the President's words to heart. Working first on broadening the stories and vision for the place, and then crafting a desired future for the park that captures the greater context, the staff, partners, and community around Sagamore Hill are building a strategy that will keep the place vibrant and relevant for future generations. Vietzke will discuss the planning process – with its ups and downs – that has attempted to embrace TR's ideals about active citizenship and demonstrate the principles of civic engagement on the ground.

History, Healing, and Hope
Cynthia MacLeod, Superintendent, Richmond National Battlefield Park & Maggie L. Walker National Historic Site, Richmond, Virginia
This paper will discuss the park's experiences with finding and presenting new stories to NPS visitors and with working in diverse communities to share stories and expand the contextual knowledge of traditionally understood events. Specific short case studies

will be presented, such as 1) representing at RICH the story of President Lincoln's visit to Richmond in April 1865, 2) revamping the main film at FRSP to tell civilian stories, and 3) conducting dialogue sessions in Richmond with a diverse membership body.

Session 20 • Contributed papers
Wildlife Management
Chair: Denny Fenn, U.S. Geological Survey, Flagstaff, Arizona

Why Survey Native Bees in National Parks?
Sam Droege, Wildlife Biologist, USGS-PWRC BARC-EAST, Beltsville, Maryland
The 4000 North American species of native bees are the primary pollinators of plants. Most plant species require visits by pollinators for adequate and viable seed production. In many instances these bees are specialized on a single genus or even species of plant. This talk outlines the natural history of native bees, their geographic patterns of occurrence, how many a large National Park might expect, and what types of information an inventory or periodic monitoring of bees might yield. Practical information on capture techniques, survey design, sample sizes, and where to sample will be given (hint: volunteers can easily collect the data, see http://www.online.sfsu.edu/~beeplot for detailed information). Surprising results are given on habitat preferences from the barren wastelands of central Washington D.C. monument plantings (nearly 50 species in late summer!) as well as a completed inventory of National Park Service lands along the Potomac River.

Assessing Grizzly Bear Population Status at an Ecosystem Scale
Katherine Kendall, Research Biologist, USGS Science Center, Glacier National Park, West Glacier, Montana
Jeffrey B. Stetz, Biologist, University of Montana Science Center, Glacier National Park, West Glacier, Montana
We describe preliminary results from a 2004 study to estimate the size and distribution of the grizzly bear population on 31,400 km^2 in Montana. Microsatellite analysis of bear hair will be used to identify individual bears for use in a mark / recapture population model. We employed two methods concurrently to sample bear hair. We collected hair from 2,564 baited hair snag stations and during repeated visits to 4,950 unbaited bear rub trees. During 4 14-day capture sessions, 20,650 hair samples were collected from baited sites. Collections from rub objects yielded approximately 13,000 hair samples. We describe strategies for working at large scale, such as: 1) fieldwork and logistical planning the previous year to prepare for the sampling effort, 2) coordinating activities among multiple agencies, 3) procedures used to prevent, detect, and correct errors, and 4) recommendations for directing 200 widely dispersed employees in remote areas where communication is limited.

Conservation of Common Species: Saving California Quail in the Presidio of San Francisco
Thomas Gardali, Avian Ecologist, PRBO Conservation Science, Stinson Beach,

California

Populations are being lost worldwide at a much more rapid rate than are species. This is especially true in highly urban areas like San Francisco, California. California Quail *(Callipepla californica)* — considered a common species — have declined dramatically in San Francisco and less than 20 individuals remain in the Presidio. As part of a broad effort to save quail in San Francisco, we implemented a study to provide biological information that could inform quail conservation efforts. We individually color-banded all quail in the Presidio, developed a standardized survey and a web-based data entry form where quail sightings could be reported. The purpose of the color-banding was to facilitate survey efforts, estimate survival and reproductive success, and determine movement patterns. We were surprised to learn that quail traveled approximately 3 kilometers between the Presidio and Golden Gate Park. Additionally, results suggest that annual survival for adults and juveniles may be more important than nesting success.

Forest Carnivore Surveys in Pacific Northwest National Parks: Detecting Presence in Largely Intact Ecosystems

Jim Schaberl, Wildlife Ecologist, Mount Rainier National Park, Ashford, Washington
Patti Happe, Wildlife Biologist, Olympic National Park, Port Angeles, Washington
Roger Christophersen, Wildlife Biologist, North Cascades National Park, Sedro-Woolley, Washington

In the large wilderness national parks in Washington, some forest carnivore species have not been documented for over 40 years — several are suspected to be extirpated. Challenges to finding evidence of these species in 1.84 million combined acres of mountainous terrain hinder survey efforts. However, recently developed protocols for surveying forest carnivores offer cost effective, non-intrusive, and amenable alternatives in a wilderness environment. We designed a rotating sampling panel, where each park was inventoried for 2 years during 2001-2004. A remote camera triggered by a passive infrared sensor was set at each baited station. Stations were rechecked as often as possible during a total data collection period of at least 28 nights. Thousands of photos were tallied among the three parks but only 60-80% of the photos contained animals. In this paper we present the sampling challenges and results of six field seasons of effort attempting to document these elusive animals.

Endangered Species Reintroduction — Comparisons between Red-legged Frogs and California Condors at Pinnacles National Monument

Jim Petterson, Wildlife Biologist, Pinnacles National Monument, Paicines, California
Paul Johnson, Rebecca Leonard, Cicely Muldoon, and Tom Leatherman, Pinnacles National Monument, Paicines, California

National parks and monuments protect large, relatively undisturbed natural areas that may appear ideal as sites to reintroduce extirpated threatened and endangered species. However, certain institutional, operational, and organizational hurdles exist which complicate such efforts. The degree to which these hurdles influence the outcome of a given reintroduction effort depends largely on the biology of the species involved, the factors that threaten its continued existence, the ability of park staff to adaptively respond to changing management scenarios, the ability to elicit cooperation from the

public, and the support and dedication of the entire park staff. To illustrate these points, examples will be drawn from Pinnacles National Monument, where efforts are underway to reestablish populations of these two widely divergent species, California red-legged frogs and California condors. Contrasts will be made on efforts and outcomes between the two species and also among other condor reintroduction efforts in other locales.

Session 21 • Invited papers

Connecting the Dots between the Physical and Ecological Sciences I: Evolution of Landforms and Life

Chairs: Bob Higgins, Chief, Education and Outreach Branch, National Park Service, Denver, Colorado

Vincent Santucci, Chief Ranger, George Washington Memorial Parkway, McLean, Virginia

Session abstract:

The NPS has made a strong commitment to science-based management and has taken several steps toward gathering and using natural resource information to gain a better understanding of park resources. This set of three sessions (sessions 21, 60, and 114) looks at how information from the many scientific disciplines within the physical, biological, and social sciences can be integrated into a holistic ecosystem management approach. We will consider the familiar concept of biodiversity and the emerging concept of geodiversity for the perspectives they provide on the interplay between physical settings and biological communities. Examples of integrated science information being applied to park management issues will be presented using park-specific cases and resource themes (e.g. coastal, wetlands, caves). In this era of increasing specialization within the ranks of natural resource personnel, we must be ever vigilant of our need to examine scientific information from many disciplines in order to guide our management decisions and realize our goals for ecosystem management.

Historical Biological and Historical Geological Perspectives of Geodiversity

Vincent Santucci, Chief Ranger, George Washington Memorial Parkway, McLean, Virginia

The origin of planet Earth dates to approximately 4.6 billion years ago. The earliest evidence of life on Earth first appears about 3.8 billion years ago. The evolution of biological organisms and biodiversity has been closely linked to Earth's changing geodiversity. Biogeographic ranges of taxa are often associated with the distribution of geologic and geomorphic features. Similarly, historical geologic processes and events have had a significant influence over biological evolution and historical biodiversity, including extinction and speciation events. Continental drift, tectonic activities, eustatic changes in sea level, and the advance–retreat of glaciers represent a few geological phenomena which have historically influenced biological diversity. Temporal changes in geodiversity have clearly shaped past and present biodiversity.

Parks and Other Natural Areas as Repositories and Classrooms to Study the Interactions Between Geology and Life

Doug Owen, Park Ranger (Interpretation) / Park Geologist, Craters of the Moon National Monument and Preserve, Arco, Idaho

Every environment has a geologic setting that largely determines the physical, chemical, and climatic conditions that life has to work with. Some geologic factors and their impacts on life are relatively obvious: elevation, slope aspect, slope gradient, lithology, and soil parent-material. Another straightforward example is orographic precipitation versus rain shadow caused by mountain ranges. Dynamic geologic processes can reset the clock of ecological succession or stop it from progressing. Fluvial and eolian processes, volcanism, weathering and erosion are all good examples of clock adjusters. Volcanism can bury previous soil profiles and cause fires; the fires liberate soils of their vegetative anchors allowing erosion and re-deposition of theses soils elsewhere. Processes can also affect one another, e.g., an isostatic response of uplift from erosion or glacial melt back, or subsidence from deposition or other forms of crustal loading. Geology also creates many micro-environments, such as cracks, caves, and rifts.

Geodiversity Increases Biodiversity; Both Increase Cultural Diversity

John Roth, Natural Resource Specialist, Oregon Caves National Monument, Cave Junction, Oregon

Geodiversity concentrates habitats small and old enough to increase speciation yet with enough climate-change refugia and size to lower extinction. Isolation from geodiversity and moderate disturbances common to mountains prevented mutations from being diluted out of existence by interbreeding in large populations. To help maintain its biodiversity, Oregon Caves monitors how prescribed burns and ecologic edges increase habitat for cave-adapted endemics. Areas with many edges attract cultures that in turn maintain such edges. Due in part to complex coastal, riverine, and overland colonizations, Klamath–Siskiyou ecosystem diversity thus produced among the world's most complex ethnic/ linguistic patterns. Global examples suggest that mountain barriers and meeting survival needs within small areas diverged cultures through isolation. Resource use in turn increased biologic and cultural diversity. In the last ten millennium, technologies have decreased such diversity.

Application of Paleoecologic Methods to Coastal Resource Management: An Example from Biscayne National Park

G. Lynn Wingard, Geologist , U.S. Geological Survey, Reston, Virginia

Biscayne National Park, located on the southeastern edge of the Miami-Dade County metropolis, is included in the Comprehensive Everglades Restoration Plan (CERP). Implementation of the CERP over the next 25 years will change the delivery of water to Biscayne Bay and to the park. The primary goal of the CERP is to restore the flow of freshwater in South Florida to a more natural (pre-development) state. The primary concerns for Biscayne are 1) what were the natural (pre-1900) patterns of freshwater delivery to the bay and 2) what impact will restoration have on the current fauna and flora of the bay and the reef tract? The U.S. Geological Survey, in cooperation with Biscayne National Park and the South Florida Water Management District, has been conducting research to define the natural patterns of change in the Biscayne Bay ecosystem prior to significant human alteration of the environment. Shallow sediment cores are collected within the bay and the faunal and floral remains, sediment geochemistry, and shell biochemistry are analyzed. Modern field data are collected in the same region as the cores and serve as proxies to allow accurate interpretation of the depositional environments of the core. The results of the analyses allow us to compare pre-1900 and post-1900 patterns of change in the ecosystem, to examine the probable role of natural versus anthropogenic change in the 20th century, and to predict future changes that may result from the implementation of the CERP.

Scorpion Diversity within Big Bend and Guadalupe Mountains National Parks, Texas

Richard Henson, Professor of Biology, Appalachian State University, Boone, North Carolina

One thousand seven hundred thirty-five scorpions, representing 16 of Texas' 19 known species and three families, were collected within Texas' two mountainous National Parks (Big Bend and Guadalupe Mountains) between 1986 and 2003. Both Parks are located within the Northern Chihuahuan Desert between 29 and 31 degrees latitude. Scorpions were found in various habitats ranging from loose shifting sand to rocky substrates with some highly specialized to habitat and others being generalists and less habitat specific. Both of these desert islands with large elevation ranges (1840 and 1562 meters) possess varied life zones and the most diverse scorpion populations in Texas. Big Bend is represented by 16 species and Guadalupe Mountains by seven species (17 of Texas' 19 species). The spatial distribution of these scorpions is partially dependent on several abiotic factors including temperature, precipitation, soil and substrate characteristics.

Session 22 • Invited papers

Coastal Watershed Assessment Methods and Analyses: Applications for the NPS Watershed Condition Assessment Program

Chair: Kristen Keteles, Research Scientist, Texas A&M University, NPS Water Resources Division–Fisheries, Fort Collins, Colorado

Coastal Watershed Condition Assessments: Painting the Picture for Ocean Parks

Cliff McCreedy, Marine Management Specialist, NPS Water Resources Division (WASO), Washington, D.C.

Kristen Keteles, National Parks Service/Texas A&M University, NPS Water Resources Division–Fisheries, Fort Collins, Colorado

Jim Tilmant, National Park Service, Water Resources Division–Fisheries, Fort Collins, Colorado

This presentation will describe how the new NPS Coastal Watershed Condition Assessment Program will assist NPS in evaluating the health of marine and estuarine resources. The NPS Water Resources Division has begun water resource condition assessments of 26 ocean Parks with more planned for FY 05 and 06, working through the Cooperative Ecosystem Studies Unit Networks. We will describe initial findings, results, and challenges from conducting these Phase I assessments. More intensive Phase II assessments will be piloted in FY05. Implications for Park managers and meeting servicewide resource management goals will be discussed, with an eye toward integrating with other agency programs, Vital Signs monitoring, Park resource stewardship plans and state and local watershed management planning.

Monitoring, Understanding, and Managing Estuarine Condition in Northeastern Coastal Parks

Hilary Neckles, Research Ecologist, USGS Patuxent Wildlife Research Center, Augusta, Maine

Blaine S. Kopp, USGS Patuxent Wildlife Research Center, Augusta, Maine

Glenn R. Guntenspergen, USGS Patuxent Wildlife Research Center, Natural Resources Research Institute, Duluth, Minnesota

Martha G. Nielsen, USGS Maine District Office, Augusta, Maine

The NPS Northeast Temperate Network and Northeast Coastal and Barrier Network contain nine parks between Maine and Virginia with significant coastal resources. NPS resource managers cite estuarine nutrient enrichment as one of their highest priority issues. Vital Signs monitoring is focused on detecting causes of and responses to nutrient inputs using indicators of nutrient load (e.g. land use, point-source discharges) and estuarine response (dissolved oxygen, chlorophyll, light attenuation, sediment organic carbon, seagrass distribution, seagrass population parameters). The indicator set and spatial sampling designs are compatible with EPA's National Coastal Assessment, which will allow integration of estuarine monitoring data between these programs. Ultimately, protecting estuaries from nutrient enrichment requires understanding the causal relationships among nutrient sources, nutrient loads, and ecosystem response. We present a case study for Acadia National Park, in which thresholds of seagrass response to nutrient input have been linked to watershed land-use in a GIS-based decision support system.

Selecting, Developing, and Maintaining Ecological Indicators of Estuarine Condition: The National Coastal Assessment Experience

Kevin Summers, USEPA/Gulf Ecology Division, Gulf Breeze, Florida

The purpose of EPA's National Coastal Assessment (NCA) program is to estimate the status and trends of the condition of the nation's coastal resources on state, regional

and national scales. During 1999-2004, 100% of the nation's estuarine waters were representatively sampled at over 6000 locations using indicators and indices describing the benthic community, fish community, water quality, sediment and tissue contamination, sediment toxicity, and SAV extent/condition. The first and second national report cards on coastal conditions based on these indicators were published in 2001 and 2004, respectively. Changes in these attributes, as well as condition, from the early 1990s to the early 2000s will be examined. The utility and benefits of the NCA indicators and assessment protocols to the NPS national reporting needs (all parks), regional reporting needs (e.g. all Pacific water parks), and for individual park reported needs will be examined.

Coastal National Parks: Assessing Water Resources in Stressed Ecosystems

Michael Mallin, Center for Marine Science, Wilmington, North Carolina
Merryl Alber, Department of Marine Sciences, University of Georgia, Athens, Georgia
Cliff McCreedy, Marine Management Specialist, National Park Service (WASO), Washington, D.C.

Water resource assessments provide insight into present water quality and quantity, impacts from use, and necessary future management actions. This talk will provide an overview of the assessment approach we have taken in coastal parks along the southeast coast, as well as some results of those endeavors. For example, contamination of groundwater and tidal creeks by active and former septic systems and fuel storage tanks is a problem of increasing concern in North Carolina coastal parks. Although water quality assessments can help identify the sources of pollutants to a region, in many cases pollutants come from upstream sources and may have undergone transformations during transport. It is therefore important to be able to separate out the relative importance of near-field and far-field effects, to understand how long the pollutant has been in the system, and how the parks can manage these issues in systems undergoing increasing human stress.

Session 23 • Workshop

Realizing Interpretation and Communication in Natural Resource Protection and Preservation: NPS–SCC Requirements for Interpretive Components

Chair: Daniel Manier, Research Communication Partner, National Park Service Natural Resources Office of Education and Outreach, Fort Collins, Colorado

Session abstract:

Recently, the NPS increased the requirements for interpretive, education and outreach components for NR Protection and Preservation project grants. The Service-wide Comprehensive Call for programs beginning in FY2005 features revised language designed to expand the generation of interpretation, education and outreach efforts associated with all NRPP projects. The new requirements include: identification of human dimensions factors for all research, restoration, and management projects; development of a communication plan; consultation and cooperation with interpretation, communication and/or education specialists; and designation of a budget. Researchers and communications specialists are being mandated to cooperate

to solve resource management issues. Participation of communications specialists in these proposals and the ensuing programs should create opportunities for productive cooperation, and provide real connections between Researcher, Managers, and Interpreters in the parks. This session will describe the content of the revised guidelines for Interpretive Components, express expectations of the funding committee, OTAG and WASO, and allow for questions and discussion of the practical application of the Interpretive Component.

Session 24 • Part one of a two-part workshop — Continued in session #37
The ESA in Half a Day: Proactive Consultation Workshop I
Chair: Peter Dratch, Endangered Species Program Manager, National Park Service Biological Resources Management Division, Fort Collins, Colorado

Session abstract:
This workshop will provide a review of the Endangered Species Act, and train participants in new consultation procedures to comply with the Act. Proactive consultation is the goal, and while the primary speakers now work for the National Park Service, they have ESA experience with other agencies (Fish and Wildlife Service, Forest Service and Bureau of Land Management). The workshop will also cover the new Counterpart Regulations, and the Alternative Consultation Agreement (ACA) that has been signed by several land management agencies. The ACA outlines procedures for the National Park Service to make effects determinations of national fire plan projects on federally listed species. The training required of NPS Natural Resource Chiefs and biologists conducting this type of consultation is part of the workshop, and those completing the session will be certified to conduct this type of consultation.

Presenters:
Peter Dratch
Loyal Mehrhoff, National Park Service, Fort Collins, Colorado
Bruce Rittenhouse, National Park Service, Fort Collins, Colorado
Jason Waanders, National Park Service, Washington, D.C.

Session 25 • Part one of a two-part workshop — Continued in session #38
Tracking and Applying IUCN Protected Area Categories in North America I
Chair: Stephen Woodley, Chief Scientist, Parks Canada, Gatineau, Quebec

Presenters:
Stephen Woodley
Jessica Brown, Vice President, International Programs, QLF/Atlantic Center for the Environment, Ipswich, Massachusetts

Session abstract:

The principal global framework for categorizing protected areas is the IUCN system, which specifies six categories of protected areas based on management objectives, and provides a global set of guidelines for their application. This system provides a "common language" for protected area managers from different countries. Despite the widespread application of the IUCN system, there is not a common understanding of the application of the IUCN protected area categories, even in North America. The system has value in reporting the percentage and areal extent of protected areas (e.g., state-of-country reports and international treaties such as the Convention on Biodiversity); creating a common mappable base for protected areas managed by a variety of agencies (e.g., municipal, state/provincial, and federal and private); and generally enabling protected area managers to work more effectively across borders on common conservation objectives. This workshop will try to put some order to the question: "how much of your area is in protected areas?" Speakers from Canada, the United States and Mexico will discuss application of the IUCN categories system in their countries' protected areas systems. Canada is in the process of developing CARTS (Conservation Area Recording and Tracking System) based on the IUCN management categories. A facilitated discussion will explore the value of this system in meeting shared conservation goals and will enter into the more difficult subjects of management effectiveness and compliance — When is an area really protected? What does it mean to comply with the IUCN definitions? Reviewing efforts in Canada, the US and Mexico, workshop participants will examine possibilities for harmonization.

CARTS — Canada's Protected Areas Reporting and Tracking System

Tony Turner, Canadian Council on Ecological Areas / A.M. Turner & Associates, Ottawa, Ontario, Canada

The Canadian Council on Ecological Areas and collaborators with support of Natural Resources Canada has developed a web portal application that enables access to standardized geospatial data, statistics, maps and reports for Canada's federal, provincial and territorial protected areas. To ensure source agency control and management of their data, the CARTS portal was built on an existing distributed network of servers in each jurisdiction. A key task was to develop a Canadian guidebook for interpreting and applying IUCN categories to ensure that the same range of protected area types were included across the country. As well, a common, yet expandable, database schema (data attributes) that all agencies could apply was cooperatively developed and implemented. The statistics and reports will contribute to Canada's national and international reporting requirements as well as many other assessments of protected areas.

Session 26 • Side meeting by invitation only • Part one of a two-part side meeting — continued in session #39

PRIDE Project Advisory Group Meeting I

Chair: Gary Williams, Manager, Inventory and Monitoring Branch, National Park Service, Natural Resource Information Division, Fort Collins, Colorado

Session abstract:

This will be a meeting about the PRIDE Project between the project team and the advisory group to discuss current status, issues, and next steps.

Presenters:
Gary Williams
Marianne Tucker, Oracle DBA, National Park Service, Natural Resource Information Division, Fort Collins, Colorado
Doug Garnand, NRSS Liaison to the CIO's Office, National Park Service, Natural Resource Information Division, Denver, Colorado

Monday, March 14 • late afternoon concurrent sessions • 4:00 – 6:05

Session 27 • Panel discussion
A Dilemma of Wild Proportions: Ecological Restoration in Wilderness
Chairs: Judy Alderson, Environmental Specialist, National Park Service Alaska Regional Office, Anchorage, Alaska
David Graber, Senior Science Advisor, Sequoia–Kings Canyon National Parks, Three Rivers, California

Session abstract:
The question of whether or not ecological restoration in designated and recommended wilderness is legal and/or appropriate will be discussed. A presentation on the basic legislative and ethical dilemmas involved in deciding whether restoration is appropriate, feasible and practical will set the tone for the speakers. A structured framework for thinking through all the components to reach a decision will be presented. The NPS National Wilderness Steering Committee response to this question will be addressed. Case studies will target both restoration projects that are underway, as well as projects that are in the conceptual stages. Time for lively discussion included!

Panelists:
David Graber
Peter Landres, Research Ecologist, Aldo Leopold Wilderness Research Institute, Missoula, Montana
Craig Allen, Ecologist, U.S. Geological Survey, Bandelier National Monument, Los Alamos, New Mexico

Session 28 • Contributed papers
Plant Science: Technology and Techniques
Chair: TBA

Using Remote Technology to Prevent the Collecting of Federally Listed Plants from Federal Lands

Dave Worthington, Biologist, Capitol Reef National Park, Torrey, Utah
Pete Fonken, Park Ranger, Capitol Reef National Park, Torrey, Utah
Rare cacti are illegally collected from park lands and sold internationally on websites. Online web sites offer plants for US$10.00 and packets of seeds for about US$2.00. These prices, although not high, make it profitable for collectors to collect plants and seeds. In the midst of the second year of a three-year project at Capitol Reef National Park, we are testing surveillance products to detect the collecting of these cacti. We faced the challenge that most off the shelf products didn't provide what was needed for installation in remote areas; we needed technology that could record events for later review and could remain unattended for long periods of time. Working together with land managers and law enforcement personnel from the NPS, USFWS, and USFS we have combined tried and true equipment with new technologies, including web-based and satellite systems. This new technology will help others protecting resources in remote situations.

The Arrival of New Sensors with Increased Spatial Resolution Can Improve the Accuracy and Reduce the Cost of Vegetation Mapping

Gina Wilson, Remote Sensing/GIS Analyst, Landscape Dynamics Lab, Idaho Cooperative Fish and Wildlife Research Unit, University of Idaho, Moscow, Idaho
Leona K. Svancara, National Park Service and University of Idaho, Moscow, Idaho
The objective of this project was to determine the current spatial distribution of landcover within and surrounding the City of Rocks National Reserve, Idaho, at a thematic resolution most appropriate for monitoring and mapping, with 0.5 ha mmu and >80% accuracy in each landcover type. Using imagery from the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) sensor we achieved these objectives. ASTER obtains high-resolution images of the Earth in 14 different wavelengths of the electromagnetic spectrum, ranging from visible (15m) to thermal infrared light (90m). The final landcover classification included 7 classes at the association level and 10 at the alliance levels of the NVCS with an overall accuracy of 89.2%. These data provide a baseline for vital sign monitoring and landscape characterization in the Upper Columbia Basin Network.

The LEWISIA Model: A Tool for Maximizing Plant Survey Efficiency

Peggy Moore, Plant Ecologist, U.S. Geological Survey, El Portal, California
Charlotte Coulter, Plant Ecologist, U.S. Geological Survey, El Portal, California
In times of declining budgets and increasing threats to natural resources, it is increasingly difficult to staff and fund special status plant surveys and monitoring. The USGS has developed a tool to increase the efficiency of plant surveys where mapped populations and GIS data are available for input. The model operates in an ArcGIS environment to derive the range of values for ecological variables within a mapped species' range. It then allows the user to select the full range of values, a proportion of values or selected categories (e.g., 6 of 8 soil types). LEWISIA maps the probability of species occurrence over the remaining landscape for which GIS data are available. Subsequent model runs allow weighting of individual variables according to their influence on the species distribution using expert opinion. We

completed model verification for three species in Yosemite. Ten verification sites indicated 70 percent accuracy for short-leaved hulsea.

Native Plants for National Parks: An Interagency Plant Materials Program

Russell Haas, Plant Materials Technical Advisor to NPS, Natural Resources Conservation Service, Lakewood, Colorado

Since 1989, an interagency agreement between the National Park Service and the Natural Resources Conservation Service has led to an exchange of technical information and the development of park indigenous plant materials, new seed/plant propagation technologies and revegetation methodologies for revegetation of highway and other construction projects. The program provides assistance to National Parks through NRCS Plant Materials Centers (PMC) to: identify plant species needed; collect and process native seed; provide high quality custom grown container plants and field production of native forb and grass seed from site specific collections; ensure genetic integrity; provide technical assistance on site preparation, plant establishment, weed control, seed collection and processing. In the past fifteen years the program has: assisted 45 National Parks with nearly 100 projects in cooperation with twelve Plant Materials Centers (PMC); tested over 1000 native species/ecotypes and developed successful propagation techniques for more than 700 species and produced approximately 29,000 PLS pounds of grass/forb seed and 720,000 tree/shrub seedlings. In addition, several computer tools, technical guides, a propagation manual, a cost estimation guide and an interagency propagation protocol website have been developed.

Session 29 • Panel discussion

Decision Time! Benefits-Sharing and Bioprospecting in the Parks?

Chair: John D. Varley, Director, Yellowstone Center for Resources, National Park Service, Yellowstone National Park, Wyoming

By GWS2005, the servicewide EIS on benefits-sharing and bioprospecting in the NPS will be in the midst of the nationwide public dialogue, followed by the agency's Record of Decision. The draft EIS under discussion is a primer on a subject that has or will affect many parks, and may set the stage for how other resource and land management agencies deal with this issue in the future. Because the subject has been debated for a decade, clear positions have emerged from various constituencies. The panel will define the issue, and the three alternative ways the EIS proposes the NPS could deal with it. Then we hear different arguments -pro and con- from experts drawing viewpoints from the environmentalist, "loyal opposition," "fringe opposition," and biotechnology constituencies.

Panelists:

Michael Soukup, Associate Director NPS / Co-chair Servicewide Benefits-Sharing EIS, National Park Service, Washington, D.C.

Preston T. Scott, Executive Director, World Foundation for Environment and Development, Washington, D.C.

Holly Doremus, Professor of Law, School of Law, University of California–Davis, Davis, California
Libby Fayad, Counsel, National Parks and Conservation Association, Washington, D.C.
Eric Mathur, Senior Director, Molecular Diversity, Diversa Inc., San Diego, California

Session 30 • Invited papers
Stewardship of Lands and Hidden Resources
Chair: Thomas Strong, Visiting Chief Scientist, National Cave & Karst Research Institute — New Mexico Institute of Mining and Technology, Carlsbad, New Mexico

Session abstract:
Karst comprises 20% of the United States land area. The National Park Service, along with the Forest Service, Bureau of Land Management, and Fish and Wildlife Service, has taken an active role in the stewardship of karst and caves. The NPS has 58 units which contain caves and karst lands. Ten parks or monuments were initially created specifically because of the presence of one or more caves. In addition to their scenic and recreational values, karst aquifers are important as a source of freshwater, accounting for over 25% of the nation's groundwater sources. Caves are important resources for a wide range of scientific studies, including physical, biological, and social sciences. This session will address concerns and difficulties in the stewardship of karst and pseudokarst resources, as well as current actions that will aid in the protection of these resources for use and study by future generations.

The World Above, the World Below: The 3-Dimensional, Interdisciplinary Nature of Cave and Karst Stewardship
Louise Hose, Director, National Cave and Karst Research Institute — National Park Service, Carlsbad, New Mexico
Penelope J. Boston, Associate Professor, National Cave and Karst Research Institute, New Mexico Institute of Mining and Technology, Socorro, New Mexico
Thomas R. Strong, Visiting Chief Scientist, National Cave and Karst Research Institute, New Mexico Institute of Mining and Technology, Carlsbad, New Mexico
Patricia E. Seiser, Cave and Karst Resources Stewardship Volunteer, National Cave and Karst Research Institute, Carlsbad, New Mexico
The intimacy and complexity of surface/sub-surface relationships in karst exceed all other terrestrial landscapes. Responsible management of karst, as with marine, lacustrine, and fluvial environments, requires a firm grasp on both its 3-dimensional and interdisciplinary bonds. Sewage, oil spills, and other pollutants on the surface contaminate the aquifers and cave ecology below. Leaky oil well casings can poison surface springs and groundwater mining may lead to surface subsidence. Destruction of sub-surface habitat impacts the surface ecosystem as populations of bats, crickets, and other cave-utilizing species decline. Cave and karst stewardship requires steadfast attention to ecological principles, evaluating the physical, biological, and social impacts of considered options and implemented policies. Management plans, inventory and monitoring procedures, and policy evaluations should be designed to consider the entire, 3-dimensional karst system. The impacts of policy on visitor

experiences and the attitudes they acquire from Park visits add other important elements for consideration.

Evaluation of Cave and Karst Programs

Kathleen Lavoie, Professor of Biology, State University of New York College at Plattsburgh, Plattsburgh, New York

Evaluation and assessment of the success of programs is a critical aspect of knowing if you have achieved your objectives, where to focus further attention, and of demonstrating your success to administration and granting agencies. Evaluation may be in the form of a written survey with questions ranking responses using a Likert-scale, open-ended questions, or gap analyses. Focus groups are another format for evaluation. A model used for departments, centers, and institutes is the external review, which is widely used in academia. An external review includes a critical self-study, review of documents by an external review team, an on-site visit, and a final report. The general procedures are presented and a 2004 review of NCKRI (National Cave and Karst Research Institute) is used as an example.

Vertebrate Species Use of Cave Resources in the Chihuahuan Desert

Thomas Strong, Visiting Chief Scientist, National Cave & Karst Research Institute — New Mexico Institute of Mining and Technology, Carlsbad, New Mexico

Caves are known to provide habitat for bats and other vertebrate species that spend all or significant portions of their life cycles in the totally dark areas. Caves also provide important resources for a wide variety of other species, particularly in entrance areas. In arid regions, caves provide temporary relief from extreme temperature or humidity conditions. In addition, they may provide hiding places to escape predators, den sites, and nest substrates. While many individual observations of vertebrate species in caves have been reported, there have been few attempts to compile this information in any systematic way. Agency files, literature, internet sources, and site visits were used to compile records of species using caves in the Chihuahuan Desert of New Mexico. At least 92 vertebrate species are now documented to use these caves. The importance of caves as wildlife habitat should be considered in any resource management plan.

Stewardship of a Hidden Landscape

Patricia Seiser, Cave and Karst Resources Stewardship Volunteer, National Cave and Karst Research Institute, Carlsbad, New Mexico

Cave and karst stewardship must consider four basic questions, or the four "Ws." What is it and what does it involve? Who is doing it? Why are they doing it? Where will these stewardship efforts take us, in terms of protecting these resources for future generations? Developing stewardship programs addressing the four "Ws" will better communicate to stakeholders that caves provide significant values beyond recreational use.

TITLE TBA

Chairs: Lisa Kolakowsky, Architectural Historian, National Park Service, Northeast Region, Philadelphia, Pennsylvania

Rolf Diamant, Superintendent, Marsh–Billings–Rockefeller National Historical Park, Woodstock, Vermont

DISCUSSION

When sharing the news of a recent trip, one of the first things usually mentioned is what you ate. Food is undeniably intertwined with place, because of the landscape and environment necessary to produce food ingredients and because of the people in that place who process the ingredients to make foods. In Boston, you eat chowder, in Seattle you eat salmon, in Santa Fe it's tortillas and in Philadelphia... foods are in abundance from pretzels to Tastycakes and Peanut Chews to the baked goods of the Amish to, of course, cheesesteaks! There are many food markets and traditional restaurants that help define this place. This session will provide a taste of the fabulous foods that Philadelphia has to offer and examine what this says about the city and region. Within this fun event is a lesson to be learned. How can food enhance interpretation at cultural sites? This session will address that question by sharing the groundbreaking Stewardship Begins With People: An Atlas of Places, People & Handmade Products, a cooperative project of NPS NERO, Marsh-Billings-Rockefeller NHP, Conservation Study Institute, and Shelburne Farms NHL.

Session 32 • Contributed papers

Marine Conservation / Coral Reefs

Chair: Gary Davis, Visiting Chief Scientist, U.S. National Park Service, Washington, D.C.

Marine Conservation Science: Examples in a Network of Hawaiian National Parks and Marine Protected Areas

Larry Basch, Senior Science Advisor / Marine Ecologist, Hawaii-Pacific Islands Cooperative Ecosystem, Honolulu, Hawai`i

The persistence of coral reef ecosystems and their component species and resources depends on natural processes affecting the replacement of adult individuals within populations by young life stages (animal larvae or algal spores). This process of young individuals entering the system is called recruitment. Recruitment of marine organisms typically varies naturally at different scales in time and space. However, exploitation of resources and environmental impacts can limit recruitment and the persistence of species of key ecological, economic or cultural importance. We describe a set of studies in progress that address questions of recruitment limitation and connectivity for several of these resource populations in a network of National Parks and Marine Protected Areas on the Kona coast of the island of Hawai`i. Preliminary results will be presented based on integrated approaches including basic ecological surveys, natural chemical or genetic tags, oceanographic current measurements, remote sensing and GIS, and Traditional Ecological Knowledge.

Identification of Ecologically and Biologically Significant Marine Areas for Integrated Management in British Columbia

Glen Jamieson, Fisheries and Oceans Canada Pacific Biological Station, Nanaimo, British Columbia, Canada

Cathryn Clarke, Fisheries and Oceans Canada Pacific Biological Station, Nanaimo, British Columbia, Canada

In order to ensure that oceans integrated management (IM) is based on the best available scientific information, Ecosystem Overview Reports are being produced in British Columbia (BC) to provide IM planners, managers and stakeholders with relevant information on ecosystem properties and components. As part of this process, ecologically and biologically significant areas (EBSAs) are being identified in British Columbian marine waters, with present focus on the BC North Coast. Knowledge of EBSAs is required to identify areas that may require special management measures to conserve their special features; to identify areas that may require special consideration in the environmental assessment of permitted activities; and to identify areas that may meet the criteria for areas of interest as Oceans Act marine protected areas. The process and criteria being used to determine EBSAs are described, and identified BC North Coast EBSAs are summarized.

Developing a Coral Reef Monitoring Method: Fine Tuning a Powerful Way to Describe the Bottom

Anna Pakenham, Biological Technician, War in the Pacific National Historical Park, Piti, Guam

Ian Lundgren and Dwayne Minton, War in the Pacific National Historical Park, Piti, Guam

The coral reefs at War in the Pacific NHP (WAPA) on Guam are home to an estimated 3500 species (including two T&E species), many of which occur no where else in the National Park System. Given the significance of this natural resource, little is known about WAPA's coral reefs. In an effort to obtain essential baseline information, the park is developing digital photo based methodology to accurately characterize the marine benthos. It is also hoped that this method will have sufficient power to detect relatively small change so that it can be incorporated into the park's long-term monitoring program. The methods will be discussed, and trends in the resulting data will be explored in the context of the larger coral reef sedimentation study that is on-going at the park.

Coral Reef Monitoring for the South Florida / Caribbean Network of National Parks

William "Jeff" Miller, Fisheries Biologist, South Florida / Caribbean Inventory and Monitoring Network, St. John, U.S. Virgin Islands

Rob Waara, Biological Technician, South Florida / Caribbean Inventory and Monitoring Network, St. John, U.S. Virgin Islands

The National Park Service's South Florida / Caribbean Inventory and Monitoring Network has been using protocols developed in partnership with USGS-BRD to monitor coral reef communities since 1999. These protocols represent a departure from classic reef monitoring with an emphasis on statistically rigorous random

sample design in selected study areas. This protocol removes much of the investigator-induced bias typically introduced from coral monitoring techniques considered best practices. This monitoring has evolved from the developmental stages (two sites around St. John–Virgin Islands National Park) to the present coverage of additional sites in Virgin Islands National Park, Buck Island Reef National Monument, Biscayne National Park, and Dry Tortugas National Park. Percent cover by benthic species and groups is quantified by analyzing random points placed upon imagery collected by videotaping twenty 10-meter transects digitally. Site mapping and random sample selection is accomplished by using a SONAR-based mapping system.

National Parks as Optimal Marine Sites for Population Recovery of Listed Species

Glen Jamieson, Fisheries and Oceans Canada Pacific Biological Station, Nanaimo, British Columbia, Canada

Edward J. Gregr, SciTech Consulting, Vancouver, British Columbia, Canada

Cliff Robinson, Western Canada Service Centre, Parks Canada, 300-300 West Georgia St., Vancouver, British Columbia, Canada

The status of northern abalone *(Haliotis kamtschatkana)* is listed as "threatened" in Canada because of low recruitment. While exact causes remain uncertain, it is believed that illegal fishing played a major role, making enforcement of protected areas an important aspect for this specie's recovery. We look at what might define critical habitat in British Columbia for this widespread, contagiously distributed, cryptic, broadcast spawning, benthic gastropod of limited mobility. Predictions of suitable abalone habitat and larval dispersal modeling were conducted within the Broken Islands in Barkley Sound in Pacific Rim National Park. Specific areas have larger, more consistent abalone recruitment than others. Suggestions as to how to identify critical abalone habitat are made, given the data that are currently available. It is recommended that because of the combined enforcement capability of both fishery officers and park wardens, national parks are a particularly logical place to attempt abalone population rebuilding.

Session 33 • Panel discussion

Making Data Usable for Park Planning

Chair: Mary Foley, Regional Chief Scientist, National Park Service, Boston, Massachusetts

Moderator: Abby Miller, National Park Service (retired), Burlington, Vermont

Responding to the recommendations of the Natural Resource Challenge, the Northeast Region of the National Park Service undertook a pilot project to transform resource data into useful and understandable information for park planning. Using the network of scientists from Cooperative Ecosystem Studies Units and others, resource information was synthesized and evaluated. This included new data available through the NR Challenge from the Inventory and Monitoring and GIS programs. Two parks were selected to participate in this effort, Fire Island National Seashore and New River Gorge National River. Each panel member will present brief remarks describing their participation in the pilot program addressing the various approaches used in data synthesis covering such aspects as status and significance of park natural

resources, threats to resources, gaps in knowledge about resources and suggested management recommendations. The utility of this process toward providing a strong scientific foundation for general management plan will be the focus of discussion.

Panelists:
Robert McIntosh, Associate Regional Director, Planning and Partnerships, National Park Service, Boston, Massachusetts
Carolyn Mahan, Assistant Professor, Biology, Pennsylvania State University Altoona, Altoona, Pennsylvania
Deborah Darden, Deputy Superintendent, New River Gorge National River, New Jean, West Virginia
Charles Roman, Research Coordinator, NPS CESU, Graduate School of Oceanography, Coastal Institute, Narragansett, Rhode Island
Barry Sullivan, Superintendent, Fire Island National Seashore, Patchogue, New York

Session 34 • Contributed papers
Park Management and the Visitor Experience
Chair: TBA

Addressing User Capacity through Management Zoning on the Merced River Corridor
N.S. Nicholas, Division Chief, Resources Management and Science, Yosemite National Park, El Portal, California
J.W. Roche, and M.T. Reynolds, Yosemite National Park, El Portal, California
In the Merced Wild and Scenic River Comprehensive Management Plan (MRP), Yosemite National Park (YNP) committed to address user capacity and protection of the river's Outstandingly Remarkable Values (ORVs). Management zoning was developed to protect and enhance ORVs within each river segment. During 2004 YNP began implementation of the Visitor Experience and Resource Protection (VERP) framework including institutionalization of continuous monitoring of selected measurable indicators of natural and cultural resources and visitor experiential conditions. Simultaneously, YNP began revising the MRP in response to a Ninth Circuit Court of Appeals ruling. Hence Yosemite's first serious foray into addressing user capacity through management zoning has been in the bright spotlight of high legal and public scrutiny. This presentation will highlight the wide range of lessons learned and describe the challenge of institutionalizing the science of indicator development, monitoring, and analysis within the demands of large park operational planning processes.

"Standardized Standards": Developing and Applying the "Levels of Service" Concept to Carrying Capacity Planning and Management in the National Parks
Robert Manning, Professor, University of Vermont, Burlington, Vermont
Jeffrey Hallo and William Valliere, University of Vermont, Burlington, Vermont

Carrying capacity is a long-standing and increasingly important issue in national parks and related areas. Contemporary approaches to carrying capacity, including Limits of Acceptable Change and Visitor Experience and Resource Protection, focus on formulation of indicators and standards of quality for resource conditions and the visitor experience. Research to support application of carrying capacity has identified visitor-based standards of quality in a number of diverse units of the national park system. However, to what extent can these standards of quality be generalized across park units? Are there "standardized standards" that can be adopted in the national park system and related areas? This paper addresses these questions by examining the "levels of service" concept used in transportation planning and management. The Highway Capacity Manual, developed by the federal Transportation Research Board, employs a series of congestion-related standards of quality for automobile and pedestrian traffic. These standards were tested in several units of the national park system to determine their applicability in this context.

Comparing the Users, Use, and Benefits of Two National Wild and Scenic Rivers

Roger Moore, Associate Professor, Parks, Recreation and Tourism Management, North Carolina State University, Raleigh, North Carolina

Christos Siderelis, Professor, North Carolina State University, Parks, Recreation and Tourism Management, Raleigh, North Carolina

This presentation will compare the findings of comprehensive user studies of two national wild and scenic river segments in the eastern U.S.: the Chattooga in GA, SC, and NC; and the West Branch of the Farmington in CT. While both segments are designated and protected as wild and scenic, they are very different in some important respects. The Chattooga is a 57-mile segment most popular for whitewater boating that flows through USDA–Forest Service jurisdiction. The Farmington, on the other hand, is a 14-mile "partnership river" flowing through a complex patchwork of private and public lands and is most popular for trout fishing and tubing. Based on data and analyses conducted between 2001 and 2003, similarities and differences will be identified and discussed in terms of use levels; use characteristics; user characteristics, experiences, attitudes, and opinions; and economic impacts and benefits. Implications for management and policy will also be addressed.

Research on Visitor Perceptions of Resource Impacts: Benefits, Status, Challenges, and Recommendations

Catherine Dorwart, Doctoral Student, North Carolina State University Parks, Recreation and Tourism Management, Raleigh, North Carolina

Roger Moore and Yu-Fai Leung, North Carolina State University Parks, Recreation and Tourism Management, Raleigh, North Carolina

National park and protected area managers are typically charged with the dual mission of protecting natural resources while providing for appropriate public enjoyment of those resources. Consequently, valid and reliable information related to visitors such as their attitudes, preferences, perceptions, and experiences is important for making informed resource and visitor management decisions. This presentation will focus on visitor perceptions of impacts to natural resources and the implications of those perceptions. It will review the existing research, discuss how improved knowledge in

this area would benefit park management, and suggest approaches to improve our understanding. Questions to be addressed will include: what resource impacts do visitors actually notice, how do resource impacts affect visitor experiences, what factors affect perceptions of impacts, what barriers exist to expanding and applying this line of research, and what needs to be done if the benefits of this research are to be realized?

Insights into the Off-Road Vehicle (ORV) Experience at Cape Cod National Seashore

Jeffrey Hallo, Graduate Research Assistant, University of Vermont, Burlington, Vermont
Patricia A. Stokowski and Robert E. Manning University of Vermont, Burlington, Vermont

Over-sand driving using off-road vehicles (ORV) is a historic recreation activity at Cape Cod National Seashore. However, ORV use has both ecological and social impacts. The latter (and lesser known) of these impacts may diminish the enjoyment of the activity for ORV users themselves. As demand for the activity increases, well-informed, comprehensive ORV management will require developing (1) insights into the importance of the activity from the participant's perspective, (2) indicators of quality for the experience, and (3) an understanding of how vehicle-related crowding affects the ORV user's experience. Results will be presented from an analysis of over 60 interviews conducted with ORV users at Cape Cod National Seashore. Descriptive information and indicators of quality gathered using this qualitative research method provide a depth of insight often lacking with quantitative survey-based research approaches.

Session 35 • Day-capper: conflict resolution exercise with audience interaction

Yellowstone Snowmobiles: Assessing the Feasibility of a Mediated Solution

Chairs: Michael Eng, Senior Program Manager, U.S. Institute for Environmental Conflict Resolution, Tucson, Arizona

The management of winter snowmobile use in Yellowstone and Grand Teton National Parks has proven to be one of the most controversial recent issues to be addressed by the National Park Service. This day-capper session will actively engage participants in determining whether it would make sense to undertake a mediated dispute resolution effort to develop a long-term solution to this challenging and highly politicized conflict. Using an interactive and informal format, participants will go through a proven method for assessing, in advance, the likely success of an attempted dispute resolution process. The session moderator is a Senior Program Manager with the U.S. Institute for Environmental Conflict Resolution — a federal program established by Congress to provide independent, impartial mediation assistance to help resolve environmental controversies involving federal agencies or interests.

Presenters:
Kevin Schneider, Planner, Yellowstone National Park, Wyoming
John Sacklin, Management Assistant, Yellowstone National Park, Wyoming

Session 36 • Day-capper: audience discussion

The NPS Research Permit and Reporting System: Revolutionary, Evolutionary, or Simply a Pain?

Chair: John G. Dennis, Deputy Chief Scientist, National Park Service, Washington, D.C.

Does basing resource management on factual information need good science? Do interesting park natural resources suffer an onslaught from scientific enthusiasm and tunnel vision? Are NPS scientists more equal than other scientists? How about NPS curators? Why has my permit application sat in limbo? Is science for science education different from science for scientific research? Why do I want to be e-authenticated or even authenticated? Does RPRS really help? Please bring your kudos, complaints, and desires for the future to a no-holds-barred (but some may be evaded!) Day Capper convened to compare anecdotes about, discuss, and evolve the NPS Research Permit and Reporting System.

Session 37 • Part two of a two-part workshop — continued from Session #24

The ESA in Half a Day: Proactive Consultation Workshop II

See description under Session #24.

Session 38 • Part two of a two-part workshop — continued from Session #25

Tracking and Applying IUCN Protected Area Categories in North America II

See description under Session #25.

Session 39 • Side meeting by invitation only • part two of a two-part side meeting — continued from Session #26

PRIDE Project Advisory Group Meeting II

See description under Session #26.

Tuesday, March 15 • morning concurrent sessions • 10:00 – 12:05

Session 40 • Panel discussion

Contested Places: Humans, Nature, and Public Landscapes

Chair: Shaun Eyring, Manager, Resource Planning and Compliance, National Park Service, Philadelphia, Pennsylvania

Session abstract:

This panel discussion is intended to be a conversation about the issues, dilemmas, and challenges that arise in interpreting the meaning of place and the often discordant views of natural and cultural resources in American landscapes. Each panelist will

present a place-based case study that reveals the ideology of place, the historically dynamic relationship between humans and nature, the tension between wilderness and civilization, the powerful role of land management policies in shaping perceptions of place, and the changing nature of history, memory, and the American landscape. Through this lens, the participants will debate the culturally specific and evolving views of the relationship between nature and culture in America, and the prospects for resource management on public lands. This session builds upon the highly successful NPS preserving memory seminar entitled "Contested Landscapes: Humans and Nature in National Parks."

Panelists:

Nora Mitchell, Director, Conservation Study Institute, National Park Service, Woodstock, Vermont

Rolf Diamant, Superintendent, Marsh Billings Rockefeller National Historical Park, Woodstock, Vermont

Ethan Carr, Professor, Landscape Architecture and Regional Planning, University of Massachusetts, Amherst, Massachusetts

Ed Linenthal, Professor, History and Religion, University of Wisconsin–Oshkosh, Oshkosh, Wisconsin

Session 41 • Invited papers

Measuring and Managing Carrying Capacity in the National Parks: From A (Acadia) to Z (Zion)

Chair: Robert Manning, Professor, University of Vermont, Burlington, Vermont

Session abstract:

Carrying capacity is a perennial and increasingly important issue in the national parks. Contemporary approaches to measuring and managing carrying capacity, including the National Park Service's recently developed Visitor Experience and Resource Protection (VERP) framework, rely on formulation of indicators and standards of quality for resource and experiential conditions. The Park Studies Laboratory at the University of Vermont, including colleagues at other institutions, has conducted studies at diverse units of the national park system to help formulate indicators and standards of quality. This session reports on the findings of several current and recent studies conducted at Acadia, Zion, Haleakala, and Mesa Verde national parks, Muir Woods National Monument, and Boston Harbor Islands National Recreation Area. These studies address indicators and standards of quality as they apply to diverse natural, cultural and recreational sites and issues, including trails, campsites, roads, beaches, scenic overlooks, visitor centers, archeological sites, crowding, environmental impact, litter and graffiti.

Indicators and Standards of Quality as an Approach to Measuring and Managing the Carrying Capacity of National Parks

Robert Manning, Professor, University of Vermont, Burlington, Vermont

Carrying capacity conventionally addresses the amount and type of recreation that can be accommodated in parks and related areas without unacceptable impacts to park resources and the quality of the visitor experience. Contemporary approaches to measuring and managing carrying capacity focus on formulating management objectives and associated indicators and standards of quality. Management objectives are broad, narrative statements that describe the level of resource protection and the type of visitor experience to be maintained. Indicators of quality are measurable, manageable variables that can be used as proxies for management objectives. Standards of quality define the minimum acceptable condition of indicator variables. Using this conceptual approach, carrying capacity can be measured and managed by formulating management objectives and associated indicators and standards of quality, monitoring indicator variables, and taking management action to ensure that standards of quality are maintained. This approach to carrying capacity is embodied in contemporary carrying capacity frameworks, including Limits of Acceptable Change (LAC) and Visitor Experience and Resource Protection (VERP). This approach to measuring and managing carrying capacity in the national park system is introduced and described in this paper. The paper will be followed by a series of papers that describe research designed to help implement this approach to carrying capacity in a number of diverse units of the national park system.

Indicators and Standards of Quality for Natural Resources: Trail and Campsite Impacts

Peter Newman, Dept. of Natural Resource Recreation & Tourism, Colorado State University, Fort Collins, Colorado
William Valliere, Researcher, University of Vermont, Burlington, Vermont
Daniel Laven, Logan Park, and Robert Manning, University of Vermont, Burlington, Vermont
Steven Lawson, Virginia Tech Department of Forestry, Blacksburg, Virginia
Megha Budruk, School of Community Resources and Development, Arizona State University, Tempe, Arizona
Jeffery Marion, Natural Resource Recreation Unit Leader, Virginia Tech Field Station, Blacksburg, Virginia
Yu-Fai Leung, North Carolina State University, Raleigh, North Carolina
Wayne Freimund, University of Montana, School of Forestry, Missoula, Montana

The concept of carrying capacity conventionally includes both resource and experiential components. This paper addresses the former, with a special focus on trail and campsite impacts. Data were gathered on resource-related indicators and standards of quality at a variety of trail and campsite locations. Studies were conducted at Acadia and Zion National Parks, and Boston Harbor Islands National Recreation Area.

Indicators and Standards of Quality for the Visitor Experience: Crowding at Campsites, Trails, Beaches, Scenic Overlooks, and Attraction Sites

Steven Lawson, Virginia Tech Department of Forestry, Blacksburg, Virginia
William Valliere, Jeffrey Hallo, Daniel Abbe, Rebecca Stanfield, Logan Park, and Robert Manning, University of Vermont, Burlington, Vermont

Peter Newman, Department of Natural Resource Recreation & Tourism, Colorado State University, Fort Collins, Colorado
Megha Budruk, School of Community Resources and Development, Arizona State University, Tempe, Arizona
Wayne Freimund, University of Montana, School of Forestry, Missoula, Montana
The concept of carrying capacity conventionally includes both resource and experiential components. This paper addresses the latter, with a special focus on crowding-related issues. Data were gathered on crowding-related indicators and standards of quality at a variety of sites, including trails, campsites, beaches, scenic overlooks, and attraction sites. Studies were conducted at Acadia, Zion, and Haleakala National Parks, Muir Woods National Monument, and Boston Harbor Islands National Recreation Area.

Indicators and Standards of Quality for the Built Environment: Visitor Centers, Roads, Walkways, Litter and Graffiti
Megha Budruk, School of Community Resources and Development, Arizona State University, Tempe, Arizona
William Valliere, Daniel Laven, Rebecca Stanfield, and Robert Manning, University of Vermont, Burlington, Vermont
The concept of carrying capacity conventionally includes both resource and experiential components. However, the built environment of parks can also pose substantive carrying capacity challenges. This paper addresses the built environment with a special focus on visitor centers, roads, walkways, litter and graffiti. Data were gathered on indicators and standards of quality at a variety of built environments. Studies were conducted at Acadia and Haleakala National Parks, and Boston Harbor Islands National Recreation Area.

Indicators and Standards of Quality for Cultural Resources: Archeological Sites
William Valliere, Researcher, University of Vermont, Burlington, Vermont
Steven Lawson, Virginia Tech Department of Forestry, Blacksburg, Virginia
Peter Newman, Dept. of Natural Resource Recreation & Tourism, Colorado State University, Fort Collins, Colorado
Megha Budruk, School of Community Resources and Development, Arizona State University, Tempe, Arizona
The concept of carrying capacity conventionally includes both resource and experiential components. This paper addresses the former, with a special focus on cultural resources. Data were gathered on crowding-related indicators and standards of quality at archeological sites in Mesa Verde National Park.

Session 42 • Invited papers
The Cooperative Conservation Initiative — Achievements of a Funding Source for Environmental Restoration through Partnerships
Chair: Lindsay McClelland, Geologist, Geologic Resources Division, National Park Service, Washington, D.C.
The Cooperative Conservation Initiative (CCI) supported on-the-ground restoration projects on lands managed by the National Park Service, the U.S. Fish and Wildlife Service, and the Bureau of Land Management. Projects were required to include non-

Federal partners who provided at least a 1:1 match in cash or in-kind services. In the two years (FY 03 and 04) that the CCI program was funded by Congress, the NPS supported almost 180 projects totaling about $12.5 million in Federal funds. Projects targeted a wide range of restoration needs. More than half of the FY 04 projects dealt with invasive plants, more than a third were in riparian areas, and 20% included benefits for threatened and endangered species. Presentations in this session will highlight CCI-funded restoration projects in a number of parks.

Creating Riparian and Wetland Habitats Lost to Reservoir Inundation, North Cascades National Park Complex

Mignonne Bivin, Plant Ecologist, North Cascades National Park Service Complex, Marblemount, Washington

Jack Oelfke, Michael Brondi, and Todd Neel, North Cascades National Park Service Complex, Marblemount, Washington

Ross Lake, a reservoir within the Ross Lake National Recreation Area, was formed by dam construction in the 1940s. Inundation resulted in the loss of over 11,000 acres of mid-elevation riparian and wetland habitat along the Skagit River. The drawdown zone contains seasonally wet habitat that has seen recent invasion of the highly competitive reed canarygrass. Reservoir operations annually require the removal of tons of floating logs that enter Ross Lake during high-flow stream conditions, representing a significant loss of organic nutrients from this aquatic system. Logs are then burned in the drawdown area in winter, contributing to air quality concerns in the Region. This CCI-funded project describes an interdisciplinary effort to retain logs along the low-gradient shoreline areas to create a stable substrate for growing native grasses, forbs, and canopy species that will both shade out the reed canarygrass and create valuable riparian and wetland habitat.

Ecohelpers: A Multi-agency, Volunteer-based Program to Restore Damaged Lands

Christy Brigham, Restoration Ecologist, Santa Monica Mountains National Recreation Area, Thousand Oaks, California

Eli Dickerson, Field Biologist, Mountains Restoration Trust, Northridge, California

Jack Gillooly, Interpretive Ranger, Santa Monica Mountains National Recreation Area, Thousand Oaks, California

Ecohelpers is a program of the Santa Monica Mountains National Recreation Area to utilize high school field trips to assist in ecological restoration projects within the recreation area. This program is a partnership both within the park (between resource management and interpretation divisions) and between NPS, local non-profit and state agencies. In a single year of operation we have brought over 1800 students to the park to remove exotic species from a 5-acre area, plant over 3000 native plants and restore over an acre of prime wildlife habitat in the Santa Monica Mountains. The program has received funding from the California Coastal Commission, the Santa Monica Bay Restoration Commission and the Cooperative Conservation Initiative. We are seeking future funding and to expand from our two initial work areas to other damaged sites within the park. This extremely effective program relies on the skills of all partners for success.

Strengthening Exotic Plant Management in Florida Parks with Cooperative Conservation Initiative Funds

Tony Pernas, Exotic Plant Management Specialist, Southeast Regional Office, National Park Service, Homestead, Florida

The Florida/Caribbean Exotic Plant Management Team (EPMT) works with Florida's Department of Environmental Protection (DEP) Upland Invasive Plant Management Program, which partners with over 400 land managers to control exotics on public conservation lands. Since 2003, CCI funds ($992,704) have augmented FLC EPMT ($1,218,182) and DEP funds ($1,616,979) for control projects, allowing FLC EPMT to expand beyond traditional herbicide-based weed management with $249,647 from CCI to develop insect biological control agents with the State and universities. Combined funding has allowed treatment of 69,534 acres at four parks (BICY, EVER, BISC, and CANA). CCI has also enabled Florida NPS units to supplement their exotic plant management programs (EVER used CCI's $609,000 to match Miami-Dade County funds). CCI challenges include: 1) Florida's July–June fiscal year, 2) obligating funds outside treatment season, 3) reduced CCI funds as more parks participate, 4) competition with more diverse projects, and 5) developing projects with cooperators several years out.

Weed Management on a Broad Scale — Successes of the Cooperative Conservation Initiative

Susan Fritzke, Supervisory Vegetation Ecologist, Golden Gate National Recreation Area, San Francisco, California

The Cooperative Conservation Initiative (CCI) has facilitated management of nonnative plants on a watershed scale at GGNRA, creating a win-win situation for the park. They have enabled ecologists to focus on key nonnative plant stands and species that were contributing to the overall decline in native vegetation and habitat conditions in the park through seed spread and drift. Species that were previously considered too widespread or dominant within the landscape are being managed through a combination of staff time, volunteer labor, and contracts. Endangered species are being protected through removal of nonnative trees and restoration of native vegetation communities. The morale for both staff and community volunteers has improved tremendously because these "unmanageable" stands and species are being removed for the first time, allowing for very visible habitat restoration and clearly showing our volunteer work force that progress is being made quickly.

Kemp's Ridley Sea Turtle Nesting Increasing in Texas

Donna Shaver, Chief, Division of Sea Turtle Science and Recovery, Padre Island National Seashore, Corpus Christi, Texas

From the late-1940s through the mid-1990s, only about one Kemp's ridley sea turtle *(Lepidochelys kempii)* nest was documented on the Texas coast every three years. The number of nests found has increased during the last decade and a record 42 were located in Texas during 2004. Additionally, during the last 50 years, more Kemp's ridley nests have been recorded at Padre Island National Seashore (PAIS) than at any other location in the USA. Kemp's ridleys that nest in Texas today are a mixture of returnees from the Mexico-USA experimental imprinting and head-starting projects

to establish a secondary nesting colony of this endangered species at PAIS and others from the wild stock. As the Kemp's ridley population continues to increase and more turtles from the egg translocation and captive rearing projects as well as their offspring reach maturity, it is likely that increasing numbers of Kemp's ridleys will nest in Texas.

Session 43 • Contributed papers
Managing Deer and Other Problem Species
Chair: Erv Gasser, National Park Service, Seattle, Washington

An Assessment of White-tailed Deer and Feral Hog Populations at Big Thicket National Preserve

Pedro M. Chavarria, Graduate Student, Texas A&M University / Big Thicket National Preserve, Bryan, Texas
Gillian Bowser and Roel Lopez, Texas A&M University, College Station, Texas

Population trends of white-tailed deer *(Odocoileus virginianus)* and feral hog *(Sus scrofa)* were assessed at Big Thicket National Preserve (BTNP) from 1981–2003. Population trend estimates were calculated from fall hunter harvest data. In the last 20 years, feral hog numbers have nearly doubled in comparison to deer at BTNP. Furthermore, a comparison of population changes between deer and hogs suggests that an interaction between the two populations is occurring — one that may possibly point to interspecific competition between the two species.

Regional Integrated Management of Imported Fire Ants (Solenopsis spp.) Along the Natchez Trace Parkway

James Vogt, Research Entomologist, USDA–ARS Biological Control of Pests Research Unit, Stoneville, Mississippi
Douglas A. Streett and Jian Chen, USDA–ARS Biological Control of Pests Research Unit, Stoneville, Mississippi
Larry G. Thead, USDA–ARS Biological Control and Mass Rearing Research Unit, Mississippi State, Mississippi
Kenneth Ward and Rufina Ward, Alabama A&M University, Normal, Alabama
Jason B. Oliver, Tennessee State University, Otis L. Floyd Nursery Research Center, McMinnville, Tennessee

Imported fire ants *(Solenopsis invicta* Buren, *S. richteri* Forel, and their hybrid) are serious pests of humans, livestock, and the environment. These mound-building ants exist in colonies of 250,000 or more individuals and reach densities of several hundred mounds per acre. The USDA–Agricultural Research Service's Biological Control of Pests Research Unit has enlisted the help of collaborators in government and academia to establish a regional integrated management program for development and transfer of environmentally-sound control strategies for imported fire ants. This effort is focused on the Natchez Trace Parkway, which essentially represents an existing north-south transect along which red, black, and hybrid fire ants can be found. New control strategies that are underway or in development include biological control (parasitic flies and microsporidian disease), enhanced

monitoring strategies (e.g., remote sensing), and new, selective bait products and repellents.

Testing Distance Sampling from Roads

Scott Bates, Wildlife Biologist, National Park Service, National Capital Region, Washington, D.C.

Questions have been raised about using roads as transect routes to collect deer density data. Are deer attracted to, repulsed, or unaffected by roads? This hypothesis was tested by: 1) conducting concurrent surveys in the same park using road and trail transects; and 2) random placement of pellet-group plots in 2 parks. The concurrent surveys will be tested by Distance analysis. The null hypothesis is that the off-road surveys will not meet the assumptions required for Distance analysis and that road transects are not overestimating the deer population. The alternative hypothesis is that the off-road analyses meet the assumptions required for Distance and that the use of roads as transects has led to overestimation or underestimation of the deer population. The null hypothesis for the pellet-group surveys is that there will be no statistically significant correlation between pellet-group abundance and distance from the road transect.

Status and Trends of Mountain Goats in Olympic National Park

Patti Happe, Wildlife Branch Chief, Olympic National Park, Port Angeles, Washington
Kurt Jenkins, USGS-FRESC Olympic Field Station, Port Angeles, Washington
Kathy Beirne and Roger Hoffman, Olympic National Park, Port Angeles, Washington
Douglas Houston, National Park Service (retired)

Management of non-native mountain goats in Olympic NP has been a challenging issue for the NPS. Following a population estimate of 1,175 +/-171 in 1983, the NPS operated a live capture program for several years and removed 297 goats from the population. No active management has taken place on the population since then. We have censused the Olympic Peninsula mountain goat population four times since the removals. In 1990, after the removals ceased, the population estimate decreased to 389 +/-106 goats; however it has stayed stable since then. The most recent census in July 2004 revealed 290 +/-30 goats. We will discuss the mountain goat population response to removals, and its implications for management.

Investigating Chronic Wasting Disease in Deer at Wind Cave National Park

Krysten Schuler, Ph.D. student, South Dakota State University, Department of Wildlife and Fisheries Sciences, Brookings, South Dakota
Jonathan Jenks, Professor, South Dakota State University, Department of Wildlife and Fisheries Sciences, Brookings, South Dakota
Daniel Roddy, Resource Management Specialist, Wind Cave National Park, Hot Springs, South Dakota

Chronic wasting disease (CWD), similarly to "mad cow disease," has emerged as a major concern in deer *(Odocoileus* spp.) and elk *(Cervus* spp.) populations. We are monitoring CWD in mule deer *(O. hemionus)* and white-tailed deer *(O. virginianus)* in Wind Cave National Park (WCNP) using a live tonsillar biopsy test. Objectives of this study are to determine CWD prevalence in deer, sources of mortality, movement

patterns, and habitat selection. Deer were tested for CWD and radiocollared, then relocated 1–3 times/week. In 2003, we calculated a prevalence rate for mule deer inhabiting the park of 8.3% and in 2004, it decreased to 3.6%. Besides CWD, deer mortalities have resulted from predation and vehicle collisions. Deer moved outside the park boundary to areas close to former CWD-positive captive elk farms. Our future plans include developing a model of CWD spread in WCNP based on number of contacts between collared deer, deer density, and social grouping.

Session 44 • Invited papers

Perspectives on Park Impacts: Natural Amenities and Population Change

Chair: Don Field, Professor, Department of Forest Ecology and Management, University of Wisconsin, Madison, Wisconsin

Session abstract:

Recent growth and development associated with areas rich in natural resource endowments has led to many changes. This session presents an organizational framework for studying such changes. Then, we use data drawn from two parallel studies — one in northern Wisconsin and one in southern Utah — to highlight these changes. Possible implications for resource management are advanced.

A Social Landscape Perspective on People and Places in Amenity-Rich Rural Regions

Al Luloff, Professor, Department of Agricultural Economics & Rural Sociology, Penn State University, University Park, Pennsylvania

Don Field, Professor, Department of Forest Ecology and Management, University of Wisconsin, Madison, Wisconsin

The demographic, social, and economic transformation of rural communities in amenity-endowed natural resource regions is dramatic and varied. They are experiencing a population renaissance with new migrants and seasonal landowners joining long time residents in shaping new community visions for the future. There, traditional sustenance organization patterns are being (or have been) replaced by alternative rural development activities linked to parks, forests, and other protected lands. A conceptual framework built around social demography, rural community studies, and rural human ecology is used to examine this transformation. Our framework embraces the importance of scale ñ from landscape to community to land parcel. Further, it includes temporal and distance dimensions, clearly reflecting the inherent relationship between the social system and biophysical system. This relationship is central to a proper understanding of an emerging social order adjacent to public lands. Implications for the use of this framework in amenity-endowed communities are advanced.

Residents' Perspectives on Resource Management: A Comparison of High-Amenity Landscapes in Utah and Wisconsin

Richard Krannich, Professor, Department of Sociology, Social Work, and Anthropology, Utah State University, Logan, Utah

Don Field, Professor, Department of Forest Ecology and Management, University of Wisconsin, Madison, Wisconsin
Al Luloff, Professor, Department of Agricultural Economics & Rural Sociology, Penn State University, University Park, Pennsylvania
Tracy Williams, Utah State University, Logan, Utah

Natural amenities, including a mild climate, topographic variation, forested landscapes, lakes or rivers, and access to public lands/recreation areas, have been linked with permanent and seasonal population growth in American rural areas. The implications of such growth for natural resource management remain unclear. For example, newly relocated residents may exhibit different patterns of resource use than established populations, while seasonal residents may use such resources differently than those establishing permanent homes. Further, seasonal residents, new in-migrants, and permanent residents may exhibit different preferences about natural resources management and use. This paper compares and contrasts resource utilization patterns and resource management perspectives among seasonal and permanent residents of high-amenity areas in Wisconsin and Utah. The Wisconsin data comes from two pine barrens counties characterized by numerous lakes and extensive tracts of forests/public lands. The Utah data comes from a five-county area proximate to several major national parks, monuments, and forest lands.

Rural Landscapes, Parks, and Populations: The Changing Nature of the Countryside in the Mountain West

Don Field, Professor, Department of Forest Ecology and Management, University of Wisconsin, Madison, Wisconsin
Richard Krannich, Professor, Department of Sociology, Social Work, and Anthropology, Utah State University, Logan, Utah
Al Luloff, Professor, Department of Agricultural Economics & Rural Sociology, Penn State University, University Park, Pennsylvania
Richelle Winkler, University of Wisconsin, Applied Population Laboratory, Madison, Wisconsin

Rural communities have experienced dramatic demographic, social, and economic transformations over the past 30 years. Historically characterized by close links between natural resources and social, cultural, and economic structure of rural communities, today, few remain dependent upon traditional extractive industries. New forms of development involving tourism and recreation linked to natural resource amenities have evolved. The Mountain West is rich in scenic and recreation qualities and many of its rural areas have experienced substantial population growth. Its new residents rate environmental quality, scenery, outdoor recreation opportunities, and pace of life as primary reasons for moving there. Their arrival represents a rural renaissance that has transformed both rural places and the surrounding landscapes. This paper documents the nature of demographic changes associated with rural landscapes in areas surrounding Zion, Bryce, and Capital Reef national parks, Cedar Breaks and Grand Staircase Escalante national monuments, and the Dixie National Forest.

Session 45 • Contributed papers

Assessment Tools for Resource Management

Chair: Sue Consolo-Murphy, Yellowstone National Park, Wyoming

How to Assess Confidence and Trust in Management: Description of a Manager-Centered Tool Development Effort

Jessica Leahy, Graduate Research Assistant, University of Minnesota, St. Paul, Minnesota

Dorothy H. Anderson, Morse Distinguished Professor, University of Minnesota, St. Paul, Minnesota

Resource managers are often concerned about the quality of relationships that exist between their agency and nearby local communities. For agencies, confidence and trust from local communities can result in many benefits including effective collaboration during planning processes and high community "buy-in" to management plans. However, some places struggle to gain the confidence or trust of local community members. It can be difficult for managers to assess the level of local community trust in their agency, and even more difficult to identify what steps should be taken to improve public confidence and trust in their resource management. This presentation describes an initial effort to develop a measurement tool that can be easily used by resource managers to assess trust levels and suggest action. The trust scale was developed using qualitative research data collected in the Kaskaskia Watershed, Illinois. It was tested using a mailed survey of 1,600 watershed residents.

Evaluating the Effectiveness of Parks and Protected Areas: A Framework for Evaluating Outcomes

Joleen Timko, Ph.D. Student, Resource Management and Environmental Studies Program, Vancouver, British Columbia, Canada

The effectiveness with which parks and protected areas are being managed and their sustainability over the long term is in question. Critics have claimed that PAs cannot continue to protect the biological resources within their borders and there is a widespread sense that these areas are simply not working. The purpose of this presentation is to introduce an "effectiveness evaluation scale" using biological and socio-cultural outcomes-focused criteria and indicators. The scale gauges progress on key biological (i.e.: knowledge of exotic species invasions, changes in species at risk) and socio-cultural criteria (i.e.: level of indigenous representation in management planning, level of cultural practices maintained, local involvement in monitoring practices). This presentation will make two important contributions to parks management: it will add to the dearth of scholarly inquiry on evaluating the effectiveness of PAs, and it will develop an outcomes-focused evaluation scale for determining the effectiveness of PAs.

Anticipating Impacts: Assessing Conservation Values at Risk When Data are Limited

Pamela Wright, Associate Professor, Natural Resource and Environmental Studies, University of Northern British Columbia, Prince George, British Columbia, Canada

British Columbia has recently undergone a rapid expansion of its protected areas system. At the same time, budgets and staffing levels have been drastically reduced such that most areas are un-staffed. Generally, there is little available data on basic conservation values and concerns. Although management for conservation and ecological integrity is emphasized, developing strategies with inadequate information is exceedingly difficult. The project was designed to develop and test an assessment mechanism to help identify conservation values and values at risk to aid in ecosystem-based management. The Conservation Values at Risk tool has been applied province wide and experience is being gained in streamlining the data collection effort and in determining how the information will be most useful for managers. The tool shows promise for use in other jurisdictions to help inform management tasks such as the prioritization of projects; identification and treatment of common or regional problems; proactive planning and management endeavors.

The National Park System in Colombia: A New Approach for Protected Areas Management

Sandra Valenzuela, Programme Development and Conservation Support Officer, WWF Colombia, Cali, Colombia

New protected areas are being established all over the world and the actual protected areas network are being expanded because it is considered one of the main strategies to biodiversity conservation. Consequently, now there are around 30,000 protected areas, covering around 8% of the Earth's surface. However, there is a growing concern among protected area professionals that many protected areas around the world are not achieving the objectives for which they were established. One response to this concern has been an emphasis on the need to increase the effectiveness of protected area management. To help this process, a number of assessment tools have been developed to assess management practices. It is clear that the existence of a wide ranges of situations and needs require different methods of assessment. Even though many new approaches for protected areas management are implemented, evaluations have focused primarily on how well the funds were acquitted, on project management and issues of accountability and propriety. It is only relatively recently that evaluation analysts have shifted their sights from projects to programs and policies assessment. With that shift came recognition that previous measures of program performance were inadequate. Lessons learned through these evaluations have led to a new development agenda with a strengthened emphasis on participation, sustainability and institutional reform.

Visual Assessment of Stream Bank Condition at Prince William Forest Park

Brian Carlstrom, Resource Program Manager, National Park Service, Prince William Forest Park, Triangle, Virginia

Jennifer Lee and James Pieper, National Park Service, Prince William Forest Park, Triangle, Virginia

Jeff Runde, National Park Service, National Capital Region/Northeast Region, The Center for Urban Ecology, Washington, D.C.

Prince William Forest Park contains approximately seventy percent of the Quantico Creek watershed, and the park's enabling legislation mandates that water quality be

maintained at a potable standard. Mounting development pressure to the north and east of the park has resulted in additional impervious surface and increased storm water runoff within the watershed. Until 2004, the stream channels within the park had yet to be systematically documented. This project used three simultaneous methods of documenting stream bank condition throughout the park: a visual assessment of stream bank condition through georeferenced photo points, the National Resource Conservation Service Stream Visual Assessment Protocol, and stream channel cross-section profiles. Twenty-four miles of stream were surveyed, 760 data points were collected, and over 3800 digital photographs were taken. This multi faceted project provided an effective, accurate, expeditious baseline inventory of stream bank condition throughout the park.

Session 46 • Contributed papers
Wetlands and Fisheries Restoration
Chair: TBA

Five Years of Monitoring Reconstructed Freshwater Tidal Wetlands in the Urban Anacostia Estuary, Washington, D.C.

Dick Hammerschlag, Biologist, USGS Patuxent Wildlife Research Center, Beltsville, Maryland
Cairn Krafft, Botanist, USGS Patuxent Wildlife Research Center, Beltsville, Maryland

Once extensive freshwater tidal wetlands in the Anacostia River, Washington, D.C. (over 2000 acres), were obliterated by dredging during the early 1900s, yielding 50 years of tidal waters, fastland and low tide mudflats. The Corps, National Park Service and the District of Columbia cooperated to reconstruct a portion of the destroyed wetlands using dredge material yielding 31 acres at Kenilworth Marsh 1993, similar acreage at Kingman Marsh in 2000, 18 acres at the Fringe Marsh location in 2003, and more to come in 2004. Throughout this 10-year period USGS PWRC has been documenting baseline conditions and restoration progress, often with partners such as NPS, the University of Maryland and the District. This presentation will focus on studies conducted during 2000–2004. Parameters being studied include vegetation (species identification, cover, richness, native species, etc.), bird use based on weekly point counts, macro-benthic organisms keyed to sediment elevations, hydrology based on hydrologgers and elevation surveys, sedimentation processes using Surface Erosion Tables (SETs), and exclosure studies. Degree of marsh restoration progress is determined not only by what occurs at each reconstructed site, but by field study comparison to unreconstructed sites such as Dueling Creek in the urban Anacostia and rural Patuxent River Marsh. Comparisons are made with literature reports for other regional marshes and historic reports for the Anacostia. Recently resident Canada goose grazing pressure, likely coupled with lowered sediment elevations, has led to partial disintegration of the Kingman Marshes.

Disease Etiology as a Factor in the Adaptive Management of Park Aquatic Resources

Frank Panek, Branch Chief for Fish Health Research, U.S. Geological Survey, National Fish Health Research Laboratory, Kearneysville, West Virginia

Emerging diseases along with a suite of known and persistent diseases can present management challenges for native species management and restoration, can influence biodiversity, or may cause losses of recreational fishing opportunities. Likewise, recurring epizootics resulting from pathogens such as Streptococcus and Vibrio in estuarine fishes or Aeromonas and Edwardsiella in freshwater fishes have challenged fishery managers for decades. Examples of diseases affecting coral reef fishes such as damselfish neurofibromatosis and streptococcal septicemia are discussed as examples of diseases of fish in parks. Pathogens including *Streptococcus iniae* and several of the Mycobacterium species may represent human health risks to resource managers and park visitors. Successful management depends on the ability of resource managers to clearly understand the etiology of infectious diseases in fish populations so that effective management and control strategies may be implemented. The needs for adaptive fisheries management strategies that employ fish health and disease considerations are discussed.

Fisheries Management and Monitoring at Shenandoah National Park: A 65-Year Chronology

James Atkinson, Wildlife & Fisheries Biologist, Shenandoah National Park, Luray, Virginia

By the time that Shenandoah National Park was established in 1936, fish populations within most streams had experienced varying degrees of degradation. A fisheries restoration program was among the first natural resource management activities implemented in the new park. Brook trout were stocked within a number of park streams annually through the 1940s and periodically, as needed through the 1950s. Monitoring efforts were initiated during the 1950s to evaluate the success of the restoration program. As the park's natural landscape matured through the 1960s and 1970s, park fish populations gradually stabilized into a sustainable resource. Park staff assumed principal responsibility for fisheries monitoring within the park in 1982. Since then, the parks fisheries monitoring program has matured into a comprehensive effort that includes a mix of annual quantitative and qualitative strategies, disease and genetic components and participation from other state and federal agencies.

Benthic Macroinvertebrate Populations of Urban Freshwater Tidal Wetlands in the Anacostia River, Washington D.C.

Kevin Brittingham, Wetlands Ecologist, USGS Patuxent Wildlife Research Center Beltsville, Maryland

Dick Hammerschlag, Biologist, USGS Patuxent Wildlife Research Center, Beltsville, Maryland

This study characterizes the benthic communities establishing themselves on recently reconstructed urban freshwater tidal wetlands on National Park Service lands in Washington, D.C. The study's focus is the two main areas of Kingman Marsh, which were reconstructed from Anacostia dredge material by the U.S. Army Corps of Engineers in 2000. Populations from this "new" marsh are compared to those of

similarly reconstructed Kenilworth Marsh (1993), as well as to the relic Dueling Creek Marsh on the Anacostia and the outside reference Patuxent Marsh in an adjacent watershed. Benthic organisms were collected using selected techniques including the Ekman bottom grab sampler, sediment corer, D-net and Hester-Dendy sampler. Samples were collected seasonally from tidal channels, tidal mudflats, three vegetation zones (low, middle and high marsh), and pools. Data collected from this study can provide valuable information on the extent that benthic macroinvertebrate communities can serve as an indicator of the relative success of freshwater tidal marsh reconstruction.

Native Fish Restoration in Our National Parks: Should We Be Doing More?

Jim Tilmant, Fisheries Program Leader, NPS Water Resources Division, Fort Collins, Colorado

The history of fish management within the National Park System has led to greatly altered fish biodiversity and loss of native species distributions within a vast majority of our national park units. Although native fish populations have been altered and impacted, managers are generally doing little to reduce the abundance of non-native fish species or to restore natural biodiversity within their aquatic ecosystems. Exotic species programs of the National Park Service are largely focused on plant and non-native wildlife removal with little attention paid to aquatic environments. This talk will provide examples and discuss the current status of non-native aquatic resources within the National Park system, highlight several recent projects that have demonstrated an ability to restore selected aquatic ecosystems to their natural biodiversity, and provide an overview of approaches park managers can use in the restoration of native fish populations.

Session 47 • Panel discussion

A Dialogue on International Wilderness Conservation: Linking the GWS and the 8th WWC

Chair: Cyril Kormos, Vice President for Policy, The WILD Foundation, Ojai, California

Session abstract:

The World Wilderness Congress (WWC), the longest-running public international environmental forum, and the George Wright Society, USA's largest biennial interdisciplinary conference on research, resource management, and education in parks, protected areas, and cultural sites, share a number of common objectives. Although there has been overlap in attendance of these events, and a number of long-standing informal working relationships, to date there has been no systematic effort to develop synergies between these events and build on each other's successes. This session will involve presentations of The WILD Foundation's work for international wilderness issues, and of events planned at the 8th WWC in Anchorage Alaska, September 30–October 6, followed by a dialogue between the session chair/panelists and the audience. The purpose of the dialogue will be to invite suggestions for input into the 8th World Wilderness Congress, and suggestions for how to build a closer relationship between these two events going forward.

Panelists:
Cyril Kormos
Vance Martin, President, The WILD Foundation, Ojai, California
David Parsons, Director, Aldo Leopold Wilderness Research Institute, Missoula, Montana
Alan Watson, Research Social Scientist, Aldo Leopold Wilderness Research Institute, Missoula, Montana
Karen Taylor-Goodrich, Associate Director, Visitor and Resource Protection, U.S. National Park Service, Washington, D.C.

Session 48 • Panel discussion
America's Forgotten Defenses: Our Historic Fortifications
Chair: Deborah Rehn, Historical Architect, U.S. National Park Service –SERO, Atlanta Georgia

Session abstract:
Historic fortifications are specialized localized structures that represent the defense of our country. Integrated with their sites, they reflect a unique unity of cultural landscape and structure. The lessons inherent in fortifications are timely and relevant to better understand our history and the world in which we live post 9/11. Currently, international activity in the conservation of fortifications is increasing. Three of the proposed panel members participated earlier this year in a UNESCO sponsored meeting, whose purpose was to identify gaps in the study, conservation and management of fortifications in the Americas. And ICOMOS has recognized the proposed International Scientific Committee on Military Heritage and Fortifications. This panel will provide reports on current international activities related to fortification preservation and management, the status of military architecture studies, current fortification preservation practices, and a discussion of the future of preservation and interpretation of fortifications in North America.

Panelists:
David Hansen, Military Architecture Historian and former SHPO and Washington State Parks Historic Preservation Officer, Olympia, Washington
Lucy Lawliss, Lead, Park Cultural Landscapes Program, U.S. National Park Service–WASO, Washington, D.C.
Milagros Flores, Historian/Museum Collections Manager, Fort Raleigh National Historic Site, Manteo, North Carolina

Session 49 • Invited papers
Integrated Environmental Monitoring for Ecosystem Health and Sustainability in the Delaware River Basin I
Chair: Richard Evans, Ecologist, National Park Service, Milford, Pennsylvania

Session abstract:

The Collaborative Environmental Monitoring and Research Initiative (CEMRI) began in 1999 with involvement of the U.S. Forest Service, the U.S. Geological Survey, the National Park Service, and NASA. The project goal is to improve the usefulness of various agency research and monitoring programs by providing links across spatial and temporal scales and across environmental media (air, vegetation, soil, water). The conceptual framework of the project is linked, multi-tiered studies involving remote sensing, basin-wide field sampling, intensive field research, and ecosystem modeling. These sessions will describe the approaches used and present examples of environmental issues that can be addressed effectively using this framework. Aspects of this project of particular relevance include: (1) Integrated, interagency monitoring of air, vegetation, soil, and water. (2) Understanding the causes of changes in ecosystem health and services. (3) Increasing awareness of the connections between protected and developed lands. (4) Understanding the ecosystem services protected areas provide.

The Collaborative Environmental Monitoring and Research Initiative (CEMRI): A Multi-scale Approach to Tracking "Vital Signs"

Peter Murdoch, Hydrologist, U.S. Geological Survey, Troy, New York
Richard Birdsey, Program Manager, Global Change Research, USDA–Forest Service, Newtown Square, Pennsylvania
Kenneth W. Stolte, Research Ecologist, Forest Health Monitoring Program, USDA–Forest Service, Southern Research Station, Research Triangle Park, North Carolina

The National Park Service, U.S. Geological Survey, and U.S. Forest Service have been testing collaborative monitoring strategies through several issue-focused studies in the Delaware River Basin. The Collaborative Environmental Monitoring and Research Initiative (CEMRI) enhances and links existing monitoring and research activities to address multi-scale environmental issues that cannot be assessed by individual programs. The collaboration has examined urbanization and forest fragmentation, carbon stocks and fluxes, nitrogen saturation and calcium depletion, vulnerability to exotic insects, and associations between terrestrial and aquatic processes. One example of CEMRI's synergistic outcomes is research linking soil calcium availability to both forest and stream conditions in the Catskill and Pocono Mountains. This talk reports on CEMRI's development, its cost-effective methods for assessing ecosystem "vital signs," and results relating to key issues of forest and aquatic health and sustainability in the Delaware River Basin and landscape surrounding Delaware Gap National Recreation Area.

Land Use Change in the Delaware Water Gap: Land Cover Classification and Model Parameterization

Dalia Varanka, Research Geographer, U.S. Geological Survey, Rolla, Missouri
John L. Hom, Deputy Program Manager, Global Change Program, USDA–Forest Service, Northeastern Research Station, Newtown Square, Pennsylvania

This presentation will discuss findings on long-term land use and land cover changes in the Delaware Water Gap watershed over the twentieth century. The study is part of

the Collaborative Environmental Monitoring and Research Initiative and the NASA Carbon Application study for the Delaware River Basin. The data sources are from historical US Geological Survey topographic maps and remote sensing data. We will discuss the importance of integrating land use classification, temporal change analysis techniques, derived geographical information system layers, with the parameterization of land use and forest productivity models. Land surface classification is a particular challenge for the analysis, as is the temporal integration of the data, and gaining a better understanding of the original collection procedures. We will compare examples of our work with existing remote sensing products such as MODIS and the NLDC. The environmental implications of these preliminary findings will be presented.

Determining Nutrient Sources and Loads for Streams Entering Delaware Water Gap National Recreation Area

Jeffrey Fischer, Water Quality Studies Program Chief, New Jersey District Office, U.S. Geological Survey, West Trenton, New Jersey
John L. Hom, Deputy Program Manager, Global Change Program, USDA–Forest Service, Northeastern Research Station, Newtown Square, Pennsylvania
Alan Ambler, Biologist, Delaware Water Gap National Recreation Area, Milford, Pennsylvania
Yude Pan, USDA–Forest Service, Northeastern Research Station, Newtown Square, Pennsylvania
Mary Chepiga, U.S. Geological Survey, West Trenton, New Jersey

As part of the Collaborative Environmental Monitoring and Research Initiative, the National Park Service, U.S. Forest Service, and U.S. Geological Survey determined loads and sources of nitrogen and phosphorus in streams entering Delaware Water Gap National Recreation Area. This work was conducted to evaluate the effects of land use and forest health outside the park on water quality inside the park. From 2001-04, watershed forest health surveys were completed and stream nutrient concentrations were measured. Two nutrient models of the Delaware River Basin were developed. A spatially referenced regression model (SPARROW) was used to predict watershed nutrient loads and estimate loads derived from atmospheric, urban, and other sources. A forest productivity model (PnET-CN) was used to investigate how nutrient loads might change in response to changes in land use, forest fragmentation, atmospheric deposition, and climate. The predicted nutrient loads from both models were similar to measured loads at park boundaries.

Urbanization Effects on Delaware Basin Streams: Identifying Key Landscape Variables and Improving Their Quantification

Karen Riva-Murray, Ecologist, U.S. Geological Survey, Troy, New York
Rachel Riemann and Andrew Lister, Northeastern Research Station, USDA–Forest Service, Troy, New York
Jeffrey Fischer, Water Quality Studies Program Chief, New Jersey District Office, U.S. Geological Survey, West Trenton, New Jersey
Peter Murdoch, U.S. Geological Survey, Troy, New York

A collaborative study was undertaken to assess effects of urbanization on streams and evaluate the suitability of satellite-based landscape data for characterizing relevant land use, cover, and forest-fragmentation variables. Characteristics of 32 catchments were quantified through photo-interpretation and related to stream data. Accuracies of National Land Cover Datasets (NLCD) from 1992 and 2001 were evaluated through comparison with photo-interpreted values for identified management-relevant variables. A correction, based on census-roads data, was developed. Increased urbanization was related to declines in sensitive invertebrates and increases in nutrient, pesticide, and chloride concentrations. Landscape variables contributing to multiple-regression response models included indicators of landscape fragmentation and percentages of forest, commercial, and residential land. NLCD-based values of many variables differed markedly from their photo-interpreted counterparts, particularly in heavily-forested catchments. Roads-based NLCD correction improved comparability for many, but not all, variables. Evaluation and correction of NLCD can substantially improve its utility in water-quality and forestry studies.

Relating Forest Condition to Soil, Tree, and Stream Chemistry in the Delaware River Basin

Ken Stolte, Research Ecologist, Forest Health Monitoring Program, USDA–Forest Service, Southern Research Station, Research Triangle Park, North Carolina

Walter C. Shortle, Senior Scientist, USDA–Forest Service, Northeastern Research Station, Durham, New Hampshire

Peter Murdoch, U.S. Geological Survey, Troy, New York

To improve assessments of forest health and sustainability, indicators that combine soil, tree, and stream chemistry are being developed. In the upper Delaware River Basin, dendrometric, dendrochemical, biogeochemical, and biochemical markers were applied to stemwood, root-zone soil, and foliage of maple and birch species. Comparisons were made with spruce growing farther north, in forests where adverse effects of acid deposition are known. Maple and birch were relatively more tolerant of aluminum-induced calcium deficiency syndrome than spruce, but still experienced reduced growth and disease resistance in acid-altered root-zone soils. Calcium depletion was associated with higher levels of stress indicators in trees and suppressed tree growth. Calcium depletion was more pronounced in higher elevation forests near ridge tops, where first-order streams originate, than lower elevation forests in the same watershed. This difference in calcium level was reflected in analysis of soil, trees, and streams.

Session 50 •
PENDING

Session 51 • Side meeting by invitation only

Research Learning Center Organizational Meeting

Chair: Judy Geniac, Program Lead, Research Learning Centers, National Park Service

Natural Resource Program Center, Denver, Colorado

Session abstract:
The National Park Service is examining ways to facilitate research in parks, and has found a successful way to leverage funding and gain valuable information from researchers and partner — the development of Research Learning Centers. This meeting is to examine how Servicewide efforts will help the existing RLCs address high priority needs, while improving the ability of other parks to establish such centers. The intended participants are all RLC and related resource management staff.

Presenters:
Leigh Welling, Director, Crown of the Continent Research Learning Center, Glacier National Park, West Glacier, Montana
Lynne Murdock, Natural Resources Interpretive Specialist, National Park Service, Washington, D.C.
Nina Roberts, Education & Outreach Specialist, National Park Service, Natural Resource Information Division, Fort Collins, Colorado

Session 52 • Workshop
Natural Resource Bibliography
Chair: Wendy Schumacher, Bibliographic Coordinator, National Park Service, Fort Collins, Colorado

Session abstract:
The Natural Resource Bibliography (NatureBib) is one of 12 inventories listed in the Natural Resource Challenge. NatureBib contains bibliographic references by and about natural resource issues in the national park system organized by park. In addition to a robust search engine to sort through hundreds of thousands of references, the online database (with an Access XP application for users with poor Internet connections) allows parks to store documents that directly link to the citation information. NatureBib handles a wide range of document types from unpublished reports to maps to conference proceedings. A public interface is in development. With the ability to designate sensitivity for both the citation and linked document (when available), NatureBib will help parks comply with requirements to post frequently requested documents on the Internet.

Tuesday, March 15 • early afternoon concurrent sessions • 1:30 – 3:35

Session 53 • Panel discussion
Native American Treaty Rights in the National Parks
Chair: Bob Krumenaker, Superintendent, Apostle Islands National Lakeshore, Bayfield, Wisconsin

Session abstract:

Many NPS units lie within areas where Native peoples may have reserved certain rights (typically hunting, fishing, trapping, and/or gathering) when they ceded land to the US in formal treaties. The Constitution declares treaties (along with federal law and the Constitution itself) as the supreme law of the land, and the courts have ruled that only Congress can abrogate treaties, but must do so with clear intent. Most park legislation is silent regarding treaties, but NPS policy and case law are clear that unless explicitly authorized by Congress, consumptive uses are prohibited. This sets up a legal and political conundrum for parks: do treaty rights exist, how do they dovetail with NPS law, policy, and traditions, and how can we manage the exercise of treaty rights to assure park resources are not compromised? Panelists will discuss the current state of these issues across the system and through case studies.

Panel presentations:

Overview of Treaty Issues in the National Park System
Patricia Parker, Chief, American Indian Liaison Office, National Park Service, Washington, D.C.

Legal and Regulatory Framework
Molly Ross, Solicitor, Branch of National Parks, DOI/Office of the Solicitor, Washington, D.C.

Policy and Precedent, and Case Studies from the West Coast
Jon Jarvis, Regional Director, NPS Pacific West Region, Oakland, California

Treaty Status Across the United States, Focusing on Federal Lands
John Echohawk, Director, Native American Rights Fund, Boulder, Colorado

Case Study at Apostle Islands
Bob Krumenaker, Superintendent, Apostle Islands National Lakeshore, Bayfield, Wisconsin

Session 54 • Panel discussion

Social Science Research to Describe Relationships between the Public and Wildlands in Alaska
Chairs: Alan Watson, Aldo Leopold Wilderness Research Institute, Missoula, Montana
Brian Glaspell, U.S. Fish & Wildlife Service, Anchorage, Alaska

Session abstract:

A consortium of scientists representing private consulting firms, academia, federal agencies, the State of Alaska, membership organizations and tribal governments have cooperated to increase understanding of the many relationships people have with the federal wild lands of Alaska (Wilderness, Parks & Preserves, Forests, Refuges, BLM Management Units). Recent research at Wrangell–St. Elias National Park & Preserve, Gates of the Arctic National Park & Preserve, the Togiak and Kodiak National Wildlife Refuges, the Yakutat District of the Tongass National Forest, Denali

National Park & Preserve, the Western Arctic Parklands, and on non-resident state-wide tourists, was initiated to help address some issues held in common across the wild lands of Alaska. Non-resident recreation visitors, commercial service providers, native people, non-native rural residents, sport anglers and sport hunters have been interviewed to provide greater understanding of unique aspects of relationships with wild lands in Alaska that should be considered in planning activities and the forces of influence that may be changing them. An extended case study approach to understanding the range of wild land relationships on a Region-wide basis provides value beyond insight for individual unit planning and management. With over half of our National Wilderness Preservation System in Alaska, and vast amounts of other public land managed to protect wilderness character, these relationships provide the incentive to do it right. The consortium of interests actively engaged in both protecting and restoring relationships with the wild land resources of Alaska will be a positive contributing force to achieving sustainability of recreation experiences, communities, businesses, and wild land resources.

PANEL PRESENTATIONS:

Visitor Experiences Enable Relationships in the Gates of the Arctic National Park & Preserve and Wrangell–St. Elias National Park & Preserve, Alaska
Brian Glaspell, U.S. Fish & Wildlife Service, Anchorage, Alaska
Katie Kneeshaw, Aldo Leopold Wilderness Research Institute, Missoula, Montana

The Importance of Understanding Influences on Local Meanings Attached to Wilderness Landscapes
Ralph Tingey, National Park Service Alaska, Region, Anchorage, Alaska

The Role of Relationships in Managing Conflict between Recreation and Subsistence Uses
Joan Kluwe, URS Corporation, Anchorage, Alaska

Community Relationships with the Situk River, Alaska
Neal Christensen, Aldo Leopold Wilderness Research Institute, Missoula, Montana

Denali Air Taxis: Unique Relationships with the Park and Visitors
Alan Watson, Aldo Leopold Wilderness Research Institute, Missoula, Montana
Mike Tranel, Denali National Park & Preserve, Alaska

Session 55 • Contributed papers
Invasive Plants
Chair: Abby Miller, National Park Service (retired), Burlington, Vermont

A Grid-Based Survey Method for Non-Native Invasive Plants
Kathryn Thomas, Ecologist, U.S. Geological Survey, Southwest Biological Science Center, Flagstaff, Arizona
Robert Hunt, Research Specialist, Northern Arizona University, Flagstaff, Arizona

The U.S. Geological Survey Southwest Biological Science Center in collaboration with the National Park Service (NPS) Intermountain Region has conducted a survey of non-native invasive plants at Petrified Forest NP. This survey is unique in that a grid based sampling method was employed to facilitate linkage of field reported data within a GIS environment. Three areas of the park were identified for systematic survey. For each area, a grid was created consisting of one-hectare sampling units. The geographic coordinates of the center of each sampling unit was determined and listed, along with the sampling unit identifier, in a Trimble GeoExplorer. In 2002, 2003, and 2004 field staff used the Trimble to navigate to each sampling unit and record occurrence of target weeds. The talk will describe this grid sampling design, the mechanics of processing the data, and its utility for spatial analysis of weed infestations.

Tackling Exotic Plants as A Team — Cooperate, Collaborate, Contract

James Akerson, Forest Ecologist, NPS Mid-Atlantic Exotic Plant Management Team, Luray, Virginia

Norman Forder, Team Leader, NPS Mid-Atlantic Exotic Plant Management Team, Luray, Virginia

Twelve park units within the Mid-Atlantic area form a Cooperative to control their highest priority invasive plants. Using the NPS Mid-Atlantic Exotic Plant Management Team (EPMT) as a catalyst, the Cooperative is making important strides. They use labor from several sources. The mainstay is made up of EPMT and park employees that work together on location. This cooperation ensures that expertise and group knowledge stays at the parks. The Cooperative benefits greatly from the enthusiasm and energy of student volunteers from American and European universities. The Cooperative works collaboratively with adjoining park neighbors to tackle mutual problems (invaders such as kudzu, golden bamboo, and others). Finally, the Mid-Atlantic Cooperative uses the expertise of a contractor to handle especially difficult sites such as engulfed Oriental bittersweet, Japanese barberry, multiflora rose, and Japanese knotweed. Combining forces through these means has created an approach that is well suited to various exotic plant challenges.

Control of the Herbaceous Invasive Plant, *Ranunculus ficaria,* in the Floodplains of Rock Creek Park

Cairn Krafft, Botanist, USGS Patuxent Wildlife Research Center, Beltsville, Maryland

Dick Hammerschlag, Biologist, USGS Patuxent Wildlife Research Center, Beltsville, Maryland

Susan Salmons, Biologist, National Park Service, Rock Creek Park, Washington, D.C.

An aqueous foliar spray of the herbicide Rodeo (glyphosate) was used in a pilot study to determine its effectiveness in controlling *Ranunculus ficaria,* an exotic perennial currently dominating the spring flora of the floodplains in Rock Creek Park. Herbicide dosage, timing, and frequency were varied to determine which combination would provide optimal control of *R. ficaria* while limiting deleterious effects to the natives species still present in the flora. Results of the three-year study suggest that 1.5% Rodeo sprayed in early March effectively knocks back *R. ficaria* cover (from 95% to 5%), with no significant effects (positive or negative) on cover by natives or

by other non-natives. It is hoped that over time, in the absence of reduced competition from *R. ficaria,* the native spring flora in the floodplains of Rock Creek Park can return to its pre-invasion densities and beauty.

Is Saltcedar Control Always Beneficial to Birds?

Mark Sogge, Supervisory Ecologist, USGS Southwest Biological Science Center, Colorado Plateau Research Station, Flagstaff, Arizona
Eben Paxton, Research Specialist, USGS Southwest Biological Science Center, Colorado Plateau Research Station, Flagstaff, Arizona

Perspectives from the American Southwest Saltcedar is a widespread invasive plant throughout much of the Southwest. The National Park Service is conducting extensive saltcedar control and eradication efforts, with a frequently stated objective to improve habitat for birds. The southwestern willow flycatcher is a federally endangered, riparian-obligate bird that breeds extensively in saltcedar. Long-term studies of flycatcher physiology, immunology, site fidelity, productivity, and survivorship found no evidence that nesting in saltcedar habitat is detrimental to willow flycatchers in central Arizona. Research here and in other areas also shows that, in some cases, saltcedar can provide habitat for many riparian bird species. Further, the nature of the replacement habitat, following saltcedar removal, is critical. Therefore, assuming that saltcedar control will positively benefit local bird species may be problematic. A truer evaluation of success will depend on monitoring of both the replacement habitat and the bird community or species of interest.

Invasive Versus Native Plants: Competition or Co-operation for Attracting Pollinators in Acadia National Park?

Constance Stubbs, Research Assistant Professor, University of Maine, Orono, Maine
Anthony O'Neal, graduate student, University of Maine, Orono, Maine
Francis Drummond, Professor of Entomology, University of Maine, Orono, Maine
Howard Ginsburg, Ecologist, USGS Patuxent Wildlife Research Center, University of Rhode Island, Kingston, Rhode Island

Invasive plant species can have profound effects on natural communities. *Berberis thunbergii* (Japanese barberry), *Frangula alnus* (glossy buckthorn) and *Lythrum salicaria* (purple loosestrife) are invasive species of great concern in Acadia National Park, but are also attractive to pollinators. To determine if these invasives affect pollinator behavior and thus native plant reproduction, we have been conducting studies testing three major hypotheses: 1) that invasives influence pollinator visitation to native plants; 2) that invasives affect pollen transfer to native plants, and 3) that invasives influence native plant fruit set. Surveys of native bees are also being conducted. Invasive plants significantly affected pollinator visitation to native plants in several trials, but our findings indicate no consistent pattern for how invasives affect pollinator behavior and native plant fruit set. Preliminary recommendations will be presented on ways to help maintain viable populations of pollinators thus ensuring sustainable pollination of native plants in National Parks.

Diverse Issues in Diversity in the National Parks
Chair: Robert Manning, Professor, University of Vermont, Burlington, Vermont

Session abstract:
A recent survey of the American public commissioned by the National Park Service found that minority racial and ethnic groups continue to be underrepresented as visitors to the national park system. This suggests that the benefits of national parks are not equitably distributed throughout society and that national parks may not enjoy broad public support in the future. Theoretical and empirical research suggests that a variety of factors may underlie these issues and that multiple management responses are possible. This session explores diverse issues relating to diversity in the national parks, including institution frameworks for understanding and addressing diversity-related issues, empirical research on discrimination in the national parks, the potential role of the NPS Heritage Areas Program for engaging issues of diversity, and the role of urban parks in serving racial and ethnic minority populations. The session will conclude with a facilitated discussion of a research and management agenda for addressing the issue of diversity in the national parks.

Building Capacity to Engage Diverse Communities to Enhance Resource Conservation: A Multi-Institutional Collaborative Approach
Myron Floyd, Associate Professor, University of Florida, Gainesville, Florida
Effective management of parks and protected areas increasingly depends on greater involvement of individuals and communities from diverse racial and ethnic backgrounds. This viewpoint has been acknowledged by federal land management agencies and non-governmental organizations alike. Consequently, several significant initiatives have been developed to address this issue. Efforts to diversify visitors to national parks, recruit a more diverse workforce, advocate environmental justice, and engage diverse communities in public involvement processes are examples. Evidence exists to suggest that while different organizations are addressing such issues a greater level of dialogue and coordination is needed. This paper explores an alternative approach to address diversity and social justice in natural resource management. It describes a collaborative, multi-institutional approach for engaging diverse communities. The paper also discusses why such an approach is necessary, highlights benefits of employing this approach and outlines preliminary steps toward building an organization to integrate "diversity" initiatives across organizational boundaries.

Racial Discrimination in the National Parks: An Empirical Study
Robert Manning, Professor, University of Vermont, Burlington, Vermont
Megha Budruk, Assistant Professor, School of Community Resources and Development, Arizona State University, Tempe, Arizona
Myron Floyd, Associate Professor, University of Florida, Gainesville, Florida
Research suggests that racial and ethnic minorities are substantially underrepresented in the national parks and that racial discrimination may be a contributing cause. This study was designed to help measure the degree to which racial discrimination exits in national parks. A series of computer-edited photographs was developed illustrating a

range of visitors along a trail in a national park. The visitors illustrated in the photographs included a mix of Black and White hikers. Study photographs were incorporated into a survey in which respondents were asked to judge the acceptability of trail use conditions illustrated in the study photographs. The survey was administered to samples of Black and White students at three universities. Study data indicate the degree to which race of both respondents and the visitors in the photographs affect evaluative judgments of trail conditions.

New Advocates in New Places: Engaging Communities through the NPS Heritage Areas Program

Daniel Laven, Graduate Research Assistant, University of Vermont, Burlington, Vermont

Issues of diversity will continue to challenge the National Park Service (NPS) as America becomes an increasingly interconnected, multicultural society. For example, research indicates that demographics of current park visitors may not reflect the increasing diversity of American society. Such trends are cause for obvious concern — if parks do not appeal to broad segments of the public, who will care for them? National parks and related areas must be relevant to a range of constituents if such places are to be sustained over time. This paper explores how the Blackstone River Valley National Heritage Corridor engages a diverse set of stakeholders. This case study also suggests how the NPS Heritage Areas Program may be an effective mechanism for introducing NPS, and its mission, to a host of new constituents and potential advocates.

Enhancing the Relevance of Urban Park and Recreation Services for Racial and Ethnic Minorities

Michael Schuett, Associate Professor, Texas A&M University, College Station, Texas
David Scott, Associate Professor, Department of Recreation, Park & Tourism Sciences, Texas A&M University, College Station, Texas

Urban parks, loosely defined as protected areas that serve large neighboring urban populations, face issues that differ from more remote locations. This presentation identifies some of the major challenges confronting urban park and recreation managers as they seek to serve racial and ethnic minorities. Data collection involved six conference calls in the fall of 2003 that focused on topics relating to racial and ethnic minorities' use of urban parks. Of these six calls, two consisted of park directors of major urban city systems; three were administrators and managers of the National Park Service, the third call included academics and researchers. Data were recorded, transcribed, and analyzed using content analysis. Study findings yielded the following common themes: 1). Develop a more diverse and knowledgeable workforce; 2) Identify, understand, and meet the needs of a multi-ethnic society; and, 3). Conduct more collaborative research and disseminate usable knowledge.

Recreational Use Patterns of African Americans in a Postmodern Era

Phadrea D. Ponds, Research Wildlife Biologist, U.S. Geological Survey, Fort Collins Science Center, Fort Collins, Colorado

Federal land management agencies such the National Park Service and the U.S. Fish and Wildlife Service along with state and local agencies, spend millions of dollars

annually to provide access to public lands. Some Americans view access to the nation's public lands as a part of their personal heritage. However, African Americans and other minorities are conspicuously absent in actively using the nation's public lands. The fact that African Americans and other minorities are underrepresented in the use of public lands is well known and commonly acknowledged. This researcher challenges that there is a strong need for new theories to explain why African Americans visit public lands at a rate lower than whites. The focus here is to move beyond studies of marginality and disparate social issues (e.g., education, employment, etc) and to look towards postmodern and historical experiences that may influence beliefs and attitudes toward public land.

Session 57 • Invited papers

Monitoring in the Parks II: Knowledge for Implementing Monitoring Programs in National Parks

Chair: John Gross, Ecologist, Inventory and Monitoring Program, National Park Service, Ft. Collins, Collins

Session abstract:

Implementation of an effective monitoring program is a substantial challenge that requires both a breadth and depth of knowledge across disciplines, and the ability to partner and communicate with many collaborators. While each monitoring program is different, there are many elements common to virtually all natural resource monitoring programs — whether the focus is on monitoring fire effects, invasive plants, endangered species, or another natural resource. This session focuses on key tasks that most natural resource monitoring programs will face, and on challenges common to monitoring programs across many parks.

Prioritization of Vital Signs within the NPS Vital Signs Monitoring Program

Kristina Heister, Mojave Network Coordinator, National Park Service, Lake Mead NRA, Boulder City, Nevada

Planning for the National Park Service Vital Signs Monitoring Program has been organized into 3 phases. Phase 1 includes initial prioritization of network vital signs based on objectively applied criteria. The process results in a list of priority vital signs for each network park and a common network list representing vital signs that ranked high for all parks. The list of "prioritized" vital signs generated may then be used to guide the "selection" of vital signs for monitoring during Phase 2 of planning. Several networks (e.g. CUPN, SFAN) have adopted a similar process for prioritizing vital signs although implementation methods and results have varied. This presentation will focus on the prioritization process implemented by the Mojave Network and discuss how it has evolved and been implemented in other networks with varied levels of success. We will include a demonstration of the database developed to facilitate the prioritization process.

Scientific Communication: Transforming Data into Shared Knowledge

Matt Patterson, South Florida/Caribbean Inventory and Monitoring Network Coordinator, National Park Service, Homestead, Florida

Communication of scientific information has changed dramatically in the recent future, with advances in technology and increased ways of communication. No longer is the research journal the only tool to communicate recent findings, now global instantaneous messaging allows for real time collaboration, education, and outreach providing the entire planet with your newest data. The priority and format chosen to share your information with the world, and at what level of detail creates a continuum needing evaluation to determine which audiences are the most important to share your message. The National Park Service's Inventory and Monitoring Program's foundation is to build capacity within networks of National Park units to better understand the natural resources through inventories and Vital Signs monitoring. Providing park managers with the best available science for decision-making, in addition to tracking changes in the ecosystems, is one of the program's many challenges.

Sample Designs for Monitoring: An Ecologist's Review of Scientifically Sound Designs for Stretching Limited Budgets

Michael DeBacker, Ecologist/Program Coordinator, Heartland & Prairie Cluster Monitoring Program, National Park Service, Republic, Missouri

The NPS vital signs monitoring program faces the operational challenge of implementing long term monitoring of natural resources in networks of geographically dispersed parks. Carefully designed monitoring allows strong inference and promotes integration of multiple projects within logistical and budgetary constraints. Designs for drawing a sample are available that achieve spatial balance, promote co-location of samples among projects, and permit inference of monitoring results from relatively few sites to a larger area of management interest. In addition to logistical and funding constraints, designs for sampling through time are shaped by the relative importance of measuring trends versus status of the resource. An overview of temporal sample designs is provided, and one approach of grouping parks into sampling "tours" is presented. Improved efficiency is also possible through sample designs that promote the simultaneous revisit of sites by multiple projects utilizing a multi-disciplinary field crew.

Simulation-Based Power Analysis for Population Monitoring

Paul Luckacs, Statistician, Patuxent Wildlife Research Center, Ft. Collins, Colorado

Power analysis is a useful method for determining a sample size needed to achieve a desired level of precision on an estimated effect or determine the magnitude of an effect that can be detected. The power of a test is the probability of rejecting the null hypothesis given the alternative is true. Power analysis is often oversimplified and based on "canned" analyses. Simulation based on a predetermined survey design provides a more robust way to determine the sample size required to reach a desired level of precision. First, the survey is designed. Next, an appropriate analysis is selected. Then, data are simulated under the survey design incorporating all levels of uncertainty. Finally, the simulated data are analyzed using the selected analysis method. Sample size can be varied until the desired precision level is achieved. This

provides a realistic evaluation of required sample size and prepares the researcher for data analysis.

National Park Service Web-based Compendium of Watershed Assessment Methods

Candy Bartoldus, Assistant Professor, George Mason University, Fairfax, Virginia
Paul Adamus, Wetland Scientist and Wildlife Biologist, Adamus Resource Assessment, Inc., Corvallis, Oregon
Eric Somerville, Nutter & Associates, Inc., Athens, Georgia
Eric Stein, Southern California Coastal Water Research Project (SCCWRP) Principal Scientist, West Minster, California
Ralph Tiner, University of Massachusetts, Department of Plant & Soil Sciences, Amherst, Massachusetts

Federal and state agencies are continuously given directives to conduct ecological assessments. These directives generated the development of methods focused on various habitats and management objectives (e.g., inventory, monitor conditions, prioritize restoration sites). Choosing an assessment method is challenging because there are numerous methods and no complete listing. The National Park Service initiated the development of a compendium of ecological assessment methods to provide park managers the information necessary for identifying and selecting methods. We compiled over 500 documents and are preparing a database that includes a description and key sorting criteria for each (e.g., habitat type, geographic area, indicators). We also developed a web site containing various ways to sort through methods. The knowledgeable user can go directly to a listing, retrieve, and print the method summary. Alternatively, users needing guidance can follow a series of queries to narrow the selection to applicable methods.

Session 58 •
PENDING

Session 59 • Invited papers

Northern Prairie Wildlife Research Center–National Parks Partnerships in Restoration Research I: Pre-restoration Effects

Chair: Amy Symstad, Research Ecologist, USGS, Northern Prairie Wildlife Research Center, Mount Rushmore National Memorial, Keystone, South Dakota

Session abstract:

Loss of keystone species and processes, invasion by non-native species, fragmentation, and a variety of other stressors have impacted ecosystems throughout the nation. This and the following session highlight USGS-NPS cooperative research in northern Great Plains National Parks, as well as Yellowstone National Park, that seeks to understand factors involved in restoration of species, communities, and ecosystems. The first session addresses pre-restoration factors — how do the stressors that led to the need for restoration affect the restoration process? The focus in this session is on

restoration of plant communities in mixed-grass prairie. The second session will address effects and effectiveness of restorations.

Effects of Invasive Yellow Sweetclover *(Melilotus officinalis)* on Nitrogen Cycling and Native Plant Communities

Laura Van Riper, Graduate Student, University of Minnesota, St. Paul, Minnesota
Jennifer L. Larson, Biologist, University of Minnesota, St. Paul, Minnesota

Exotic nitrogen-fixing species can alter nitrogen cycling and increase soil nitrogen levels, changing competitive dynamics between species. In historically low-nitrogen ecosystems, such as prairies, increased nitrogen levels can favor exotic species over native species. Yellow sweetclover *(Melilotus officinalis)* is an exotic, biennial legume that has become abundant in the Great Plains. I studied yellow sweetclover invasion at Badlands National Park in South Dakota in both western wheatgrass prairie and Badlands sparse vegetation. There was evidence that sweetclover increased potential net nitrogen mineralization and nitrification in sparse soils. In a fertilization study, increased nitrogen levels changed species composition and increased the biomass of the exotic species *Halogeton glomeratus.* Spread of exotic legumes and other nitrogen-fixing species may have a negative impact on the native flora due to alterations in nitrogen dynamics.

Leafy Spurge *(Euphorbia esula)* Control at Theodore Roosevelt National Park

Diane Larson, Research Wildlife Biologist, USGS, Northern Prairie Wildlife Research Center, St. Paul, Minnesota
Paul A. Rabie, School of Biological Sciences, Washington State University, Pullman, Washington
James B. Grace, Research Ecologist, USGS National Wetlands Research Center, Lafayette, Louisiana
Paula Andersen, National Park Service, Tallgrass Prairie National Preserve, Cottonwood Falls, Kansas

Leafy spurge *(Euphorbia esula)* is a serious invader at Theodore Roosevelt National Park, where an aggressive biocontrol program has been underway for more than a decade. We evaluated the effect of two flea beetles, *Aphthona nigriscutis* and *A. lacertosa,* alone and in the presence of herbicide application, on leafy spurge stem counts over three years using structural equation models. *Aphthona lacertosa* had a small negative effect on leafy spurge stem counts in the absence of herbicide, but a similar effect could not be demonstrated for *A. nigriscutis.* Herbicide application increased negative interactions among the two flea beetle species for up to two years after spraying. For each one-year time step, the single strongest negative effect on leafy spurge stem counts was the beginning stem count (i.e., plots with higher stem counts declined more than plots with lower stem counts), suggesting strong density-dependent effects in these mature spurge populations.

Relationships among Invasive and Native Plants Mediated through Soil Biota

Nicholas Jordan, Professor, University of Minnesota, Department of Agronomy and Plant Genetics, St. Paul, Minnesota

Diane Larson, Research Wildlife Biologist, USGS, Northern Prairie Wildlife Research Center, St. Paul, Minnesota
Sheri Huerd, Scientist, Department of Agronomy and Plant Genetics, University of Minnesota, St. Paul, Minnesota

It is increasingly evident that invasive plants can alter soil biota in ways that facilitate their own invasion. We examined this capacity in three important plant invaders in prairies and rangelands of the northern Great Plains: leafy spurge (*Euphorbia esula),* smooth brome *(Bromus inermis)* and crested wheatgrass *(Agropyron cristatum).* In glasshouse experiments, invasives and a set of six native species were grown separately through three growth cycles, after which we assessed relative growth of each species in soils conditioned by each species. Smooth brome and crested wheatgrass had substantial self-facilitative effects. We observed cross facilitations between invasives in four of six possible instances. All three invasive species modified soil in ways that decreased seedling growth of native species. Effects varied among native species, but forbs generally were more sensitive than grasses. Native species that are relatively insensitive to altered soil biota may be important "pioneer" species in restoration efforts.

Plant Community Impacts of Not Having Grazing in a Small Prairie Park

Amy Symstad, Research Ecologist, USGS, Northern Prairie Wildlife Research Center, Mount Rushmore National Memorial, Keystone, South Dakota

The mixed-grass prairie at Scotts Bluff National Monument, some of which is heavily infested with invasive annual brome grasses, lost a keystone process — grazing by large ungulates — when the monument was established in 1919, potentially having negative effects on the remaining native flora. Grazing may also be useful for reducing annual brome abundance. However, the monument may house grazing-sensitive species within a landscape dominated by production ranching. This pilot study compared plant composition and diversity of a dominant vegetation type within the monument to that in an adjacent private ranch to investigate one aspect of the potential effects of restoring grazing to the ecosystem. The plant community differed little between the two locations, but species richness at the scale of 1000 m^2 was greater within the ungrazed monument. This suggests that, for this vegetation type, restoring grazing may have little to a slightly detrimental effect on the plant community.

Session 60 • Invited papers

Connecting the Dots between the Physical and Ecological Sciences II: Integrated Science Approaches

Chair: Bob Higgins, Chief, Education and Outreach Branch, National Park Service, Denver, Colorado

Session abstract:

See under session #21.

Integrated Science: The Importance of Understanding Other Scientific Perspectives

Bob Higgins, Chief, Education and Outreach Branch, Geologic Resources Division, National Park Service, Denver, Colorado

John Muir once observed that when we try to pick out anything by itself, we find it hitched to everything else in the universe. As scientists, we have marveled at the diversity and complexity in the physical, biological and social realms. However, as we have moved deeper into individual scientific disciplines, we have often lost sight of the abiotic connections which are the underpinnings of our ecosystems. The National Park Service is discovering the importance of comprehensive ecosystem management, including geodiversity and the many roles the geosciences play. In managing natural resources, it is critical to have a team that provides a balance of scientific disciplines. Just as our understanding of predator/prey relationships, biomagnification, and fire ecology have improved drastically over the years, we are discovering that by integrating abiotic information, we can further refine our understanding of park ecosystems.

Geologic and Geomorphic Controls on Fine Sediment Dynamics, Upper Colorado River: Implications for Biological Productivity

Michael Harvey, Principal Geomorphologist, Mussetter Engineering, Inc., Fort Collins, Colorado

Robert A. Mussetter, Principal Engineer, Mussetter Engineering, Inc., Fort Collins, Colorado

Snowmelt in the higher elevations of the Colorado River basin, underlain by erosion resistant crystalline rocks, produces the bulk of the annual flow. Although most of the annual sediment load in the Colorado River is transported during the snowmelt period, the river also carries a high fine (silt/clay-sized) sediment load in the baseflow-period. Thunderstorms that occur over the lower portions of the basin, underlain by highly erodible sedimentary rocks, deliver the fine sediment to the river. Deposition of the fine sediment on the surface gravels and cobbles strongly affects the macro-invertebrate population. Joint physical and biological investigations and 2-D hydrodynamic modeling indicate that (1) surface flushing of the fine sediment without mobilization of the underlying gravel and cobbles significantly increases biological productivity, and (2) the amount of fine-sediment-free area can be predicted for a wide range of flows, providing a basis for quantifying fine sediment management flows.

The Geological Foundation for Prescribed Fire in Mammoth Cave National Park

Rick Olson, Ecologist, Mammoth Cave National Park, Mammoth Cave, Kentucky

Using regional geology, physiography, and hydrology, a vegetation habitat classification was developed for Mammoth Cave National Park. This habitat classification combines bedrock geology, slope, and aspect in the park's Geographic Information System (GIS). The rationale is that for a given climate, bedrock geology influences soil type, and whether surface or subsurface (karst) drainage prevails. Aspect controls whether a site is shaded or sunny, and sun-drenched slopes underlain with carbonate bedrock produce the most xeric vegetation communities. Approximately 75% of the park is composed of habitat types that would naturally support fire dependent or fire

tolerant vegetation communities. The remaining 25% of the park supports moist habitat types with vegetation that would be damaged by fire. Even within appropriate habitat types, much of the park has successional vegetation where application of prescribed fire should be approached with caution. Prescribed fire areas were selected in the GIS based upon appropriate habitat and vegetation types.

Using GIS for Mapping Vegetation and Managing Resources Along the North Boundary of Yellowstone National Park

Cheryl Jawoworski, Geologist, Yellowstone Center for Resources, Yellowstone National Park, Wyoming

Mary Hektner and Jennifer Whipple

Along the north boundary of Yellowstone National Park, agricultural land use, diverse geology, alkali-rich soils high in clay and a semi-arid climate (10–12 inches average annual precipitation per year) present a challenge to restoring native vegetation. The bedrock geology is primarily Cretaceous sediments and Tertiary Absaroka volcanic rocks. Surficial geologic (Quaternary) deposits consist of colluvium, fine-grained alluvium, lake beds and boulder-rich deposits from late glacial floods. Before these lands became part of Yellowstone National Park in the 1930s, they were private lands that were tilled and irrigated. Yellowstone's botanists are mapping existing vegetation on previously tilled fields and non-tilled fields as the first step towards re-establishing native vegetation for Yellowstone's large grazing animals. Using Geographic Information Systems (GIS) software, a digital orthophotograph and general knowledge of the area, Yellowstone's botanists and geologists created a digital landform/vegetation/land use map. During the summer of 2004, botanists used this digital map as a base during their field survey of vegetation. This digital map of vegetation/landform/land use is easily integrated with other existing digital information on bedrock geology, soils, or other digital data. During 2005, Yellowstone's botanists and other managers will use this integrated digital information about vegetation, soils, geology, and land use to address the challenge of restoring native vegetation within the north boundary area.

Geoecologic Contingency: The Power of Integrative Science in Ecosystem Management

Cathleen May, Senior Director of Strategic Initiatives, University of Michigan, Ann Arbor, Michigan

The presence, persistence, and attributes of most ecosystems depend on geologic attributes that can be characterized as abiotic contingencies or threshold parameters. Because most geologic attributes accrue over millennia and across landscapes, they yield threshold dynamics that are more conservative across space and time than the ecosystems they support. These "first principles" of geoecologic contingency yield a deceptively simple yet powerful tool for managing ecosystems because many geologic attributes are easily located using the simplest of "remote" sensing tools (geologic and topographic maps; aerial and satellite images.) The utility of the concept of geoecologic contingency will be illustrated by discussing the hanging gardens of the Colorado Plateau as a distributed geoecosystem. The core attribute of

truly integrative science will be illustrated by discussing the hypothesis-generating power in the notion of geoecologic contingency.

Session 61 • Invited papers

Lake Mead's Cold War Legacy: The B-29 Bomber at the Bottom of the Lake

Chair: Larry Murphy, Chief, Submerged Resources Center, National Park Service, Santa Fe, New Mexico

Session abstract:

On July 21, 1948, B-29 serial number 45-21847 crashed into the Overton Arm of Lake Mead while engaged in top-secret high-altitude research. Though the existence of the missing plane had long been known, it wasn't until summer 2002 that the park learned that the plane had been found by local divers after an unpermitted side-scan sonar search in 2001. During a year of unauthorized diving, numerous items were removed from the plane. The discovery of the wreck set in motion a storm of legal, archeological, management, and conservation issues — not the least of which was a hostile admiralty salvage claim in Federal Court. The B-29 in Lake Mead pulled the Park Service in many different directions and this session will discuss some of the legal, management, historical, archeological, and conservation issues that all came to bear on this fascinating and unique cultural property.

History of the B-29 Sunk in Lake Mead

Bob Chenoweth, Curator, Nez Perce National Historic Site, Spalding, Idaho

Designed to replace the B-17 Flying Fortress, the B-29 earned its place in history as the most advanced bomber of its time and dropped the two atomic bombs on Japan that ended World War II in the Pacific. Following the war the B-29 was used in support of a wide range of advanced scientific research. On July 21, 1948, B-29A 45-21847 crashed into Lake Mead, Nevada, while being used as a flying laboratory studying solar radiation in the atmosphere. More than 50 years later, National Park Service researchers began studying the wreck using the latest technology for underwater archeology. This talk will not only look at the history and significance of the B-29 in aviation history but illuminate the fascinating mission this aircraft was engaged in, detail the special modifications made to it and describe the chain of events that lead to the crash and dramatic rescue of the crew.

The Case of the Missing B-29: A Battle for Protection and Ownership

Rosie Pepito, Cultural Resource Manager, Lake Mead National Recreation Area, Boulder City, Nevada

On July 21, 1948, RB-29A 45-21847 was on a scientific mission when it ditched in Lake Mead, Nevada. What kind of scientific mission was this aircraft engaged in? Where was the exact location of the aircraft? Was this aircraft historically significant? Can this aircraft be subject to salvage claim? For 53 years the lure and mystery of the aircraft prompted numerous individuals and aircraft collectors to request permits to search and salvage the Lake Mead B-29. Search attempts by the NPS were unsuccessful. In 2001 an illegal side-scan sonar search operation discovered its

location and withheld it from the NPS. This set into motion creative partnerships within the NPS and with other agencies to locate, document, and defend the aircraft as federal property in a subsequent hostile salvage claim.

Cold War Archeology 190 Feet Deep

Dave Conlin, Archeologist, NPS Submerged Resources Center, Santa Fe, New Mexico
Brynn Bender, National Park Service, Western Archeological and Conservation Center, Tucson, Arizona

Following the successful location of the Lake Mead B-29 by the National Park Service in 2002, the Submerged Resources Center (SRC) was called in to document and assess the condition of the wrecked plane. Utilizing technical diving techniques and a host of advanced instruments, the SRC Team was able to produce solid scientific information concerning present condition, environmental variables and damage caused by unauthorized diving and looting. This information, combined with the conservator's assessment of the condition of looted materials recovered by the Park Service was instrumental in defending the plane from the hostile salvage claim. This talk will discuss some of the details of underwater archeological operations 190 feet deep as well as conservation issues relating to the site and to materials looted from it.

The Case of the Missing B-29: A Management Perspective of the Lessons Learned

Gary Warshefski, Deputy Superintendent, NPS, Lake Mead National Recreation Area, Boulder City, Nevada

The discovery in December 2000 of the sunken B-29, lost since 1948, in Lake Mead by a private individual asserting ownership over this cultural resource through salvage law created a myriad of legal issues not usually dealt with by the National Park Service. Legal issues related to admiralty law, including the Abandoned Shipwreck Act and salvage law, are complex and affect short-term and long-term resource management and protection strategies. This paper will explore from the park perspective the legal issues, their effect on the management of this cultural resource and the lessons learned.

Session 62 • Contributed papers

Using Students, Interns, and Volunteers to Preserve Resources

Chair: Rebecca Conard, Middle Tennessee State University, Murfreesboro, Tennessee

Putting the Invisible Hand to Work: Using Economic Research to Facilitate Learning about the Parks

Leah Greden Mathews, Associate Professor of Economics, University of North Carolina at Asheville, Asheville, North Carolina

Many college students are familiar with national parks as recreation sites, but few have the opportunity to experience parks as social science educational sites. This presentation will outline two projects that have engaged college students in applied economic research in parks. This type of pedagogy has significant outcomes for both students and teachers, since they can have their understanding of park resources and issues significantly enhanced as a result of the activities. Implications for how

pedagogical contributions such as this can impact the interface of parks with colleges and universities will also be discussed.

Park Flight: International Volunteers Help Connect Underserved Audiences and Park Resources

Carol Beidleman, Park Flight Program Coordinator, University of Arizona CESU, Estes Park, Colorado

America's changing demographics, has created a need to connect national parks with underserved communities. The Park Flight Migratory Bird Program engages these audiences and helps make park resources relevant to them. This program brings conservation professionals from Latin America to intern with park resource managers on resource management, interpretation, education, and outreach efforts. Working through the NPS International Volunteers in Parks program, these internships provide an opportunity to serve local Latino communities. Migratory birds which breed in or migrate through NPS sites and winter in Latin America provide a link between NPS sites and Latin America, and provide a way to increase Latino community interest in park resources. Connections are made through bilingual materials exhibits, and presentations in parks and schools. The resulting interactions build an understanding and appreciation of species shared across cultures and the hemisphere, stimulate bonds with the parks and generate interest in the NPS mission.

Using Interns for Research and Resource Management at Mesa Verde National Park: A Success Story

Sarah Bishop, President, Partners in Parks, Paonia, Colorado

Partners in Parks, with Fort Lewis College and Mesa Verde National Park, is managing the park's intern program. Starting as a small project with a few students from Fort Lewis College supporting the park's archeology program, this has grown to 10 students, from two schools, supporting many programs. The interns receive academic credit and a stipend for their work. Park staff specify job descriptions and act as mentors. Partners in Parks and the college recruit the interns. Partners in Parks creates the agreement all interested parties sign, and pays the students. Funds to support the program come from the Colorado State Historic Fund, Mesa Verde National Park, Mesa Verde Museum Association, Fort Lewis College Foundation, and others. This successful intern program is easily applicable to other parks in partnership with other colleges or universities. Partners in Parks and Mesa Verde stand ready to assist!

Habitat Restoration through Service Learning at Zion National Park

Denise Louie, Vegetation Program Manager, Zion National Park, Springdale, Utah

Zion National Park attracts a large pool of volunteers interested in making a difference in restoring native habitats. In FY2004, Zion hosted over 8,700 volunteer hours dedicated to native seed collection, propagation in the in-park nursery, invasive plant control, planting, watering, seeding and caring for out-planted materials, building fences to protect resources and education outreach. Our many volunteers come from the local community, local schools, universities all over the nation, individuals from all over the world, and special interest groups such as the Sierra Club, Wilderness Volunteers and American Hiking Society. Equal to Zion's gains in accomplishing

important work, are the new advocates gained when volunteers learn and serve directly within one of the awe-inspiring western national parks. This volunteer resource enables us to maximize limited resources while leveraging our volunteers' significant contribution towards funding opportunities to accomplish other habitat restoration projects such as through the Cooperative Conservation Initiative.

Addressing Physical and Integrated Research, Resource Management, and Interpretation through Students and Volunteer Expertise

Judy Geniac, Program Lead: Research Learning Centers, Geoscientists-in-the-Parks, Geo-research Facilitation, National Park Service, Natural Resource Program Center, Denver, Colorado

The actions required to address the preservation of resources is dependent upon the understanding of the resources, their interactions, and society's desire to protect them. Agencies and land managers must address an expansive list of types of resources and find expertise in those fields, as well as expertise that cross the divisions of science fields. In addition, agencies must find a way to get as much information to the public as possible so that society can weigh the importance of resources. While at times difficult, there are ways to facilitate access to students and volunteers to cover these factors and meet both broad and specific resource needs of an agency or land manager. Using the National Park Service's Geoscientists-in-the-Parks Program as an example, it is clear to see there are at simple and rewarding methods to find expertise and diverse candidates with a desire to be interns and volunteers.

Session 63 • Part one of a two-part workshop — continued in Session #76

Using NEPA for Collaboration and Conflict Resolution I

Chair: Michael Eng, Senior Program Manager, U.S. Institute for Environmental Conflict Resolution, Tucson, Arizona

Session abstract:

A number of park units, including Everglades NP, Grand Canyon NP, Golden Gate NRA, and Cape Hatteras NS, are explicitly using the NEPA process as the procedural vehicle for collaborative problem solving and dispute resolution with other agencies and nongovernmental stakeholders. This workshop will explore with participants the inherent flexibility provided by NEPA for resolving conflicts, for collaborative problem-solving, and for arriving at decisions that enjoy broad support, while minimizing risks of litigation. The workshop organizer is a Senior Program Manager with the U.S. Institute for Environmental Conflict Resolution, a federal program established by Congress to provide independent and impartial mediation assistance to all parties in helping to resolve environmental conflicts involving federal agencies or interests. Other workshop presenters will include NPS staff involved in these conflict resolution efforts. Workshop participants will have an opportunity to assess the feasibility of using a collaborative approach with their own upcoming NEPA processes.

Presenters:

Karen Trevino, Director, NPS Natural Sounds Program, Denver, Colorado

Sandy Hamilton, NEPA Coordinator, NPS Environmental Quality Division, Denver, Colorado
Chris Powell, Public Affairs Officer, Golden Gate NRA, San Francisco, California

Session 64 • Workshop
America's Forgotten Fortifications: An Opportunity for Dialogue
Chair: Deborah Rehn, Architect, National Park Service, Southeast Support Office, Architectural Division, Atlanta, Georgia

Session abstract:
At a time when we are all aware of very real threats at home, our historic fortifications recall earlier efforts to secure our shores from attack. Internationally, there is increasing attention and activity regarding the interpretation and conservation of fortifications. An example is UNESCO's International Committee on Monuments and Sites (ICOMOS). ICOMOS is creating a technical and scientific group to consider the challenges posed by the world's historic fortifications. Another indicator was the 2004 "International Meeting of Experts on the Recuperation of American Fortifications" held in Mexico. The side meeting will allow natural and cultural resource managers, landscape architects, architects, interpreters and other specialists the opportunity to: 1. Evaluate the relevance of the current interpretation of fortifications in North America; 2. Identify any need for dialogue between interest groups, owners, and professionals; and 3. Help organize a future meeting of national and international groups and professionals to advance the conservation and interpretation fortifications in the Americas.

Session 65 • Side meeting by invitation only • Part one of a two-part side meeting — continued in session #78
Park Planning Leadership Group I
Chair: Warren Brown, Chief, Park Planning and Special Studies, National Park Service (WASO), Washington, D.C.

Session abstract:
Regional planning program managers, park based planners, and others interested in the planning program will have an opportunity to discuss recent accomplishments and the challenges of resolving contentious issues about resource management and visitor use. Focus will be on General Management Planning. This meeting will encourage dialogue across regions, agencies, and program areas to define common problems and solutions in the process, funding, and substance of planning for parks in the future. About 25 invited participants are expected, but the meeting would be open to other observers subject to space constraints.

Tuesday, March 15 • late afternoon concurrent sessions • 4:00 – 6:05

Session 66 • Contributed papers

Using Natural Resources Information in Planning

Chair: Bill Walker, U.S. Geological Survey, Reston, Virginia

Utilizing Physical and Biological Information to Guide Management Decisions Based upon Sound Ecological Principles

Daniel Sealy, Deputy Chief, Natural Resources and Science, National Park Service, National Capital Region, Washington, D.C.

Katia Engelhardt, Assistant Professor, University of Maryland, Center for Environmental Science, Appalachian Laboratory, Frostburg, Maryland

Brent Stuery, Natural Resource Manager, George Washington Memorial Parkway, McLean, Virginia

Kristy N. Hopfensperger, University of Maryland, Center for Environmental Science, Appalachian Laboratory, Frostburg, Maryland

The National Park Service has a strong commitment to science-based management and has taken several steps toward gathering and using natural resource information to gain a better understanding of park resources. This presentation looks at how information from the many scientific disciplines within the physical and biological sciences can be integrated into a holistic ecosystem management approach. We will consider examples of integrated science information being applied to park management issues and will present a case study utilizing a freshwater tidal marsh. We will look at an approach utilizing existing data as well as identify critical additional data required to make a decision based on sound ecological theories. This case study will show a logical progression of engaging decision-makers by utilizing scientific knowledge in preparation for the more public forums required of the Federal Government including the National Environmental Protection Act and National Historic Preservation Act.

Alternatives in the Analysis of Trend Data

Scott Gende, Coastal Ecologist, National Park Service, Juneau, Alaska

Central to the NPS I&M efforts is the analysis of data collected over time to assess whether parameters, such as population estimates or indices of air or water quality are changing. Parametric regression techniques are often used for this type of analysis. Yet several alternatives exist that may be more powerful and informative, including Likelihood and Bayes Theorem, because they allow for presentation of uncertainty associated with the data. Probabilistic statements regarding the trend or status of some parameter can also be made. Presentation of the results of the data may be particularly useful for the I&M program where park managers, who may vary in their training in quantitative techniques, need to make decisions based on the results of monitoring analyses. A sample data set of harbor seal population estimates collected since 1992 in Glacier Bay National Park was used to demonstrate strengths and weaknesses of different analytical techniques.

Origin of Coral Reef Lidar Rugosity in Biscayne National Park, Northern Florida Reef Tract

John Brock, Oceanographer, U.S. Geological Survey, St. Petersburg, Florida

In early August 2002, an intensive USGS–NASA airborne lidar survey was conducted over the coral reefs of Biscayne National park. A map of lidar rugosity was created by passing a 2 m by 2 m kernel over a 1 m resolution lidar digital elevation model (DEM). Five substrate types were recognized as the causes of elevated lidar rugosity on patch reefs, transitional reefs, and carbonate banks on the lagoonal backreef platform of the northern Florida Keys. In order of decreasing mean rugosity, the identified substrates are: 1) live stoney coral colonies (SCC), 2) large rubble, 3) dead SCC, 4) dead SCC overgrown with algae and octocoral, and 5) hard bottoms with large gorgonians. We conclude that airborne lidar rugosity mapping can provide new information on the likely distribution of significant stoney coral colonies scattered across the thousands of shallow patch reefs of the northern Florida reef tract.

Process to Prioritize Air Quality Monitoring and Research Needs at Acadia National Park: Lessons Learned

Tonnie Maniero, Regional Air Quality Ecological Effects Coordinator, National Park Service, Northeast Region, Boston, Massachusetts

Bob Breen, Biologist, National Park Service, Acadia National Park, Bar Harbor, Maine

Since 1979, Acadia National Park has conducted a comprehensive air quality program. The park, however, did not have a proactive plan for addressing air pollution information needs; projects were usually initiated in response to the interest of a scientist or regulatory agency. To ensure a focus on high priority air quality projects at the park, a process to develop a long-term air quality research and monitoring strategy was initiated in 2002. What was initially envisioned as a 20-page report resulting from three months of effort was finalized as a 75-page report two years later. When the final report was released, the question arose, "would it be worthwhile to use the same process to prioritize air quality needs in other parks?" This presentation outlines the process followed, briefly discusses the identified air quality needs for Acadia, and highlights methods for improving the process for use in other parks and program areas.

Realizing Efficiencies through Simultaneous Implementation of Vegetation Research

Brian Carlstrom, Resource Program Manager, Prince William Forest Park–National Park Service, Triangle, Virginia

Patrick Donovan and Jennifer Lee, Prince William Forest Park–National Park Service, Triangle, Virginia

Approaching resource issues from multiple perspectives enhances desired results. Over the past two years, vegetation management within Prince William Forest Park has focused on five separate yet related efforts: floristic surveys, vegetation mapping, vegetation monitoring, *Isotria medeoloides* surveys, and exotic plant management. The combined expertise of primary investigators has resulted in shared knowledge, which has complemented each effort. Botanists have identified and mapped infestations of exotic plants. Biological technicians and vegetation mapping personnel have discovered plant species not previously noted by the floristic researchers. Floristic researchers and Isotria botanists identified unique communities for the vegetation mapping personnel. The results of each project have been greatly enhanced

as a consequence of their simultaneous implementation, and will improve the knowledge base for management decisions in the park. Coordinating related research efforts, while complex, is the ideal method for obtaining the maximum knowledge of park resources and should be encouraged whenever possible.

Session 67 • Panel discussion

Building Tribe–Park Relationships — The Culturally Affiliated Tribal View

Chair: Destry Jarvis, President, Outdoor Recreation & Park Services, LLC, Hamilton, Virginia

Session abstract:

Today, national parks occupy the home grounds of numerous First Americans. Many of these Native Peoples reside on reservation adjacent to or near their aboriginal homeland. While they have been granted some special rights of use and access to national parks for traditional cultural purposes, the NPS relationship to culturally associated tribes could be significantly improved. The National Association of Tribal Historic Preservation Officers (NATHPO) will present a discussion of emerging opportunities, including tribal parks, in which an improved working relationship with the NPS could be mutually beneficial. From subsistence uses, traditional foods and crafts, or treaty rights of access, a complex set of issues is confronting the NPS on a regular basis. Better understanding can reduce fears and uncertainties, and lead to cooperative initiatives. Preservation of ethnographic landscapes can be beneficial to both parties.

Presenters:

Bambi Kraus, Executive Director, National Association of Tribal Historic Preservation Officers, Washington, D.C.

Thomas Gates, Tribal Historic Preservation Officer, Yurok Tribe, Yurok Tribe Culture Department, Klamath, California

Alan Downer, Director, Historic Preservation Department, The Navajo Nation, Window Rock, Arizona

John Welch, Director, Heritage Program and THPO, White Mountain Apache Tribe, Fort Apache, Arizona

Session 68 • Contributed papers

Natural Disturbance: Getting Ready for Restoration

Chair: Bill Halvorson, Research Ecologist, USGS, Southwest Biological Science Center, Sonoran Desert Research Station, Tucson, Arizona

Organizational Learning in Wildland Fire

Paula Nasiatka, Center Manager, Wildland Fire Lessons Learned Center, Tucson, Arizona

As a knowledge resource center, the new Wildland Fire Lessons Learned Center strives to improve safe work performance through organizational learning in wildland fire. A

learning organization is skilled in creating, acquiring, interpreting, transferring, and retaining knowledge, and at purposefully modifying its behavior to reflect new knowledge and insights (David Garvin 2000). Wildland fire information for use by field staff and managers is acquired by the Lessons Learned Center through after action reviews and rollups, information collection teams, case studies and surveys. The information is then analyzed by subject matter experts and shared widely as lessons learned and best practices. The Lessons Learned Center helps communities of practice in wildland fire communicate and share knowledge through the on-line Community Center.

Rapid Assessment of Disturbed Sites for Restoration Potential and Site Value

Ron Hiebert, Research Coordinator, Colorado Plateau CESU, National Park Service, Flagstaff, Arizona

Amy Richey, Colorado Plateau CESU, National Park Service, Flagstaff, Arizona

Pamela Benjamin, Vegetation Specialist, IMR, National Park Service, Lakewood, Colorado

The goal of restoration is to return a site to a reference or desired future condition. The potential for site restoration is dependent upon the departure from a reference condition, the ability to remove disturbances and the promotion/restoration of natural ecological processes. We have made the assumption that there are more disturbed sites than the National Park Service has the resources to restore in a timely manner. We also have made the assumption that some sites have been disturbed to a degree that they are unrestorable. Finally, we also assume that some disturbed sites have more potential value than others. Thus, sites must be prioritized for management. We are developing a restoration rapid assessment tool to help managers make sound decisions on disturbed sire restoration. In this paper, the tool will be described. We will also share how we are testing and refining the tool in cooperation with Exotic Plant Management Teams and park resource managers. Preliminary results of field trials in 2004 will be presented.

Landfire: A Scientific Foundation for Improving Effectiveness of Wildland Fire Management

Kevin Ryan, Landfire Program Manager, USDA–Forest Service, Missoula Fire Sciences Lab, Missoula, Montana

Ayn Shlisky, Landscape Ecologist, The Nature Conservancy, Fire Initiative, Boulder, Colorado

Wildfires often compromise parks and protected area management by damaging resources and infrastructure. Fire restoration on these lands is often limited by the risk escaped fire poses to adjacent lands or park infrastructure. Although fire is a landscape-level process that does not recognize jurisdictional boundaries the scientific foundation to support fire management varies greatly in consistency and quality across jurisdictional boundaries. In 2004 the USGS's EROS Data Center, USFS's Missoula Fire Science Laboratory, and The Nature Conservancy-initiated LANDFIRE to develop geo-spatial data and map vegetation, fuels, and fire potential consistently for the entire country. LANDFIRE provides a means for managers to evaluate fire programs. And it provides scientists with landscape-level descriptions of

vegetation and processes. We discuss use of LANDFIRE to support fire and fuels management in and around parks such that natural processes can be allowed with lowered risk to adjacent lands and infrastructure, and potential science applications.

Managing the Impacts of Wildfire and Fuels Treatment on Cultural Resources

A. Trinkle Jones, Cultural Resources Coordinator, National Park Service Colorado Plateau Cooperative Ecosystem Studies Unit, Flagstaff, Arizona

Kevin Ryan, Landfire Program Manager, USDA–Forest Service, Missoula Fire Sciences Lab, Missoula, Montana

A state of knowledge synthesis has been conducted of the effects of fire and fire management practices on cultural resources. The synthesis consists of 10 chapters authored by 12 scientists. The volume includes a primer on fuels, fire behavior, and heat transfer as they affect cultural resources; detailed descriptions of the effects of fire on ceramics, lithics, rock art, and historic resources; impacts of fire on modern native peoples; management considerations to mitigate potential negative impacts on cultural resources; and research recommendations. The volume also includes a glossary and bibliography. An overview of the synthesis is used to demonstrate the impacts of fuels build-up on the severity of fire damage to cultural resources; and to illustrate situations where thoughtful restoration of natural fuels and fire regimes can reduce the potential for damage. Future research needs are identified.

Hurricanes, Tropical Storms, and Tree Fragmentation

James Burch, Supervisory Botanist, Big Cypress National Preserve, Ochopee, Florida

The 2004 hurricane season in Florida provided several opportunities to collect information about landfalling tropical storm systems and associated damage to trees. Information was gathered about types of trees affected, patterns of tree breakage, and associated winds; comparisons with Hurricanes Andrew (Florida, 1992) and Mitch (Honduras, 1998) also were considered. In southern Florida native trees generally survived high winds more often than non-native trees, and trees in naturally occurring forest communities generally survived more often than those in disturbed areas. Furthermore, patterns of tree breakage differ with species. Many native trees show indications of brittle branches that break quickly and leave boles intact; many non-native or landscape trees retain branches, but become uprooted. Information related to these patterns offers consideration for landscape planning in inhabited areas, areas with breakable property, or natural resource sites that require protection from possible falling trees.

Session 69 • Day-capper

Urban Parks, Diverse Communities

Chair: Gillian Bowser, CESU Liaison, Texas A&M University and National Park Service, College Station, Texas

Session abstract:

How do we talk the same language? A session exploring the needs and desires of managers versus the needs and desires of academics. Too much ivory tower? Too

much bean counting? Come and discuss with CESUs and academic partners the points and counterpoints of academic/managers interactions on real-life issues and debates.

Presenters:
Michael Schuett, Texas A&M University, College Station, Texas
David Scott, Texas A&M University, College Station, Texas
J.T. Reynolds, Superintendent, Death Valley National Park, California
Robert Stanton, National Park Service (retired)

Session 70 • Day-capper
Reporting from the Front Lines of Civic Engagement: Lessons Learned through Involving the Public in Controversial Management Decisions
Chair: Mike Tranel, Chief of Planning, Denali National Park and Preserve, Anchorage, Alaska

Session abstract:
Planning and management decisions in units of the National Park System involve the public in an increasing variety of ways, and more directly than ever before. While additional public involvement can result in more informed decisions, it can also mean greater investments of time and money to arrive at a decision. This session analyzes several different methods of public involvement conducted in the Alaska Region of the National Park Service over the past 10 years, providing insight into: (1) Methods of public involvement that have proven most effective, (2) Balancing local, regional, and national interests, (3) How recent initiatives such as the Department of Interior's 4Cs have shaped public involvement, (4) The role of partnerships at the local, state, and national level, (5) Characteristics of management actions that have resulted in litigation, (6) Types of planning and management decisions that have generated the most interest, and (7) Effective methods for communicating with the public to ensure active participation.

Session 71 • Day-capper
Basing Management Decisions on Science: How Does It Really Work?
Chair: Meg Weesner, Chief, Science and Resource Management, Saguaro National Park, Tucson, Arizona
The National Parks Omnibus Management Act of 1998 directed the National Park Service to integrate study results into management decisions. How are parks and other protected areas accomplishing this? This session will be a roundtable discussion of how scientists, resource managers, and superintendents interact to ensure that the best scientific information is used in decisions on park management. Participants will be invited to share examples (no more than 5 minutes each) of how scientific study results have been used in their park or protected area (no PowerPoint allowed). Be prepared to participate and provide both good and not-so-good examples. We can all learn from each others' experiences.

Session 72 • Invited papers

Northern Prairie Wildlife Research Center–National Parks Partnerships in Restoration Research II: Restoration Effects and Effectiveness

Chair: Amy Symstad, Research Ecologist, USGS Northern Prairie Wildlife Research Center, Mount Rushmore National Memorial, Keystone, South Dakota

Session abstract:

Loss of keystone species and processes, invasion by non-native species, fragmentation, and a variety of other stressors have impacted ecosystems throughout the nation. This and the previous session highlight USGS–NPS cooperative research in northern Great Plains National Parks, as well as Yellowstone National Park, that seeks to understand factors involved in restoration of species, communities, and ecosystems. The first session addresses pre-restoration factors. This second session addresses the effects and effectiveness of restorations — how successful was a restoration attempt? What effects did the restoration of a species have on other components of the ecosystem? What management issues arise with the restoration? This session includes talks on animal species and plant community restoration.

Managing Reintroduced Elk at Theodore Roosevelt and Wind Cave National Parks

Glen Sargeant, Research Wildlife Biologist, USGS Northern Prairie Wildlife Research Center, Jamestown, North Dakota

Michael W. Oehler, Wildlife Biologist, Theodore Roosevelt National Park, Medora, North Dakota

Daniel E. Roddy, Natural Resource Specialist, Wind Cave National Park, Hot Springs, South Dakota

Elk were extirpated from the Black Hills of South Dakota and Badlands of North Dakota during the late 19th century. They were later reintroduced at Wind Cave National Park in 1914 and at Theodore Roosevelt National Park in 1985. Biological and social consequences of these reintroductions obligated the National Park Service to play an active role in elk population control, a task first accomplished by shooting elk at Wind Cave and later by translocating animals from both parks. Recently, however, population control efforts have been suspended indefinitely, and Environmental Impact Statements on elk management are being developed, because translocation could contribute to the spread of chronic wasting disease. We review the history of elk management at these parks, identify information needs for the development of scientifically credible management strategies, and discuss the management implications of our interagency studies of elk population dynamics, movements, and distribution.

Restoration of Swift Foxes at Badlands National Park

Gregory Schroeder, Swift Fox Restoration Coordinator, Badlands National Park, Interior, South Dakota

Marsha Sovada (presenter), Research Wildlife Biologist, USGS Northern Prairie Wildlife Research Center, Jamestown, North Dakota

Jonathan Jenks, Professor, Department of Wildlife and Fisheries, South Dakota State University Brookings, South Dakota

Swift foxes once occupied the Great Plains from Texas to Alberta. Settlement led to declines and by 1900 the species was rare in its northern range. Since the 1960's populations have increased, but the only significant expansion of distribution occurred because of reintroductions in Canada and Montana despite existence of suitable habitat elsewhere. We are conducting a reintroduction of swift foxes in Badlands National Park (BNP), in coordination with a reintroduction 80 km northeast of the park by the Turner Endangered Species Fund. The two reintroductions are similar except coyotes (source of swift fox mortality) were reduced at the Turner site, but not at BNP. Rather, at BNP, swift foxes were released on the periphery of coyote territories. Similar pre-release (habitat suitability) and post-release data (mortality causes/rates, reproduction rates, habitat/area use) are being collected at both sites. This study offers the opportunity to evaluate the role of coyotes as a barrier to range expansion.

U.S. Geological Survey Studies of Wolves and Prey in Yellowstone National Park

L. David Mech, Senior Research Scientist, USGS Northern Prairie Wildlife Research Center, St. Paul, Minnesota (Glen Sargeant, presenter)

The reintroduction of wolves *(Canis lupus)* into Yellowstone National Park (YNP) in 1995 and 1996 provided an excellent opportunity to study the restored wolf population and understand its role in the population dynamics of its prey. The U. S. Geological Survey partnered with YNP and the University of Minnesota to launch several investigations: (1) characteristics of wolf predation on elk *(Cervus elaphus)* in winters of high and low severity, (2) leadership behavior in wolf packs, (3) details of the wolf's predatory sequence and the role of injury risk in wolf predatory behavior, (4) winter condition of cow elk on YNP's northern range, (5) survival rate and causes of death in cow elk on the northern range, (6) seasonal movements of northern range cow elk, (7) survival rate and causes of death of elk neonates, and (8) antipredator behavior of bison *(Bison bison)*. Studies are ongoing.

Improving the Native Seed Mix for Re-vegetating Disturbed Areas at Wind Cave National Park

Amy Symstad, Research Ecologist, USGS Northern Prairie Wildlife Research Center, Mount Rushmore National Memorial, Keystone, South Dakota Helen McGranahan and *Molly Benson, Biological Technicians, Wind Cave National Park, Hot Springs, South Dakota*

Wind Cave National Park is exemplary for its high quality vegetation. Re-establishing native vegetation quickly after anthropogenic disturbance is therefore a high priority. However, park staff have been dissatisfied with previous plantings because establishment success seemed low and the planted mix included only five grass species from commercial sources of uncertain regional origin. We compared the vegetation in a three-year-old planting to adjacent undisturbed vegetation to quantitatively measure the success of this planting and to help design a more diverse, park-collected seed mix. By some measures the planting is successful. Plant cover is only slightly lower in the planted area than in adjacent vegetation and non-native

species cover and native species richness do not differ between planted and control vegetation. However, cover of four of the five planted species was significantly greater in the disturbed area than in the control vegetation, suggesting that plant community structure is not yet restored.

Session 73 • Contributed papers
Interpreting Nature and Culture: Research and Practice
Chair: Jerry Emory, Gordon & Betty Moore Foundation, San Francisco, California

Interpreting Nature and Culture in the Desert Southwest: Using Research to Inform Practice
Dave White, Assistant Professor, Arizona State University, School of Community Resources and Development, Tempe, Arizona
Randy J. Virden, Associate Professor, Arizona State University, Tempe, Arizona
In this paper, we present results from a visitor survey designed to inform interpretive program development at three National Park Service sites in the Southwest: Montezuma Castle NM, Montezuma Well, and Tuzigoot NM. Data were collected from on-site (N=1303) and mail survey (N=671) questionnaires. We explore affective elements of visitors' experiences, such as feelings of pride, nostalgia, and sadness. We will also discuss cognitive elements of visitors' experiences, including learning about biological diversity, archaeology, and cultural history. This research illustrates an iterative process of interpretive program development whereby potential themes and media are designed by park staff, and then individual theme components and media choices are evaluated by visitors, and subsequently refined. Also, in this study we discuss the creation of integrative, cross-cutting messages that highlight the relationships between human culture and the natural environment and link past cultures to the present.

Reduce Resource Threats through Park-Wide Educational Campaign
Denise Louie, Vegetation Program Manager, Zion National Park, Springdale, Utah
An exponential increase in park visitation (2.5 million annually) has resulted in degradation of natural and cultural resources that is overwhelming Zion's ability to be proactive. Most of these negative impacts can be reduced or prevented with a cohesive effort to enlist the public for help. Problems include numerous visitor-created trails, feeding wildlife, human waste and widespread graffiti on rock surfaces. In response to these issues, we launched an educational campaign called Take Pride in Your Park, an umbrella for many different messages striving to change visitor behavior for the benefit of the resource. Communication venues include trail and shuttle bus signs, personal contact, youth education and souvenir stickers. We continuously seek positive and compelling ways to articulate these messages and realize that resource threats associated with heavy park use is a common thread among many NPS units. We would like to promote national consideration of a NPS-wide messaging campaign.

The Heights of Inspiration: Integrating Spiritual and Cultural Perspectives into Interpretation

Edwin Bernbaum, Director, Sacred Mountains Program, The Mountain Institute, Berkeley, California

The Mountain Institute has been working with the National Park Service developing interpretive materials and activities that highlight the spiritual and cultural meanings of features of mountain environments — ranging from peaks to wildlife — in American, Native American, and other cultures around the world. The purpose is to connect a broad range of visitors with nature, enrich their experiences, and give them deep-seated, sustainable reasons for conserving the environment. In addition to reaching the general public, the project helps diversify the NPS's visitor base by connecting with the backgrounds of cultural and ethnic groups who have not visited national parks in high numbers, such as Native Americans, African-Americans, and Latinos. The paper describes model products and activities developed at such parks as Mount Rainier, Yosemite, and Great Smoky Mountains, ranging from an exhibit on the spiritual value of wilderness to an interpretive trail linking natural features to Cherokee traditions.

From Mission 66 to 1976 and Beyond: The Old Stone House and the Day-to-Day Challenges for Park Cultural Resource Management

Perry Wheelock, Cultural Resource Manager, Rock Creek Park, National Park Service, Washington, D.C.

The Old Stone House (c.1765) is the oldest known structure in the District of Columbia. The National Park Service "restored" the property during the Mission 66 era and opened it to the public using furnished period rooms and "living" history interpretive programs to tell its story. Since this initial effort, the small stone and frame structure located in the heart of the bustling Georgetown historic district, has had only minor repairs and replacement-in-kind to keep it open and operating. My paper will examine the straightforward and innovative ways in which park staff has managed a property in critical need of comprehensive research reports and studies, new preservation and rehabilitation efforts, and a revitalized interpretive program by outlining the challenges and the interim measures taken thus far on behalf of this 240-year-old property.

Batflight Viewing: Wildlife Conservation through Interpretation

Gary Vequist, Associate Regional Director, Natural Resource Stewardship and Science, Midwest Region, National Park Service, Omaha, Nebraska

Carlsbad Cavern was discovered when bats were first observed leaving the cave entrance, soon guano miners arrived to harvest this organic fertilizer, and finally tourist came to view the new Carlsbad Caverns National Monument. Early visitors started gathering for the unique experience of watching emerging hoards of bats from this dark hole in the earth. The first formal talks were given on July of 1929 in front of a temporary grandstand. During subsequent decades the numbers of human observers increased, while the numbers of our elusive bats decreased. It was recognized that precautions and stringent rules were needed to protect these misunderstood creatures from human harassment. Scientific studies of Mexican free-tailed bats (*Tararida brasiliensis*)

increased our understanding of this species and its habitat needs. In 1963, more due to luck than actual careful planning, an outdoor amphitheater was constructed a sufficient distance away from the primary bat flight path. The visitor attendance surpasses 70,000 each year, making it the most popular wildlife viewing attraction in the Southwest. The ranger talks serve as a forum to educate the viewers about on the importance of bat conservation. Over $25,000 are donated each year through the "Adopt-A-Bat" program to assist in bat research and educational activities. New knowledge of bat ecology is including in interpretive bat flight talks toward furthering public appreciation for conservation of protected natural sanctuaries.

Session 74 • Day-capper

Selecting Plant Materials: A Parable of Endemism in Philadelphia Area Sandwiches

Chair: Gregory Eckert, Restoration Ecologist, National Park Service, Ft. Collins, Colorado

Session abstract:

The use of appropriate genetic material for revegetation work is difficult because of the availability of this material. This can be cause for paying less attention to the selection of species, much less genotypes. This day-capper session will present a case study of the ramifications of slacking when selecting seeds and plants for your restoration projects. Participants will be introduced to the Zep, an endemic sandwich to Norristown, Pennsylvania, as an analogy to the indirect and deleterious consequences of blind obsessions with tweaking natural perfection, by the cultivation of "varieties" or worse, hybrids with other sandwich types. Participants will develop taste differential curves and prepare samples for analysis. Guest appearances may be made by other regional endemics such as Shoo-fly pie, Conshohocken tomato pie, and Scrapple, that have, although unstudied, display greater resistance to food-fad contamination.

Session 75 • Invited papers

Integrated Environmental Monitoring for Ecosystem Health and Sustainability in the Delaware River Basin II

Chair: Richard Birdsey, Program Manager, Global Change Research, USDA–Forest Service, Newton Square, Pennsylvania

Session abstract:

The Collaborative Environmental Monitoring and Research Initiative (CEMRI) began in 1999 with involvement of the U.S. Forest Service, the U.S. Geological Survey, the National Park Service, and NASA. The project goal is to improve the usefulness of various agency research and monitoring programs by providing links across spatial and temporal scales and across environmental media (air, vegetation, soil, water). The conceptual framework of the project is linked, multi-tiered studies involving remote sensing, basin-wide field sampling, intensive field research, and ecosystem modeling. These sessions will describe the approaches used and present examples of

environmental issues that can be addressed effectively using this framework. Aspects of this project of particular relevance include: (1) Integrated, interagency monitoring of air, vegetation, soil, and water. (2) Understanding the causes of changes in ecosystem health and services. (3) Increasing awareness of the connections between protected and developed lands. (4) Understanding the ecosystem services protected areas provide.

Hemlock Forest Decline at Delaware Water Gap National Recreation Area: Research, Monitoring, and Management

Richard Evans, Ecologist, Delaware Water Gap National Recreation Area, Milford, Pennsylvania

Bradley Onken, USDA–Forest Service, Forest Health Protection, Morgantown, West Virginia

Denise Royle, Rutgers University, Department of Ecology, Evolution, and Natural Resources, New Brunswick, New Jersey

Michael E. Montgomery, USDA–Forest Service, Center for Forest Health Research, Hamden, Connecticut

Eastern hemlock forests contribute much to the aesthetic, recreational, and ecological values of Delaware Water Gap National Recreation Area (DEWA). Hemlock woolly adelgid (HWA) is an alien (Asian) insect that severely stresses and kills eastern hemlock trees. HWA has spread throughout DEWA since it was first detected here in 1989. Research and monitoring studies at DEWA have generated information about HWA infestations, hemlock tree health, the distinctive characteristics of hemlock ecosystems, and the importance of hemlock forests to park biodiversity. Presently, about 20% of hemlocks at DEWA are dead, 60% are in decline, and 20% healthy. Decline of hemlock forests is leading to significant ecosystem transformations, invasions of alien plants, the loss of biodiversity, and the loss of recreational and aesthetic resources. We are developing management strategies and techniques to maintain hemlock trees, foster regeneration of native plants, curtail invasions by alien plant species, and minimize impacts to park visitors.

Understory Vegetation Dynamics in Declining Hemlock Stands in the Delaware Water Gap National Recreation Area

Anne Eschtruth, Ph.D. Student, University of California at Berkeley, Berkeley, California

John J. Battles, Associate Professor of Forest Ecology, Department of Environmental Science, Policy, and Management, University of California at Berkeley, Berkeley, California

Hemlock woolly adelgid *(Adelges tsugae)* infestations have resulted in the continuing decline of eastern hemlock *(Tsuga canadensis)* throughout much of the eastern United States. In 1994, we established a network of permanent, intensive plots in two hemlock ravines located in the Delaware Water Gap National Recreation Area in order to document changes in understory vegetation dynamics in declining hemlock stands. In this work, encompassing 1994 to 2003, we examined: 1) changes in the understory environment, 2) changes in abundance, species richness, species composition, and turnover of species in plots, 3) differences in the response of bryophytic and herbaceous vegetation and 4) the relationship of changes in

understory flora to changes in the environment. We are currently building on this study to examine invasive plant dynamics in declining hemlock stands and the potential role of deer herbivory in altering the response of understory vegetation following hemlock decline.

Using Foliar Chemistry to Assess Hemlock Susceptibility to Hemlock Woolly Adelgid

Jennifer Pontius, Research Ecologist, USDA–Forest Service, Durham, New Hampshire
Richard Hallett, Research Ecologist, USDA–Forest Service, Northeastern Research Station, Durham, New Hampshire

The objective of this study was to determine if foliar chemistry could be linked to HWA success and subsequent hemlock decline using a three-tiered approach: 1) a comparison of resistant vs. susceptible species, 2) an examination of chemistry vs. colonization success, and 3) an investigation of relationships between foliar chemistry and HWA/hemlock health across hemlock's native range. HWA resistant species demonstrated higher concentrations of Ca and P, and lower concentrations of N and K. Regardless of host species, successful colonization was associated with higher N, and lower Ca and P concentrations. Using foliar chemistry alone, over half of the variability in hemlock decline could be accounted for. This increased to over two thirds of the variability with a combination of chemistry and site factors. These results indicate that foliar chemistry may be used to assess relative susceptibility to HWA across the Northeast and should be included in susceptibility models.

Multi-scale Analysis of Carbon Dynamics of Soil, Water, and Vegetation

Jennifer Jenkins, Research Assistant Professor, Rubenstein School of Environment & Natural Resources, University of Vermont, Burlington, Vermont
Richard Birdsey, Program Manager, Global Change Research, USDA–Forest Service, Newton Square, Pennsylvania

Methods are fairly well-developed for estimating terrestrial carbon (C) cycling rates at the plot scale for small-scale ecosystem science research. Techniques also exist to estimate terrestrial and aquatic C cycling rates at large scales, using stream monitoring data, inventory datasets, and/or modeling approaches. Still undeveloped, though, are techniques for linking the two types of monitoring datasets (terrestrial and aquatic) for complete C cycle estimation at both intensive and extensive study sites. We report results of a pilot test conducted as part of the interagency Collaborative Environmental Monitoring and Research Initiative (CEMRI) to link terrestrial and aquatic monitoring data for estimation of all components of the C cycle in a series of watersheds nested within the Delaware River Basin. The methods tested here will provide a template for similar efforts to integrate monitoring systems for complete C cycle estimation in regions where extensive monitoring systems exist.

The Effects of Climate Change on Forests and Water of the Delaware River Basin

Richard Birdsey, Program Manager, Global Change Research, USDA–Forest Service, Newton Square, Pennsylvania
Louis R. Iverson, Northeastern Research Station, USDA–Forest Service, Delaware, Ohio
Yude Pan and Anantha Prasad, USDA–Forest Service, Newtown Square, PA

In the Mid-Atlantic region, climate is expected to warm by 3-10 degrees F, and annual rainfall may increase from 0-10 inches over the next 50-100 years. The concentration of CO^2 in the atmosphere will double. The prospective effects of these changes on forest vegetation and water yield are explored with simulation models that have been parameterized for the conditions of the Delaware River Basin. The effects of increased nitrogen deposition on water quality are also simulated. Oak–hickory and oak–pine forest types are expected to increase in abundance while maple–beech–birch and eastern hemlock forests are expected to decline. If annual rainfall does not increase along with temperature, water yield will decline. Nitrogen deposition is likely to increase, exceeding the capacity of forests to absorb the excess nitrogen, and leading to increased export into the Basin's streams and estuaries. These expected changes will challenge land managers to maintain forest ecosystem services.

Session 76 • Part two of a two-part workshop — continued from Session #63
Using NEPA for Collaboration and Conflict Resolution II
See description under Session #63.

Session 77 • Side meeting by invitation only (to be followed by informal reception/meeting)
Northeast Region Natural Resource Managers 2005 Meeting
Chair: Holly Salazer, Regional Air Resources Coordinator, National Park Service Northeast Region, University Park, Pennsylvania

Session abstract:
The Northeast Region is hosting a 2-hour "Side Meeting — Invitation Only" session to share important information on natural resource issues and update the Region's natural resource managers on new programs. This side meeting will provide the opportunity for the Northeast Regional directorate to meet and discuss natural resource issues important to field managers. Invitees will include natural resource managers from all national park units in the Northeast Region.

Presenters:
Holly Salazer
Tonnie Maniero, Air Quality Ecological Effects Coordinator, National Park Service Northeast Region, Boston, Massachusetts

Session 78 • Side meeting by invitation only • part two of a two-part side meeting — continued from Session #65
Park Planning Leadership Group II
See description under Session #65.

Wednesday, March 16 • extramural sessions

Renewal of the U.S. Biosphere Reserves Program

Chair: Vernon "Tom" Gilbert, President, U.S. Biosphere Reserves Association, Knoxville, Tennessee

Session abstract:

Plans are underway to renew the U.S. Biosphere Reserves program in support of the U.S. return to UNESCO and pledge to contribute to human welfare and dignity by participating fully in UNESCO's science and education programs. A United States Biosphere Reserves Association has been incorporated to help achieve this goal, and a Biosphere Reserve Managers Survey was conducted in 2003 in which most managers believe there are significant advantages to participating in the Biosphere Reserve program, and will help in planning a revitalized U.S. program, and collaborative activities with Canadian and Mexican Biosphere Reserves. A national conference of Biosphere Reserve managers and partners is planned for late 2005, and a side meeting at the GWS Conference would be an excellent forum for the planning committee, and a few Mexican and Canadian representatives. A closed invitational side meeting (1:00–5:00) will be followed by an meeting open to all conference participants (7:30–9:30). The evening open session will enable all interested GWS Conference people to participate and discuss plans for the renewal of the U.S. Biosphere Reserves program, and prospects of collaborative activities internationally.

Presenters:

Robert Turner, Executive Director, SAMAB, Knoxville, Tennessee
Natarajan Ishwaran, UNESCO, Paris, France

Thursday, March 17 • morning concurrent sessions • 10:00 – 12:05

Session 79 • Contributed papers

Human Dimensions of Wildlife Management

Chair: Robert A. Winfree, Science Advisor, National Park Service, Alaska Regional Office, Anchorage, Alaska

A Model to Increase Community Participation: Human Dimensions of Deer Management in Northeastern NPS Units

Kirsten Leong, Graduate Student/SCEP Biologist, Cornell University/NPS Biological Resource Management Division, Ithaca, New York

Daniel J. Decker, Director, Cornell University Agricultural Experiment Station/Associate Dean, College of Agriculture and Life Sciences, Ithaca, New York

Margaret A. Wild, Wildlife Veterinarian, Biological Resource Management Division, National Park Service, Fort Collins, Colorado

The National Park Service's Biological Resource Management Division and Cornell University's Human Dimensions Research Unit are collaborating to study human dimensions of white-tailed deer management in park units of the northeastern U.S. The first phase of research consisted of semi-structured informal interviews with natural resource managers. Results identified a multi-tiered complex of influences that shape a park's deer management environment and five key elements of successful deer management planning: understanding the park's unique management environment, internal NPS coordination, coordination with external stakeholders, effective planning processes, and adequate resources. With respect to each element, local communities significantly affect management action. Therefore, future research will examine managers' approaches to decision-making, techniques for engaging the public, and differences between the specific values for which a park is managed and those held by stakeholders. Insights of such inquiry will improve NPS ability to respond to natural resource management issues that involve local communities.

A Multi-Park Design for Investigating Cougar-Related Risks to Humans in the Southwest

David Mattson, Research Wildlife Biologist, USGS Southwest Biological Science Center, Colorado Plateau Research Station, Flagstaff, Arizona

Jan Hart and Terence Arundel, USGS Southwest Biological Science Center, Colorado Plateau Research Station, Flagstaff, Arizona

Elaine Leslie, Canyon de Chelly National Monument, Chinle, Arizona

Increasing encounters between humans and cougars *(Puma concolor)* caused managers to list cougar-related risks to humans as a priority concern in 11 NPS units on the Colorado Plateau. Models that predict distributions of both cougars and humans can be used to predict levels of human exposure and, from that, predict probability of encounter with cougars based on recorded incidents. However, robust models depend on data collected from a wide range of relevant conditions. We describe a design for studying cougar movement, habitat use, diet, and demography in the diverse physical and human environments of Grand Canyon NP, Zion NP, and the Flagstaff Area NMs, which, because of their different sizes, also entail a range of exposure to human

facilities and non-park management. The primary goals are to predict human risk as a function of landscape features and determine the effects of human features and non-park management on cougar movements and populations.

Space Utilization, Activity Patterns, and Distribution of Carnivores in the Presidio of San Francisco

Erin Boydston, Research Ecologist, U.S. Geological Survey, Henderson, Nevada

Abundant cultural, historic, and natural resources are tightly packed into the Presidio of San Francisco's 1480 acres. From 2003–2004, we conducted the first study of terrestrial mammalian carnivores in this part of the Golden Gate National Recreation Area to understand how native and non-native species utilize this highly varied landscape and to identify effective methods for monitoring these species. To study the ecology of foxes, coyotes, raccoons, striped skunks, cats, and one non-carnivore species, the opossum, we used camera traps, track plates, opportunistic sightings, trapping, and radio-tracking. We also attempted a dog-aided survey for fox scats. Raccoons and skunks were the species detected most frequently and were found throughout the park, but these species differed in their habitat use. Gray foxes, a native species that is generally sensitive to habitat fragmentation and urban edge effects, were confirmed present before and after the study but may have a tenuous presence here.

Preserving a Cultural Resource While Enhancing Wildlife Habitat

Katrina Strathmann, Natural Resources Specialist, Golden Gate National Recreation Area, San Francisco, California
Johanna Rahman, Biological Science Technician, Golden Gate National Recreation Area, Presidio Natural Resources, San Francisco, California
Ellen Hamingson, Madison, Wisconsin
Terri Thomas, Natural Resources Manager, Presidio Trust, San Francisco, California

The Presidio of San Francisco features planted forest stands preserved for their historic significance. Local experts and management plans recommend increasing vegetation structure and diversity in Presidio forests to benefit wildlife, particularly songbirds. Two studies investigated field methods for establishing native plants in the forest understory. In one study, 22 species were planted in a *Eucalyptus globulus* stand with soil treatments selected to remedy harsh site conditions. Irrigation led to the greatest increase in survival and cover for shrubs and trees, and removing leaf litter benefited less shade-tolerant species. In a second study, we tested methods for establishing a keystone species, *Quercus agrifolia,* in forest stands. One year of irrigation was critical for sapling survival, and amending with compost increased growth even 4 years after planting. Study results provide tangible recommendations for future forest projects, and allow managers to compare costs with effectiveness when selecting methods and species.

Session 80 • Panel discussion

Communicating Complex Natural Resource Issues to the Public: Innovative Methods and Techniques

Chair: Nina Roberts, Education & Outreach Specialist, National Park Service, Natural Resource Information Division, Fort Collins, Colorado

Session abstract:

What's in your toolbox of innovative techniques for communicating complex natural resource issues? National Park Service professionals from the Geologic Resources Division, Biological Resource Management Division, Environmental Quality Division, and the Servicewide Interpretation and Education Division will share their methods and success stories for fostering appreciation for park resources and educating the general public. The outcome of these efforts has resulted in a fresh look at how the NPS is developing new strategies and methods for interpreting critical resource issues generally defined through findings made by scientists and resource managers. Cases will include: how to link public involvement/civic engagement and interpretation, how interpreters play an essential role in education and public awareness to ensure the sustainability of invasive species management efforts, what are imaginative and resourceful ways of initiating working relationships with schools consisting of diverse student populations, and "big picture" strategies being practiced by the NPS Servicewide.

Panelists:

Jake Hoogland, Chief, Environmental Quality Division, National Park Service, Washington, D.C.: Linking public involvement/civic engagement and interpretation. How do we connect interpretation to public involvement in issues/processes and get public comments back.

Judy Geniac, Research Facilitator, Partnerships Lead, & Geoscientists-in-the-Parks Program Manager, National Park Service Geologic Resources Division, Denver, Colorado: Initiating working relationships with schools that have diverse student populations — focusing on research, resource management, and interpretation in geosciences .

Bradley Welch, National Invasive Species Monitoring Coordinator, National Park Service/Colorado State University, Fort Collins, Colorado: How interpreters play an essential role in education and public awareness to ensure the sustainability of invasive species management efforts.

Wendy Davis, Servicewide Education Program Coordinator, National Park Service, Washington, D.C.: Sampling of "big picture" strategies being practiced by the NPS Servicewide.

Lynne Murdock, Natural Resources Interpretive Specialist, National Park Service, Washington, D.C.: Integrating cutting edge research into NPS Marine Parks through interpretive programs and products. Talk will include case studies that illustrate collaborative use of NASA images and NOAA information into Managing NPS Marine Sites.

Bill Gawley, Biologist/Data Manager, Acadia National Park, Bar Harbor, Maine: Through a cooperative agreement with the NPS, eNature.com is providing material for an outstanding *on-line nature guide* for parks whose species lists have been certified through the NPS Inventory & Monitoring program. Parks can customize the species accounts to reflect park-specific situations. The nature guide is linked through

the parks' "Nature and Science" web page, which is created through the Natural Resource Profiles program. This talk will include presentation from a park perspective to round out the panel (which currently consists of professionals from all Program Offices).

Session 81 • Invited papers

Climate Change in National Parks I: Past Initiatives, Current Science, and Implications for the Future

Chairs: Leigh Welling, Director, Crown of the Continent Research Learning Center, Glacier National Park, West Glacier, Montana

Julie Thomas, Air Resources Liaison, National Park Service, Washington D.C.

Session abstract:

Climate change presents significant risks and challenges to the National Park System. Some parks face potential threats to their very future: for example, rising sea levels could submerge large sections of the freshwater Everglades. Other parks may lose characteristic features, such as the mountain glaciers that gave Glacier National Park its name. And for many parks, future climate change could hamper efforts to preserve natural communities and rare, threatened, and endangered native species. This session will provide an overview of climate change research in the National Parks, including history of the program, current status of research results and trends, and implications for impacts to park resources. Speakers will present a combination of technical information and examples or recommendations of how current climate change research can be used to support management and policy decisions.

Climate Change Research in U.S. National Parks: An Overview

David Parsons, Director, Aldo Leopold Wilderness Research Institute, Missoula, Montana

Daniel Fagre, Research Ecologist, USGS Northern Rocky Mountain Science Center, West Glacier, Montana

In 1990 the National Park Service (NPS) Global Change Research Program was established within the concept of BioGeographical Areas (BGA). A BGA had a major national park at its core but included surrounding areas in recognition that regional landscapes are critical to understanding a park's response to climatic variability. While several BGAs were funded, the program was truncated at about half the envisioned BGA networks. Subsequently, the NPS Global Change Research Program was transferred to the short-lived National Biological Service and, eventually, to the U.S. Geological Survey's Biological Resources Discipline. Despite the programmatic turbulence, the existing park-oriented global change research programs provide 14 years of progress and insight into how national park resources are impacted by climate change. Recently, the Western Mountain Initiative tied together five former park-based programs into a network of sites that is intended to identify major commonalities and differences across national parks in the western U.S.

Global Change in the Northern Rocky Mountains: Leaving Our Ice Age Legacy Behind

Daniel Fagre, Research Ecologist, USGS Northern Rocky Mountain Science Center, West Glacier, Montana

A global change research program was established by Glacier National Park in 1991 and is one of the few to have survived agency reorganizations and funding cuts. For the past 14 years the research focus has been threefold: to document climatically-driven changes to natural resources, to understand underlying mechanisms of change, and to project potential future changes to this mountain ecosystem. Glacier recession has proved a robust indicator of climate change. There are only 27 glaciers left of the original 150 estimated to have existed when the park's area was first described to Congress. The largest glaciers cover less than 30% of their original area and are estimated to disappear entirely by 2030 if current trends continue. The demise of glaciers is primarily driven by temperature increases of 1.60 C during the last century, three times the global average, but also by the timing and duration of multi-decadal droughts and pluvial periods. Alpine treelines have responded to the same climatic change but in more complex ways. Positive feedbacks and sensitivity to microtopography greatly influence the pace and pattern of tree invasion into the alpine tundra. However, infilling of gaps in the patch forests and krummholz is more consistent, leading to a more sharply defined treeline and greater biomass. Finally, development of ecosystem models has provided key insights. One model, for instance, suggests that increased climatic variability will have as much influence on mountain forests as increases in annual average temperature or precipitation.

Climate Change, Montane Forests, and Protected Areas of the Northwestern U.S.

Jeremy S. Littell, JISAO Climate Impacts Group, College of Forest Resources, University of Washington, Seattle, Washington

David L. Peterson USDA–Forest Service Pacific Northwest Research Station Fire and Environmental Research Applications Team, Seattle, Washington

Montane forest ecosystems in the western U.S. are important components of mountainous protected areas, including wilderness and parks. While much research has focused on higher elevation ecosystems as indicators of climate change, montane ecosystems are perhaps more vulnerable to combinations of increasing temperature, decreasing precipitation and snow pack, and increasing likelihood of fire. The widespread presence of ancient forests in the national parks and wildernesses of the Pacific Northwest and the Northern Rocky Mountains allows us a unique opportunity to investigate the climate sensitivity of ecosystem processes over broad geographical areas and long periods of time. Given the range of predicted future climate patterns, we assess the vulnerability of montane forests to climate variability and change for the 21st century. This type of "mechanism–response" conceptual approach provides the pivotal information necessary to decide whether to manage for the consequences of global change or adapt to them.

Ecosystems in Transition: Climate Change Research in Southwestern National Parks

Craig Allen, Research Ecologist, Jemez Mountain Field Station, Los Alamos, New Mexico
Julio L. Betancourt, U.S. Geological Survey, Desert Laboratory, Tucson, Arizona
National parks in the Southwest encompass diverse ecosystems, from warm deserts to boreal forests. Abundant historical evidence demonstrates the dynamic, transitory nature of these regional ecosystems since the last Ice Age and since European settlement. We now can expect comparable instability from rapid changes in climate, exponential growth in human activities, and a growing list of naturalized, non-native species poised to become invasive. Climatic predictions remain uncertain for regional precipitation, which may not change outside the range of natural variability. What will change are seasonal temperatures, with fewer freezes, longer growing seasons, hotter summers, prolonged fire seasons, more extensive outbreaks of insect and pathogens, and a host of hydrological changes (more rain/less snow, earlier snowmelt, higher ET). The end product may be biotic reorganizations that have no past or present analogs. Ecosystems in a constant state of transition will challenge NPS managers to recognize and manage for "unimpaired" park conditions.

The NPS Mission in an Era of Rapid Global Changes: A Dinosaur that Must Evolve or Die?

Nathan Stephenson, Research Ecologist, USGS Sequoia–Kings Canyon Field Station, Three Rivers, California
National Park Service management policies direct natural resource managers to restore and maintain naturally-functioning ecosystems. If not possible, managers should then "maintain the closest approximation of the natural condition." Using supporting examples from the Sierra Nevada of California and elsewhere, I examine whether these policies are sensible, or even possible, in an era of rapid, human-induced environmental changes. In ecosystems that are rapidly changing and cannot maintain natural conditions, attempting to an "approximation" of that system might lead to unstable results and potentially catastrophic loss of resources. Thus, in light of pervasive global changes, I suggest the National Park Service should reexamine its mission. A realistic new mission might focus on enhancing or maintaining ecosystem resistance (ability to resist stress) and resilience (ability to recover from stress), while maintaining native biodiversity as best as possible. Regardless, "natural" is rapidly losing its utility as a sensible, meaningful, or possible benchmark for management.

Session 82 • Invited papers

National Park Service Museums: Innovative Legacy, Innovative Future

Chairs: Ann Hitchcock, Chief Curator, National Park Service, Washington, D.C.
Virginia Salazar-Halfmoon, Regional Curator, Intermountain Region, National Park Service, Santa Fe, New Mexico

Session abstract:

National parks are said to be America's best idea. For the last 100 years park museums have contributed not only to development of the national park idea, but also to shaping of museums in the U.S. and abroad. The session will cover creative ideas in

early National Park Service museums, recent innovations and strategies, and visions for the future. The challenges of managing and interpreting 105 million items in 388 parks in the national park system have called for big scale solutions to local problems. New developments in national park museums have often had a ripple effect in the museum world. The chair will provide an overview of park museum ideas and contributions that the speakers will discuss in detail. Each speaker will highlight innovations from the first part of the century, emphasize recent developments, and comment on trends for the future. The discussant's commentary will be followed by questions.

NPS Museum Collections: Documentation Equals Access

Kathleen Byrne, Museum Registrar, National Park Service, National Catalog, Harpers Ferry, West Virginia

Acquiring, documenting, and maintaining accountability for and access to the diverse museum collections of the National Park Service require innovative approaches. Both parks and the museum profession have benefited from the procedures, guidelines, and automated systems that NPS has developed. The NPS Museum Handbook, available on the web, has been adapted for use by other museums, cited by national museum associations in their reference services, and used in university museology programs. An in-house automated cataloging system evolved into a customized off-the-shelf system used by parks as well as many other museums. The recently introduced Web Catalog allows a new level of public access.

NPS Conservation Innovations

Brigid Sullivan Lopez, Senior Conservator, National Park Service, Northeast Museum Services Center, Lowell, Massachusetts

From the treatment of Sitka's totem poles in 1918, to the 353-foot cyclorama at Gettysburg in 1959, and the Shaw Memorial from Saint-Gaudens National Historic Site in 1997, National Park Service conservators have preserved unique objects in challenging environments. NPS has created procedural manuals and technical guidance for parks, such as Conserve O Gram (1975-present), that have been used by a much wider audience. The Exhibit Conservation Guideline CD-ROM, with over 1,500 copies distributed, is an idea that took hold quickly in the 1990s and remains popular. The parks have been a test bed for preservation ideas and strategies.

Rustic Trailside Museums and Visitor Centers: America's Most Popular Museums

Sarah Allaback, Architectural Historian in private practice, Amherst, Massachusetts

An early president of the American Association of Museums was instrumental in funding and organizing projects to demonstrate the potential of park museums. In 1926, the Yosemite Museum, in the rustic architectural style, became a prototype for park museums. The "visitor center" concept, pioneered by the National Park Service in the 1950s is now widespread in parks at local, state, and national levels. More recent trends have been less distinctive leaving the field open to new ideas.

An Interpretive Media Perspective

Neil Mackay, Senior Exhibit Planner, National Park Service, Harpers Ferry, West Virginia

Early park museums were designed to exhibit ideas and lead the visitor to the natural and cultural exhibits outside. Mid-century the NPS moved narrative stories from exhibits to publications and audio-visual media. NPS has exported ideas abroad, including interpretive planning concepts, the park brochure grid format, and the integration of exhibits and interpretive media in a visitor center. NPS waysides, interpretive trails, and historic furnished interiors, with high standards for historical integrity, have been models. Innovative cartography and web technology are new approaches that enrich the viewing of museum objects in their original contexts, the idea that makes park museums different.

Museums and the Interpretive Message

Dwight Pitcaithley, Chief Historian, National Park Service, Washington, D.C.

This presentation will explore the history of interpretive programs in national parks, note particular innovations and accomplishments to the craft of interpretation, and include some thoughts on the future of site-based interpretation. It will highlight the interpretation of contentious or controversial subjects such as slavery and the coming of the American Civil War with thoughts on how these issues can be approached methodically and intellectually, and will examine the connections between museum interpretive content and its role in the broader education program in this country.

Discussant: Changing Ideas and Perceptions

Virginia Salazar-Halfmoon, Regional Curator, Intermountain Region, National Park Service, Santa Fe, New Mexico

The discussant will offer a summary commentary focusing on the process of change and how new ideas are introduced and take hold in the National Park Service. Using the Native American community and park museums as an example, the discussant will offer examples of change within the National Park Service to respond to the diverse ideas, worldviews, and expectations of its employees and the public.

Session 83 • Panel discussion

The Antiquities Act on the Eve of its Centennial

Chair: Frank McManamon, Chief Archeologist, National Park Service, Washington, D.C.

Session abstract:
(pending)

Panelists:
Richard West Sellars, Historian, National Park Service, Santa Fe, New Mexico

Session 84 • Panel discussion

Understanding Marine Protected Areas: A Basic Guide to a Complex Concept

Chair: Dana Topousis, Communications and Outreach Manager, NOAA National Marine Protected Areas Center, Silver Spring, Maryland

What are marine protected areas and why is there so much confusion surrounding them? This panel presentation will provide information to help increase understanding and awareness of the complex world of marine protected areas (MPAs). Designed to be ideologically neutral, this panel presentation will cover the basic principles and general issues surrounding MPAs. The presentation will be structured to discuss why MPAs are established, science surrounding MPAs, MPA decision-making, measuring MPA effectiveness, and getting people involved with MPAs. This portion will be 60 minutes, and other panelists will then have 10 minutes each to discuss developing a national system of MPAs, cultural heritage MPAs, and regional coordination of MPA activities. The remaining 30 minutes will allow for dynamic interaction with audience members. All panelists are staff of the National Marine Protected Areas Center, which is jointly managed by the Department of Commerce/NOAA and the Department of the Interior

Panelists:

Heidi Recksiek, MPA Coordinator, NOAA National Marine Protected Areas Center, Charleston, South Carolina

Dana Topousis, Communications/Outreach Manager, NOAA National Marine Protected Areas Center, Silver Spring, Maryland

Brian Jordan, Marine Archaeologist, NOAA National Marine Protected Areas Center, Silver Spring, Maryland

Jonathan Kelsey, National MPA System Development Coordinator, NOAA National Marine Protected Areas Center, Silver Spring, Maryland

Kate Smukler, Northeast Regional Coordinator/Tribal Coordinator, NOAA National Marine Protected Areas Center, Boston, Massachusetts

Session 85 • Contributed papers

Preservation of Historic Roads as Cultural Landscapes

Chair: Susan Dolan, Historic Landscape Architect, Mount Rainier National Park and NPS Pacific West Region, Longmire, Washington

Session abstract:

Mount Rainier's master plan, begun in 1926, was the first National Park Service master plan to be conceived. The plan envisaged the infrastructure of the park as a system of scenic highways and developed areas. Over the summer of 2004, five students from the University of Oregon completed a Cultural Landscape Inventory of historic features of Mount Rainier's Stevens Canyon Highway. The success of the Mt. Rainier Field School, and the partnership between the NPS and the university may serve as a model for future cultural landscape projects. In six weeks, these students completed research that established the groundwork for future maintenance and rehabilitation of Stevens Canyon Highway. The purpose of this session is to demonstrate the mutual benefit of collaborative work between the National Park Service and educational

institutions. The speakers will discuss their methodology, research, and evaluation of the site within the context of a field school.

New Applications for GIS in Historic Roads Preservation

Kris Ackerson, Graduate Student of Planning and Public Policy, University of Oregon, Eugene, Oregon

The 2004 Mt. Rainier Field School employed a unique information management system that synthesized the power of Geographic Information Systems and Access databases using a newly designed web interface. The web interface enabled students to store and evaluate their field research without prior experience with these applications. The system allowed researchers to attach feature descriptions, condition evaluations, GPS delineated locations, digital images, and other research data to a unique identification number referenced by GIS and database software. Students analyzed and evaluated the inventory of 400+ historic features of Stevens Canyon Highway by sorting records easily on the web and through relational maps created with GIS. Variations of this methodology are anticipated for future historic road preservation projects at Mt. Rainier and could be useful for other preservation projects. This presentation will elaborate on the methodology utilized during the Field School, including a discussion of the project as an educational tool.

Context: A Physical History of Stevens Canyon Highway

Daniel Schaible, Undergraduate Student of Landscape Architecture, University of Oregon, Eugene, Oregon

This portion of the presentation will provide a historic backdrop of Mount Rainier and Stevens Canyon Highway. This narrative will briefly cover the physical history of Mount Rainier, from the parks inception in 1904 until the completion of Stevens Canyon Highway in 1957. I will define the rustic design style and illustrate how this style is manifested within the highway. I will then contrast the rustic design style with its successor, the Mission 66 style and give examples of the Mission 66 style that are extant within the highway. I will focus on key features and elements that make this highway significant. This presentation will include comparative map analysis and synthesis, archival and contemporary photos, and assessments of original blue prints and master plans.

Maintaining the Historic Integrity of Stevens Canyon Highway: Analysis and Evaluation

Justin Dykstra, Graduate Student of Landscape Architecture, University of Oregon, Eugene, Oregon

I will focus on the inventory, analysis and evaluation of the historic features of Stevens Canyon Highway. I will explain how we proceeded through our first preservation experience from adapting the field work process to be more efficient and effective to identifying patterns and tying together the information gleaned from historic research. We sought to determine how best to identify and evaluate the historic character and integrity of the attributes and physical elements of the site. Through investigation and debate we were able to complete work that identified the key historical components of the highway and those that had a negative impact on the historic integrity of the

site. I will explain our process, rationale and decisions concerning specific elements and the site as a whole, decisions which will have lasting impacts on the management and preservation of a significant historic cultural landscape of the National Park Service.

Mount Rainier's Stevens Canyon Highway: A Model for Historic Road Documentation and Preservation

Mark Davison, Historical Landscape Architect, Mount Rainier National Park, Longmire, Washington
Darrin Swinney, GIS Coordinator, Mount Rainier National Park, Longmire, Washington

Park roads have been a longstanding resource management issue challenging the National Park Service (NPS). Without a means to clearly communicate what to preserve, and where there are opportunities for compromise, landscape architects and preservationists find themselves at a disadvantage in the planning and design process. However, recent innovations in digital information technology make it possible for preservationists to wield the same powerful tools as civil engineers, improving their contribution to the design process. The Cultural Landscape Inventory (CLI) for Stevens Canyon Highway at Mount Rainier National Park, the case study for this paper, combines the NPS working CLI methodology with new information technology, including a method of linear referencing for road features using ArcGIS. A review of this project offers an overview of how historic roads can be thoroughly understood to ensure appropriate design guidelines as well as discussing the innovative techniques used to support road preservation and management.

Session 86 • Invited papers

"Views of the National Parks" — Using Multimedia to Make Connections to Our Parks

Chair: Bruce Nash, Ecologist, National Park Service –NRID, Lakewood, Colorado

Session abstract:

"Views of the National Parks" (Views) is a multimedia educational system designed to provide an entertaining gateway for the public and school children to learn about national parks. Using state-of-the-art educational techniques Views helps all Americans make lasting connections with their parks. The system is composed of two complimentary sections, which present information from individual parks and thematic information that is pertinent across the entire System. This session will address: building a Views module with emphasis on park staff involvement, fitting a park-based Views module within a comprehensive educational system, using Views as an interagency educational tool (Wilderness Views), working with the Views Support Center at James Madison University (Fort Sumter Views), and using Views as an interpretive tool at a co-managed (BLM and NPS) national monument (Grand Canyon–Parashant NM). This session will offer insights from module conception through implementation.

Use of "Views of the National Parks" in an Interpretive Program

Bill Halvorson, Research Ecologist, U.S. Geological Survey, USGS Southwest Biological Center, Tucson, Arizona
Cori Dolan, Research Specialist, School of Natural Resources, University of Arizona, Tucson, Arizona

The Natural Resource Information Division (NPS) is developing Views modules that provide formal and informal programs for students and learners of all ages, inside and outside park boundaries. Educational outreach is critical to the mission of the National Park Service. However, it is necessary for educators to have the appropriate tools to be effective, as well as to share the experience with those who are unable to visit a park, or some particular aspect of a park, in person. This multimedia, interactive educational system brings the diversity and excitement of national parks to the nation's classrooms and to the public via CD-ROMs and the Internet. Views has two complimentary sections, one which provides park-based virtual experiences and one which presents information on national themes such as invasive species, glaciers, volcanoes, and major ecosystems. Views gives parks and protected areas a way to broaden the outreach of any interpretive program.

Views Goes Wild — Exploration of a Wilderness Knowledge Center

Laura Buchheit, Wilderness Education Specialist, Shenandoah National Park, Luray, Virginia
Dave Krueger, Computer Specialist, National Park Service –NRID, Lakewood, Colorado
Erika Matteo, Student Trainee, National Park Service –NRID, Lakewood, Colorado

In 2004, inspired by celebrations commemorating the 40th anniversary of the Wilderness Act, the Views team expanded beyond its traditional people, places and parks to develop a module on wilderness. Since wilderness is inherently interdisciplinary and interagency, the scope of the project presented incredible challenges. In a remarkably short time, the Views team collaborated with several partners and many agency experts to successfully develop a Knowledge Center on wilderness. The wilderness module invites exploration of the National Wilderness Preservation System through virtual visits to wilderness areas and encourages interaction through accompanying activities. While demonstrating the ability of Views to utilize available technology in offering educational opportunities on complicated subjects to a variety of audiences, this wilderness knowledge center presents an outstanding opportunity to educate the American public about their "enduring resource of wilderness" and their role in preserving wilderness for future generations.

The Far View: Interpreting the Values of an Interagency National Monument

Darla Sidles, Superintendent, Grand Canyon–Parashant National Monument, St. George, Utah

The Grand Canyon–Parashant (PARA) National Monument, designated in 2000, is jointly managed by the NPS and the BLM. Covering over one million acres in northwestern Arizona, it is among the most remote areas in the contiguous United States, with access only via primitive, unpaved routes. We have developed a PARA module and a Mt Logan Wilderness case study for the NPS Views Program. We will use these modules as primary interpretive tools to educate the public about management values and Parashant's unique interagency management. Views will

provide the ability to reach diverse audiences that do not have proper equipment or adequate time to visit the monument. It also provides a meaningful way to educate local, regional, and national constituents, including Department staff and members of Congress. This paper will demonstrate the two PARA Views programs, and discuss the challenges and benefits of developing, coordinating, and managing an interagency interpretive program.

"Views of the National Parks" — Fort Sumter Views

Carollyn Oglesby, Scholar in Residence, James Madison University, Integrated Science and Technology, Harrisonburg, Virginia

Katheryn Wright and Charles Tysse, Students, James Madison University, Harrisonburg, Virginia

Carlin Timmons, Park Ranger, Fort Sumter National Monument, Charleston, South Carolina

Bruce Nash, Ecologist, National Park Service –NRID, Lakewood, Colorado

An interactive, multi-media educational module for Fort Sumter (FOSU) National Monument is being developed at James Madison University (JMU) in partnership with the NPS Natural Resources and Information Division. This module, a part of the "Views of the National Parks" project, was designed and assembled by JMU graphic design students. The module emphasizes the multicultural history of FOSU and includes information on Fort Sumter, the Charles Pinckney plantation and the port of Charleston. The module seeks to connect to non-traditional audiences while teaching traditional audiences about other cultures and points of view. Topics addressed are: events preceding the Civil War, the fall and siege of Fort Sumter, the Confederate submarine "Hunley," the African American 54th Massachusetts regiment, slave life, the Gullah and Geechee cultures, and the challenges of site restoration/preservation. The module includes still and video photography, audio voiceovers by JMU theater students, interviews with local storytellers, craftsmen and residents.

So You Think You Might Want a "Views of the National Parks" (Views) Program

Cori Dolan, Research Specialist, School of Natural Resources, University of Arizona, Tucson, Arizona

Bill Halvorson, Research Ecologist, U.S. Geological Survey, USGS Southwest Biological Center, Tucson, Arizona

The Natural Resource Information Division has accepted the challenge of the National Park System Advisory Board "to become a more significant part of America's educational system." NRID has initiated "Views" to meet these goals. This is a multimedia, interactive educational system that can bring the diversity and excitement of national parks to the nation's classrooms and to the public via CD-ROMs and the Internet. The process of designing, building, and implementing a Views module is as wonderful and fascinating as the finished product. A site or subject is chosen for module development by park staff and View's team members. Between this initial step and a finished product is a journey like no other, involving script writing, research, interviews, filming and photography. Staff knowledge of the park and its surrounding environment is irreplaceable and critical to the success of a Views module. Vision and cooperation is what makes a Views module come alive.

Session 87 • Contributed papers
Which Public? Inclusion and Exclusion in Heritage Tourism
Chair: John Reynolds, National Park Service, Castro Valley, California

Heritage Tourism: Trails of Discovery in National Parks
Gillian Bowser, CESU Liaison, Texas A&M University and National Park Service, College Station, Texas
Joseph O'Leary, Texas A&M University, College Station, Texas
Joel Frank, Office of Tourism, National Park Service, Philadelphia, Pennsylvania
Heritage tourism trails of discovery is a project to link parks through trails of cultural and natural heritage. Heritage Trails of Discovery uses a linking theme that becomes the thread to tell a story as a visitor travels from one park to anther. The goal of the project is to encourage visitors to "discover" lesser-known sites within the National Park System and also to discover lesser-known stories of heritage that link those sites together. Each of 44 itineraries was identified by a particular theme ad linked through maps of drivable routes. The criteria for a theme was that a visitor could travel a loop and learn about a theme at several different locations. Materials included in the loops were web-based materials through primary research by Texas A&M University and partners, where visitors could learn about the theme; and the parks would get materials about the themes as well as a plan on the critical elements for the theme. The project is starting by focusing on one itinerary for each region that will be developed fully with themes, stories, and associated materials.

"In Someplace in the Sun": The Demise of African-American Beach Culture in North Carolina
Jenny Edwards, Program Officer, North Carolina Humanities Council, Greensboro, North Carolina
African-American beaches in the South were important public gathering places and cultural centers during the first half of the 20th century. One such beach, known as Sea Breeze, located in New Hanover County, North Carolina, began in the 1920s and existed for nearly six decades. During its WWII "heyday," Sea Breeze was patronized by crowds at times numbering in the thousands; people were drawn to beach's food, music, dance and water-related activities. It was essentially the only place that blacks could safely interact in large groups outdoors. But as Sea Breeze grew in popularity, it sustained a series of environmental, social and political attacks that ultimately destroyed the beach as a significant gathering place. Using public records, archival evidence and oral histories, I will explore the rise of Sea Breeze from the religious camp tradition in the post-Civil War period to its ultimate demise after WWII.

Roots: African-American Environmental Narratives in Muir's America
Carolyn Finney, Clark University Graduate School of Geography/Canon National Parks Science Scholar Program, Worcester, Massachusetts
American conceptions of the Great Outdoors have shifted over time, influenced by social and political processes, reflecting ideas about culture and nation. Popular media lends

authenticity to "original" stories of the American wilderness presented as fundamental American truth through photographic and discursive representations of places and Other peoples. Prominent views of the outdoors draw from the experiences of those in a position to influence and establish legitimacy for their ideas institutionally and culturally. Furthermore, these narratives, which contribute to the American environmental imaginary, are grounded in the values and beliefs of individuals who construct these narratives and are manifested in our everyday environmental practices. National parks, as spaces reflecting national identity, environmental values, and American history are not immune to these processes. This study explores the construction and representation of the environment in the United States and how African-Americans negotiate these meanings within the context of their particular historical experience.

The Comment Book in Historical Sites — More Valuable than a Bridal Register

Linda Crocker Simmons, Vice President of the Board, Black Heritage Museum of Arlington, Arlington, Virginia

Talmadge T. Williams, President, Relevant Educational Corporation, Arlington, Virginia

Long a standard of museum exhibitions, comment books appears to be new to NPS historic sites. We present an overview of a short-lived book for an exhibition about African Americans once enslaved at Arlington House. The BHMA initiated the exhibit and lent a model of Freedman's Village. Comments by visitors tell of their experience as visitors and provide information in support of the advocacy efforts of the BHMA for more inclusive programming about the enslaved African Americans at a major national site overlooking the Nation's capitol and linked to the most decisive event of our national history. Notations indicate visitor gratitude and desire to receive a more complete story about Arlington House: "It is absolutely necessary that all the story of this place be revealed. That would not be the case without this display. African Americans are not among the forgotten. Thanks for keeping us visible to all."

Stewardship Begins With People: An NPS Atlas of Places, People & Hand-Made Products

Rolf Diamant, Superintendent, Marsh–Billings–Rockefeller National Historical Park, Woodstock, Vermont

Nora Mitchell, Director, Conservation Study Institute, National Park Service, Woodstock, Vermont

The NPS Conservation Study Institute (in cooperation with NERO, MABI, & Shelburne Farms NHL) is publishing an "atlas" celebrating personal stories of stewardship, people taking care of special places — friends, neighbors and communities in and around national parks, heritage areas and national landmarks. This work often preserves authentic traditional cultures and landscapes, and demonstrates an enduring stewardship ethic and a commitment to sustainability. This "atlas" is inspired by exchanges between the NPS and Italian Parks which shared ideas and experiences and discussed issues regarding the promoting and marketing of local products that add value to park operations, community relations, traditional cultures, and sustainable practices. We will discuss several project objectives: (1) Recognize people practicing stewardship sustaining landscapes and living cultures. (2) Demonstrate the

relationship between people, special products, and landscapes. (3) Model sustainable behaviors. (4) Enhance relationships between parks and communities. (5) Build network of parks involved in this work.

Session 88 • Panel discussion

Visitor Use and Resource Impact Monitoring I — Importance, Utility, and Purpose of Park Monitoring Strategies

Chair: Christopher Monz, Assistant Professor, St. Lawrence University, Canton, New York

Session abstract:

Monitoring visitor use and associated resource impacts remains a high priority for park and protected area managers. Monitoring programs are a challenge to implement and are often mistaken as a substitute for planning and decision making processes. This panel discussion will offer commentary on the implementation and design of visitor use and impact programs with an emphasis on the management utility and limitations. Panelists will present information on recent NPS visitor monitoring initiatives and discuss the role of monitoring in planning. This session will focus on key questions, such as why it is important to monitor visitor impacts and, what should be monitored. An interactive format will provide an opportunity for participants to discuss specific questions and concerns about visitor monitoring programs and their role in resource protection and park planning.

Panelists:

Charlie Jacobi, Resource Specialist/Visitor Use, Acadia National Park, Bar Harbor, Maine

Jeff Marion, Unit Leader/Scientist, Virginia Tech Department of Forestry, Blacksburg, Virginia

David Cole, Research Geographer, Aldo Leopold Research Institute, Missoula, Montana

Bryan Milstead, Northeast Coastal and Barrier Island Network Coordinator, NPS/University of Rhode Island, Kingston, Rhode Island

Session 89 • Invited papers

National Heritage Areas: Current Research on Social Meaning, Policy Evaluation, Qualitative Indicators, and Management Models

Chair: Nora Mitchell, Director, Conservation Study Institute, National Park Service, Woodstock, Vermont

Session abstract:

As interest in creating new national heritage areas and extending existing areas grows, the program is under pressure to demonstrate its value in conserving traditional communities, develop measurable indicators, and build a body of theory and practice. This panel highlights current research from a variety of disciplines that showcases the diversity of the heritage area movement and provides the first steps in evaluating

these complex regional conservation strategies and a stronger foundation on which to develop future National Park Service policy. The work in the Blackstone National Heritage Area and in the Blue Ridge National Heritage Area test an evaluative approach that seeks to understand the impact of heritage areas on the quality of life of designated regions. The work in the Northern Rio Grande in New Mexico and the Mississippi Delta look at the role heritage plays in engaging residents and managing the future and economic development of diverse communities.

Towards an Anthropological Understanding of Heritage Area Development

Thomas Guthrie, Ph.D. Candidate, Department of Anthropology, University of Chicago, Chicago, Illinois

This paper, based on eighteen months of ethnographic fieldwork, critically examines the social meaning of heritage area development through a New Mexico case study and considers the prospects for social scientific research on heritage areas. The Northern Rio Grande National Heritage Area, a cultural conservation and economic development project being developed by local citizens and the NPS, will commemorate the 400-year "coexistence" of Spanish and Indian peoples in north central New Mexico. I present an overview of my research on the cultural politics of this project, then discuss several questions that my research attempts to answer. Under what social and political conditions do people begin thinking about their lives in terms of "heritage"? What does heritage area designation mean to people and how does it affect their lived experience? What methods can researchers employ to study the social, cultural, and political conditions of heritage area development on a regional scale?

Evaluating National Heritage Areas: Program Analyses and Policy Implications at the Blackstone River Valley National Heritage Corridor

Daniel Laven, Conservation Study Institute/Park Studies Laboratory, Rubenstein School of Environment & Natural Resources, Burlington, Vermont

Management of U.S. national parks has evolved to reflect changes in the American conservation movement. By 1990 the mission of the NPS had grown to include stewardship of cultural, natural and historic resources, urban-proximate parks, and national heritage areas. Although an emerging body of literature describes the evolution of the heritage area movement, research is needed to address a fundamental question related to the development of future NPS policy concerning heritage areas: How well are designated heritage areas working? Using a case study design, I will employ a policy evaluation framework to answer this question. The first case examines the Blackstone River Valley National Heritage Corridor (BRVNHC). Results from this study provide feedback to program managers and participants at BRVNHC as well as contribute information to the development of a NPS Heritage Areas Program. Additionally, this study offers a framework for conducting future multi-case evaluations of NPS heritage areas.

Quality of Life Indicators in Two Small Towns in the Blue Ridge National Heritage Area

Molly Levin, Candidate, Master of Applied Anthropology, University of Maryland, College Park, Maryland

Successful heritage development is dependent upon understanding and addressing the differences and similarities of towns and jurisdictions within a heritage region. This paper is based on ethnographic field research in the small towns of Hayesville and Crossnore, North Carolina. Quantitative data, such as new businesses, loss of buildings, and population change, were documented. Residents were interviewed and their answers were coded according to the quality of life indicators that surfaced in their answers. An analysis of the findings led to the formulation of thirty-seven indicators for quality of life, some shared and others unique to each town. While towns in the Blue Ridge National Heritage Area and Southern Appalachia are often grouped together by policymakers and planners, the differences between Hayesville and Crossnore are quite clear, and reflect a range of values and concerns that can inform the development of local and regional heritage policy, planning, and management.

Higher Education Institutions and Community-Based Tourism Development: The University-Based National Heritage Area Model in Perspective

Rolando Herts, Ph.D. Candidate, Urban Planning and Policy Development, Rutgers University, Newark, New Jersey

The Mississippi Delta is a culturally significant but economically depressed region where cultural heritage tourism (CHT) is being viewed as a viable economic development strategy, as well as a way to empower historically marginalized groups by affirming their contributions to American cultural heritage. Empowering these groups as valued stakeholders is crucial, as effective CHT planning and development is said to require a collaborative, community-based approach. One stakeholder that is playing a role in advancing the community-based National Heritage Area (NHA) designation process is Delta State University. The university could become the management entity of the Delta NHA; however, whether or not a university-based NHA is most appropriate in this context is yet to be determined. Using a proposed typology of university-community-based tourism development approaches, this paper considers the potential effectiveness of the university-based NHA model in a region whose cultural heritage has been shaped largely by socioeconomic and racial conflict.

A Practitioner's Commentary

John Cosgrove, Executive Director, Alliance of National Heritage Areas, Scranton, Pennsylvania

Research on national heritage areas provides positive direction and focus to the practical advancement of the field in numerous ways. While practitioners are preoccupied with addressing the pressing needs of their constituents and resources, research provides the third party perspective of what is working and what can be improved. Research confirms and dispels what professionals think they know about the heritage development movement. Through thoughtful consideration of the movement's history and context, research provides pragmatic approaches to visioning, development, planning, and implementing heritage development projects. It showcases the lessons learned and provides guidance as the movement grows and matures. It identifies

trends and provides suggestions to address the challenge of continuing education for industry practitioners. Finally, research validates the argument for "casting the net wider" to align a range of interests and partners, to integrate natural and cultural resource challenges, and to sustain meaningful relationships.

Session 90 • Panel discussion

Professional Expertise; Meeting the Future Challenges of Resource Protection

Chair: Jeri Hall, Training Manager – Natural Resources, National Park Service Albright Training Center, Grand Canyon, Arizona

Session abstract:

The NPS is charged with protecting a diverse system of resources. The nature of this work requires a highly trained and knowledgeable work force that can analyze and develop innovative solutions for complex and emerging resource issues through interdisciplinary collaboration. The Horace M. Albright Training Center has been a part of the Service's commitment to developing a skilled, modern workforce to handle increasingly complex park management issues. A newly formed Resource Stewardship, Protection and Visitor Management Team has been formed at Albright. The team will develop and implement a competency-based, multi-disciplined curriculum to address critical resource issues. This session explores: the role of the new team; results of a study based on recently conducted needs assessments for natural and cultural resource professionals; and curriculum and pilot courses that are being developed with partners to address critical field and management issues such as the interaction of science and policy in natural resources. The intent of the session is to have short presentations on current training issues and enter into a discussion and gain feedback from the audience on issues.

Panelists:

Jeri Hall

Costa Dillon, Superintendent, Horace M. Albright Training Center, Grand Canyon, Arizona

Tony Knapp, Training Manger – Cultural Resources, Horace M. Albright Training Center, Grand Canyon, Arizona

Session 91 • Workshop

Partners in Stewardship: Civic Engagement Strategies for Successful Resource Management

Chair: Eileen Woodford, Civic Engagement Coordinator, National Park Service, Boston, Massachusetts

Session abstract:

The strategies, tools, and techniques of engaging diverse communities in managing public places is the focus of this workshop. The National Park Service Northeast Region, through its Civic Engagement Grant Program, has developed model

examples of engaging the public on many levels in heritage preservation. This workshop will analyze the strategies, challenges, successes, and failures of activities and programs that embrace diverse communities as critical partners in park planning, programming, and resource preservation. Workshop participants will be encouraged to share examples and will leave with a sharpened understanding of civic engagement and its value as a tool in preserving natural and cultural resources. Participants will also leave with a heightened awareness of the challenges and dilemmas, both internal and external, of opening resource preservation to a broader range of views and perspectives.

Presenters:
John Piltzecker, Chief, National Park Service Partnership Office, Washington, D.C.
Rolf Diamant, Superintendent, Marsh Billings Rockefeller National Historical Park, Woodstock, Vermont
Cindy MacLeod, Superintendent, Richmond National Battlefield Park, Richmond, Virginia
Jed Levin, Archeologist, Northeast Regional Office, Philadelphia, Pennsylvania

Session 92 • Workshop
The Use and Analysis of Integrated Interdisciplinary "Four-Component" Resource Management Models for Resource Management
Michael Reiter, Associate Professor, Delaware State University, Dover, Delaware

Session abstract:
In this workshop, participants will receive an introduction to "Four-Component" (drivers–stressors, stressors–valued ecosystem components, valued ecosystem components–services, services–drivers) interdisciplinary conceptual models for environmental decision making, and the use of simple link and fuzzy logic approaches for their analysis and application. Participants will learn the basics for creating their own information matrices and building graphic conceptual models from the matrices, how to convert the qualitative matrices into forms useful for fuzzy logic analysis, how to convert the graphic models into simple rule-based relative numerical models, and how to interpret the results for use in designing adaptive management programs. Time will be available for participants to ask questions concerning the application of the methodology to their own specific models, locations, or issues.

Session 93 • Side meeting by invitation only
NPS Coordinators Working Meeting
Chair: Gary Machlis, CESU Network National Coordinator, National Park Service, Moscow, Idaho

Session abstract:
NPS CESU Coordinators meet regularly to share best practices, collaborate on projects, and conduct business related to NPS involvement in the CESU Network. This

meeting would be for the above purposes, and include the NPS CESU coordinators (both natural and cultural resources) as well as selected others involved in the CESU Network.

Panelists:
Gary Machlis
Jean McKendry, Deputy National Coordinator, CESU Network, Washington, D.C.

Thursday, March 17 • early afternoon concurrent sessions • 1:30 – 3:35

Session 94 • Panel discussion
The Once and Future Park: Restoration in Protected Areas
Chair: Bill Halvorson, Research Ecologist, USGS, Southwest Biological Science Center, Sonoran Desert Research Station, Tucson, Arizona

Session abstract:
This two-hour discussion will be led by a panel of four who will give short discussion-generating presentations on the history, practice, and philosophy of restoration in protected areas. The audience will have the opportunity to discuss a broad range of questions relating to restoration in areas that were intended to be set aside and left for nature to take its course. Restoration in protected areas is a relatively new concept and yet how we think about restoration has changed over time with changes in philosophy, policy, and funding.

Evaluating the Past as Context for an NPS Restoration Program
Greg Eckert, Restoration Ecologist, National Park Service, Natural Resource Program Office, Fort Collins, Colorado
The US National Park Service (NPS) Natural Resource Programs benefited from the addition of resource inventory, monitoring, weed control, fire management, and assessment capacity in recent years. In the meantime, greater focus is being placed on improving the condition of degraded resources. Of the many guidelines and field techniques that are being developed and collected to assist park managers, a critical element of restoration program progress is the past. This talk will present initial findings on the history of restoration in NPS units, and key program areas for future restoration programs. These will be used to identify points for the session discussion on the role of cultural resource mandates, general conservation mandates, science availability, the NPS Mission, and the NPS identity in restoration decisions of when and where we restore, an to what standards we restore.

The Bow Valley: Parks Canada's Valley Forge
Stephen McCanny, Parks Canada
The Bow Valley ecosystem, the birthplace of Canada's National Parks, a major transportation corridor and a tourism destination for millions, was in trouble in the early 1990s. Food chains were out of balance. Vegetation types were disappearing. The mobility of wildlife was severely restricted. The Bow Valley Study engaged the

public in a series of science-based measures to restore an ecosystem that was critical to economic activity in the area. The Study inspired a series of legislative, organizational, and funding changes in Parks Canada. Here, I compare the state of ecological restoration before the Bow Valley study and in the current policy and organizational structure. I also attempt to forecast the effects of a proposed set of restoration standards and guidelines on the quality and quantity of restoration work done within national parks.

Evolution of Ocean Restoration in the National Park System

Gary E. Davis, Visiting Chief Scientist, Ocean Programs, National Park Service, Washington, D.C.

Restoration of depleted or impaired marine resources in the National Park System focused on individual species in the 1970s. Natural history and population dynamics of exploited species shaped restoration strategies, such as reserves for spiny lobsters, *Panulirus argus,* in South Florida. Weaknesses in species-based approaches became apparent as exploited populations in parks edged toward extinction in the 1980s, e.g., white abalone, *Haliotis sorenseni.* Unintended consequences of fishing cascaded through park ecosystems in the 1990s, such as the loss of kelp forests in Channel Islands National Park, CA, indicating a need for ecosystem-based restoration strategies. Currently, several parks are exploring ecosystem-based marine reserves to restore ecosystem integrity, stability, and beauty, and to rebuild depleted populations and support sustainable fisheries in parks.

Additional panelist:
Eric Higgs

Session 95 • Panel discussion

Integrating Social Indicators in Response to Natural Resource Management Issues

Chairs: Greg Danchuk, Manager, Market Research, Parks Canada, Gatineau, Quebec, Canada
James Gramann, Visiting Chief Social Scientist, U.S. National Park Service, College Station, Texas
Dave McVetty, Manager, Social Science Unit, Western Canada, Parks Canada, Winnipeg, Manitoba, Canada

Session abstract:

Park managers need sustainable solutions to the complex issues facing North America's national parks — issues with natural, cultural, and social dimensions — and expect their scientists to address these issues in a comprehensive fashion. To respond, the science community has opportunities to improve its definition and measurement of human use systems, and to predict the ecological, economic, and social impacts of potential changes to those systems. The social science communities in Parks Canada and the US National Park Service have started working together to adapt to this transdisciplinary future: including shared standards for data reliability, metadata, sampling, weighting, reporting, and research methods. When complete, these

standards will help to build an interface between the natural and social sciences. The discussion focuses on developing consistent measures of visitor use, visitors' behavior, and the visitor experience; and how these can be integrated into multidimensional visitor models. This will help the entire science community to integrate its response to complex issues.

Session 96 • Invited papers

Climate Change in National Parks II: Current Science and Implications for the Future

Chairs: Leigh Welling, Director, Crown of the Continent Research Learning Center, Glacier National Park, West Glacier, Montana

Julie Thomas, Air Resources Liaison, National Park Service, Washington D.C.

Session abstract:

Climate change presents significant risks and challenges to the National Parks System. Some parks face potential threats to their very future: for example, rising sea levels could submerge large sections of the freshwater Everglades. Other parks may lose characteristic features, such as the mountain glaciers that gave Glacier National Park its name. And for many parks, future climate change could hamper efforts to preserve natural communities and rare, threatened, and endangered native species. This session will continue from Climate Change in National Parks I by presenting current research results and implications for impacts to park resources. Speakers will present a combination of technical information and examples or recommendations of how current climate change research can be used to support management and policy decisions.

Glacier Change in Denali and Glacier Bay National Parks, Alaska (1890s to the Present)

Ronald Karpilo, National Park Service, Denver, Colorado
Guy W. Adema, Denali National Park and Preserve, Denali Park, Alaska
Bruce Molnia, U.S. Geological Survey, Reston, Virginia
Harold S. Pranger, National Park Service, Denver, Colorado

This study utilizes a combination of historical observations, repeat photography, aerial photography, and spatial analysis techniques to document glacier change over the past century in Denali and Glacier Bay National Parks. During the 2003 and 2004 summers the locations of over 100 historic ground-based photographs taken between the late 1890s and mid-1900s by survey and research expeditions to the Denali and Glacier Bay areas were reoccupied and the images repeated. The repeat photo-pairs were combined with data from existing maps and satellite imagery to produce GIS coverages of glacial extent during the past century. Preliminary data suggests that the majority of the glaciers included in this study have retreated, thinned, or stagnated over the observed time periods. A few glaciers in these parks have advanced or surged during the past century, but these examples seem to be isolated exceptions to the observed trend.

Using the Past of Southwestern Parks to Predict the Ongoing Vegetation Shift Toward "Weedworld"

Kenneth Cole, Research Ecologist, USGS Colorado Plateau Research Station, Southwest Biological Science Center, Flagstaff, Arizona

The last event of abrupt climate warming with increasing atmospheric CO^2 comparable in magnitude to the changes starting now occurred 11,500 years ago. While these climatic events are not precise analogs of each other, the first can be used to visualize the type and severity of the vegetation changes that are now starting. Abundant fossil records from southwestern National Parks demonstrate that although the same species have lived in the region throughout this period, their distributions have changed radically. During this sudden climatic shift, plant associations/communities were disassociated as individual plant species responded differently. Most species took many thousands of years to fully equilibrate to the change contributing to a drop in local species diversity and an increase in species adapted to disturbance and invasion. Extrapolating these results portrays a future weedworld. The results also have implications for monitoring design, vegetation manipulation, and possibly a reconsideration of the weeds.

How Will Climatic Change Affect Regional Haze and Visibility in Parks and Wilderness?

Don McKenzie, Pacific Wildland Fire Sciences Lab, Seattle, Washington

Narasimhan Larkin and Susan O'Neill, Pacific Wildland Fire Sciences Lab, Seattle, Washington

Visibility impairment from regional haze is already a significant problem throughout the continental United States. A substantial portion of regional haze is produced by smoke from prescribed and wildland fires. Some climate models suggest that a warmer climate will increase both the frequency and severity of wildland fire in the western United States. Such a future will bring further degradation of air quality. Using an integrated modeling framework that incorporates new and existing computer models and continental-scale geographic databases, we estimate regional haze from fire emissions data. Haze-producing emissions are sensitive to climatic variability, particularly synoptic weather patterns, and the stochastic nature of fire occurrence. However, predicted increases can be partly mitigated through both short- and long-term management efforts. Our modeling underscores the importance of the region-wide context of changing fire regimes for natural resource management in parks and wilderness.

Climate Change and Coastal Systems: Adaptation, Modification, or Retreat?

Glenn Guntenspergen, Research Ecologist, USGS, Patuxent Wildlife Research Center, Laurel, Maryland

Donald Cahoon, Research Ecologist, U.S. Geological Survey, Patuxent Wildlife Research Center, Laurel, Maryland

Extensive coastal habitats exist within National Parks and National Seashores. These coastal areas will bear a significant burden from the impacts of climate change (changes in the rate sea level rise, patterns of storminess, and extreme flooding events). These changes will have an impact on coastal erosion, coastal inundation,

sedimentation rates, and landward intrusion of seawater affecting: salt marsh, coastal wetlands, coral reef and atolls, delta systems, and submerged systems. We will identify sensitive ecosystems and critical ecological processes, discuss the development of predictive tools that model the vulnerability of habitats to climate change, and the alternatives for management responses. The development and evaluation of appropriate management strategies should reflect the risk and vulnerability of these systems to climate change. We illustrate this decision process by examining the range of management responses to changing rates of sea level rise.

Assessing Potential Effects of Future Sea-Level Rise and Coastal Change on NPS Resources

Elizabeth Pendleton, USGS, Coastal and Marine Geology Program, Woods Hole, Massachusetts

E.R. Thieler, S. Jeffress Williams, and Rebecca Beavers, Geologic Resources Division, National Park Service, Denver Colorado

Sea-level rise (SLR) is one of the most important drivers of dynamic coastal systems and consensus is growing that SLR rates will increase with near-future climate change. To better understand the implications for coastal regions, the USGS, in partnership with the NPS, has been conducting an assessment of potential future change for 25 coastal park units. Using existing geologic and physical process data in a GIS system, this study is quantitatively assessing which areas of park coastline are likely to be affected by future SLR. The result of this study is a Relative Coastal Vulnerability Index (CVI) for each park which NPS is using for long-term management planning and for assessing potential impacts to natural resources and park infrastructure. Products from this study are a USGS open-file report for each park, including the spatial data and geologic interpretations and CVI maps. Data and products are available at: http://woodshole.er.usgs.gov/project-pages/nps-cvi/.

Session 97 • Contributed papers

Digital Strategies for Education, Appreciation, and Accessibility

Chair: Marc Steuben, Superior, Colorado

Computer-based Interactive Tours for Education, Appreciation, and Accessibility

Marc Steuben, Superior, Colorado

Recent advances in digital media and interactive technology offer new and powerful opportunities for fulfilling educational, accessibility, and outreach goals for public lands and protected areas. This paper presents a case study of the development of the Navajo National Monument Interactive tour, offering details on project development, commitment of resources and funds, and end results in terms of the fulfillment of park goals and visitor outreach. The paper offers a comprehensive look at how the substance of a prehistoric site can be effectively and uniquely communicated with digital technology.

Beyond the Building: Bringing the Museum to the People through the Internet

Tammy Ann Duchesne, Museum Curator, War in the Pacific National Historical Park, Piti, Guam

In December 2002, Supertyphoon Pongsona decimated the island of Guam and forced the permanent closure of the War in the Pacific National Historical Park's museum. Given the unavoidable closure of our building, a virtual museum (www.nps.gov/wapa/indepth)was constructed to allow Guam residents and people from around the world access to stories, publications, and over 800 historical WWII images from the Pacific Theater. Through our on-line museum, visitors are now able to learn about the events of the War in the Pacific, view historical photos from the museum collection on-line, and discover how our remote National Park works to commemorate and honor the bravery and sacrifice of those who served and suffered. While our museum has been closed for two years due to typhoon damage, the resources and historical photos of our island's park are now continuously available to a wider audience than ever before.

Digitizing Legacy Library Content for Distribution on the World Wide Web

Stephanie Wyse, Technical Information Specialist/Librarian, Grand Canyon Monitoring and Research Center/USGS/Department of the Interior, Flagstaff, Arizona

The U.S. Department of the Interior's Grand Canyon Monitoring and Research Center (GCMRC) manages scientific monitoring and research efforts for a federally mandated program to mitigate the impacts of Glen Canyon Dam on Grand Canyon National Park and Glen Canyon National Recreation Area. The Center's library organizes, archives, and disseminates a wide range of information sources for the program, including reports, maps, aerial imagery, slides, and videos. The Center's Scanning Project is an ongoing effort to convert the library's collection of approximately 30,000 rare and one-of-a-kind materials to digital format. The Project will not only preserve the original media, but also allow for the more effective distribution of library resources. Digital resources will be made available to program stakeholders, scientists, and interested people around the world through the Center's Web site. Major implementation challenges have included researching metadata for historical photos and planning for future data migration.

The Homestead Records Project — Preserving America's Agricultural History for Future Generations

Todd Arrington, Historian, National Park Service, Homestead National Monument of America, Beatrice, Nebraska

This paper will focus on the Homestead Records Project, a partnership between the National Park Service (NPS), the University of Nebraska–Lincoln (UNL) and the National Archives (NARA.) The purpose of this project is to microfilm all NARA-held records generated by the Homestead Act of 1862 and make those records available for public access at Homestead National Monument. The record collection contains approximately 30 million individual pieces. The NPS hopes to microfilm the entire collection and also create a name index to it, which currently does not exist. In addition to agricultural information, homestead records contain information on naturalization of immigrants, military service, births and deaths, monetary value of the property, and more. UNL has become involved in the project because it feels that

a major rewrite of U.S. history as it relates to western American settlement may be needed after scholars have widespread access to these vital records. NARA has stated that homestead records are the second-most information set of records that agency maintains. This paper will discuss this exciting project at length, give an update on the status of it, and provide ideas for other professionals attempting to undertake such complex and challenging preservation projects.

Sharing the Wealth: Information Exchange Among Research Watersheds

Andrea Grygo, Research Assistant, Senator George J. Mitchell Center for Environmental and Watershed Research, University of Maine, Orono, Maine
Peter Vaux and Sarah J. Nelson, Senator George J. Mitchell Center for Environmental and Watershed Research, University of Maine, Orono, Maine
Kathy Tonnessen, National Park Service, Rocky Mountains CESU, University of Montana, Missoula, Montana
David Manski, Acadia National Park, Bar Harbor, Maine

Searchable Park Access to Research Catchments (SPARC) is a website that was established to coordinate information exchange among watershed research sites. Purposes of the SPARC web-based information network include: facilitating collaboration and increasing regional/national cooperation; developing national assessments on status and trends; increasing awareness about related research on a national scale; and providing guidance for uniform methods and site design. SPARC will address the needs of the National Park Service and other natural resource agencies by providing access to research information. Long-term data are often needed to understand ecological interactions and protect natural resources. SPARC will provide access to existing long-term data and will lend a spatial context to studies in small research watersheds. The SPARC website facilitates the integration of both results and research methods to enhance the national-scale applicability of NPS research. Proposed SPARC headquarters are at the Schoodic Education and Research Learning Center at Acadia National Park.

Session 98 • Invited papers

The Challenge of Understanding and Preserving Wilderness Character

Chair: Peter Landres, Research Ecologist, Aldo Leopold Wilderness Research Institute, Rocky Mountain Research Station, USDA–Forest Service, Missoula, Montana

Session abstract:

This 2-hour invited paper session offers a comprehensive review of the historical and current understanding of wilderness character, and the issues that need to be considered in preserving wilderness character. The Wilderness Act of 1964 mandates the agencies with administrative responsibility for wilderness to preserve the "wilderness character of the area." But there is no definition of 'wilderness character' in the Wilderness Act, and no explicit discussion about the meaning of this phrase in Congressional discussions leading to passage of the Wilderness Act. This session provides an opportunity for recognized leaders in wilderness history, science, and management to explore 1) the legislative background and meaning of wilderness

character, 2) how human relationships in wilderness landscapes are a fundamental yet often ignored component of wilderness character, 3) key ecological issues that need to be addressed to preserve wilderness character, and 4) an Alaskan perspective on how recreational development diminishes wilderness character.

The Wilderness Act: Humility and Restraint in American Land Law

Ed Zahniser, Writer–Editor, NPS, Harper's Ferry Center, Division of Publications, Harpers Ferry, West Virginia

The Wilderness Act signals historically significant humility and restraint in land law. Its two-part definition of wilderness is carefully explained in legislative history. Section 2(c) defines wilderness ideally, as "untrammeled" and then "further" for practical purposes of the Act. The first definition is the ideal toward which to administer designated wilderness. The second, qualified definition provides criteria for designating wilderness. 'Wilderness character' appears in Section 2(a) and then twice in Section 4(b), where it refers back to untrammeled as the goal for administering wilderness. Read against Howard Zahniser's 1955 essay "The Need for Wilderness Areas," the Act asks those who administer wilderness to practice an epistemology of humility and ethic of restraint. That Congress chose such spacious terms as untrammeled and wilderness character seems to signal resistance to reductionism both in interpreting the Act and in administering wilderness areas.

Human Relationships with Wilderness: Extending Wilderness Character Beyond Wilderness Attributes

Alan Watson, Research Social Scientist, Aldo Leopold Wilderness Research Institute, Rocky Mountain Research Station, USDA–Forest Service, Missoula, Montana

A new era of stewardship has dawned, with not only responsibility to steward our public lands, but also acknowledge our role in stewarding relationships between the public and public lands. Local communities are vocal in their assertion that we need to understand the values they receive from wilderness and other lands and demonstrate to them that we consider these values in making decisions, while also meeting the primary intent of the legislation and policy that guide us. Different people perceive wilderness character very differently, and these perceptions are bound to be changing through time. Our jobs as scientists include providing adequate understanding of the range of these relationships with wilderness places and the things that influence them in a way managers can set objectives for protection, and even restoration, of human relationships with wilderness landscapes.

Wild Nature: Key Issues in Preserving Ecological Systems and Wilderness Character

Peter Landres, Research Ecologist, Aldo Leopold Wilderness Research Institute, Rocky Mountain Research Station, USDA–Forest Service, Missoula, Montana

In the context of preserving wilderness character, this presentation explores several key issues necessary for protecting and sustaining ecological systems in designated wilderness. The 1964 Wilderness Act defines wilderness as an area 'retaining its primeval character and influence' and mandates agencies to protect and manage wilderness 'so as to preserve its natural conditions.' From an ecological perspective

the meaning of these phrases is examined, definitions offered, and management implications explored. Wildness and naturalness are two core concepts of wilderness character that strongly affect ecological systems inside wilderness. These concepts are used to examine proposed actions to restore natural conditions in wilderness, and management responses to impacts from global climate change and other pervasive threats to wilderness. Last, practical recommendations are offered for monitoring ecological threats, impacts from these threats, and natural conditions inside wilderness.

Primeval Influence in Wilderness Character: An Alaskan Perspective on Diminishing the Wild

Steve Ulvi, Management Assistant, NPS, Yukon-Charley Rivers National Preserve & Gates of the Arctic National Park and Preserve, Fairbanks, Alaska

The wilderness idea is founded in the gut-level association between undeveloped primal landscapes and modern people. Wilderness character has been defined, in part, as "an area of undeveloped federal land retaining its primeval character and influence without permanent improvements or human habitation." Since 1964 the NPS has seen wilderness as a recreational playground for those few who leave behind the carefully constructed experiences of the visitor center, campground and evening programs. Risk averse managers respond to perceived impacts by controlling primeval influences and blunting inherent risks: modifications such as extensive trail systems, foot bridges, ranger cabins, signage, outfitter camps, and designated campsites. This shrinks and packages the illusion of wildness and increases use. Alaska allows for immersion and an unscripted relationship between people and place that blurs the illusion of separation. Through restraint even small wild areas can exhibit immense cognitive influence. Tamed wilderness is no wilderness at all.

Session 99 • Panel discussion

From Individual to Citizen: People Reclaiming their Histories and Natural Spaces

Chair: Catherine Turton, Architectural Historian, National Park Service, Philadelphia, Pennsylvania

Session abstract:

Experienced panelists share how they reconnect individuals to history and natural spaces; how they are revitalizing democracy through inclusiveness and shared authority. With community support, Martin Luther King Jr. NHS exhibits, "Without Sanctuary: Lynching Photography in America" reclaiming the history of when Atlanta was not "too busy to hate." The Rivers of Steel Heritage Area relies on the input of the local communities, labor unions, local government and ethnic groups of southwestern Pennsylvania to preserve the stories of ordinary steel workers and organized labor. Along the Maurice, a partnership Wild and Scenic River, individuals transform into citizens to conserve, protect and take "ownership" of their river. At Lowell National Historical Park and Tsongas Industrial History Center, a civic collaborative with local colleges reaches out to residents, especially new immigrant populations, with cultural and environmental programs.

Panelists:

Saudia Muwwakkil, Public Information Officer, Martin Luther King Jr. National Historic Site, Atlanta, Georgia

Doris J. Dyen, Director of Cultural Conservation, Rivers of Steel Heritage Area, Homestead, Pennsylvania

Paul Kenney, Partnership Wild and Scenic Rivers Manager, National Park Service Northeast Region, Philadelphia, Pennsylvania

Audrey Ambrosino, Coordinator of Special Events and Public Information, Lowell National Historical Park, Lowell, Massachusetts

Session 100 • Invited papers

Parks for Science: Examples from the National Parks Ecological Research Program

Chairs: Jason Fridley, Postdoctoral Student, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina

David Parsons, Director, Aldo Leopold Wilderness Research Institute, Missoula, Montana

Betsy Von Holle, Postdoctoral Student, Harvard Forest, Harvard University, Petersham, Massachusetts

Session abstract:

We will have a brief introduction by David Parsons, followed by five 20-minute presentations from researchers., There is increasing recognition that the long-term protection of biodiversity in National Parks critically depends on the sound use of scientific research within them, and yet there remain major challenges in attracting scientists to use Parks as ecological laboratories. To combat this problem, NPS has recently partnered with private organizations to support basic ecological research. One such program is the National Parks Ecological Research Fellowship Program (NPERF), funded by the Andrew W. Mellon Foundation, which supports postdoctoral researchers working on basic ecological science related to Park flora. In this session we present research examples from the NPERF program, and illustrate their strong links to natural resource management. Topics for connecting basic science to management include how to incorporate landscape history in dealing with vegetation change and the threat of invasive species; how to use insights from vegetation science to develop biodiversity survey protocols; and providing sound scientific bases for fire management.

Ecological Resistance to Plant Invaders in a Mosaic Landscape: Cape Cod National Seashore

Betsy Von Holle, Postdoctoral Student, Harvard Forest, Harvard University, Petersham, Massachusetts

David R. Foster and Glenn Motzkin, Harvard Forest, Harvard University, Petersham, Massachusetts

Effects of non-native species are a hazard to global biodiversity, second only to habitat destruction. For informed management decisions, we must determine factors that contribute to ecological resistance to biological invasion. Habitat invasibility to plant

invaders was investigated in the highly resistant Cape Cod ecosystem through a spatially-explicit study of historical disturbances and current environmental and biotic properties of 20 x 20m field plots, randomly located across the landscape. Historic disturbances, current vegetation, edaphic properties and other environmental conditions were determined for each plot using historic and field methods and were assessed for their influence on exotic species richness and cover. The most influential factors for non-indigenous plant cover and richness were current soil nutrient conditions, indicating that resistance of these natural areas may be due to the harsh conditions provided by the depauperate soils in this area.

Climate and Land Use Impacts on Pinyon–Juniper Woodland Expansion

Nichole Barger, Postdoctoral Student, Institute of Arctic and Alpine Research, University of Colorado, Boulder, Colorado

Over the last century, the western United States has experienced a dramatic expansion of pinyon–juniper woodlands. In this study I examined the effects of livestock grazing, the dominant land-use in the western US, on pinyon–juniper woodland distribution. Using historical aerial photos and field measurements, I compared pinyon-juniper stand dynamics on a near-relict mesa (Bridger Jack Mesa) to an adjacent grazed area (Jackson Springs) near Canyonlands National Park. Horses were grazed on Bridger Jack Mesa during the 1930s, but the mesa is inaccessible to cattle. I observed no differences in tree density at these sites. However, pinyons at Jackson Springs were younger than those on Bridger Jack Mesa, which suggests that livestock grazing alters recruitment dynamics. Historical aerial photos showed an increase in pinyon-juniper density and cover on Bridger Jack Mesa since the 1930s, which suggests that pinyon-juniper woodland expansion occurred in the absence of historical livestock grazing.

Climate and Fire Management in Everglades National Park: A Prescription for Success

Brian Beckage, Assistant Professor, University of Vermont, Burlington, Vermont

The Everglades ecosystem of southern Florida is in the midst of a large-scale restoration designed to protect its rich biological diversity. Restoration efforts have been focused on restoring the natural hydrology, but the Everglades is a fire-frequented ecosystem and fire management is an important component of ecosystem restoration. Fire management should be based on the natural fire regimes that have provided the evolutionary basis for development of biotic communities. Identifying the natural fire regime, however, is difficult in southern Florida because data on historic fire regimes are not available prior to the establishment of Everglades National Park in 1948, nor can fire histories be reconstructed from dendrochronological records in the subtropical environment. We suggest that the natural coupling of El Nino Southern Oscillation climatic cycle to fire, including frequency and seasonality, in southern Florida can provide the basis for sound ecological fire management.

Exploring Physiological Determinants of Community Assembly in Old-field Systems of Great Smoky Mountains National Park

Jennifer Nagel, Postdoc, University of Tennessee, Knoxville, Tennessee

Because photosynthesis provides plants with energy and plant growth entails an energetic expense, we hypothesize that dominant plant species within a community maximize physiological benefits of accrued energetic costs to enhance their energetic gain. We quantified abundance and percent ground cover and measured energetic gains (via photosynthesis) and energetic costs of photosynthetic biomass production (via construction costs) of plant species within old-field communities of Great Smoky Mountains National Park. Physiological variables and community assembly were compared monthly throughout the growing season to examine the influence of energy-use efficiency on species' relative dominance within these communities. We found positive correlations between species relative abundance and cover and their energy-use efficiency on monthly measurement dates, as well as significant relationships between monthly changes in species' representation within these communities and their energy-use efficiency. Our results suggest that differences in energetic properties and processes among constituent species could influence plant community assembly.

Park Biodiversity Surveys: Does Vegetation Science Suggest Where to Look?

Jason Fridley, Postdoc, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina

Describing the distribution of organisms in a park is a fundamental prerequisite for protecting them, and yet accurate, high-resolution surveys of the biodiversity of large areas remain a daunting challenge for park resource managers. With meager survey resources, a common dilemma is where to focus survey efforts given the increasing availability of spatial environmental data. This practical consideration thus becomes a largely scientific one: which environmental factors most strongly influence the distribution of particular taxa, at scales relevant to both whole-park surveys and available spatial data? I use a new database of vascular plant surveys and high-resolution climate and edaphic data for Great Smoky Mountains National Park (TN and NC, USA) to describe how the distributions of key environmental factors influence plant species turnover in space. This information is a crucial component to directing park survey efforts, particularly as the availability of relevant environmental data increases.

Session 101 • Panel discussion

Critical Information on Protecting Natural and Cultural Resources

Chair: Wendy Schumacher, Bibliographic Coordinator, National Park Service, Fort Collins, Colorado

Session abstract:

Creating a culture of care with the information about resources in the National Parks is a vital new part our mission. When location information about a rare cactus or burial site is posted on the Internet, those resources are at once put at risk. Learn about handling protected information from a diverse panel representing the service-wide natural resource, cultural resource and information management outlook in addition to the park perspective. The panel includes members of the NPS working group that

developed Director's Order #66: FOIA processing and handling protected information. The Solicitor's Office is also represented. Specifically this session covers how to identify potentially protected information, the laws giving NPS protection beyond FOIA and how to work with other federal agencies, contractors, cooperators, permittees, VIPs and other partners who do, or may, come in contact with it. It will finish with an open forum.

Panelists:
Peter Dratch, Endangered Species Program Manager, National Park Service, Fort Collins, Colorado
John Dennis, Deputy Chief Scientist, National Park Service, Washington, D.C.
Ann Hitchcock, Chief Curator, National Park Service, Washington, D.C.
Jason Waanders, Attorney Advisor, Office of the Solicitor, Washington, D.C.
Regina Rochefort, Science Advisor, North Coast and Cascades Network, National Park Service, Sedro-Woolley, Washington

Session 102 • Panel discussion
Did You Hear That? The Impact of Sound on Nature and Culture
Chair: Lisa Kolakowsky, Architectural Historian, National Park Service, Northeast Region, Philadelphia, Pennsylvania

Session abstract:
Panelist Topics: (1) The Science of Sound — Acoustics: This presentation will focus on the basics of sound to give the audience a framework within which to analyze the subsequent presentations. (2) Sound and Nature: This presentation will focus on sound, both natural and man-made, particularly within National Parks. This presentation will also address the NPS Natural Sounds Initiative. (3) Sound and Culture: While attention is beginning to be focused on the affect of sound on the natural environment, this is a rather new filter for looking at, or rather, listening at, cultural and historic resources. This presentation will focus on sound at historic and cultural resources; sound that can intrude on the visitor experience, sound that can enhance the visitor experience and finally the absence of sound. The case studies and proposed solutions in this presentation will be drawn from our partners at National Historic Landmarks.

Panelists: TBA

Session 103 • Invited papers
Visitor Use and Resource Impact Monitoring II: Recent Developments in Methodology
Chair: Yu-Fai Leung, Assistant Professor, North Carolina State University, Parks, Recreation and Tourism Management, Raleigh, North Carolina

Session abstract:

The value and utility of visitor impact monitoring is increasingly recognized by protected area managers worldwide. In the U.S., two recently developed National Park Service programs — Visitor Experience and Resource Protection (VERP) framework and Vital Signs Monitoring program — have an integral component of visitor impact monitoring. This second session of the Visitor Use and Resource Impact Monitoring series complements the panel discussion (Session I) with highlights of several recent developments in impact monitoring methods. Presenters in this session will report experiences in applying new or adapted methods based on their ongoing or recent studies in the U.S. and abroad. Topics covered include sampling, trails, social trails and visitor-wildlife interactions. The potential and limitations of these recent developments will be evaluated. Implications for management and research will be discussed. An open forum discussion will conclude this series of special sessions.

Using GIS to Develop a Spatially Balanced Monitoring Protocol for Resource and Experiential Indicators in Yosemite National Park

Peter Newman, Assistant Professor, Colorado State University, Fort Collins, Colorado
David Theobald, Colorado State University, Department of Natural Resource Recreation and Tourism, Fort Collins, Colorado
Yu-Fai Leung, Assistant Professor, North Carolina State University, Parks, Recreation and Tourism Management, Raleigh, North Carolina
Laurel Boyers and Mark Fincher, Yosemite National Park, California

Monitoring resource and experiential conditions in protected areas requires the development of monitoring protocols that allow managers to collect data in order to understand current use, impact and improvement trends. Creating a robust and accurate measurement strategy requires a good sampling plan. Watson et al. (2000) outlined seven components of a good sampling strategy. These sampling strategies can be applied to the indicators to be measured in the Merced River Wild and Scenic Corridor of Yosemite National Park. This paper will build on Watson's strategies and will describe and discuss a sampling plan and monitoring protocols currently being developed for estimating the number and condition of campsites in the Merced River Corridor of Yosemite National Park. The sampling plan utilizes GIS and mathematical algorithms to estimate locations of visitor campsites based on landscape and social attributes.

Trail Assessment Methods: Applications in Two International World Heritage Sites

Sanjay K. Nepal, Assistant Professor, Texas A&M University, College Station, Texas

Recent studies on visitor-induced trail impact assessment indicate to a continuous refinement in data collection and analytical techniques. The majority of trail impact studies have been conducted in relatively pristine wilderness areas in US where permanent human habitation is rarely found. When applying these techniques to wildland areas with permanent human habitation, these methods require further adaptations and refinements. This paper examines the application of standard trail impact assessment techniques at two world heritage sites, namely Mount Robson Provincial Park, Canada, and the Sagarmatha (Mt. Everest) National Park, Nepal. The former park has no permanent human habitation the latter has several permanent human settlements within its boundaries. Refinements in Mt. Robson Provincial Park

include a comprehensive and systematic collection of vegetation and soil samples along the trails. In Sagarmatha, the focus is on including tourist infrastructures such as a lodge accommodation as one of the influencing factors on trail impacts.

Methodological Challenges for Assessing Soil Erosion on Trails

Jeffrey L., Marion, Unit Leader/Scientist, USGS, Patuxent Wildlife Research Center, Blacksburg, Virginia

Soil erosion has often been cited as the most significant and potentially irreversible impact associated with trail use in protected areas. Land managers are therefore highly interested in being able to assess and monitor changes in soil loss along trails. Such data are also vital to the application of decision frameworks such as Limits of Acceptable Change and Visitor Experience and Resource Protection decision frameworks that employ indicator and standards of quality. Methods for assessing soil loss on trails are reviewed with a focus on measurement-based methods that yield cross sectional area estimates. This presentation highlights two critical issues: 1) identification of what to measure, including consideration of differences between trails in flat versus sloping terrain and distinguishing between recent versus historic erosion, and 2) measurement options for using variable versus fixed interval measures.

Applying Geospatial Technologies to Assess and Monitor Social Trails in National Parks: Recent Examples

Yu-Fai Leung, Assistant Professor, North Carolina State University, Parks, Recreation and Tourism Management, Raleigh, North Carolina

Lee Steider, Michael Smith, and Michael Naber, North Carolina State University, Parks, Recreation and Tourism Management, Raleigh, North Carolina

Social trails, or informal visitor-created tracks, are unwanted features in national parks. Due to their unplanned and non-maintained nature, social trails are often found at poor terrain positions and in degrading conditions such as active erosion. Social trails also scar and fragment landscapes, and may threaten endangered plant and animal species. In recent implementations of the Visitor Experience and Resource Protection (VERP) framework social trails have been repeatedly selected as a resource indicator. Limited research has been conducted to monitor social trails. Recent advancements in geospatial technologies (GTs), including GIS, GPS and digital orthophotography, seem to provide new opportunities for this type of visitor impact monitoring. This presentation provides a brief review of past research and highlights current GT-enhanced procedures being applied or tested in Boston Harbor Islands National Park Area and Colonial National Historic Park. The utility of social trail data collected using GTs will be demonstrated with examples.

Developing Indicators for Visitor–Wildlife Interactions: Value, Feasibility and Limitations

Christopher Monz, Assistant Professor, St. Lawrence University, Canton, New York

Yu-Fai Leung, Assistant Professor, North Carolina State University, Parks, Recreation and Tourism Management, Raleigh, North Carolina

Inappropriate visitor–wildlife interactions (VWIs) in national parks and other protected natural areas are a common management problem. The primary issue — that visitors feed, harass or unintentionally disturb wildlife — has attracted growing research attention recently. Although many questions remain as to the significance of these disturbances to wildlife populations, the importance of this problem to managers has prompted the development of VWI indicators into long-term monitoring programs such as NPS Vital Signs and the Visitor Experience and Resource Protection (VERP) framework. The objective of this paper is to examine the value, feasibility and technical limitations of VWI indicators in long-term visitor impact monitoring programs. Analysis is based on our experiences from current projects in the eastern U.S. and Alaska. Examples include VWI indicators being proposed and tested for piping plovers, wild horses, and bears.

Session 104 • Side meeting by invitation only

National Heritage Areas II: Fostering a Research Agenda

Chair: Suzanne Copping, Program Assistant, National Heritage Areas, National Park Service, Washington, D.C.

Session abstract:

This meeting, co-sponsored with the Historic Preservation Department at University of Pennsylvania, will offer a forum for researchers, students, academic faculty, and practitioners to learn about current research on heritage areas, share research ideas and experiences, and discuss new opportunities for advancing a research agenda to better understand heritage areas. The meeting builds upon two earlier workshops held in 2002 and 2003 that brought researchers and practitioners together to share and discuss research that will help inform heritage area policy and practice (see http://www.cr.nps.gov/heritageareas/REP/research.htm). After a brief discussion of the findings since earlier workshops, there will be presentations of current research occurring within existing and proposed heritage areas. Participants will discuss opportunities for collaborative research and how this work can assist in developing effective policy for the National Park Service and other governmental partners, as all players seek to better understand what creates "success" in this rapidly developing movement.

Panelists:

Randy Mason, Associate Professor of Architecture, Graduate Program in Historic Preservation, School of Design, University of Pennsylvania, Philadelphia, Pennsylvania

Nora Mitchell, Director, Conservation Study Institute, National Park Service, Woodstock, Vermont

Session 105 • Invited papers

CESUs in the NPS Intermountain Region: Expanding our Understanding of Cultural and Natural/Cultural Resources

Chair: Christine Whitacre, NPS Cultural Resource Specialist, Rocky Mountains CESU, Intermountain Region, Missoula, Montana

Session abstract:

In recent years, the Colorado Plateau, Desert Southwest, and Rocky Mountains Cooperative Ecosystem Studies Units (CESUs) — all within the NPS Intermountain Region — have placed a greater emphasis on cultural resource and interdisciplinary natural/cultural resource projects. This has been accomplished through the establishment of NPS cultural resource specialist positions within the CESUs, National Park Research Learning Center participation in CESU projects, an expanded definition of project needs, and outreach to cultural resource experts within the NPS and CESU partner organizations. This session will highlight this new emphasis with a showcase of recent cultural and interdisciplinary natural/cultural projects that have expanded the traditional definition of CESU research, technical assistance and education. Session papers will highlight NPS cultural and natural/cultural projects that were completed through the CESUs, and will be presented by the projects' principal investigators, as well as a representative of the Crown of the Continent Research Learning Center.

Cultivating History: The Kino Fruit Trees Project

Robert Emanuel, Research Associate, Arizona–Sonora Desert Museum, Tucson, Arizona
Jesus Manuel Garcia, Education Specialist, Arizona–Sonora Desert Museum, Tucson, Arizona

In 2004, Tumacacori National Historical Park, an important mission site in southeastern Arizona, completed the acquisition of an original 5-acre mission orchard and a significant portion of its original agricultural area. It was on these lands in the late 17th and early 18th centuries that Jesuit missionaries such as Father Eusebio Francisco Kino and later Franciscans introduced European fruit trees to this portion of the New World catalyzing a watershed agricultural transformation for the region's peoples. The goal of the Kino Fruit Trees Project is to assist the National Park Service in replanting historically and horticulturally appropriate varieties of those fruit trees on this land. This has involved the project's team in an exciting blend of archival, ethnohistorical, ethnobotanical, and horticultural methods, experiments, and adventures. The authors will introduce the broad outlines of the project, discuss the results of a first year of work, and talk about new directions.

Fire in the Crown: A Fire Workshop for Glacier National Park Employees

Sallie Hejl, Resource Education Specialist, Crown of the Continent Research Learning Center, West Glacier, Montana

The goals of the Crown of the Continent Research Learning Center are to: (1) facilitate research in Waterton–Glacier International Peace Park and the surrounding ecosystem, (2) provide science-based decision support to park managers, and (3) coordinate educational initiatives about park resources for the public. To increase the knowledge of park employees — so they could make informed management decisions and provide accurate information to the public — the Learning Center organized a fire workshop in spring 2004. The objectives were to summarize the 2003

fires, describe the impact that these fires had on cultural and natural resources, and acknowledge the importance of fire as an ecological process in Glacier National Park. The author will present an overview of the workshop, which also included presentations on fire history and the effects of fire on wildlife, fish, plants, air and water, as well as a panel on "lessons learned" and future strategies.

Controlling Pests, Preserving History, and Using Video as an IPM Information Tool

Zachary Gildersleeve, Creative Director, Aver Ingenuity, LLC, Bozeman, Montana
Christine Ford, Curator, Grant–Kohrs Ranch National Historic Site, Deer Lodge, Montana

This presentation highlights a partnership among the National Park Service, Montana State University (MSU), and a small not-for-profit museum that created products that benefit themselves and many others. A grant from the Rocky Mountains CESU funded an in-depth review of persistent pest problems at Grant–Kohrs Ranch National Historic Site by MSU entomologist Will Lanier. Lanier provided a revised Integrated Pest Management (IPM) plan that focused less on collecting repetitive data and control based on calendars days, to a more fluid data-collecting system and control based on the "degree day" concept. As part of the project, the Powell County Museum and Arts Foundation received an on-site visit and introduction to IPM concepts. The educational value of the entomologist's time was increased a hundred fold when a DVD about IPM was produced from video shot during the site visits and is available to the hundreds of small museums throughout Montana and Wyoming.

Old Buildings/New Collaborations: Archaeological Research, Teaching and Service in Southwestern National Parks

Christian Downum, Associate Professor and Director, Anthropology Laboratories, Dept of Anthropology, Northern Arizona University, Flagstaff, Arizona

Over the past decade Northern Arizona University (NAU) has used cooperative agreements with the NPS to build a productive program of archaeological research, teaching, and service with parks and monuments in the Southwest. Most of the work has focused on documenting and stabilizing prehistoric pueblos and other ancient architectural sites on the Colorado Plateau. Though designed primarily to fulfill the goals of the NPS Vanishing Treasures initiative, the NAU program has reaped surprising rewards in the areas of research, teaching, and professional training. Work through cooperative agreements has led to new understandings of ancient pueblo chronology and social organization and the development of new technologies for architectural documentation. The field sessions also are uniquely productive settings for practical field training of future archaeological professionals. This paper reports the results of these cooperative ventures, including Lidar-based surveying and architectural documentation.

Archaeology and the Warriors' Project: Exploring a Buffalo Soldier Campsite in the Guadalupe Mountains of Texas

Eleanor King, Assistant Professor, Department of Sociology and Anthropology, Howard University, Washington, D.C.

In summer 2005, the National Park Service and Howard University fielded an archaeological expedition as an extension of the Warriors' Project. The objective was to investigate a known Buffalo Soldiers' campsite in Guadalupe Mountains National Park with a joint team of Howard undergraduates and high school students, including participants from the Mescalero Apache Reservation. The site was originally thought to comprise a temporary encampment, periodically used by both 9th and 10th Cavalry soldiers. Survey revealed it to be a much more extensive, semi-permanent encampment covering some 40 acres of land. Excavations and surface collections in and around the hearths suggested that the primary occupation was by the 10th Cavalry in the late 1870s. Ovens, tent pads, and other semi-permanent structures attested to an important military presence at that time. In addition, however, we found the site had been occupied in numerous periods, both historically and prehistorically, by several different groups.

Session 106 • Side meeting by invitation only • Part one of a two-part side meeting — continued in session #121

NPS Historians Affinity Meeting I

Chair: Dwight T. Pitcaithley, Chief Historian, National Park Service, Washington, D.C.

Session abstract:
(pending)

Session 107 • Part one of a two-part workshop — continued in session #122

Feral and Exotic Animals in National Parks I

Chair: Gillian Bowser, CESU Liaison, Texas A&M University and the National Park Service, College Station, Texas

Session abstract:
Feral and exotic animals threaten natural and cultural resources in parks and this threat is increasing. Feral mammals damage natural resources, destroy cultural sites, and degrade visitor experiences. This workshop is designed in two parts. Part 1. What is the extent of feral animals and the species involved? Here the workshop will look at techniques for assessing the damage done by different feral mammals to give parks information on the extent of feral animal issues. Four parks will be used as examples of ongoing assessments of feral animal populations. Part 2 will focus on the mitigation phase. Here the existing project proposes the use of feral and exotic teams that service a number of parks. Participants will learn about the basic issues regarding assessment tools for feral animals and how to design accurate assessments in a wide variety of settings. Part 2 will provide participants with lessons learned and pitfalls.

Presenters:
Roel Lopez, Texas A&M University, College Station, Texas
Nova Silvy, Texas A&M University, College Station, Texas
Pedro Chavarria, Big Thicket National Preserve, Beaumont, Texas

Anna Munoz, Texas A&M University, College Station, Texas
Laura Ballwebber, Mississippi State University, Mississippi State, Mississippi
Peter Pappas, Palo Alto National Battlefield, Brownsville, Texas
David Vela, Lyndon B. Johnson National Historic Site, Johnson City, Texas
Louis Halverston, Sul Ross University, Alpine, Texas
Raul Valdez, New Mexico State University, Las Cruces, New Mexico

Session 108 • Part one of a two-part workshop — continued in session #123
Wildlife Monitoring Programs: Integrating Objectives, Design Considerations, and Analysis I
Chair: Allan O'Connell, Research Wildlife Biologist, USGS, Patuxent Wildlife Research Center, Beltsville, Maryland

Session abstract:
Monitoring programs for wildlife populations have become a focus for many natural resource management agencies. In many cases, however, the lack of clearly defined goals and objectives lead to poorly-designed programs that do not provide meaningful information. For example, the use of indices continue to be widespread in wildlife monitoring despite the fact that they offer little information of value about either the status (i.e., size) or change (i.e., trends) in the target population. This workshop will discuss the value of developing monitoring as an integrated information component of a larger program of either management or science (or both), address the issue of setting clear goals and objectives within the context of the larger program, identify how monitoring data can be used to achieve program objectives, emphasize the importance of consideration of design and analysis concerns before sampling, and discuss variables critical for developing science-based monitoring programs. We will describe resources and approaches for appropriate design of monitoring programs and discuss case studies from current and previous National Park Service monitoring programs.

Presenters:
Larissa Bailey, James Nichols, and John Sauer, USGS, Patuxent Wildlife Research Center, Laurel, Maryland
Greg Shriver, Marsh–Billings–Rockefeller National Historical Park, Woodstock, Vermont
Steven Fancy, National Park Service, Fort Collins, Colorado

Thursday, March 17 • late afternoon concurrent sessions • 4:00 – 6:05

Session 109 • Contributed papers
Routes to Restoration: Concepts and Practice in Restoring and Reclaiming Natural Areas
Chair: Denny Fenn, Director, Southwest Biological Science Center, U.S. Geological Survey, Flagstaff, Arizona

Active versus Passive Restoration in National Parks, Analysis and Decision Making for Protecting Genetic Diversity

Jeff Connor, Natural Resources Specialist, National Park Service, Estes Park, Colorado

Parks were established to perpetuate the natural ecosystems as near pristine conditions as possible. Like it or not, unprecedented change (environmental, social and economic) is occurring throughout the world. The future in protecting the genetic integrity of National Parks depends on our ability to manage change, and deal with it creatively and cooperatively. To do this, we will need the best information and technology available to us, and marshal the help of others. Future anthropic disturbances must be minimized in key areas. Numerous practical and philosophical questions arise relative to restoring disturbed sites. From a philosophical viewpoint, the purpose of revegetating a disturbed site is to minimize anthropic influences on ecosystems. Is active and/or passive vegetation restoration contributing to anthropic influences? It is also important to recognize influences of natural succession and employ the minimum intervention consistent with achieving results. Also, recognize that active or passive restoration may take decades or longer.

Big Egg Marsh Experimental Restoration in Jamaica Bay, New York

George Frame, Biologist, Gateway National Recreation Area, Staten Island, New York
Kathryn Mellander and Doug Adamo, Gateway National Recreation Area, Staten Island, New York

Saltmarsh islands are rapidly disappearing in Jamaica Bay, Gateway National Recreation Area, NY. Centuries of urbanization destroyed 90% of the wetlands. Now the remaining 1000 acres are losing more than 40 acres per year through internal decay and erosion. The park embarked on an experimental restoration of two acres of Big Egg Marsh using a swing-ladder dredge with high-pressure nozzle to spray sand on the marsh surface. In September 2003 the elevation was raised in varying amounts up to 50cm by thin-layer spray to study optimum target elevation for successful saltmarsh restoration. The site was replanted and fenced in October 2003. The experiment used a BACI (Before, After, Control, Impact) study design for monitoring. After one year Smooth Cordgrass covers the site. Birds and Horseshoe Crabs show preferential use of the sandy soil. Volunteers from local community organizations, colleges, businesses, and agencies are participating in the monitoring.

Reclamation is a Long-Term Prospect: Lessons Learned at Prince William Forest Park, Virginia

Jennifer Lee, Biologist, National Park Service, Prince William Forest Park, Triangle, Virginia
Carol Pollio, Acting Branch Chief, FHC Outreach Partnerships, Communications, and Information Management, U.S. Fish & Wildlife Service, Arlington, Virginia
Brian Carlstrom, Resource Program Manager, National Park Service, Prince William Forest Park, Triangle, Virginia
Greg Eckert, Restoration Ecologist, National Park Service, Natural Resource Program Center, Fort Collins, Colorado

Disturbed sites are particularly interesting areas for scientific investigation, and require consistent monitoring and vigilance. The Cabin Branch Pyrite Mine, a ten acre site on the National Register of Historic Places, has been the focus of reclamation efforts dating to 1995. The reclamation project was the result of a collaboration between the National Park Service, Environmental Protection Agency, and Virginia Department of Mines, Minerals, and Energy. Park and Biologic Resource Management Division staff, university scientists, Resource International, Inc., and the United States Geologic Survey studied highly acidic soils, water quality, sediment load, and ground- and surface water hydrology before and after reclamation. Immediate post-reclamation benefits included improved safety, a dramatic increase in water quality, and improved vegetative cover on site. After nine years, areas remain that require additional reclamation, demonstrating that disturbed site reclamation requires continual energy, resources, and partnerships to ensure long term viability in the ecosystem.

The Human Ecosystem as an Organizing Concept in Ecosystem Restoration

Gary Machlis, Visiting Senior Scientist, National Park Service, Moscow, Idaho

The restoration of severely disturbed ecosystems represents one of conservation's grand challenges in the 21st century. Restoration is particularly complex when ecosystems have been significantly disturbed and the related social, political, and economic systems have likewise been substantively (and negatively) transformed. Examples include landscapes impacted by industrial plunder (such as selected mining/timbering regions), military control (such as large-scale bombing ranges), rampant land speculation (leading to sprawl), urban decline, and more. In such cases, interdisciplinary models for restoration and conservation practice become critically important. The human ecosystem is proposed as an organizing concept in ecosystem restoration, and a specific human ecosystem model is presented that describes the critical linkages between biophysical and sociocultural variables. Application of the model to complex restoration challenges is potentially useful. An example is the restoration of Vieques, Puerto Rico — an island used by the US Navy since WWII for extensive military training, and recently returned to civilian use and conservation. The model also has potential application in other kinds of restoration efforts underway in South Florida, Chesapeake Bay, and elsewhere.

Ecological Effects of Lock and Dam Number Six in Mammoth Cave National Park

Rick Olson, Ecologist, Mammoth Cave National Park, Mammoth Cave, Kentucky

Lock and Dam 6 was built in 1906 to allow navigation of barges carrying natural asphalt from mines on the Nolin River. The demise of this business resulted in the Lock being decommissioned in 1951. Normal flow of 16 miles of the Green River and 7 miles of the Nolin River in the park is retarded by the dam. Habitats for 7 aquatic species federally listed as Endangered are seriously degraded through reduction of natural flow velocity. Green and Nolin Rivers possess one of the most diverse fish (82 species) and invertebrate faunas (51 species of mussels alone) in North America, and these populations would benefit from restoration of free flow. People would also benefit since water quality at the intake for Brownsville, KY just below the dam would improve, as would the quality of recreational non-motorized boating in the

park. Increased canoe and kayak use would have economic benefits for Brownsville as well.

Session 110 • Contributed papers
Into the Circle: Rethinking Management Strategies for Protected Lands
Chair: Rebecca Conard, Middle Tennessee State University, Murfreesboro, Tennessee

Protected Areas, Indigenous People, and Ecological Integrity
Dennis Martinez, Restorationist, Indigenous People's Restoration Network of Society for Ecological Restoration, Douglas City, California
The 1872 Yellowstone park model has now encircled the planet, with both negative and positive consequences. The positive impact is protection of large sections of wildland from development. The negative is relocation of indigenous people from their homelands and blocking of access to traditional cultural use areas. This has resulted in much loss of sustainable traditional management regimes and consequent losses of ecological integrity — including stability, resilience, function, animal habitat, and humans as a keystone species. My presentation will show ways in which indigenous peoples have cared for their homelands in a variety of ecosystems, and how their removal is causing widespread ecological degradation. I will focus on three foundations of tribal sovereignty: access, equity (co-management), and the ability to practice sustainable cultural resource management. I will explore ways in which Western scientists can work with knowledgeable indigenous elders to integrate their traditional ecological knowledge (TEK) with modern wildlife management.

Managing Agriculture, Archeology, and Natural Resources with Park Cooperators at Delaware Water Gap NRA
Larry Hilaire, Wildlife Biologist, Delaware Water Gap National Recreation Area, Milford, Pennsylvania
The agricultural leasing program at the Delaware Water Gap National Recreation Area (DEWA) is one of the largest in the National Park Service. Its program is a case study of how collaboration between public agencies and private cooperators can successfully support park management objectives while protecting park resources. Park-specific requirements for maintaining agriculture, enabling legislation mandates, and advances in agricultural management practices may sometimes appear to conflict with current NPS management policies. Issues like the use of pesticides, organic farming, genetically modified crops, crop rotations, maintaining open space and wildlife habitat, planting native grasses, pasturing and grazing, protecting underground archeological resources, and maintaining cultural landscapes are common topics addressed by agricultural programs in parks. We will look at how DEWA has managed to address all of these issues working in partnership with Special Use permittees and outside agencies.

The Water Tower — Sentinel of a Section 106 Resolution within an Extant Cultural Landscape
Frank Fiala, Superintendent, Keweenaw National Historical Park, Calumet, Michigan

This paper will examine the issues of a significant Section 106 violation that halted approximately $35 million in public and private construction within the Quincy Unit of Keweenaw National Historical Park. At issue were the effects a proposed water improvement project would have on an extant cultural landscape — a landscape consisting entirely of private property within both the National Historic Landmark District and the park. Resolution required intervention (and refereeing) of the National Trust for Historic Preservation to develop a Memorandum of Agreement between the State Historic Preservation Office, USDA Rural Development, the City of Hancock, Michigan, and the park.

Designing Dyea: Park Master Planning from a Cultural Landscape Perspective

Paul Schrooten, Landscape Architect, National Park Service, Anchorage, Alaska
Tonia Horton, Landscape Architect, National Park Service (former) and Penn State University (current) Landscape Architecture Department, University Park, Pennsylvania

Dyea Historic Townsite, Klondike Goldrush National Historical Park, poses serious questions to traditional preservation and park management methodologies due to the scale of its dramatic landscape, a tapestry of natural and cultural resources, often with conflicting protection strategies. Situated within a dynamic glacial watershed and with a historical record barely visible in archeological remains now cloaked by emergent forest, Dyea represents a formidable challenge in developing a sustainable master plan that addresses overall patterns of change. The Dyea Historic Townsite Cultural Landscape Management Plan represents a contextual integration of resource management, park operations, and interpretive strategies for Dyea's complex past and its future physical evolution as a National Historic Landmark. A follow-up to a 2003 GWS panel, "Saving Dyea," on the process of documenting and analyzing landscape change, this presentation explores how cultural landscape methodology applied in a site-specific case contributes to reshaping the contours of park planning and design.

Escape to Alcatraz

Christiana Grefe, Graduate Student, Brown University, Providence, Rhode Island

Few urban areas have a surfeit of green space. By the year 2000, however, 51% of San Francisco's land was tax exempted because of its public status. The Golden Gate National Recreation Area, or GGNRA, consists of 34,000 acres. Twelve of these belong to Alcatraz National Park. This is the only civilian penitentiary historic site to be managed and interpreted by the National Park Service, and the limits that it faces because of this federal status hinder frank discussions of the politics of incarceration. My paper will address the ways in which the NPS' cultural stewardship shaped The Rock's history to fit within their scope of pristine, sublime wilderness parks, nature preserves, and hallowed grounds of American national formation. Concomitantly, the Park Service has had to alter its conception of itself and its role in the nation to tell the story of the most notorious prison in the United States.

Session 111 • Panel discussion

Climate Change in National Parks III: Informing Management Decisions

Chairs: Julie Thomas, Air Resources Liaison, National Park Service, Washington, D.C.
Leigh Welling, Director, Crown of the Continent Research Learning Center, Glacier National Park, West Glacier, Montana

Session abstract:
Impacts of climate change on our natural resources may challenge us to rethink our entire concept of protection. Protected areas are rooted in the idea of permanence. But under rapid climate change, many protected areas, such as coastal, arctic, and mountain regions, are may be irrevocably altered. What are the best strategies for managing protected areas in the face of rapid climate change? For example, how do we protect an area if the species for which it was established can no longer survive? This panel discussion is designed as a response and discussion session to follow Climate Change in National Parks I & II, previous sessions featuring baseline research about climate change impacts and implications for management and policy decisions. Panel members will present what they see as the biggest challenges and opportunities for using climate change research to inform management and policy decisions. A 45-minute discussion will follow.

Panelists:
Eric Barron, Dean, College of Earth and Mineral Sciences, Pennsylvania State University, University Park, Pennsylvania
David Welch, Head, Environmental Quality, Ecological Integrity Branch, Parks Canada, Gatineau, Quebec, Canada
Jack Waide, National Program Coordinator, Ecosystem Research, USGS-Biological Resources Discipline
Don Neubacher, Superintendent, Point Reyes National Seashore, Point Reyes Station, California

Session 112 • Panel discussion
Art in the Parks
Chair: Gay Vietzke, Superintendent, Sagamore Hill National Historic Site, Oyster Bay, New York

Session abstract:
(pending)

Panelist presentations:
Partnership for Art and Ecology: The Museum Park at the North Carolina Museum of Art
John Pugh, Graduate Research Assistant/Doctoral Student, North Carolina State University, Raleigh, North Carolina
Roger Moore, Associate Professor, North Carolina State University, Raleigh, North Carolina
Dan Gottlieb, Deputy Director, Museum Planning & Design, North Carolina Museum of Art, Raleigh, North Carolina

This case study will focus on a creative partnership between the North Carolina Museum of Art (NCMA), North Carolina State University's College of Natural Resources and a wide variety of others to create an innovative "Museum Park." This 164-acre protected area adjacent to the NCMA in Raleigh, NC is intended to bring together the power of artists' vision in a large natural setting to create a living laboratory for the exploration of art related to the environment, ecological restoration, environmental education, the study of nature, and nature-based outdoor recreation. Our presentation will place this project within the increasingly important context of public cultural resources, urban open space, outdoor recreation resources, and urban planning. We will focus on the unusual partnerships that are making this project a reality, the innovative goals of the park, and what we believe are the broadly applicable concepts and approaches involved.

The Bunker Hill Monument Projection — Controversy and a Public Icon

Marty Blatt, Chief of Cultural Resources, Boston National Historical Park, Boston, Massachusetts

In 1998 Boston National Historical Park and the Institute of Contemporary Art (Boston) collaborated on a public art project at the Bunker Hill Monument. The artist Krzysztof Wodiczko projected the faces and voices of five Boston residents speaking about the devastation of losing loved ones to murder. The "code of silence" in Charlestown, the neighborhood in Boston that houses the monument, had led to an alarming number of unsolved homicides. The projection animated the monument, giving the impression of its coming to life. Some leaders in Charlestown denounced the projection as defilement of sacred ground, the site of the Battle of Bunker Hill, and the sanctity of the monument. This talk will explore the background of the video projection, present an excerpt from the video, and analyze negative and positive reactions. In the assessment of the speaker, this was an extraordinary work of temporary public art in that the projection gave new life and meaning to this nineteenth-century public icon.

Session 113 • Day-capper (film screening and discussion)

Out from the Park into the Heart of its Community: Filming "A Civic Engagement"

Chair: Rolf Diamant, Superintendent, Marsh–Billings–Rockefeller National Historical Park, Woodstock, Vermont

Session abstract:

Marsh-Billings-Rockefeller NHS offers the first-ever NPS program interpreting the Civil War Home Front, adding value to the efforts of all Civil War sites to provide broader interpretive context, by encouraging dialogue on the resiliency of democracy and the role of compromise and tolerance. This program inspired collaboration between the NPS and Woodstock High School to create a live original performance entitled Woodstock's Civil War — A Speak-chorus. The "speak-chorus" is a rapid-fire dramatic reading of diaries, letters and quotations based on the themes of the Home Front tour. A new 18-minute documentary film chronicles the development of the speak-chorus culminating with a final live performance at Town Hall. Most

compelling, are interviews with three of the young performers, who reflect on the lessons of history and how their view of their community, and their role in its future, have been profoundly changed by this experience.

Session 114 • Invited papers

Connecting the Dots between the Physical and Ecological Sciences III: Biodiversity and Geodiversity

Chair: Bob Higgins, Chief, Education and Outreach Branch, National Park Service, Denver, Colorado

Session abstract:

See under session #21.

Glaciers, Snow and Avalanches as Ecological Drivers of Change in Glacier National Park, Montana

Dan Fagre, Ecologist, USGS Science Center, West Glacier, Montana

Climatic change affects biological resources of national parks directly through precipitation and temperature shifts but also affects physical processes that constrain ecological responses to altered climates. Glaciers have receded at Glacier Park during the past 100 years, providing 82 km^2 of new terrain for plant colonization. As glaciers were eliminated from watersheds, late summer base flows of streams were reduced and water temperatures increased, resulting in dramatic shifts in aquatic insect distribution and abundance. Snow avalanche paths cover as much as 50% of alpine basins where avalanches are a more important source of disturbance than forest fires. Wet-snow avalanches are triggered by increasingly common rain-on-snow events and are more effective than other avalanche types at transferring soil and trees into valley bottoms where they are entrained in the aquatic systems. These linkages between the physical and biological sciences are critical to understanding ecosystem responses to climatic change.

Limestone Habitat and Metapopulation Structure of Barking Frogs at Coronado National Memorial

Caren Goldburg, Department of Fish and Wildlife Resources, University of Idaho, Moscow, Idaho

Cecil R. Schwalbe, USGS Southwest Biological Science Center, Sonoran Desert Research Station, University of Arizona, Tucson, Arizona

Barbara Alberti, Coronado National Memorial, Hereford, Arizona

We investigated the ecology of the barking frog *(Eleutherodactylus augusti),* a secretive species, at the northern edge of its range at Coronado National Memorial in southeast Arizona. Although limestone formations cover only 2.6% of the surface area of the canyon where we conducted this study, by far the majority of the frogs captured were on limestone outcrops and the movements of radio-tracked frogs were mostly confined to these outcrops. During five years of mark-recapture efforts during the breeding season, no frogs were found on a different outcrop from the one where they were originally captured. Population genetic analyses support the hypothesis that

groups of frogs living on these outcrops constitute subpopulations in a metapopulation structure. As an organism living at the edge of its range, barking frogs in Arizona may rely heavily on extensive underground areas such as those found in limestone to protect them from a physiologically challenging environment.

Beach Dynamics and Coastal Habitat: Examples from the Kona Coast, Hawaii

Bruce M. Richmond, U.S. Geological Survey, Pacific Science Center, Santa Cruz, California

Cheryl Hapke, Tom Reiss, and Gerry Hatcher, U.S. Geological Survey, Pacific Science Center, Santa Cruz, California

Beaches of the Kona Coast provide critical habitat for a variety of coastal plants and animals, including the protected green sea turtle, serve as a recreational and economic resource, provide a natural buffer during storm wave attack, and are culturally significant to the Hawaiian people. A cooperative research program between the USGS and NPS is designed to assist managers in better understanding and protecting this valuable resource. Along the Kona Coast, beach morphology and composition varies dramatically over relatively short distances, suggesting a strongly compartmentalized coastal zone. Kona beach types include "normal" intertidal beaches that undergo daily reworking by waves and supratidal "perched" beaches that are active only during episodes of high wave activity. The two primary sources of sediment are reef-derived carbonate material and erosional products from the island's volcanic rocks. The relative proportion of each component and its size class gives important information on the local source potential.

Eolian Dust: Physical and Ecological Linkages

R.L. Reynolds, U.S. Geological Survey, Denver, Colorado

J.C Neff, M.C. Reheis, and Jayne Belnap

Physical and ecological processes are commonly linked in the destiny of atmospheric dust — in its generation through wind erosion and its distribution across landscapes. The intensity of dust generation from vegetated drylands depends greatly on interannual variability in vegetation density. Deposited dust is redistributed across topographically uneven landscapes by both geomorphic and biologic (bioturbation) processes. Eolian dust in geologic substrates (soils and surficial deposits) plays critical roles in ecosystem dynamics in many types of terrestrial settings, from drylands to rainforests. Most importantly, dust may provide essential nutrients, replenishing ecosystem fertility over centuries to millennia. The atmospheric addition of silt and clay also contributes to soil texture, affecting water-holding capacities of substrates and thus, perhaps, microbial communities. The recognition of eolian dust in substrates, factored with climatic variability and (or) human-related activities, helps identify areas vulnerable to future wind erosion and rapid loss of nutrients, with potentially adverse impacts on ecosystems.

The New Concept of Geodiversity and its Influence on Biodiversity

Murray L. Gray, Queen Mary, University of London, London, United Kingdom

Geodiversity is the abiotic equivalent of biodiversity. It is a concept and term that is increasingly being used in Europe, Australia and other parts of the world to describe

the range of geological materials (rocks, minerals, fossils), soils, landforms and physical processes. Together, geodiversity and biodiversity make up the diversity of nature. Over 30 ways in which geodiversity can be valued are recognizable, and one of these involves the value of geodiversity in influencing biodiversity and ecosystem functions. The abiotic environment plays a huge role in providing diverse habitats and substrates that create biodiversity. For example, geological rock type influences soil properties. Topography creates different microclimates and hydrological conditions. Geomorphological processes create a range of active habitats including coastal, fluvial, wind-blown, glacial, periglacial, slope, volcanic and other process environments. Without this diversity of the abiotic world there would be much less biodiversity, but relationship is partly reciprocal. Some key relationships between geodiversity and biodiversity are examined in this paper.

Session 115 • Invited papers

Monitoring in the Parks III: Feedback Between Long-Term Ecological Monitoring and Ecosystem Science

Chair: Mark E. Miller, Research Ecologist, USGS, Southwest Biological Sciences Center, Canyonlands Research Station, Moab, Utah

Session abstract:

One goal for vital-signs monitoring in National Parks is to provide data to better understand the dynamic nature and condition of park ecosystems. At the same time, our understanding and conceptualizations of ecosystem dynamics play important roles in shaping the design of long-term monitoring efforts. The theme of this session is the two-way information feedback between long-term ecological monitoring and ecosystem science. Following an introduction to the session, a series of speakers will provide examples representing a range of approaches (theoretical versus empirical) and ecosystems (drylands, forests, riparian, and aquatic). Intent of the session is to illustrate the rich opportunities for vital-signs monitoring and associated activities to enhance linkages between science and management in National Parks and other natural areas.

Ecological Theory and Monitoring I: Dynamics and Conservation Management of Dryland Ecosystems

Mark E. Miller, Research Ecologist, USGS, Southwest Biological Sciences Center, Canyonlands Research Station, Moab, Utah

Ecological theory and empirical evidence suggest that ecosystems can undergo persistent changes in structure and functioning. Such shifts between alternative ecosystem "states" can be driven by natural processes such as climatic episodes, anthropogenic processes such as land use, or by their interaction. For a particular ecological situation, the likelihood of a persistent ecosystem shift is dependent on properties of the driving force as well as on ecosystem properties that interactively determine ecosystem resistance and resilience but vary in the degree to which they can be altered by managers (e.g., precipitation regime versus vegetation structure). Because of the significance of precipitation regime for ecosystem resilience, dryland

ecosystems are among the most susceptible to persistent state shifts. These theoretical perspectives on ecosystem dynamics have numerous implications for management concepts such as "impairment" and "desired future conditions," as well as for long-term monitoring and restoration efforts designed to sustain or restore ecosystem integrity.

Ecological Theory and Monitoring II: Integrated Indicators of Ecosystem Health

Andrea Woodward, Research Ecologist, USGS, Forest and Rangeland Ecosystem Science Center, Seattle, Washington

The National Park Service monitoring program aims to assess the basic health or integrity of park ecosystems by monitoring a subset of physical, chemical, and biologic elements (Vital Signs) of park ecosystems. Unfortunately, "health" and "integrity" of ecosystems are not precisely defined by ecological theory, either in general or for specific ecosystems. Theory does suggest that indicators of ecosystem health need to be integrative and they should include both structure and process. Potentially effective processes for indicating ecosystem health include flow and cycling of energy and materials, biodiversity, respiration, and transpiration. Many of these processes are potentially expensive, time-consuming, and require technical expertise to monitor. This talk describes a pilot study investigating the efficacy of several relatively affordable and non-technical methods to detect stress in forest ecosystems of the Pacific Northwest showing that soil respiration, nitrogen mineralization and leachate chemistry have promise.

Structure and Functioning of Colorado Plateau Riparian Ecosystems: Using Conceptual Models to Develop Monitoring Strategies

Michael L. Scott, Riparian Ecologist, USGS, Fort Collins Science Center, Fort Collins, Colorado

Rivers of the southwestern U.S. are inherently dynamic systems characterized by frequent and intense physical disturbance. Riparian corridors are structured by vegetation patch dynamics, driven by fluvial-geomorphic disturbances. The presence of water, nutrient-rich soils, and the interspersion of a variety of successional communities make riparian forests, particularly in arid regions, more productive and biologically diverse than surrounding uplands. A conceptual model was developed to refine a process-oriented understanding of these systems. Regional climate and upland watershed conditions produce the primary drivers of these ecosystems; streamflow regime and flow-related geomorphic processes. Reach-scale controls on channel and floodplain formation and surface and groundwater dynamics influence the pattern and extent of riparian vegetation, and associated fauna. Factors including land-use and exotic species further modify local and site-specific riparian conditions. We present elements of a riparian ecosystem monitoring strategy, involving integrated measures of stream stage, alluvial groundwater, channel geometry, and vegetation structure and composition.

Riparian Invertebrate Communities of Salt Creek, Canyonlands National Park: Variability and Finding Indicator Taxa

Tim B. Graham, Research Ecologist, USGS, Southwest Biological Sciences Center, Moab, Utah
Wyatt I. Williams, Laura J. Lingenfelter, Kim Plengemeier, and Sena Nissen, USGS Southwest Biological Sciences Center, Canyonlands Research Station, Moab, Utah
Invertebrates represent all trophic levels above primary producers, perform many ecosystem functions, and thus provide a large pool of potential indicator taxa to monitor ecosystem condition. Before they can be used, we must know which taxa are present, what functions they perform, and how they respond to natural and anthropogenic disturbances. The road closure in Salt Creek was closed in 1998, providing an opportunity to document riparian ecosystem response to elimination of vehicles. Since the closure, Canyonlands has received significantly less precipitation than normal, overlaying the natural stress of drought on potential recovery from anthropogenic disturbance. Open road and closed road communities are more similar, and show similar fluctuation patterns, while the no road site communities had different proportions of each order, and fluctuations in abundance differed from open road and closed road patterns.

Persistence, Serendipity, and Ecosystem Change: Long-term Monitoring at Bandelier National Monument

Craig D. Allen, Research Ecologist, USGS Fort Collins Science Center, Jemez Mountains Field Station, Los Alamos, New Mexico
Kay L. Beeley, Bandelier National Monument, Los Alamos, New Mexico
Long-term monitoring is challenging but rewarding, as it provides abundant opportunities for unanticipated scientific findings of management importance. Monitoring of key ecosystem parameters at Bandelier National Monument (New Mexico, USA) since ca. 1990 has spanned the transition from an unusually wet period into severe drought conditions, illustrating the essential value of long-term data to distinguish short-term variability from longer term trends. E.g., multi-scale measurements of runoff and erosion show extreme variability at all time scales, while weekly ponderosa pine tree growth shows trends that predict landscape-scale patterns of tree mortality. Previous investments in baseline vegetation data now allow us to monitor extensive drought-induced mortality of trees and grasses, while monitoring elk movements reveals extreme climate-driven differences in landscape use patterns. The value of long-term ecological data is enhanced through linkages to larger networks, e.g., LTER and Western Mountain Initiative at Bandelier, allowing local contributions to even global change-scaled issues.

Session 116 • Contributed papers

The Politics of Park-Making: International Examples and Experience

Chair: David Ostergren, Department of Political Science, Northern Arizona University, Flagstaff, Arizona

From Industrial Wasteland to Wilderness: How Zimbabwean Conservationists Redeemed Lake Kariba

David M. Hughes, Assistant Professor, Department of Human Ecology, Rutgers University, New Brunswick, New Jersey

The Mid-Zambezi Valley is one of Africa's most disturbed ecosystems; the Mid-Zambezi Valley is one of Africa's most pristine ecosystems. These divergent views of Lake Kariba and its protected areas (including Matusadona National Park) are both true, and conservationists have disseminated both of these messages to the public. In 1958, engineers dammed the Zambezi River for hydropower, inundating 5580 square km of riverine and scrub woodland. Scientists and popular writers described the ensuing lake as an ecological catastrophe. Yet, even as the reservoir filled, these authorities crafted a different message for the public: the dam, they said, was creating an artificial, lakeshore with tremendous biodiversity, beauty, and scope for tourism. Along that 2000-km shoreline, the government of Southern Rhodesia (now Zimbabwe) proclaimed a national park, a national recreation area, and two controlled hunting areas. This complex soon became a prime destination for visitors and habitat for endangered mammals (including the African elephant and black rhino). But was Kariba wild? The Department of National Parks — along with writers and photographers — grappled with this question through the 1960s, 1970s, and 1980s. Popular books claimed that the abundant flora and fauna of the lakeshore redeemed the dam-builders. Biologists and ecologists assessed the degree to which the lake had restabilized. By the 1990s, spokespeople for the Lake tacitly agreed to call it (and market it as) "wilderness." This improbable conclusion has allowed conservationists and tourists to make use of a fundamentally altered landscape. Such flexibility of mind — if only it were recognized as such — might help solve conservation conflicts in Africa and elsewhere.

Preservation and Politics: A National Park in North Cyprus

Jonathan Warner, Associate Professor of Economics, Dordt College, Sioux Center, Iowa

Since August 1974, the Mediterranean island of Cyprus has been divided along ethnic lines. Most of the Greek Cypriot inhabitants of the Karpas peninsula fled to the south. Despite an agreement of 1975 reaffirming their right to return, the Greek Cypriot community has dwindled, to be replaced by Turkish Cypriot refugees and settlers from the Turkish mainland. The Karpas is rich in natural history, the beaches being one of the few nesting-places of the Green and Leatherback Turtles. The isolation of north Cyprus meant that tourism development was slow to arise. To prevent excessive and inappropriate development, there has been support for turning the area into a national park. As the Cyprus problem edges towards a resolution, a novel political aspect comes into play: the declaration of a park could be a way of restricting the right to return of the Karpas' former residents.

Anthropological Perspectives of Transboundary Park Impact: People of the Great Limpopo Transfrontier Park, Southern Africa

Natalie Grimé, Graduate Student, Anthropology Department, American University, Washington, D.C.

This research paper discusses cultural and natural resource management issues. Additionally, it discusses conservation, sustainable development and park policy that affects local, rural, poor and indigenous people living within and around the Great

Limpopo Transfrontier Park between Zimbabwe, Mozambique and South Africa. The paper outlines the emergence of transboundary parks, historical to present park disempowerment and dislocation of local and native peoples, notes problems in general for this particular park and gives guidelines for effective management and development from an anthropological point of view. The paper's main thesis is that the local, indigenous voice for management of the park has been neglected although originally planned to be at the forefront of park creation. Thus, voice, decision making, land rights and empowerment must be given back to the local and indigenous populations for successful park management.

Conservation Areas, Tourism and Environmental Impacts in the Bragantina Region — Sao Paulo, Brazil

Joao Luiz de Moraes Hoeffel, Professor and Researcher, Tourism Department — Universidade Sao Francisco, Bragança Paulista, Sao Paulo, Brazil

Almerinda A. B. Fadini, Micheli K. Machado, and Fabio Bueno de Lima, Universidade Sao Francisco, Bragança Paulista, Sao Paulo, Brazil

Conservation of natural resources has emerged as a priority in areas sensitive to deterioration such as watershed basins. This issue determined in the State of Sao Paulo, Brazil, the creation of two Environmental Protected Areas in order to preserve the Piracicaba River Basin and the Cantareira Reservoir System. These conservation areas are located in the north area of Sao Paulo Metropolis, in the Bragantina Region. This area underwent a slow urbanization process that allowed the conservation of a cultural patrimony and significant remnants of Atlantic Forest. The doubling of regional highways has brought profound changes and impacts to the Bragantina Region that became a tourist destination, and this intensification of land use has not been accompanied by effective conservation policies and regional planning. In this study we analyze the problems and impacts generated by tourism in the conservation areas and characterize programs for maintaining the region's cultural and environmental aspects.

Session 117 • Day-capper (panel discussion with audience participation)

Creating an Innovative Organization: Overcoming Barriers to the Use of Science

Chair: Vita Wright, Research Application Program Leader, Aldo Leopold Wilderness Research Institute, Missoula, Montana

Session abstract:

Meet with managers and researchers to exchange thoughts on barriers to the use of new knowledge, tools, and ideas in resource management in the NPS, BLM, or USFS. This is a follow-up to the 2003 GWS workshop "Barriers to Science-based Management: What Are They and What Can We Do About Them?" This year's session will focus on social influences to the use of research by land managers within the agency, regional, local unit, and resource specialist organizations. Drawing from the literature on communication, organizational learning and behavior, and social-psychology, the session will begin with an overview of influences to the communication and use of new ideas within an organizational context. The group will

then explore how much innovative space there is within different administrative units, what influences that space, what influences whether individuals use it, and how information about innovations is communicated (or miscommunicated) among researchers and managers.

Session 118 • Invited papers

Managing a Moving Target: Applications of Geomorphological Monitoring in Northeastern Coastal Parks

Chair: Mark Duffy, Geographer/GIS Specialist, NPS — Northeast Coastal and Barrier Network, Berlin, Maryland

Session abstract:

The dynamic nature of coastal landforms presents complex challenges to park managers. Migrating physical features alter landscapes and threaten habitats, species, cultural resources, and park infrastructure. Long term geomorphological monitoring provides managers with information to manage effectively in the face of rapid change. Technology has vastly improved the ability to collect, present, and analyze coastal geomorphologic data. By assembling relatable datasets and making them accessible to park managers and their cooperators, informed decisions can be made and supported. This session will begin with an overview of the major geomorphologic topics affecting coastal parks and the regional monitoring program being developed to address them. Building upon this background, two papers will highlight the application of monitoring data to specific park issues at Assateague and Fire Island National Seashores. Finally, a user-friendly GIS tool to access, view, and analyze coastal data will be demonstrated.

Concepts of Coastal Geomorphological Evolution: A Primer for Tracking Change

Norbert Psuty, Director, Sandy Hook Cooperative Research Programs, Rutgers University, Sandy Hook, New Jersey

Sediment management is the current focus of nearly all aspects of shoreline concern because it is generally the one variable that can be affected by decision-making. The parks in the Northeast Coastal and Barrier Network are drawn to this variable through a combination of natural deficits in sediment availability and the effect of structures and human modification producing loci of positive and negative sediment budgets. The responses to sediment budget variations are manifested in shoreline displacements as well as evolution of the dune-beach topography in the sand-sharing system. Concepts of sediment pathways and restoration of natural processes focus on the conditions of sediment availability and the maintenance of natural vectors in the sand-sharing system. Yet, restoration does not equate to shoreline stability. Monitoring of shoreline position and the geotemporal topographical evolution document trends of displacement and geomorphological response and provide a basis for evaluation of management actions affecting sediment budgets.

Ocean Beach Monitoring in the NPS Northeast Coastal and Barrier Network

Mark Duffy, Geographer/GIS Specialist, National Park Service Northeast Coastal and Barrier Network, Berlin, Maryland

The Northeast Coastal and Barrier Network (NCBN) comprises eight parks stretching from Massachusetts to Virginia. Four of the parks contain significant ocean beaches. Park managers and scientists have identified shoreline and topography as critical resource issues. The NCBN is using ground and airborne measurements to collect beach-dune data. GPS and survey equipment are used to conduct shoreline surveys and collect elevations along pre-defined transects. Cooperative research with USGS and NASA is being used to acquire airborne topographic data for entire beach-dune systems. Multiple partnerships are being used to implement the program. Park staff and cooperators provide major input into sampling design and data development and are being targeted as primary field data collectors. USGS and NASA are developing an airborne platform for data collection and developing park focused applications. Rutgers University and the University of Rhode Island are providing scientific and technical expertise for protocol development and data management.

Geomorphologic Monitoring Guides Resource Management Decisions: Case Studies from Assateague Island National Seashore

Courtney Schupp, Geologist, Assateague Island National Seashore, Berlin, Maryland

Geomorphologic monitoring has shaped the progression of two related resource management projects at Assateague Island National Seashore. Updrift jetties block alongshore sand transport to Assateague Island, leading to frequent overwash on the sediment-starved north end and increasing the potential for island breaching. Monitoring data show that a constructed berm, built to prevent breaching while allowing overwash, is disrupting the ecosystem. Strategies to modify the structure and to restore natural processes will use biologic and geomorphologic data to improve engineering models. A second restoration effort, a long-term project to mitigate the continuing effects of the jetties, integrates morphologic and hydrologic data to identify collection and deposition sites for sand bypassing. The Park's ability to evaluate project success is enhanced both by frequent data collection for each phase of the projects and by longer-term datasets that provide a baseline. Integration of monitoring datasets enables a holistic approach to resource management and restoration.

Using LIDAR Topographic and Photographic Data for Dune Template Design at Fire Island National Seashore

Jeffrey Pace, Watershed Coordinator — Sandy Hook Cooperative Programs, Rutgers University, Sandy Hook, New Jersey

Norbert Psuty, Director, Sandy Hook Cooperative Research Programs, Rutgers University, Sandy Hook, New Jersey

Fire Island National Seashore is in a unique setting of Park units interlaced with private communities. Dune and beach management is a complicated issue of preservation of a dynamic natural system. In response to requests for privately funded beach nourishment in the communities, the Park was in need of a scientific, statistically based template of the dune and beach. Aerial photography was used to map the existing and historic natural dune crest line. 25 years of ground surveys utilizing a

total station, and 3 LIDAR surveys were used to establish the dune crest line. The 2000 LIDAR survey, chosen as a pre-erosional condition, was sub-sampled with 122 profiles. Calculations based on these profiles developed a suite of template statistics including dune crest height, crest width, dune width, beach/dune interface elevation (dune toe) and beach width. This statistical approach to defining a template established a dataset for future nourishment project evaluation.

The Coastal GeoToolbox: Providing Access to Geomorphologic Data

Arty Rodriguez, GIS Specialist, Assateague Island National Seashore, Berlin, Maryland

The Coastal Geo-Toolbox is designed to enable efficient use of shoreline, LIDAR, and general elevation data by resource managers unfamiliar with complex GIS processing methods. Created through a compilation of existing GIS tools and augmented with additional programming using VBA and ArcObjects, the toolbox is a GIS-based set of automated procedures for viewing, manipulating, and analyzing coastal geomorphologic data. It includes routines for GUI driven queries of shoreline databases and shoreline change analysis, and a series of LIDAR raster management tools including visualization, change calculation, and elevation range identification and extraction. Future additions to the toolbox include enhanced statistical analysis tools for shorelines, and automated routines for the identification of cliff and dune features. It is currently in use at Assateague Island, Cape Cod, and Fire Island National Seashores. Although designed as a coastal tool, it can be readily applied to any continuous linear features or spatially coincident raster dataset.

Session 119 • Day-capper (panel discussion with audience interaction)

Finding the Unexpected and Unexpected Use of Findings: Confirming the Unobvious through Social Science Research

Chairs: Alan Watson, Research Social Scientist, Aldo Leopold Wilderness Research Institute, Missoula, Montana

James Gramann, Visiting Chief Social Scientist, U.S. National Park Service, College Station, Texas

Session abstract:

In the decades of research conducted to improve management of our national parks and other protected lands and rivers, scientists and managers alike have often found surprising results during studies on resource or visitor management issues. The purpose of this “day-capper” session is to broaden our understanding of the value of science to include those unexpected findings and unexpected use of scientific findings and how they have influenced management. A small panel of scientists and managers will give examples and the audience will be asked to also contribute examples of such instances. Some examples will include unanticipated insight into recreation conflict, unexpected influences of recreation studies on local community issues, realization of the negative influence of management activities on visitor experiences, and some surprising characteristics of visitors to some parks. Participants will hear the stories that are not included in scientific publications and how they influenced management, and they will be expected to contribute some examples of their own.

Panelists:
Alan Watson, Leopold Institute
Jim Gramann, Texas A&M University
Steve Ulvi, Gates of the Arctic National Park & Preserve
Jeff Marion, USGS

Session 120 • Invited papers

Computer Simulation Modeling as a Tool for Park and Wilderness Planning and Management

Chair: Robert Manning, Professor, University of Vermont, Burlington, Vermont

Session abstract:
Simulation modeling is the imitation of a real-world process or system over time. Computer-based simulation modeling has been applied to park and wilderness planning and management for a number of years, but recent advances in computer hardware and software have ushered in a new generation of simulation models and applications. This session describes and illustrates this work. An initial paper outlines the history and status of computer-based simulation modeling in the context of park and wilderness planning and management, and a series of subsequent papers illustrate this work with applications in several units of the National Park System and the National Wilderness Preservation System. These applications demonstrate the usefulness of simulation modeling in 1) developing baseline data on park and wilderness use patterns, 2) monitoring indicator variables that are difficult to directly observe, 3) predicting the effectiveness of alternative management actions, and 4) estimating the maximum level of visitor use that can be accommodated without violating standards of quality. A focus of the session will be discussion and distribution of a new report authored by the session organizers and published by the U.S. Forest Service on the development and application of computer simulation modeling in park and wilderness planning and management.

Computer-Based Simulation Modeling in Park and Wilderness Planning and Management: History and Status

Jan van Wagtendonk, Research Scientist, USGS Yosemite Field Station, El Portal, California
David Cole, Research Geographer, Aldo Leopold Wilderness Research Institute, Missoula, Montana
Kerri Cahill, National Park Service, Denver Service Center, Denver, Colorado

Computer-based simulation modeling has a relatively long history in park and wilderness planning and management. The Wilderness Travel Simulation Model was introduced in the 1970s and was applied to a number of units of the National Wilderness Preservation and National Park Systems through the 1980s to estimate the number, type and location of encounters between hiking groups. However, the model was not widely adopted due to its cost and the limitations imposed by computer hardware and software. Recent advances in computing technology have made computer simulation

more accessible and affordable, and this has facilitated development and application of a second generation of simulation models and applications in park and wilderness planning and management. This paper reviews the development and application of computer simulation modeling in park and wilderness planning and management, including its history and current status. Special focus is placed on a recent collaborative project between land management agencies and university scientists to describe and illustrate the potential usefulness of computer simulation modeling to park and wilderness planning and management. The paper will describe a new report developed by this project, and copies of the report will be distributed.

Managing Automobile Traffic at Acadia National Park: An Application of Computer Simulation Modeling

Jeffery Hallo, Graduate Research Assistant, University of Vermont, Burlington, Vermont
Robert Manning, Professor, University of Vermont, Burlington, Vermont

Driving is a principal way in which many visitors experience the national parks. The scenic Loop Road in Acadia National Park is a good example of this type of park use. However, increasing use of the national parks can result in automobile congestion on park roads and this can impact the quality of the visitor experience. How many cars can use park roads without detracting from the quality of the park experience to an unacceptable degree? This study addresses this question in two ways. First, a survey of visitors to the Loop Road of Acadia National Park was conducted to determine visitor-based standards of quality for automobile congestion. Second, a computer simulation model of automobile use on the Loop Road was developed. Data used to develop the model included GPS-derived travel routes of a representative sample of Loop Road visitors and daily counts of the number of automobiles entering the Loop Road system. The model was developed using the general purpose, commercial simulation software package, Extend. The model was used to estimate the maximum number of vehicles that can be accommodated on the Loop Road system without violating standards of quality for automobile congestion.

Pattern of Use Simulation in Canada's Mountain National Parks

Randy Gimblett, Professor, University of Arizona, Tucson, Arizona
Bob Itami, GeoDimensions Pty Ltd, Sorrento, Victoria 3943, Australia
Darrel Zell, Ecosystem Data Specialist; Banff National Park; Box 900; Banff, Alberta, Canada
Dave McVetty, Client Research Specialist, Parks Canada, Winnipeg, Manitoba, Canada

This paper describes a study to improve visitor experiences, level of service and ecological integrity of those using Canada's Mountain Parks. Inherent in this study is the aim of Parks Canada to provide visitors with a level of service appropriate to their needs to pursuit a quality recreation experience. This paper addresses the need to improve an understanding of the complex patterns of distribution of park visitors, associated infrastructure and to meet the expected level of service of its visitors through the use of simulation modeling. A simulation model of human/travel patterns for Banff, Yoho, Kootenay, and Jasper National Parks from visitor survey data collected in 2003 and vehicle count data is described. The presentation will report on alternative management scenarios that were developed to investigate the impact of

proposals for major changes in visitor infrastructure on the convenience and quality of experience of visitors to these Parks.

Benefits and Challenges of Computer Simulation for Describing, Monitoring and Managing Backcountry Recreational Use

Steve Lawson, Assistant Professor, Virginia Polytechnic Institute and State University, Blacksburg, Virginia
Bob Itami, GeoDimensions Pty Ltd, Sorrento, Victoria 3943, Australia
Randy Gimblett, Professor, University of Arizona, Tucson, Arizona
Robert Manning, Professor, University of Vermont, Burlington, Vermont

This paper describes the development and application of a computer-based simulation model of recreational use in the John Muir Wilderness Area of the Inyo National Forest, California, USA. The paper describes data collection methods, simulation model design and verification, and evaluation of policy decisions related to backcountry visitor use management. The results of the study demonstrate how simulation modeling can be used as a tool for understanding existing visitor use patterns within the John Muir Wilderness Area and estimating the potential effects of visitor use policy decisions. Furthermore, this study illustrates how GIS can be used to communicate simulation modeling results in a manner that may be more useful for managers and easier for interested publics to understand. Lastly, this study identifies and describes several potential challenges associated with applying computer simulation to backcountry recreation management. The lessons learned from this study have implications for future applications of computer simulation.

Session 121 • Side meeting by invitation only • Part two of a two-part side meeting — continued from session #106

NPS Historians Affinity Meeting II

See description under session #106.

Session 122 • Part two of a two-part workshop — continued from session #107

Feral and Exotic Animals in National Parks II

See description under session #107.

Session 123 • Part one of a two-part workshop — continued from session #108

Wildlife Monitoring Programs: Integrating Objectives, Design Considerations, and Analysis II

See description under session #108.

Session 124 • Off-site day-capper — field trip via subway

Linnaeus Lives — in FDR Park, Philadelphia! A Short Field Trip

Chairs: Karen, Reeds, Guest Curator, Linnaeus and America Project, American Swedish Historical Museum, Philadelphia / Princeton Research Forum, Princeton, New Jersey

Tessa Izenour, MFA Student, Temple University, Horticulture, Ambler Pennsylvania

Meet in Lobby at 4:00 pm for trip departure.

Session abstract:

In the spirit of Linnaeus, the American Swedish Historical Museum (ASHM) invites you to a short botanical/historical walk through FDR Park, snacks, and an informal discussion at the museum. A generation before William Penn, a Swedish colonist settled this land. In the mid-18th century John Bartram and Linnaeus's student, Pehr Kalm, botanized hereabouts. In 1926, Philadelphia hosted the Declaration of Independence Sesquicentennial Exposition here. Today, this segment of Fairmount Park provides natural and recreational space for South Philadelphia, parking for sports events, and a home for ASHM, a little-known regional treasure. Your comments on this excursion — led by naturalists and historians from Fairmount Park and ASHM — will help us plan effective natural history activities for Linnaeus's 300th birthday celebrations in 2007. *Leave Loews Hotel lobby at 4 pm promptly.* Family members welcome. Dress for weather and mud! Advance sign-up recommended: info@ americanswedish.org. ($12 donation to ASHM suggested--includes roundtrip subway.)

Friday, March 18 • morning concurrent sessions • 10:00 – 12:05

Session 125 • Invited papers

The Inside/Outside Strategy: Resource Stewardship through Community Engagement

Chair: Kristin Peppel, Training Program Manager, The Conservation Leadership Network, The Conservation Fund, Shepardstown, West Virginia

Session abstract:

Many parks are facing unprecedented resource threats from increased urbanization and nowhere is this more urgent than in the Northeast and National Capital Regions. Concurrently, neighboring communities are struggling to maintain their sense of place and economic vitality. Over the last year, five parks have taken an initiative to actively engage neighboring communities in planning for a common future by combining their General Management Planning with the Gateway Communities Program's approach. Information is being collected on the park and its region, and relationships are being built to achieve the type of informed, collaborative dialogue and planning that is needed to engage key stakeholders and be able to address these challenges to both parks and communities. This panel will offer lessons learned and explore application of this approach in other locations. Each presentation will be 20 minutes and the session chair will moderate the open audience discussion following the presentations.

Addressing Resource Stewardship Issues Facing Parks: Why We Need a New Approach

Bob McIntosh, Associate Regional Director, Planning and Partnerships, Northeast Region, National Park Service, Boston, Massachusetts

John Parsons, Associate Regional Director, Lands Resources and Planning, National Capital Region, National Park Service, Washington, D.C.

Sally Blumenthal, Deputy Associate Regional Director, Lands Resources and Planning, National Capital Region, National Park Service, Washington, D.C.

Terrence Moore, Chief of Park Planning and Special Studies, Northeast Region, National Park Service, Philadelphia, Pennsylvania

For years we have discussed the challenge of threats from outside the parks, yet our planning process continues to be focused primarily on the park itself. While the internal park issues are critical to the future, part of the park's long term strategy must be to create a level of engagement and commitment of neighboring communities that are making decisions that affect the park's future. The vision of this project with five parks in our regions was to use the Gateway Communities Program approach to turn the process around ñ and begin with contacting key stakeholders and collecting information on areas around the park and using that information to identify key planning issues that could be addressed through improved collaboration with other agencies and organizations. This project has tremendous potential for enhancing resource stewardship, forging long term relationships with park neighbors, and achieving the community landscapes and parks of the future.

Forging Long-term Partnerships between Gateway Communities and National Parks

Kristin Peppel, Training Program Manager, The Conservation Leadership Network, The Conservation Fund, Shepardstown, West Virginia

Jackie Tuxill, Partnerships Program Director, Conservation Study Institute, National Park Service, Woodstock, Vermont

This project builds on over five years of successful Gateway Communities Program conducted in partnership between The Conservation Fund and the NPS. This program assists park managers and their community partners in identifying and addressing issues of common concern. This project matches Gateway Community Program experience to the planning needs of parks while making the vital connection with both analysis of trends external to the park and forging partnerships with adjacent communities. Regional and community profiles are created using a set of protocols and in cooperation with park staff and other key stakeholders. This project also used the "Gateway Community Workshop Model" tailored to the issues and needs of the parks identified in the regional and community profiles, as well as input from park staff and community partners. Each workshop involved park staff and community members including, local business owners, non-profit representatives, and state / local government leaders.

Resource Stewardship and Community Engagement at George Washington Birthplace National Monument

Vidal Martinez, Superintendent, George Washington Birthplace National Monument, Washington's Birthplace, Virginia

Carol Cook, Planner, Park Planning and Special Studies, Northeast Region, National Park Service, Philadelphia, Pennsylvania

This paper describes the resource stewardship issues facing the park and the process of both development of regional and community profiles and community engagement. This park is in the path of the next generation of growth evolving from the nearby and rapidly urbanizing Fredericksburg and Spotsylvania region. Already, transportation plans and rising land costs indicate that growth levels will increase significantly along the gateway to the park from the west. With this approach, the park and the community began their dialogue with informal discussions and a workshop to develop a common agenda to lessen the impact of future growth and create planning strategies for their shared future. This project presents an opportunity to demonstrate civic engagement strategies that will have long-term benefits to the park and the community and to evaluate the transferability of this experience to other places.

Resource Stewardship and Community Engagement at Catoctin Mountain Park

Mel Poole, Superintendent, Catoctin Mountain Park, Thurmont, Maryland

Patrick Gregerson, Chief of Planning, National Capital Region, National Park Service, Washington, D.C.

This paper describes the resource stewardship issues facing the park and the process of development of regional and community profiles and community engagement as part of their General Management Planning process. Prior to this project, the park has been cooperating with the neighboring community on sharing services but did not

have a strong relationship regarding issues related to growth. The park took this opportunity to enhance the cooperation with the surrounding area by collecting and analyzing information on trends that will affect both stewardship of park resources and community well-being. Through cooperation the community and the park increased their understanding and appreciation of their assets and their shared future.

The Yosemite National Park Gateway Communities Program
Michael Reynolds, Planning Manager, Yosemite National Park, California
Jen Nersesian, Public Outreach Manager, Yosemite National Park, California
Yosemite National Park has begun a series of programs and steps to work with its Gateway Communities to better manage communications, projects, and regional problem solving. Employing a series of different programs, events, workshops, working groups, and communication devices, the idea of a Yosemite region is taking hold among the disparate communities surrounding the park. This program, while in its infancy, offers insights and current examples to park and protected area resource managers to try techniques to not just talk about partnerships with Gateways but implement on the ground projects and programs toward better park understanding, management, planning, and ultimately resource protection on a regional scale. Successes along with challenges and failures will be discussed.

Session 126 • Panel discussion
Forest Health, Fire, and Biodiversity
Chair: Norman L. Christensen, Professor, Duke University, Durham, North Carolina

Session abstract:
The frequent fires in western forests over the past decade have generated widespread public concern and debate regarding the condition of our forested lands and their apparent increasing vulnerability to extensive and sometimes very intense wildfires. Recent legislation and management plans have emphasized fuels management, with little reference to the variations in forest structure and composition, i.e., biodiversity, that comprise those fuels and often no consideration of the different trajectories in forest change that determine fuel conditions. Fuel management, whether through prescribed or natural fire or by mechanical thinning, involves manipulating elements of the biological diversity of forests. Furthermore, wildfires, their suppression, and fuel manipulations have consequences for the biological diversity of forests that extend decades, perhaps centuries into the future. James Agee (University of Washington) will provide an overview of factors affecting variability in fire regimes and an evaluation of the effects of past, current and likely future management on wild land ecosystems. Panelists will discuss the implications of these changes for biodiversity conservation and wilderness management. Open discussion will follow.

Presenter:
James Agee, College of Forest Resources, University of Washington, Seattle, Washington

Panelists:

Jan van Wagtendonk, U.S. Geological Survey, Yosemite National Park, California
Bruce Kilgore, National Park Service (retired), Pocatello, Idaho
Carol Miller, Aldo Leopold Wilderness Research Institute, USDA–Forest Service, Missoula, Montana
Nathan Stephenson, U.S. Geological Survey, Three Rivers, California

Session 127 • Panel presentations

Exotic Plants Are Eating Your Lunch — What Now?

Chair: James Akerson, Forest Ecologist, NPS Mid-Atlantic Exotic Plant Management, Luray, Virginia

Session abstract:

This session will briefly introduce the national and regional impacts to native flora and fauna caused by exotic plant invaders. Once a person or organization gets past the notion that "It's green, what's the problem?" they may too quickly conclude that "The problem is too big, what's the use?" This session is intended to give hope by introducing means to get started and make important headway in preserving our natural and cultural resources. First, we will explore methods to assess and prioritize exotic plant invaders for eradication or control. Second, several approaches will be explored. All topics will be led by field practitioners who have tried, failed and adapted their approaches to succeed in the war on invasives.

What's On the Menu to Protect?

Speaker: TBA

One of the greatest threats to species richness in North America is the introduction of exotic invasive plants. Invasives fill and dominate the role of "pioneer species" after natural and human-cause stand impacts. Native pioneers have a limited role of site dominance for a period until other natives phase in. During the initial phase, pioneers (in general) capture the sites to minimize soil erosion and provide other amelioration for such factors such as solar inputs, microsite conditions, and soil chemical balances. Exotic invasive pioneers, without their suite of natural controlling mechanisms, do not easily give up their environmental role and thus remain dominant to their introduced sites. Biological species diversity is at risk across the country where invasives reduce native species richness. This presentation will look at the species richness at stake.

Prioritize Your Exotic Plant Battles — Get Focused

James Akerson, MA-EPMT Liaison / Forest Ecologist, NPS Mid-Atlantic Exotic Plant Management, Luray, Virginia

Exotic invasive plants move across the natural landscape at differing rates and with differing impacts upon the ecosystems they invade. Regardless of ownership, some infestations are far advanced and require large amounts of capital and manpower to tame while other infestations are early in their colonization and are easier to control. With so many invasives on the scene it is essential that managers prioritize their control activities to maximize the outcome of their efforts. A system of prioritizing

species and geographical areas for exotic species control will be introduced. The intent of the system is to focus efforts on plants and infested areas that pose the greatest biological harm while still offering the most favorable potential to actually be controlled. Factors are considered that protect prized native species, rare plant communities, and cultural values. In the end, organizations must make the greatest headway possible with their limited budgets to justify future programmatic funding.

Fast Foods vs. the Blue Plate Special: Samplings from the Northeast's Salad Bar of Diversity

Betsy Lyman, NE-EPMT Liaison

Some of the best biodiversity dining in the world can be found in the Northeastern United States. However, the unique offerings served up by this region's indigenous plant communities are under attack by aggressive nonnative species. Centuries of human habitation have altered native ecosystems, and many thousands of exotic species have been introduced, intentionally and accidentally. A small percentage of these introduced species have become unwelcome intruders in natural areas. These "fast foods" of the veggie world are threatening to put native species out of business, negatively impacting existing ecosystems and forever changing the biodiverse offerings which have existed for millennia. A sampling of these regional "blue plate specials" will be used to highlight some of the unique ingredients the Northeast has to offer and the strategies being taken by some of our parks, with help from the Northeast EPMT, to keep them on the menu.

Controlling Exotic Plants in the Desert Southwest

Curt Deuser, Lake Mead National Recreation Area-EPMT Liaison

Each Park Service EPMT has a tremendous territory to cover, with many parks to serve. The Lake Mead EPMT has 19 partner parks spread out over a distance greater than 700 miles. Just traveling to some of our park units takes a full day each way. That wouldn't leave much time left over for controlling targeted exotic plants, our commission to preserve and protect the nation's valued natural and cultural resources. Finding economies, efficiencies, and partnerships is essential to make sure we optimally serve our partners. The LAME team, in one form or another, has existed since 1996. We will share our experiences and ideas for effectiveness in this presentation.

The California EPMT's Approach: Maximizing Efficiencies and Understanding Success

Bobbi Simpson, CA-EPMT Liaison

It is abundantly clear that the EPMT program is appreciated by the parks we serve. However, is our approach (i.e., funded capability) commensurate with the size of the problem? Will we ever see the parks closing in on the last great threats and be able to design and implement invasive plant maintenance programs necessary to control incipient populations? This presentation outlines how we organize site information in such a way that we make the best use of the time we have in parks. Three areas the California EPMT has focused on to enhance productivity are planning, information management and expanding the size of the team. The next step in the development of the program is to critically examine the database and develop standardized protocols

for collection and interpretation of post-treatment monitoring data. Hurdles encountered, and steps taken to achieve this goal will be discussed.

Session 128 • Contributed papers

A Sense of Place: Understanding Relationships between the Public and Public Lands

Chair: Bill Halvorson, Research Ecologist, USGS, Southwest Biological Science Center, Sonoran Desert Research Station, Tucson, Arizona

Overlooked Landscapes of Home: Using Photographic Methods to Understand National Park Resident Sense of Place

Ben Amsden, Department of Agricultural Economics and Rural Sociology, Penn State University, State College, Pennsylvania

Richard C. Stedman, Department of Agricultural Economics and Rural Sociology, Penn State University, University Park, Pennsylvania

Tom Beckley, Faculty of Forestry and Environmental Management, University of New Brunswick, University of New Brunswick, Fredericton, Canada

Research on attachment to high-amenity places often focuses on visitors, although these settings may hold permanent residents. Visitor employed photography (VEP) has studied elements that increase recreational quality. We apply VEP to elements that foster place attachment among Parks residents. Canada differs from the U.S. as many of its National Parks contain working communities. These people and their interests are often overlooked by Park management and interpretation. We provided cameras to 50 residents of communities within Jasper National Park, Alberta, and Gros Morne National Park, Newfoundland. They took photos of elements that attached them to their community. We find that ecological and sociocultural factors tended to inform each other. Although we made comparisons across many variables, such as residence time, occupation, etc., we found strong differences by gender: women placed greater emphasis on social relationships. The implications of these and other findings for the management of parks are discussed.

Place Attachment as Process: The Case of Jackson Hole, Wyoming

David Smaldone, West Virginia University, Morgantown, West Virginia

Charles Harris, Professor; Department of Conservation Social Sciences, College of Natural Resources, University of Idaho, Moscow, Idaho

Nick Sanyal, Assistant Professor, Department of Conservation Social Sciences, College of Natural Resources, University of Idaho, Moscow, Idaho

Numerous theoretical constructs and frameworks have been studied to better understand how places become meaningful to people. These models suggest that person-place bonds are complex and multidimensional; from a transactional perspective, people are creators of places, with place creation and meaning flowing from a continual process of interaction between people and places. This paper explores places as ever-evolving points of meaning marking changes in people's lives. In a study that used mixed methods, results from questionnaires and in-depth interviews explore facets of place meanings of both visitors and locals in the Grand Teton National Park region.

Dimensions of place shaping these meanings are discussed: how and why does place attachment form and change? Three key themes are discussed: 1) life stage/course, 2) searching for a feeling, and 3) place commitment. Results indicate that length of association with place and place of residence play important roles in processes connecting people with places.

Understanding Sense of Place in Apostle Islands National Lakeshore

Richard Stedman, Assistant Professor of Rural Sociology, Department of Agricultural Economics and Rural Sociology, Penn State University, University Park, Pennsylvania

Tom Heberlein, Department of Rural Sociology, University of Wisconsin–Madison, Madison, Wisconsin

Sense of place is identified as a framework for managing parks and protected areas. Researchers have asked how visitors experience a place, what meanings it conveys, its importance, and whether they will return. The implications for management remain unclear: can and should managers attempt to manage for sense of place? Our research examines sense of place among visitors to Apostle Islands National Lakeshore. We examine strength of the landscape meanings, how they are created through time in the setting, preferred activities, and other variables. We find multiple senses of place co-existing in the same landscape: there is no single sense of place for the Apostle Islands, and hence, no "magic bullet" for structuring management goals. However, nor are these senses of place radically individualistic or ad hoc: they are rooted in the way landscapes are used and hence can be used by managers to identify and understand conflict between stakeholders.

Place-based Affect and Participation in Educational/Interpretive Programs: Exploring Differences

Laurie Harmon, Instructor, Pennsylvania State University, University Park, Pennsylvania

Harry Zinn, Associate Professor, Pennsylvania State University, State College, Pennsylvania

Mark Gleason, Adjunct Professor, Michigan Technological University, Houghton, Michigan

Place attachment theory suggests individuals are more likely to act in protective ways about places to which they are attached. Additionally, people may become attached as they interact with a place. One type of interaction is participation in educational/interpretive programs. Place attachment and participation in educational/interpretive programs was measured in 248 visitors to Isle Royale National Park during August, 2004. Place attachment measured on a single item was higher among visitors participating in programs, however, no differences were found on the multi-item place attachment scale that included a previously untested dimension of emotion-based attachment. Additionally, higher attachment levels were found among people participating in the follow-up mailback survey. This, and discussion of the qualitative responses regarding emotional attachment, may assist public land managers in understanding the emotion-based dimension of attachment

people have to places and inconsistencies between actual public responses to managerial actions and anticipated responses based on survey results.

Neighborhood Park Uses by Phoenix Residents: An Exploration of Socio-demographic Differences

Louis Machabèe, Post-doctoral Student, International Institute for Sustainability, Arizona State University, Tempe, Arizona

Jacob Oleson, Assistant Professor of Biostatistics, Department of Biostatistics, College of Public Health, University of Iowa, Iowa City, Iowa

Ann Kinzig, Associate Professor, School of Life Sciences, Arizona State University, Tempe, Arizona

In April 2003, 638 Phoenix residents completed a self-administered survey questionnaire designed to better understand the quality of life in their neighborhood. Questions were posed about neighborhood park use, landscape preferences, neighborhood familiarity and demographics. Residents living within one half mile around six parks, located in three socioeconomic categories, were polled. This presentation focuses on results concerning neighborhood park uses. First, a portrait of neighborhood parks uses by Phoenix residents is drawn. Second, an attempt to explain the variations of park uses is made. This explanation draws upon four categories of variables: 1) residents' socio-demographic characteristics, 2) satisfaction with park's physical features and recreational facilities, 3) activities taking place in parks, and 4) level of familiarity with and attachment toward the neighborhood. A review of four logistic regression models assessing the correlation of these variables with the park use is made. A brief conclusion follows.

The Sensate Experience of a National Park

Patricia A. Taylor, Professor, Department of Statistics, University of Wyoming, Laramie, Wyoming

Burke D. Grandjean, Executive Director, Wyoming Survey and Analysis Center, University of Wyoming, Laramie, Wyoming

Attempts to measure the public's experience of our National Parks has traditionally focused on whether the Park Service provided necessary services, and yet minimized crowding. More recently, attempts have been made to evaluate a wider variety of the reaction to the park experience, including reactions to noise pollution, for example. In this on-going research at Rocky Mountain National Park, we attempt to assess the public's reaction to the park experience through four senses: sight, sound, smell, and touch. We report the early results from winter survey work with the public.

Session 129 • Invited papers

Wilderness Stewardship in the East — Triumphs and Trials

Chair: Rick Potts, National Wilderness Program Manager, National Park Service, Washington, D.C.

Session abstract:

Settlement patterns of Europeans on the North American landscape in the eighteenth and nineteenth centuries resulted in relatively high densities of human population and land modification in the eastern United States. The concept of wilderness has long been easier for many people to grasp as lands that were "way out west." Indeed, after the passage of the Wilderness Act, some agency decision makers believed that there were no lands left east of the 100th meridian that could even be considered as wilderness. The debate, informed by additional legislation from Congress and input from the American public, continues today. This session explores the history of wilderness areas in the east, and provides four additional case studies illustrating the challenges for managers in the designation and stewardship of eastern wilderness areas.

Historical Overview of Eastern Wilderness Areas Establishment and Management
Doug Scott, Policy Director, Campaign For America's Wilderness, Seattle, Washington
The Wilderness Act of 1964 created one National Wilderness Preservation System, established a public process for creating wilderness areas, issued guidance to wilderness managers, and provided criteria and designated the first areas as examples of what Congress had in mind. After the agencies completed a 10-year review, Congress provided additional guidance through legislation, creating numerous additional wilderness areas. Many of the new wilderness areas created were in the eastern half of the United States, overriding the belief among some within the agencies that there were no lands east of the 100th meridian suitable for consideration as wilderness. Today, as human populations grow and wild areas continue to melt away, it is more important than ever that the American public actively participate in the wilderness stewardship process.

Wilderness Issues at Sleeping Bear Dunes National Lakeshore
Tom Ulrich, Assistant Superintendent, Sleeping Bear Dunes National Lakeshore, Empire Michigan
When the Lakeshore was established in 1970, Congress required its review for wilderness suitability. A 1981 Wilderness Recommendation proposed 30,903 acres of recommended and potential wilderness. Though the NPS forwarded the Recommendation, it never officially reached Congress. In 1982, however, Congress passed a law requiring that the proposed areas be administered to "maintain their presently existing wilderness character until Congress determines otherwise." The Lakeshore retained the 1981 Recommendation in all alternatives in a recent General Management Plan (GMP) scoping. Considerable public opposition was received, primarily concerning potential loss of road access under the recommended wilderness configuration. The GMP was stopped by the Department of the Interior. This presentation will discuss what went wrong, and how the Lakeshore is attempting to restore community relations and resolve the wilderness issue. Our intent is to begin a public process to produce a recommendation that the public will support and Congress will act upon.

Creating a New NPS Wilderness — Case Study of the Apostle Islands National Lakeshore

Bob Krumenaker, Superintendent, Apostle Islands National Lakeshore, Bayfield, Wisconsin

Apostle Islands National Lakeshore recently completed the first stand-alone wilderness study done by the NPS in over 20 years. During three years of public involvement, the NPS succeeded in turning public skepticism to overwhelming support — 99% of the written comments in the final comment period supported wilderness designation. While the local political environment was more favorable than in many areas, intensive civic engagement and open, honest, and frequent dialog — and listening — were essential elements of this success. The local business community and both political parties supported wilderness, seeing the preservation of the park's wild character as a fundamental asset to the gateway communities. This wide and deep support led to an administration recommendation to the Congress to designate 80% of the park as wilderness, and rapid enactment in the FY05 Appropriations Bill. This session will explore the what, and the how, of the successful Apostle Islands case study.

Balancing Opposing Values: Fire Management in Wilderness

Elsa Alvear, Environmental Protection Specialist, Everglades National Park, Homestead, Florida

Everglades National Park is preparing a fire management plan and environmental assessment, and must determine the appropriate minimum tools for managing fire in both designated and potential wilderness (new addition lands). This is the park's first public disclosure of wilderness issues in fire management. Drainage and roads alter the natural flow of fire that maintain natural vegetation communities. Fire managers argued for no change to current practices of tool and vehicle use in prescribed burns and suppression. National fire safety standards hold that flames over four feet high are not safe to fight with hand tools, and the prevalent habitat typically has flame lengths over twelve feet. High heat and humidity increases the chances of heat stroke. Helicopters are used for water drops in this vast park. In the Everglades, even walking trails can compact substrate. The Committee weighed the merits of normally prohibited activities and devised mitigation strategies.

Management Practices on Eastern Wilderness Trails among Appalachian Mountain Units of the NPS and USFS

Steve Bair, Backcountry, Wilderness, and Trails Branch Chief, Shenandoah National Park, Luray, Virginia

Gary F. Somers, Chief, Division of Natural and Cultural Resources, Shenandoah National Park, Luray, Virginia

Trails management on federal wilderness lands managed by the National Park Service and US Forest Service requires special attention to trails maintenance and management strategies and tools in accordance with the 1964 Wilderness Act. Trails management among several Appalachian Mountain area NPS and USFS units are examined, compared and contrasted in terms of trails management strategies, policy, trails program organizational structure and responsibility, use of traditional hand tools as the minimum tool, and special challenges of wilderness trails management among the respective agencies and units.

Session 130 • Workshop

Partnership for Ocean Stewardship: The National Park Service and National Marine Sanctuary Program

Chairs: Brad Barr, Senior Policy Advisor, NOAA's National Marine Sanctuary Program c/o USGS, Woods Hole, Massachusetts

Gary Davis, Visiting Chief Scientist, U.S. National Park Service, Washington, D.C.

Session abstract:

As the National Park Service makes the final revisions to the Ocean Stewardship Strategy. protected areas management in ocean and coastal areas is attracting considerable attention. Highlighted in the National Ocean Policy Commission Report, marine protected areas are one of the tools being put forward as an effective way to preserve natural and cultural resources, and that collaboration among marine protected area managers is essential to such preservation efforts. A number of joint programs and initiatives are being developed and implemented, including the design of a national system of marine protected areas being overseen by the joint NOAA/DOI National Marine Protected Areas Center. One key partnership in this larger choreography is one between the NPS and the NOAA's National Marine Sanctuary Program. Founded in a General Agreement between the NPS and NMSP signed in 2001, the partnership seeks to bring together Parks and Sanctuaries to share ideas, seek opportunities for expanded collaboration, and identify site-specific and program-wide joint initiatives that help the NPS and NMSP be fully successful in achieving their missions and mandates. The NPS and NMSP are launching an 18-month planning process, and are seeking ideas, insights and creative suggestions for what projects, programs and initiatives might be most effective in achieving the goals of this partnership. The session will briefly describe NPS and National Marine Sanctuary Program cooperative efforts (MOU), introduce the new NPS ocean parks stewardship strategy that was highlighted in the President's response to the Ocean Commission in January, and then use a presentation by Ann Gibbs and a couple of other specific examples of sea bed mapping as case studies exemplifying the action items in the strategy and MOU. We'll follow with a panel discussion about how to coordinate such mapping efforts in the future.

Panelist presentation:

Seafloor Habitat Mapping in the Kona Coast National Parks

Ann Gibbs, U.S. Geological Survey, Pacific Science Center, Santa Cruz, California

Susan Cochran-Marquez, Josh Logan, Eric Grossman, Mike Field, and Sallie Beavers, National Park Service, Kaloko-Honokohau National Historical Park, Kailua-Kona, Hawaii

A cooperative study between the U.S. Geological Survey and the National Park Service is focused on mapping and understanding the underwater environment in and adjacent to three National Parks along the Kona coast of Hawaii. A combination of aerial photography, bathymetric lidar, ship-towed video, and SCUBA are being used to develop detailed benthic habitat maps that will document the geological and

biological framework offshore of the parks. The bottom substrate in all three parks is volcanic in origin, however, different morphologies and coral cover make each offshore environment unique. There are increasing environmental and human pressures along this coastline, including activities such as recreational boating and diving, the creation and expansion of small-boat harbors, and the rapid development of adjacent lands. These highlight the need for comprehensive, baseline information on the current status and character of the underwater resources in order to best manage the Parks' resources for the future.

Session 131 • Invited papers

Monitoring in the Parks IV: Considerations and Insights from the Colorado Plateau and Southwest

Chair: Mark Sogge, Supervisory Ecologist, Southwest Biological Science Center, Colorado Plateau Research Station, Flagstaff, Arizona

Session abstract:

When effectively designed and executed, inventory and monitoring programs have the potential to add greatly to the knowledge of National Park Service resources, and to help guide management and stewardship activities. Creating such effective programs can be challenging, given the complexities of study designs, statistical analyses, field logistics, behavior of biological organisms, and ecological linkages. In this session, we will discuss some important lessons and experiences arising from a variety of recent and on-going inventory and monitoring projects in National Park units within the Colorado Plateau and American Southwest. Our focus will be on practical considerations that affect whether inventory and monitoring efforts achieve their desired goals, provide effective insights, and are viable for future comparisons in a complex and dynamic world.

Harvesting the Lessons of Inventorying Biological Resources: Thoughts on Design from the Colorado Plateau

David Mattson, Research Wildlife Biologist, USGS Southwest Biological Science Center, Colorado Plateau Research Station, Flagstaff, Arizona

Charles Drost, Research Zoologist, USGS Southwest Biological Science, Colorado Plateau Research Station, Flagstaff, Arizona

Planning and execution of biological inventories have been underway in Colorado Plateau parks since 1999. Lessons from this experience may be instructive for future inventories. Given limited resources, there was an inherent tension between designing inventories to estimate total species richness versus document new and often rare species, and this led to designs that were generally suboptimal for achieving either objective. Stratified random sampling was efficient for estimating species richness and adding to species lists for avifauna. Targeted sampling, which we de-emphasized, worked better for collecting useful information on mammals, herpetofauna, and vascular plants. Compromised methods may arise partly from conflicts between national-level programmatic goals and park-level needs. Species richness is a useful metric for judging program performance and the adequacy of protected areas at a

national level, but information on the identities and locations of specific rare or at-risk taxa is often more relevant to individual parks.

Where Problems Arise in Vegetation Classification: USGS–NPS Vegetation

Monica Hansen, Research Manager, USGS Southwest Biological Science Center, Colorado Plateau Research Station, Flagstaff, Arizona

Kathryn Thomas, Ecologist, USGS Southwest Biological Science Center, Colorado Plateau Research Station, Flagstaff, Arizona

The United States Geological Survey Southwest Biological Science Center and the National Park Service (NPS) Southern Colorado Plateau Network Inventory and Monitoring Program are collaborating on vegetation mapping at Canyon de Chelly NM (CACH), Mesa Verde NP (MEVE), and Petrified Forest NP (PEFO). A vegetation community analysis is being developed for all of these NPS units using the National Vegetation Classification System (NVCS). Problems arise in applying the NVCS where natural vegetation composition reflects the influence of: 1) cultural modification by the resident Native American community (CACH), 2) repeated recent fires have resulted in a patchwork of vegetation in different successional stages with variable species composition and high proportion of non-native species (MEVE), and 3) species distribution is patchy and the vegetation communities vary depending on the scale considered. These specific challenges will be described in relation to the USGS-NPS Vegetation Mapping Program.

Inventory, Monitoring, and Mapping Species-Level Vegetation Data

Kenneth Cole, Research Ecologist, USGS Southwest Biological Science Center, Colorado Plateau Field Station, Flagstaff, Arizona

Although a plant association map can be an important park management tool, these maps are inappropriate for quantifying vegetation change or examining environmental relationships for most plant species. The increase in geographic accuracy made possible through new geospatial technologies has at times unfortunately been accompanied by a decrease in taxonomic detail as ground-based observations are considered less necessary. And, plant classification schemes must be generalized in order to be useful, but these general classifications are not quantitative enough for monitoring change through time. Networks of replicable permanent plots are required for monitoring changes, while even larger networks of plant relevès are required to map distributions of individual species. Data from both can be complied into a species-level spatial database. These data can then be flexibly re-classified into multiple association schemes for specific applications. Species-level flexible mapping will be compared with a 1982 static plant association map from Grand Canyon National Park.

Considerations in Avian Inventory and Monitoring in National Parks of the Southwest

Jennifer Holmes, Biologist, USGS Southwest Biological Science Center, Colorado Plateau Field Station, Flagstaff, Arizona

Matthew Johnson, Wildlife Biologist, USGS Southwest Biological Science Center, Colorado Plateau Field Station, Flagstaff, Arizona

Mark Sogge, Supervisory Ecologist, USGS Southwest Biological Science Center, Colorado Plateau Field Station, Flagstaff, Arizona

Bird communities and species are often studied and monitored in hopes of gaining insight into physical and biological phenomena, such as changes in climate, habitat, human disturbance, or environmental contaminants. Since 1995, many National Parks in the Colorado Plateau have participated in land bird inventories, and are embarking on bird monitoring programs, as part of a new national emphasis of inventory and monitoring within the NPS. We will discuss conceptual and methodological differences between an inventory and the actual monitoring of birds, propose factors that should be considered during the inventory stage, and describe the lessons learned during our numerous bird inventory projects. We will also discuss important considerations that should be addressed when designing an avian monitoring program, including the adequacy of using bird monitoring data to detect environmental change, and the potential linkages between changes in bird populations, ecological consequences of these changes, and subsequent management practices.

Challenges in Inventory of Spatially and Temporally Rare Species: Lessons from Colorado Plateau Herpetofauna

Erika Nowak, Wildlife Biologist USGS Southwest Biological Science Center, Colorado Plateau Field Station, Flagstaff, Arizona

Trevor Persons, Research Specialist, USGS Southwest Biological Science Center, Colorado Plateau Field Station, Flagstaff, Arizona

In Fiscal Year 2000, the National Park Service initiated a nationwide program to inventory vertebrates and vascular plants. We conducted herpetological inventories at 12 of the 19 park national park units in the Southern Colorado Plateau Inventory & Monitoring Network. Parks ranged in size from less than 50 acres to over 100,000 acres, with habitats ranging from high- elevation coniferous forests to Chihuahuan desert vegetation. We used standard herpetological sampling techniques, including variants of visual encounter surveys at random and non-random localities, road cruising, and museum specimen data searches. These methods were not equally effective in detecting species. Due to the synergistic effects of ongoing drought, spatially rare species, and taxa-specific sampling design problems, we had difficulty meeting the Service-wide goal of reaching 90% inventory completeness at many parks. We review our results and make suggestions for improving future herpetofauna inventories.

Session 132 • Contributed papers

Why Do Native Americans Care About the Environment?

Chair: Abby Miller, National Park Service (retired), Burlington, Vermont

So, Why *Do* Native Americans Care So Much About the Environment, Anyway?

Cassandra Hensher, Elk Grove, California

As a California Indian and traditional basket weaver, I believe that our public lands — in fact, all lands — should be managed in full cooperation with Native Americans.

Allowing Native people to use traditional gathering techniques is essential to the survival of our cultures. Our traditions and religions are unequivocally tied to the land; without our traditional materials and without access to traditional cultural places, we have no culture, we cease to exist. Additionally, incorporating Native land management techniques into modern policies is essential to environmental restoration. Damaged and impacted environments cannot be restored to a pre-human condition — because such a state hasn't existed for tens of thousands of years. The condition we seek in our environment, a healthy condition, is a pre-European contact condition — which was created and managed by the Native Americans.

Plants, Farming, Oystering: Maurice River Coast and Salt Marsh Region Culturally Affiliated Unilachtigo

Sandra Gaskell, Environmental Consultant, Mariposa Indian Council, Mariposa, California

Sandra King-Gaskell, Eunice King-Gaskell, and Jean King-Nocon, King Family Trust, Dividing Creek, New Jersey

The cultural landscape of the Southern Unilachtigo of New Jersey is historically anchored in the swamp and salt marsh estuaries of Southern New Jersey. "Half Way," known as Dividing Creek, was the border town and edge of Indian Country until 1688. Through the association between Unilachtigo Lenape naming practices for plants and places, evidence for reconstructing the trail known as Old Beaver Dam Road may offer an explanation for the current population dispersion. Oral traditions passed down through the activities of farm life reveal the extent of historic Unilachtigo farm management practices within the coastal region of Southern New Jersey. Inside the colonial plantations, missionary farming, and resource manipulations, were the contributions of the remaining Unilachtigo which married fur traders and farmers preventing the destruction of local resources. Descendants of these early farmers worked the marsh and bear swamps, preserving them through cultivation practices passed down through their family heritage.

Common Grounds, Common Purpose: Native American Rights to Gather Resources and the NPS Mission

David Ostergren, Associate Professor, Northern Arizona University, Flagstaff, Arizona

Amanda Cronin, CESE, Northern Arizona University, Flagstaff, Arizona

Native American rights to gather natural resources from National Park Service lands has long been a source of discussion and controversy. The NPS has changed as an institution to address Native American rights while at the same time tribes have changed how they manage their resources and interact with the NPS. During a 2-day workshop in Flagstaff Arizona several representatives from regional tribes and NPS units sat down to talk. Quite simply to find common ground and identify common purpose. This presentation will provide a brief background on the government to government relationship between tribes and the NPS, provide an institutional perspective, review significant findings from the workshop including current agreements the desert southwest, and discuss the potential for future agreements, strategies and research.

Native Plant Gathering Along the Village Chain Routes of Yosemite Genealogical Family Use Districts

Sandra Gaskell, Environmental Consultant, Mariposa Indian Council, Mariposa, California

The physical landscape of the Southern Sierra Miwuk Nation was transformed by the ethnobotanical manipulations made in cultivating native plants in various ecosystems of the Sierra Nevada Foothills. Based on the geographic regional family use tracts, defined by the first USGS geographers and ethnographers, cultivation occurs at every elevation and in many microclimates as native people gather, prepare, and use thousands of California Native Plants as nutritional and medicinal components of their diets. As the population and the human footprint increases, so will regulatory policy from all levels of government that may inadvertently affect native plant gathering, cultivation, and use. Current tribal practices continue on the 50% of Mariposa County that are public lands, as well as private and allotment lands. Ancient village sites remain under the care of the current generation, and in Yosemite the reconstruction of the village Wahhogah is beginning.

Session 133 • Contributed papers

Shoreline Change

Chair: Bill Walker, U.S. Geological Survey, Reston, Virginia

Research in Small Estuary Dynamics at George Washington Birthplace National Monument, Virginia

Wayne Newell, Geologist, U.S. Geological Survey, Reston, Virginia

Rijk Morawe, Chief of Historic and Natural Resources, National Park Service, George Washington Birthplace National Monument, Washington's Birthplace, Virginia

George Washington Birthplace NM (GEWA) is an historical park located in Virginia at the confluence of Popes Creek and the Potomac River. GEWA provides an excellent opportunity to study small estuary dynamics. The history of coastal erosion, nutrient, and sediment loading from Colonial to present times is documented by both the historical record compiled by NPS and by data from continuous cores of estuarine mud collected by the USGS. The cores provide a history of more than 6,000 years of sea-level rise and include Colonial agricultural sediment. The integration of geology and local history is a witness to land-use changes, coastal erosion rates, and extreme climatic events; antecedent data provided a baseline for evaluating the impact of Hurricane Isabel in September,2003. In the Chesapeake Region GEWA is a valuable resource for baseline information and monitoring of ecosystem change. Process-focused research at GEWA now supports management decisions on remediation and protection of the ecosystem and archeological sites.

Beach Dynamics and Coastal Habitat: Examples from the Kona Coast, Hawaii

Bruce Richmond, Research Geologist, USGS Pacific Science Center, Santa Cruz, California

Cheryl Hapke, Tom Reiss, and Gerry Hatcher U.S. Geological Survey, Pacific Science Center, Santa Cruz, California

Beaches of the Kona Coast provide critical habitat for a variety of coastal plants and animals, including the protected green sea turtle, serve as a recreational and economic resource, provide a natural buffer during storm wave attack, and are culturally significant to the Hawaiian people. A cooperative research program between the USGS and NPS is designed to assist managers in better understanding and protecting this valuable resource. Along the Kona Coast, beach morphology and composition varies dramatically over relatively short distances, suggesting a strongly compartmentalized coastal zone. Kona beach types include "normal" intertidal beaches that undergo daily reworking by waves and supratidal "perched" beaches that are active only during episodes of high wave activity. The two primary sources of sediment are reef-derived carbonate material and erosional products from the island's volcanic rocks. The relative proportion of each component and its size class gives important information on the local source potential.

Shifting Sands and Shoreline Change at a Pacific Island National Park

Hilary Stevens, Natural Resources Specialist, American Memorial Park, Coastal Resources Management Office, San Jose, Saipan

American Memorial Park (AMME) on Saipan has experienced considerable shoreline erosion over the past three decades. Local residents have noted over 35 meters of beach lost since the 1970s. However, over the last 15 years, informal observations made by NPS resource staff do not support the public's belief that the shoreline is continuing to recede. Strong seasonal changes in beach profile may be responsible for the public perception of continued loss. In cooperation with the Commonwealth government, AMME has begun a shoreline monitoring project with two primary goals: 1) document seasonal changes in beach profile and shoreline position, and 2) document historical changes in shoreline position. Beach profiles, using the Emory method, are made monthly and before and after large storm events. Historic shorelines are being examined using aerial photos dating back to 1948. These photos show considerable change in AMME's shoreline, the cause of which is currently under investigation.

Promoting Natural Processes in a Geomorphically Altered Environment: Assateague Island National Seashore

Courtney Schupp, Geologist, Assateague Island National Seashore (NPS), Berlin, MD,
Arthur Rodriguez, GIS Specialist, Assateague Island National Seashore (NPS), Berlin, Maryland

Following powerful storms in 1998, a constructed berm was emplaced on Assateague Island National Seashore in an area starved of sediment by updrift jetties. The structure was designed to prevent island breaching while allowing some overwash, but it has proved impenetrable, resulting in unnatural ecosystem developments that include altered vegetation communities, interrupted morphological processes, and reduced habitat availability for piping plover, a threatened migratory bird. The Park has partnered with the Corps of Engineers to address these unintended consequences and to restore natural ecologic and geomorphologic processes to the north end of the island. In autumn of 2004, using engineering models based on monitoring data, the Park will modify the structure to allow occasional overwash into the island's interior.

The partnership will continue working to manage park resources successfully and to advance predictive modeling capabilities through the integration of science, engineering, and island observation and monitoring.

Fire, Water and the Erosion of Guam's Land and Sea

Jenny Drake, Biological Technician, National Park Service, Piti, Guam

Ian Lundgren, Anna Pakenham, Holly Tupper, and Dwayne Minton, National Park Service, Piti, Guam

Erosion is a significant issue on the island of Guam and at War in the Pacific NHP (WAPA). Upland erosion removes topsoil, destroys soil quality, clogs streams and settles on nearshore coral reefs, potentially killing them. When sufficient erosion has occurred, soil quality becomes so poor that it is incapable of supporting vegetation, leaving highly erodible, red clay "badlands." Poor land management activities and wildland arson are two of the two primary causes of soil erosion on Guam. This study examined the effects of wildfire and vegetation community structure on erosion rates in tropical grasslands within WAPA. Even though burned areas still contained plant root masses and could regenerate, erosion rates were comparable to badland areas and as much as 16x higher than vegetated savanna grasslands. Additionally, plant community composition significantly affected soil erosion. Recommendations to mitigate erosion and restore badland areas will be discussed.

Session 134 • Panel discussion

Hiding in Plain Sight: History and Civic Engagement in Urban Parks

Chair: Doris Fanelli, Chief, Division of Cultural Resources Management, Independence National Historical Park, Philadelphia, Pennsylvania

Session abstract:

At the 2003 GWS conference, Gary Nash gave an important plenary session address, "For Whom Will the Liberty Bell Toll? From Controversy to Consensus," regarding public involvement in Independence National Historical Park's (INDE) programs. This proposed session updates Nash's work by placing it in the larger context of INDE's History, Archeology and civic engagement programs. The three proposed papers use two specific sites at INDE as examples of the growing acknowledgement and interpretation of diversity in urban sites that is occurring throughout the country. They describe methods INDE has used to expand and diversify its audience while demonstrating the relevance of its major themes to all groups. This topic holds importance for all sites, especially urban areas whose past has been transformed by development. We hope to use the papers to generate productive sharing and discussion. We would welcome the inclusion of others who focus on a similar topic.

Civic Engagement at Independence Park: The President's House and the James Dexter Site

Doris Fanelli, Chief, Division of Cultural Resources Management, Independence National Historical Park, Philadelphia, Pennsylvania

Two sites in Independence National Historical Park, the President's House and the home of James Dexter, were the eighteenth century locations of momentous events in the history of race and slavery in America. For two centuries, the sites were largely forgotten in public memory. The redevelopment of Independence Mall revivified the stories of former enslaved and free African residents and invested their tales with identity and agency. Encouraged by scholars and community activists, Independence Park has embarked upon a vigorous civic engagement program. This new public fervor has caused the redesign of a major exhibition on the Liberty Bell, a Congressional resolution for the park to appropriately commemorate slavery, a grant for an archeological film, the expansion of the park's ethnographic resource inventory and the discovery of a traditionally associated group. This paper discusses the President's House, the Dexter site and their constituencies as major foci of the civic engagement program.

Historical Background of the James Dexter and the President's House Sites, Independence National Historical Park

Anna Toogood, Historian, Independence National Historical Park, Philadelphia, Pennsylvania

Independence Park's General Management Plan (1997) authorized the redesign of Independence Mall that led to the building of the new Liberty Bell Center, Visitor Center and the National Constitution Center. In accordance with section 106 of the National Historic Preservation Act, archeology preceded construction at the building sites. Historical research on the 18th century development of the blocks was carried out to inform the archeology. The first block was rich in political history. Presidents Washington and Adams both occupied a house on Market near Sixth Street. As many as nine enslaved servants worked in Washington's household. The third block proved to have an integrated community encouraged by Quaker values and landownership. The free Africans who resided side by side with white families remained indistinct due to an absence of documentation, but James Dexter, formerly enslaved, came to life through a layered web of sources, as one of Philadelphia's African American leaders of his day.

Civic Engagement and the Stewardship of the James Dexter Site, Independence National Historical Park

Jed Levin, Archeologist, Northeast Region Archeology Program, National Park Service, Philadelphia, Pennsylvania

During the late winter, 2003, the National Park Service and the National Constitution Center jointly sponsored excavation of the James Dexter site on Independence Mall in Philadelphia. This site was the home of a free African American during the closing years of the eighteenth century and was located in an area slated for development as a bus drop-off facility for a new museum. Original plans called for the preservation of the un-excavated archeological site below the new transportation facility. This paper discusses how public involvement in the decision making process transformed the stewardship approach adopted for this site from one of in situ preservation to archeological excavation and interpretation. The excavation, and controversy leading

up to it, also served to deepen local and national knowledge about the historic roots of the African American community in Philadelphia.

Conflict or Convergence? Forging New Narratives for the President's House
Charlene Mires, Associate Professor of History, Villanova University, Philadelphia, Pennsylvania
In the on-going discussion of the President's House site in Philadelphia, individuals and groups have articulated a variety of perspectives on the histories embedded at this location. This paper will explore the intersecting local and national historical narratives which have been expressed, with particular attention to the experience of African Americans in Philadelphia during the twentieth century. Public testimony points toward a new narrative for the site, linking its eighteenth-century history with later collective memory and the concerns of the present.

Session 135 • Informal discussion
IUCN World Commission on Protected Areas, North America Section: An Open Forum
Chair: Dave Harmon, Executive Director, George Wright Society, Hancock, Michigan

Session abstract:
The World Commission on Protected Areas (WCPA) is a global volunteer network of park and protected area professionals. Organized by IUCN (The World Conservation Union), the WCPA is divided into regional sections, including one for North America (Canada, USA, Mexico). Two WCPA officials — the newly elected chair, Nik Lopoukhine (formerly director of national parks for Parks Canada), and the nominee for vice chair for North America, Dave Harmon — will be on hand to discuss the commission's work plans as they relate to North America and get input from GWS2005 attendees. We are interested in hearing your thoughts regardless of whether you are currently a WCPA member.

Speakers:
Dave Harmon
Nik Lopoukhine, Chair, IUCN WCPA, Ottawa, Ontario, Canada

Session 136 • Side meeting open to all
Making Movement: Cultural and Environmental Justice Working Group
Chair: Sharon Franklet, Botanist, Pinnacles National Monument, Paicines, California

Session abstract:
We will generate working plans to address the following topics (or others that arise): (1) Urban parks, (2) Tribal sovereignty and co-management, (3) Increasing workforce diversity in parks/protected lands, (4) Heritage tourism/ honoring sites of interest to specific groups, (5) Funding for diversity presenters/scholarships at GWS 2007 and beyond.

Session 137 • Workshop

Collaboration Across the Challenge: A Workshop for the Future

Chair: Gary Machlis, Visiting Senior Scientist, National Park Service, Moscow, Idaho

Session abstract:

The Natural Resource Challenge is a significant initiative in the history of the National Park Service, and many of its key elements are making substantial contributions to resource protection and management. Examples are the Inventory and Monitoring Program, the Research Learning Centers, the Exotic Plant Management Teams, and the Cooperative Ecosystems Studies Units. The purpose of this workshop is to explore the opportunities for collaboration among these and other innovative programs of the Challenge. The workshop will include a brief presentation by NPS Associate Director Mike Soukup and short overviews from field representatives of four Challenge-related programs. The audience/participants will work to identify potential opportunities for further collaboration. The result of the workshop will be a briefing paper to be provided to NPS leadership, the managers of Challenge-related programs, and other interested NPS employees and partners.

Presenters:

Leigh Welling, Director, Crown of the Continent Research Learning Center, Glacier National Park, West Glacier, Montana

Mike Soukup, Associate Director for Natural Resource Stewardship & Science, National Park Service, Washington, D.C.

Kathy Tonnessen, CESU Coordinator, Rocky Mountains Region, National Park Service, Missoula, Montana

Carrie Phillips, I&M Coordinator, Cape Cod National Seashore, Wellfleet, Massachusetts

Paul Super, Science Coordinator, Appalachian Highlands Science Learning Center at Purchase Knob, Great Smoky Mountains National Park, Lake Junaluska, North Carolina

Tony Pernas, Everglades National Park, Homestead, Florida

Poster and Computer Demo Abstracts (listed alphabetically by lead author)

Acoustic Studies in National Parks: Standards and Protocols (computer demo)

Skip Ambrose, Wildlife Biologist, National Park Service, Natural Sounds Program Office, Moab, Utah

Shan Burson, Ecologist–Soundscape, Grand Teton National Park, Moose, Wyoming

A mission of the National Park Service is to preserve and/or restore the natural resources of the parks, including the natural soundscapes associated with units of the national park system. Director's Order 47, Soundscape Preservation and Noise Management, requires the development of Soundscape Management Plans for units of the National Park Service. The Natural Sounds Program is responsible for developing standards and protocols for acoustic studies in national parks. Acoustic data to be collected in national parks include: sound level data (1-second Leq, dBA and 1/3 octave bands, 20-20,000 Hz); identification of source of sounds, percent time audible for sounds, number of events/source/time, time of day and duration of different sources of sound, and noise-free interval. Other metrics may be required for specific situations. The Natural Sounds Program is developing database standards for acoustic data. Acoustic systems and handouts with protocols and data standards will be presented.

"Science Behind the Scenery": Using Digital Movies to Convey Research, Inventories, and Monitoring

Christie Anastasia, Science and Learning Center Education Coordinator, National Park Service/ Point Reyes National Seashore, Point Reyes Station, California

The Pacific Coast Science and Learning Center has recently released a 54-minute random access/continuous play DVD highlighting inventory work through Point Reyes National Seashore. There are eleven, 5-minute video segments on projects such as the Northern Elephant Seals, Tule Elk, and Myrtle's Silverspot Butterfly. By displaying this DVD through a poster session, I'm hoping to get feedback from those in the research field. I want to hear their opinions on how this type of media can be expanded upon to meet their needs for sharing information about their projects with the public in an easily digestible format. The accompanying poster and handouts will detail the process, equipment, software and knowledge necessary to embark on this type of project at their respective sites.

Golden Spike Locomotive Accessibility Project (computer demo)

Thomas Archibald, Ph.D. Student, Utah State University, Hauula, Hawaii

Melissa Cobern, Chief Ranger, Golden Spike National Historic Site, Brigham City, Utah

Anne Trinkle Jones, NPS Cultural Resources Coordinator, National Park Service Colorado Plateau Cooperative Ecosystem Studies Unit, Flagstaff, Arizona

The Golden Spike National Monument in Promontory Point, Utah strives to help Americans remember the great event of the joining of the Union and Central Pacific Railroads. In February of 2004, the chief ranger, Melissa Cobern, expressed a need for disabled persons to be able to explore the cabs of the two replica locomotives that were present at the driving of the last spike. Before this project, visitors could view the insides of the cabs; however, they had to ascend a staircase that was not accessible to all. Therefore, Utah State University and Golden Spike National Monument joined

together in producing an instructional kiosk enabling all the ability to view and explore the cabs of the Jupiter and No. 119. The kiosk has received an ADA accessibility award, received positive feedback from park visitors, and other parks have shown interest in producing similar sorts of kiosks. Our goal would be to show what we have done and hopefully inspire others to produce similar products.

Collaboration in the Pacific Region for Ecosystem Restoration in Hawaii and Western Pacific Parks

Carter Atkinson, Research Microbiologist, U.S. Geological Survey, Pacific Island Ecosystems Research Center, Kilauea Field Station, Hawaii National Park, Hawaii

Lloyd Loope, Research Botanist, U.S. Geological Survey, Pacific Island Ecosystems Research Center, Haleakala Field Station, Makawao, Hawaii

National Parks in Hawaii and the western Pacific are some of the most spatially and climatically diverse in the world, with habitats ranging from coral reefs to subalpine tundra over distances as small as 40 km. USGS-PIERC and National Park Service collaborate on science-based efforts at restoration of indigenous biota. Resource managers in Hawaiian and western Pacific park units are working with PIERC scientists to establish baseline community structure and species demographics, which serve as benchmarks against which restoration and recovery can be assessed. Sustainability of these unique ecosystems depends on control and prevention of invasive organisms and emergent disease. Comparison of threat to avifauna from mosquito-borne disease across Parks in Hawaii and the western Pacific suggests potential for disease management. Field trials of management tools and study of ecological interactions among native and non-native species in several Parks informs integrated pest management, and supports attempts to restore native communities.

The Jamaica Bay Institute — Working to Promoting Informed Decision Making in an Urban Ecosystem

Dave Avrin, Assistant Superintendent, Gateway National Recreation Area, Brooklyn, New York

Kim Tripp, Research Coordinator, Gateway National Recreation Area, Brooklyn, New York

In the midst of New York City lies Jamaica Bay. Broad estuarine waters, expanses of tidal wetlands, and myriad birds, fish and other wildlife are all featured in this natural haven. Conserving this unique ecosystem embedded in the urban realities of continual development, air and water pollution, and daily human demands is a tremendous challenge. Gateway National Recreation Area is committed to focus energy and resources today, in order to conserve the health and diversity of Jamaica Bay for future generations. The Jamaica Bay Institute's mission is: "To promote and improve the ecological health of Jamaica Bay through research, education, and informed decision making." Over the past 2 years, the Institute has undertaken actions to promote the following: 1) expand the body of resource knowledge; 2) share the knowledge with land managers, policy makers, and civic organizations; and, 3) apply the knowledge in resource management within and beyond park boundaries.

Equal Access to Boating: An Accessible Boat Loading Platform

Robert (Bob) Beckley, Project Leader, USDA–Forest Service, Missoula Technology & Development Center, Missoula, Montana

Safely getting into or out of a boat can pose problems for anyone. The boat may be moving and unstable. In cases where a floating dock is being used, both the boat and dock may be moving. Entering a boat that has been pulled to shore also poses problems, especially if the shoreline is steep or rugged. The poster shows and explains how a dry-loading accessible platform can be used to help boaters with mobility disabilities get into and out of a boat safely. The poster also includes information on how to obtain the publication "Accessible Loading Platform for Boaters." The publication includes plans for three ramp designs (concrete ramp, earth ramp with retaining wall, and timber ramp).

Equal Access to Drinking Water: An Accessible Hand Pump

Robert (Bob) Beckley, Project Leader, USDA–Forest Service, Missoula Technology & Development Center, Missoula, Montana

A recurring need has been an accessible hand pump for potable water in backcountry recreation sites. A market search found no hand-operated water pumps meeting accessibility standards. In response to this need, MTDC designed and built a prototype accessible hand pump that meets accessibility requirements and worked with manufacturers to establish a commercial supply of the pumps. The pump operates with no more than 5 pounds of force and its handle is easy to reach and operate for seated persons. This poster and accompanying working demo pump show how it works. The new pump is now commercially available, and the display includes information on how to purchase a pump.

Developing an Integrated Earthworks Management Plan: Balancing Legislative Mandates, Resource Protection, and Recommended Preservation Practices

Brandon Bies, Cultural Resource Specialist, National Park Service, George Washington Memorial Parkway, McLean, Virginia

Matthew Virta, Cultural Resource Manager, National Park Service, George Washington Memorial Parkway, McLean, Virginia

The George Washington Memorial Parkway was established May 29th, 1930, through the Capper-Crampton Act, which mandated the protection and preservation of the Gorge of the Potomac from Mount Vernon through Great Falls. This legislation, in addition to the National Park Service Organic Act, which established parks for the purpose of conserving "the scenery and the natural and historic objects and the wildlife therein," provides a legislative framework for the management of GWMP lands. Contained within GWMP are the remains of Fort Marcy, an 1861 Civil War earthwork constructed as part of the Defenses of Washington. Today, Fort Marcy exists in an upland deciduous forest that presents both challenges and benefits to the long-term preservation of the earthworks and the archeological resources contained within. GWMP resource management staff are attempting to strike a balance between legislative mandates, cultural and natural resource management practices, and recommended procedures for the preservation of earthworks.

Presenting Park Science to the Public — Fire Island has been Doing It for Ten Years

Michael Bilecki, Chief, Resources Management, Fire Island National Seashore, Patchogue, New York

Since 1997, Fire Island National Seashore has been holding a Biennial Science Conference. The goal of the conference is to present scientific information to the general public. Even the most technical presentations have to be geared for the general public and only those projects that receive at least some National Park Service funding are considered. Conference media reviews are positive. And each year the park receives letters and phone calls telling us how much folks appreciated the opportunity to learn about scientific studies the park is working on. The value of the conference can be measured in various ways. But the most important, exciting and beneficial, is getting the researchers together in one place so that the public, other agencies, other resource managers, public officials and park staff can meet and talk to the people doing research in the park. The challenges and successes of developing and implementing the park's science conference will be presented.

Global Contaminants in a Remote Alaska Park: Realizing that We All Live Downstream

Andrea Blakesley, Environmental Protection Specialist, Denali National Park & Preserve, Denali Park, Alaska

Long-term air quality monitoring in Denali National Park & Preserve has shown that even the most remote wilderness areas can be influenced by human activities thousands of miles distant. Each year, small amounts of industrial and agricultural contaminants are transported to Denali from other continents via atmospheric pathways. While concentrations of these contaminants are low at present, the amount of pollution reaching Denali is likely to increase over time due to global human population growth and development. Resulting declines in park air quality and accumulation of contaminants in Denali ecosystems will not be preventable using national laws alone. To help protect the park against international pollution, park managers must use indirect tools such as public education, building awareness of tangible threats and potential solutions. National parks, as symbols of unimpaired wilderness, may provide a reason for the American public to support international cooperation toward universal conservation goals.

Natural and Cultural Resources Unite through Landscape Rehabilitation at Gettysburg National Military Park

Zach Bolitho, Natural Resource Specialist, Gettysburg National Military Park and Eisenhower National Historic Site, Gettysburg, Pennsylvania

Gettysburg National Military Park is in its third year of rehabilitating the battlefield landscape to reinstitute the pattern of open fields and wooded areas present in 1863. The rehabilitation is removing mature woods from areas that were not historically wooded, replanting thickets that have since transitioned to agricultural use, and restoring new and existing open meadows and fields to native grasslands. Collectively, an interdisciplinary team of park staff and partners weaved the extensive cultural layers of the park's history into the park's surrounding natural landscapes.

This collaboration preserves both cultural values and perpetuates park natural resources. Representing one of the last contiguous open grasslands in the state of Pennsylvania, the battlefield provides habitat for a myriad of wildlife; including grassland nesting birds, important pollinator species, and state-listed species. In 2005 studies to determine how best to manage grasslands in context to preserving the cultural landscapes will be initiated.

Inspired and Shaped by Hundreds of Generations

Donald Briggs, Superintendent, Potomac Heritage National Scenic Trail, National Park Service, Harpers Ferry, West Virginia

In 1968 the Potomac Heritage National Scenic Trail was imagined as a set of pathways and routes connecting outstanding resources. Today, it's about the experience of place, about understanding the ways in which five physiographic provinces influence human adaptations and the ways that humans have shaped the land. This poster session describes a process to develop an "interpretive concept plan" as a means to articulate the significance of the Trail corridor.

Acoustic Studies in National Parks: Examples from Grand Teton and Yellowstone National Park (computer demo)

Shan Burson, Ecologist–Soundscape, Grand Teton National Park, Moose, Wyoming

What are the common natural sounds in the backcountry of Grand Teton National Park? How often can you hear aircraft and how loud are they? How does the soundscape change among seasons and locations? What percent time can over-snow vehicles be heard in Yellowstone National Park? How far can they be heard? Sophisticated automated sound monitoring systems were deployed to begin to answer these and other questions about the parks' natural soundscape and the impact of non-natural sounds. These systems document both decibel levels and digital recordings to allow sound sources, percent time audible and sound levels of both natural and non-natural sounds to be identified. Generally, non-natural sounds were louder and more numerous in developed areas and along travel corridors and natural sounds predominated in backcountry areas, but some of the details were not intuitively obvious. Park managers can benefit from accurate acoustic information for planning and park management.

Determining a Baseline of Genetic Variation in Wolves of Yukon–Charley Rivers National Preserve, Alaska

Melanie Cook, Biological Sciences Technician, Yukon–Charley Rivers National Preserve and Gates of the Arctic National Park & Preserve, Fairbanks, Alaska

John Burch, Wildlife Biologist, Yukon–Charley Rivers National Preserve and Gates of the Arctic National Park & Preserve, Fairbanks, Alaska

Sandy Talbot, Judy Gust, and Kevin Sage, USGS–Alaska Science Center Molecular Ecology Lab, Anchorage, Alaska

This study will assess baseline levels of genetic variation and connectivity of the intact, wild wolf population of Yukon–Charley Rivers National Preserve, Alaska. Collaborating with USGS-Alaska Science Center, Molecular Ecology Laboratory (ASCMEL), 100 wolf samples will be analyzed with molecular-genetics.

Microsatellite genotyping, the Polymerase Chain Reaction (PCR) and DNA sequencing will determine populational levels of heterozygosity, allelic composition, inbreeding and gene flow within and among packs. Both genetic and radio-telemetry data will be used to 1) monitor the "natural and healthy" status of this population, as mandated by the Alaska National Interest Lands Conservation Act (1980), 2) aid in the development of management plans for this population 3) and contribute to ACSMEL's effort to assess genetic variation of wolves throughout Alaska. Additionally, this genetic baseline could serve as a gauge against which fragmented or isolated wolf populations throughout the world could be compared.

Partnerships in Monitoring: A Water Quality Example from American Samoa

Eva DiDonato, Ecologist, National Park of American Samoa, Pago Pago, American Samoa

Kevin Summers, United States Environmental Protection Agency, Gulf Ecology Division, Gulf Breeze, Florida

Guy DiDonato, Research Scientist, American Samoa Environmental Protection Agency, Pago Pago, American Samoa

Quality environmental monitoring is a logistically and financially challenging endeavor. For this reason, the National Park of American Samoa (NPSA) developed partnerships with the American Samoa Environmental Protection Agency (ASEPA) and the United States Environmental Protection Agency (USEPA) in 2004 to conduct a Territory-wide water quality survey. This survey utilized the Environmental Monitoring and Assessment Program (EMAP) protocols, and its purpose was to document a set of environmental indicators to assess the ecological condition of coastal resources. Water, fish, and sediments were collected from fifty sites selected randomly in Territorial coastal waters extending out from shore. The study design will allow a comprehensive assessment of the condition of Territorial waters; furthermore, it will quantify the condition of National Park waters relative to the Territory. One major benefit for all involved parties is the identification of emerging water quality concerns in this remote island Territory.

The Trinity Concept: A Catalyst for Restoration and Preservation through Partnerships at Pea Ridge National Military Park

Kevin Eads, Chief of Resources Management, Pea Ridge National Military Park, Garfield, Arkansas

A two-year case study on the effects and accomplishments of the "Trinity Concept" in which Cultural and Natural Resources and Fire were managed and applied in a congruous nature to develop a synergism whereby Historic Landscapes were restored and partnerships developed. These two accomplishments have begun to feed off each other enhancing the effectiveness of one while increasing the occurrence of the other. This influence has served to assist the park in the obtainment of its goals and objectives in one of its primary desired future conditions. Pea Ridge National Military Park was established to preserve and protect the historic landscapes and resources associated with the battle of Pea Ridge that occurred on March 7th and 8th, 1862.

A Comparison of Recreational Use Between National Seashores and Other Recreational Beaches in North Carolina

Christopher L. Ellis, Graduate Student Intern / National Park Service, Social Science Program Office, East Carolina University, Greenville, North Carolina

Hans Vogelsong, Assistant Professor, East Carolina University, Department of Recreation and Leisure Studies, Greenville, North Carolina

In addition to protecting areas of our rapidly developing coastline, National Seashores may provide unique opportunities for recreational use that are not found at other beaches within a given region. The purpose of this paper is to observe differences in visitor use at National Seashores compared to other beach types in the state of North Carolina. Areas of focus include personal demographics, activity participation, and preferences for certain site-specific beach attributes. On-site visitation data was collected for this project from seven North Carolina beaches between July and November 2003. Surveys were conducted at Cape Hatteras National Seashore, Cape Lookout National Seashore, and a variety of other beaches managed by local, regional, and state authorities. By recognizing differences between users of different types of beaches, managers can better understand the aspects of their sites that make them attractive, and help to maximize the positive experiences of their visitors.

Allegheny Portage Railroad National Historic Site Acid Mine Drainage Treatment Alternatives: USGS/NPS Cooperative Study on ALPO AMD

Alan Ellsworth, Northeast Region Hydrologist, National Park Service, Milford, Pennsylvania

Charles Cravotta III, Hydrologist/Geochemist, USGS WRD, New Cumberland, Pennsylvania

Kathy Penrod, Natural Resource Specialist, Allegheny Portage Railroad National Historic Site, Gallitzen, Pennsylvania

An NPS Northeast Region-funded cooperative study utilized field and laboratory analyses to quantify chemical loading and prescribe active and passive acid mine drainage treatment alternatives at the Staple Bend Unit of Allegheny Portage Railroad NHS. Synoptic surveys measured inorganic chemistry at baseflow conditions for known mine discharges and two proposed treatment settling ponds. Abandoned mine drainages produced a flow weighted average of 3.1 for pH and 0.75 mg/L and 5.4 mg/L for iron and aluminum, respectively. Laboratory cubitainer tests examined the efficacy of steel slag and limestone as mediums for water treatment. Resultant data was entered into AMDTreat to estimate size and cost for construction of acid mine drainage treatment systems.

Potomac Gorge Wetland Inventory, Mapping, and Characterization Project

Linda Erdmann, Project Manager, Mangi Environmental Group, McLean, Virginia

Tim Gaul, GIS Specialist, Mangi Environmental Group, McLean, Virginia

E.O. 11990, Director's Order #77-1 directs the NPS to conduct parkwide wetland inventories or obtain such inventories from other sources such as the National Wetland Inventory (NWI) to assure proper planning with respect to management and protection of wetland resources. However, NWI is not highly accurate and tends to omit smaller wetland occurrences. This was the case in the Potomac Gorge, a high

gradient reach of the Potomac River encompassing approximately 9,700 acres in the Washington metropolitan area. This ecologically significant area harbors unique and diverse wetland communities that are highly susceptible to degradation or loss due to human activities. A more detailed wetland inventory was conducted using a combination of satellite imagery interpretation, ancillary GIS wetland indicator data, groundtruthing, and field delineation to identify wetlands. This approach focused field efforts to only 8% of the project area reducing labor effort and cost, while providing an accurate and comprehensive wetland inventory.

"Main Street" in Keweenaw National Historical Park

Frank Fiala, Superintendent, Keweenaw National Historical Park, Calumet, Michigan

This poster will highlight steps Keweenaw National Historical Park took to successfully leverage the National Main Street Program within the Village of Calumet, Michigan. Overall, the vast majority of land within the park is mandated to private ownership which requires cooperation and collaboration by the park. See how the Main Street Program was an ideal program for this partnership park in achieving park goals for both historic preservation and economic development within this National Landmark District.

Setting Objectives, Monitoring Achievements and Reporting Results in Fire Effects Monitoring

Melissa Forder, Lead Fire Effects Monitor, Shenandoah National Park–Northeast Region, Luray, Virginia

The use of prescribed fire on park lands has led to the need to monitor the short-term and long-term effects of fire on the landscape. DO-18: Wildland Fire Management (USDI NPS 1998) mandates that: 1) fire effects monitoring must be done to evaluate the degree to which objectives are accomplished; 2) long-term monitoring is required to document that overall programmatic objectives are being met and undesired effects are not occurring; and 3) evaluation of fire effects data are the joint responsibility of fire management and natural resource management personnel. Using an example from a National Park, I will show in a poster how fire effects monitoring crews can work with managers to identify prescribed fire objectives, monitor the achievement of these objectives, and present the results in a way that allows managers to make sound, science-based management decisions.

National Park Service Sabbatical in the Parks Program

Brian Forist, Senior Research Associate, Texas A&M University/NPS Social Science Program, Washington, D.C.

The National Park Service (NPS) has a twofold scientific responsibility to use the best available science in park management and to encourage research in parks that benefits society as a whole. To effectively undertake these dual responsibilities of "science for parks" and "parks for science" the NPS must enlist the help of the academic community, and facilitate scientific inquiry in the parks. The Sabbatical in the Parks Program assists in arranging faculty sabbaticals to conduct research and other scholarly activity that provides usable knowledge for NPS management and/or advances science and human understanding. The program works by providing faculty

members and park staff with the services of a sabbatical clearinghouse through which all arrangements are made. Program information will be provided for university faculty members and park managers. Information on past and current sabbatical activities will be featured.

Potomac Gorge Wetland Inventory, Mapping, and Characterization Project Demo (computer demo)

Tim Gaul, GIS/Natural Resource Analyst, Mangi Environmental Group, McLean, Virginia

Linda Erdmann and Rebecca Whitney, Mangi Environmental Group, McLean, Virginia

The National Park Service and The Nature Conservancy contracted with Mangi Environmental Group, Inc., to conduct an inventory and characterization of wetlands found in the Potomac River Gorge in support of a Site Conservation Plan. The approach for this inventory utilized a combination of satellite and aerial imagery analysis, digital soil survey data, high resolution topographic information, hydrologic information, National Wetlands Inventory, and GPS assisted field survey efforts to delineate and characterize wetlands along a 15-mile, 9,700-acre stretch of the Potomac River. The final product of this effort included a report and corresponding GIS data layer of all wetlands inventoried in the Potomac Gorge project area. Tabular data for this layer included such information as a primary and secondary Cowardin classification, GPS accuracy, acreage, and a hyperlinked photo of the wetland taken during field delineation efforts. The data used for the analysis, methods used, and final data product will be demonstrated.

Nature Guides: A Partnership of eNature.com and the National Park Service (computer demo)

Bill Gawley, Acadia National Park, Bar Harbor, Maine

Jen Coffey, Natural Resources Web Manager, NPS Washington Office, Fort Collins, Colorado

Kathy Jope, Regional Natural Resources Program Chief, NPS Pacific West Region, Seattle, Washington

Through a cooperative agreement with the National Park Service, eNature.com is providing the material for an on-line nature guide for parks whose species lists have been certified through the NPS Inventory & Monitoring program. Parks can customize the species accounts to reflect park-specific situations. The nature guide is automatically linked through the park's "Nature and Science" web page, which is created through the Natural Resource Profiles program. Parks' nature guides are also linked to eNature.com and the website of its parent organization, the National Wildlife Federation, the largest membership organization in the world. Through this exciting partnership, we hope to bring an awareness of the natural wonders of the National Park System, and their documentation through the Inventory & Monitoring program, to a wider audience than ever before. This presentation gives participants an introduction to the Nature Guides program and its possibilities.

The Isle Royale Institute: A NPS and University Partnership in Promoting Education and Research (computer demo)

Mark Gleason, Director, Isle Royale Institute, Michigan Technological University, Houghton, Michigan

This poster/demo session will explain the history that lead to the creation of the Isle Royale Institute (IRI) as well as its activities that promote public education and research. IRI is a partnership between NPS, Michigan Technological University, and the University of Minnesota Duluth with a mission to promote education and research at Isle Royale National Park and on the waters of Lake Superior. This Institute has undertaken many of the traditional activities that other park Institutes provide but with some additional activities that are unique. One of those unusual projects that the display will explain is the Institute's Remotely Operated Vehicle (ROV). ROVs are small-unmanned vehicles that have cameras, lights, and the ability to explore underwater while the non-diving operator remains on the surface. This small underwater ROV is being used to involve the public in and support NPS efforts to conduct non-invasive research. The Institute is promoting a stronger public understanding of our resources through its programs.

360-degree Photo Monitoring and General Photography

Greg Gorfkle, Photographer, Seattle, Washington

The exhibit depicts samples of 360-degree photography taken at the Grand Canyon NP, Capitol Reef NP, and the Olympic NP to illustrate how this technique serves to preserve complete visible contexts as records of our protected areas for resource management, educators, and other professionals in the natural and social sciences. Conventional photo monitoring and general photography inherently fragment out perception of protected lands with images that picture small sections of vast areas. This exhibition serves to illustrate how 360-degree photography serves to build a visual framework for resource management. Adding 360-degree perspectives facilitates better communication by sharing highly detailed, expansive visual contexts amongst researchers, natural and cultural resource managers, administrators, educators and other professionals who work on behalf of scientific and heritage values. Three hundred sixty-degree photography is a unique tool, capturing views that are virtually impossible to obtain with the naked eye. This method of photography can be used as a powerful analytical tool in any area that demands detailed photo-documentation. Three hundred sixty-degree photography permits a contiguous scene surrounding a single camera position to be viewed directly and without interruption. When scenes are re-photographed later, the images uniquely convey specific changes about the overall context of the landscape and lend greater veracity to the partial views recorded by conventional photo monitoring methods using general photography.

Maintenance Matters: Illustrated Guidelines for the Treatment of Historic Properties at Petrified Forest National Park

Andrew Gorski, Graduate Student, College of Architecture and Landscape Architecture, University of Arizona, Tucson, Arizona

Michael Lovato, Graduate Student, College of Architecture and Landscape Architecture, University of Arizona, Tucson, Arizona

The historic resources at Petrified Forest National Park in Northeast Arizona were constructed during two main periods of development. Early park service planning and design principles were the driving force behind the development of the Rainbow Forest District in the 1930s. The National Park Service's Mission 66 initiative produced the Painted Desert Community, a complex of modern buildings and plazas designed by master architect Richard Neutra. Envisioned to assist maintenance staff with understanding the unique historic resources of the park, the maintenance guidelines are illustrated with photographs, drawings and diagrams that inform the user of the history and significance of these different resources, while providing guidance and technical assistance on appropriate maintenance and preservation treatments. The guidelines are conceived as a dynamic resource management tool that can be utilized for a variety of management needs, complimenting existing and yet to be developed strategies being employed by the park.

The Amphibian Research and Monitoring Initiative on the Colorado Plateau: Pitfalls to Selecting Survey Sites

Tim Graham, Research Ecologist, USGS, Southwest Biological Science Center, Canyonlands Research Station, Moab, Utah
Sarah Willbrand and Jessica Reilly, USGS, Southwest Biological Science Center, Canyonlands Research Station, Moab, Utah
Gery Wakefield, National Park Service, Southeast Utah Group, Moab, Utah

The Amphibian Research and Monitoring Initiative (ARMI) initiated a Colorado Plateau Mid-Level Survey Area (MLSA) in 2001 of Canyonlands National Park with adjacent Glen Canyon NRA and BLM lands. ARMI measures the Proportion of Areas Occupied (PAO) for each amphibian species. Protocol development includes selection of areas that 1) allow us to draw inferences about amphibian condition throughout the MLSA (i.e., sites are selected at random); 2) can be visited at least twice in a survey period; and 3) are likely to contain amphibian habitat. We will discuss the difficulties in developing an amphibian monitoring program in this arid environment including lack of definitive criteria to identify amphibian habitat, multiple visits (at least two) to each survey site is difficult in rugged topography, and uncertainty of finding habitat in a given randomly selected area.

Ant Community Structure in Grand Staircase–Escalante National Monument: Response to Drought or Anthropogenic Disturbances

Tim Graham, Research Ecologist, USGS, Southwest Biological Science Center, Canyonlands Research Station, Moab, Utah
Wyatt Williams, Department of Biology, Boise State University, Boise, Idaho

Ants can be important ecosystem drivers, and community dynamics of ants can play a role in ecosystem response to disturbances and environmental stress. At The Gulch and Steep Creek, in the Grand Staircase–Escalante National Monument, ant community composition was determined in each year from 1999 through 2003; samples were collected only in fall 1999, in spring and fall in other years. Specimens were identified to genus and assigned to functional groups. Genera with numerical dominance differed at the two sites, and at the same site over time. There were significant positive and negative relationships between some genera pairs and

functional groups within sites over time and between sites at the same time. Intensity, and even direction of interactions differed between sites. Relative importance of inherent site differences, drought, and recent changes in management of the two sites in ant community dynamics will be discussed.

Peregrine Falcon Satellite Tracking in Virginia and Shenandoah National Park

Rolf Gubler, Biologist, Shenandoah National Park, Luray, Virginia

Over the last two decades, Virginia coastal peregrine populations have made a slow and steady recovery while Central Appalachian populations have lagged behind. The goals of this multi-agency peregrine tracking study (FalconTrak) were 1) to boost state-threatened peregrine populations in the Central Appalachians and 2) to track 19 young peregrines over three years to learn more about their dispersal patterns, wintering areas, and mortality rates. 2002 and 2003 tracking data showed that many peregrines used major rivers and mountain ranges for early dispersal in summer. Fall 2003 migration routes and wintering destinations varied. One falcon wintered in coastal Delaware (Harpers Ferry, 2003). Others went on long migrations to Florida (Harpers, 2002 & Wallops Island, 2002) and Panama (Watts Island, 2002). Two falcons migrated northeast and wintered in coastal New York (Shenandoah, 2003). One falcon went inland and wintered in Pittsburgh, Pennsylvania (Shenandoah, 2002). First-year peregrine mortality rates were 50-65%.

Seismic Sensors Protect Sensitive Bat Colonies

David Hays, Resource Management Specialist / GIS, Lava Beds National Monument, Tulelake, California

The extensive lava tube cave system of Lava Beds National Monument provides unique habitat to a variety of wildlife. One fragile resident is a population of threatened Townsend's big-eared bats *(Corynorhinus townsendii).* Even the most minor disturbance suffered by maternal colonies of these bats can cause them to abandon their roosts and young. Although the park has posted closures and tried to educate visitors about bat conservation, trespass into closed caves was a persistent problem and the bat population was considered in jeopardy. Leveraging new technology to manage this problem, Lava Beds deployed 10 seismic sensors to the entrances of the most heavily impacted roost caves. Using automated radio alerts, these sensors allowed law enforcement rangers and resource management staff to immediately respond to cave trespasses. The result has been a zero-intrusion record for the length of the entire summer breeding season, a first for the park.

Integrating Natural and Cultural Resources in Hawaiian and Pacific National Parks: I&M Program Working with Indigenous Culture

Leslie HaySmith, Pacific Islands I&M Network Coordinator, Hawaii Volcanoes National Park, Volcano, Hawaii
Darcy Hu, National Park Service, Pacific West Regional Office , Honolulu, Hawaii
Fritz Klasner and Gordon Dicus, Hawaii Volcanoes National Park, Volcano, Hawaii

The Pacific Island Network (PACN) includes 8 National Parks in the Hawaiian Islands, Guam, Saipan, and American Samoa which encompass multi-ethnic groups of Hawaiian, Chamorro, Carolinian, Samoan, and immigrants. The Inventory and

Monitoring Program (National Park Service) works with these cultures to fulfill NPS mission, and select Vital Signs to monitor. A sixth goal was added to PACN Monitoring program goals: "To provide data to better understand, protect, and manage important resources that share cultural and natural value." To illustrate, numerous inventories and/or monitoring are being conducted as Vital Signs in PACN Parks that share cultural and natural value: Royal Hawaiian fishponds; Samoan fisheries harvest; traditional celestial/astronomical lightscapes; Hawaii park underwater sounds; collection & curation to improve NPSpecies and ANCS+ linkages; a culturally oriented out-planting landscape map, and/or plant list in Hawaii and Saipan; monitoring of erosion/deposition from anthropogenic fires in Guam; in American Samoa an ethnobotanical survey, and GIS mapping of subsistence agriculture plots; creel surveys in American Samoa and Guam; cave inventories of Hawaiian culturally significant and rare cave biota sites; and invasive species with cultural significance creating management challenges.

Righting a Century's Wrongs: Environmental Justice on the Cheyenne River Indian Reservation

Jeffrey Henderson, President and CEO, Black Hills Center for American Indian Health, Rapid City, South Dakota

David Nelson, Director, Environmental Protections Department, Cheyenne River Sioux Tribe, Eagle Butte, South Dakota

The Cheyenne River Sioux Tribe has endured greater than a century's worth of environmental injustices, from the effects of nearby heap-leach gold mining, to use of a portion of the reservation for an aerial gunnery range, to the purposeful flooding of over 100,000 acres of prime reservation land, including over 80,000 acres of productive river bottom lands. We have recently secured an environmental justice grant from NIH to foster among Cheyenne River Sioux tribal members an awareness and appreciation of prominent environmental health issues sufficient to drive an organized agenda of environmental health activities, planning, and policy, for the betterment of tribal members' health and the ecology of the reservation. This goal will be accomplished using both qualitative and quantitative methods, and by assisting the Tribe to create a quasi-independent Environmental Health Advisory Board with both regulatory and enforcement authority.

Planting Native Grasses: How to Implement Management Policies on the Ground

Larry Hilaire, Wildlife Biologist, Delaware Water Gap National Recreation Area, Milford, Pennsylvania

Current management policies, in conjunction with Executive Order 13112, direct the National Park Service to use native plants whenever possible in restoration and construction projects. The problem is that many parks don't know how to implement this policy, particularly where it pertains to restoring significant acreages of native grasses and forbs. The Delaware Water Gap National Recreation Area has re-established over 200 acres in native grasses using various methods over a number of years. This poster will outline such topics as seed sources and ecotypes, ground preparation, planting techniques, and post-emergence monitoring and management.

HABS in the Southwest: A Cooperative Project by NPS, BLM, and the University of Colorado-Denver

Michael Holleran, Associate Professor of Urban and Regional Planning, College of Architecture and Planning, University of Colorado at Denver, Denver, Colorado
Luis H. Summers, Meera S. Joshi, Alan Scheer, and Mark Sullivan, College of Architecture and Planning, University of Colorado Denver, Colorado

This poster highlights a project by the NPS Heritage Partnerships Program (Intermountain Region), BLM, and the University of Colorado-Denver (UCD) to complete Historic American Buildings Survey (HABS) documentation of three sites in the Four Corners area of the Southwest. The sites are the Cannonball Pueblo, Colorado, which was occupied during the 12th and 13th centuries, and includes over 100 masonry structures, and the Margarita Martinez and Senon S. Vigil homesteads, which represent late 19th- and early 20th-century Hispanic settlement in New Mexico's Upper Largo Canyon. BLM, which manages these sites, had requested HABS assistance from the NPS Heritage Partnerships Program, Intermountain Region. The Heritage Partnerships Program, which administers HABS projects in an 8-state area including Colorado and New Mexico, developed a cooperative project, through the Rocky Mountains CESU, with UCD to complete the work. The UCD team completed 12 ink-on-Mylar measured drawings of the sites.

A Gopher Tortoise Management Plan for the Timucuan Ecological and Historic Preserve (TEHP)

Ken Hoover, Professor of Biology, Jacksonville University, Jacksonville, Florida
Shauna Ray Allen, Natural Resource Management Specialist, Timucuan Ecological and Historic Preserve / Fort Caroline National Memorial, Jacksonville, Florida

TIMU scientists partnered with Jacksonville University scientists to locate and map tortoise distributions on the preserve and to identify suitable management practices for the tortoises and their habitat. This project also identifies and classifies areas suitable for additional gopher tortoise habitat and recommends management practices specific to these areas that will promote viability of existing gopher tortoise populations without use of prescribed fire. It also recommends application of these management practices to corridors of habitat to link isolated populations and help promote genetic viability. The management plan identifies opportunities for cooperative conservation in preserving and enhancing habitat areas. Management plans for areas where prescribed fire is not an alternative call for labor-intensive techniques. Volunteers from local high schools and universities wishing to fulfill community service requirements could participate by providing significant blocks of labor necessary to implement each of the management steps. Owners and managers of adjacent lands with gopher tortoises provide opportunities for enhancement of the gopher tortoise populations through cooperative management agreements. These management practices were incorporated into a management plan that will provide a framework for preserving, enhancing and expanding habitat for tortoises on the preserve.

Partners Against Crime: Law Enforcement Monitoring of Archeological Sites at Grand Canyon National Park

Amy Horn, Archeologist, Grand Canyon National Park, Grand Canyon, Arizona

Grand Canyon National Park encompasses 1.2 million and includes an estimated 50,000 archeological sites. With only 3% of the park surveyed and 2 archeologists committed to inventory and monitoring, the workload is overwhelming. Grand Canyon Park staff have undertaken an innovative partnership between archeologists and law enforcement personnel to more effectively manage archeological resources. The ultimate goal of the program is to reduce unintended impacts to archeological sites and detect and prosecute ARPA violations. The program includes training in archeological monitoring and field techniques for law enforcement staff, ARPA training for archeologists, and the development of an ARPA task force. The ultimate success of the program is increased communication between archeological and law enforcement personnel.

Implementing the National Cave and Karst Research Institute Vision

Louise D. Hose, Director, National Cave and Karst Research Institute, National Park Service, Carlsbad, New Mexico

Penelope J. Boston, Associate Professor, National Cave and Karst Research Institute / New Mexico Institute of Mining and Technology, 801 Leroy Place, Socorro, New Mexico

(Thomas Strong, presenter)

The National Park Service (NPS) and New Mexico Institute of Mining and Technology (NMT) have worked with diverse members of the cave and karst community over the last two years towards the development of the National Cave and Karst Research Institute (NCKRI), addressing NCKRI's Congressional mandate, the needs and opportunities in the discipline, the appropriate range of activities, and how to most effectively structure NCKRI. Efforts now concentrate on implementing the vision. The National Park Service is moving NCKRI towards a "jointly administered" structure in which NMT will plan, coordinate, and administer the Institute and its programs while the NPS will have ultimate responsibility and retain indirect control. NCKRI's third primary partner, the City of Carlsbad, plans to begin construction of the Institute headquarters in early 2005 and complete the project about 18 months later. Over $4 million has been appropriated or pledged towards the building.

Congaree National Park's Old Growth Bottomland Forest Research and Education Center

Bill Hulslander, Chief, Resource Management, Congaree National Park, Hopkins, South Carolina

Christina Hulslander, Education Coordinator, Congaree National Park, Hopkins, South Carolina

The Old Growth Bottomland Forest Research and Education Center is located at Congaree National Park near Columbia, South Carolina. The Center was established to encourage and facilitate scientific research and to promote learning centered on three primary themes; 1) research in environmental change, 2) environmental education and 3) GIS technology. The Center provides laboratory and dormitory facilities for scientists and has sought to expand the use of citizen scientists to enhance research and facilitate community understanding of floodplain ecosystems

and cultural heritage. Community volunteers have assisted researchers on several projects including inventories for fish, butterflies, beetles, and birds, and have also collected data for long-term monitoring programs pertaining to forest dynamics, water quality and rare plants. Volunteers have interacted directly with scientific professionals and have learned research protocols through hands on involvement. Future projects will enable the continuation of this type of informal education between the public and scientific community.

Vulnerability of National Parks to "Sprawl:" A Regional Analysis in the Eastern United States

Claire Jantz, Research Associate, The Woods Hole Research Center, Woods Hole, Massachusetts

Scott Goetz, Associate Scientist, The Woods Hole Research Center, Woods Hole, Massachusetts

The contemporary pattern of urban development in industrialized countries is increasingly taking the form of low density, decentralized residential and commercial development. This type of development, commonly known as "sprawl," poses several threats to National Parks, including fragmentation of the surrounding natural and cultural landscape, isolation, and degradation of vistas. Recently, several geographic data sets have become available that can be used for broad scale vulnerability assessments of National Parks and protected areas. A national data set of modeled impervious surface cover at one-kilometer resolution (NOAA-NESDIS) was used in conjunction with a 500-meter resolution global forest cover data set (University of Maryland) and U.S. population data (U.S. Census) to perform a GIS-based assessment to identify parks that are threatened by sprawl in the eastern United States. The results of this pilot project can be used to further develop methodologies for broad scale vulnerability assessments.

Bat Inventories of the National Capital Region National Parks

Joshua Johnson, Faculty Research Assistant, University of Maryland Center for Environmental Science, Appalachian Laboratory, Frostburg, Maryland

J. Edward Gates, Associate Professor, Appalachian Laboratory, University of Maryland Center for Environmental Science, Frostburg, Maryland

We inventoried bats within 11 National Capital Region National Parks during 2003 and 2004, using mist nets, harp traps, and bat detectors in fields, forests, riparian zones, and caves. Our efforts included 365 mist net/harp trap nights at 75 locations and 362 locations monitored with bat detectors. We captured 6 species, including 149 big brown bats *(Eptesicus fuscus),* 63 eastern red bats *(Lasiurus borealis),* 3 hoary bats *(L. cinereus),* 105 little brown bats *(Myotis lucifugus),* 26 northern myotis *(M. septentrionalis),* and 33 eastern pipistrelles *(Pipistrellus subflavus).* We collected and analyzed 6,380 bat calls, identifying 7 species, including 1 not previously captured, the silver-haired bat *(Lasionycteris noctivagans).* Although we detected no rare or endangered bats, historic records of small-footed bats *(Myotis leibii)* and Indiana bats *(M. sodalis)* occurred on nearby properties, indicating that these species could occur in low numbers in some parks, e.g., the Chesapeake & Ohio Canal National Historical Park.

Bat Inventory and Monitoring at Selected National Parks within the Great Lakes Network

Laura Kruger, Graduate Student (Masters), Michigan Technological University School of Forest Resources and Environmental Science, Houghton, Michigan

Bill Route, Ecologist/Coordinator, National Park Service, Great Lakes Network Office, Ashland, Wisconsin

Rolf Peterson, Michigan Technological University, School of Forest Resources and Environmental Science, Houghton, Michigan

The recognized importance of temperate bat populations as key components of Northern Great Lakes ecosystems has placed bats as a high priority for biological inventory at several parks within the Great Lakes Inventory and Monitoring Network (GLKN). Through acoustic sampling and mist netting, inventories were conducted at the following parks in the GLKN: Pictured Rocks National Lakeshore (PIRO), MI; Apostle Islands National Lakeshore (APIS), WI; and Grand Portage National Monument (GRPO), MN. At PIRO and APIS, further methods were developed to monitor bat activity in certain habitats. Within PIRO, the effects of differing forest structure on bat activity in the lakeshore zone (no logging) and the inland buffer zone (active logging) was investigated. Within APIS, shoreline habitat was examined to determine the effect sea caves have on mainland and island bat activity. This poster will illustrate results from the inventory and monitoring efforts and discuss future bat-monitoring options for GLKN parks.

Science, Kyosei, and National Parks: The Canon National Parks Science Scholars Program

Lisbet Kugler, Assistant Coordinator, CESU Network & Canon National Parks Science Scholars Program, National Park Service, Washington, D.C.

Gary Machlis, Visiting Senior Scientist, National Park Service. Moscow, Idaho

The Canon National Parks Science Scholars Program began in 1997, with generous support from Canon USA, Inc. Partners include Canon, the National Park Service, and the American Association for the Advancement of Science. Over 50 doctoral students have received Canon Scholarships, conducting research in national parks throughout the Americas. This poster highlights and describes the students' research projects and the parks that have served as study sites.

Planning for the Future — The Denver Service Center Advantage

Nat Kuykendall, Chief, Planning Division, Denver Service Center, National Park Service, Denver, Colorado

The Denver Service Center offers a wide range of professional planning services, including cost estimating, consultation, facilitation, compliance, graphics production, and general management planning. As a project-funded organization, DSC has an overhead far below the private sector. Its staff consists of highly experienced planners knowledgeable in NPS planning policies and standards and cutting-edge planning tools such as visitor carrying capacity and Choosing by Advantage. DSC planners communicate regularly with regional and park planning partners, and can operate in a variety of environmental and political settings. This interdisciplinary staff ensures a

continuous presence from foundation planning through implementation. Since 2001, the center has received three American Planning Association Annual Awards, including the 2004 outstanding federal collaborative plan. In light of tightening budgets, the Denver Service Center offers cost-effective, comprehensive planning services — and the flexibility to tailor them to its clients' needs.

Minimizing the Risks of Wildland Fire in the Prince William Forest Park Wildland–Urban Interface

Jennifer Lee, Biologist, National Park Service, Prince William Forest Park, Triangle, Virginia

Brian Carlstrom and George Liffert, National Park Service, Prince William Forest Park, Triangle, Virginia

The wildland-urban interface (WUI) has been extensively studied and scrutinized over the past several years. With development occurring at a rapid pace, the WUI area at Prince William Forest Park has become a focus for the park's fire management program. In 2004, the park completed a 403-acre Hazard Fuel Reduction project and implemented the Wildland Hazard Assessment Methodology (WHAM). All structures within and adjacent to the park boundary were assessed. Public meetings were conducted with local citizens and fire departments, and information was posted on the park's website. The principles of the National Fire Plan and firewise recommendations were shared with WHAM participants. The areas identified as high risk by WHAM were used to prioritize future hazard fuel reduction projects in and around the park. These efforts demonstrate the park's proactive approach to safeguard life and property should a wildland fire occur.

Collaboration in the Pacific Region for Addressing the Threat of Invasive Species

Lloyd Loope, Research Botanist, U.S. Geological Survey, Pacific Island Ecosystems Research Center, Haleakala Field Station, Makawao, Hawaii

Carter Atkinson, Research Microbiologist, U.S. Geological Survey, Pacific Island Ecosystems Research Center, Kilauea Field Station, Hawaii National Park, Hawaii

USGS-PIERC and National Park Service are involved in regional, collaborative, science-based efforts at prevention, early detection, rapid response, and management of biological invasions of terrestrial and marine ecosystems. The Pacific Ant Prevention Plan addresses the spread of invasive ants throughout the Pacific islands via the Secretariat for the Pacific Community. In Hawaii, Parks collaborate with USGS and island-based "invasive species committees" to address eradication and containment of incipient plant and insect invasions. An American Samoa Invasive Species Team is addressing prevention and participates in the innovative Pacific Island Invasives Learning Network led by The Nature Conservancy. The 1996 Brown Tree Snake Control Plan is being updated, and major effort is underway to achieve stable funding for preventing this snake from hitchhiking from Guam to other Pacific islands as well as to assess and combat impacts of the snake including biota of the War in the Pacific National Park on Guam.

Dark Sky Preserves

Jessica Maloney, Special Projects Coordinator, International Dark-Sky Association, Tucson, Arizona
David Crawford and Scott Davis, International Dark-Sky Association, Tucson, Arizona
Both nature and mankind are becoming over run with artificial night lighting. There is a real need therefore for the establishment and maintenance of dark sky preserves, to preserve the night environment for all. The International Dark-Sky Association began such a program some years ago, and a number of these preserves are now established. Many more are needed. All such preserves are in the nature of IDA's Lighting Zone 1, an outdoor night lighting control zone now used by many other organizations. A Lighting Zone 1 is an area of very low ambient brightness where few lights exist or are needed. Examples include national and state parks and such areas, passive recreation areas, wetlands and wildlife preserves, zoos, the area around astronomical observatories, residential enclaves where obtrusive light is specifically banned, some city parks, and other places characterized by natural darkness.

University Collaboration in Producing a Socioeconomic Atlas Series for U.S. National Parks

Jean McKendry, Deputy National Coordinator, CESU Network, Washington, D.C.
Cynthia Brewer, Joel M. Staub, and Steven D. Gardner, Department of Geography, Pennsylvania State University, University Park, Pennsylvania
The National Park Service (NPS) has collaborated with Pennsylvania State University to produce socioeconomic atlases for national parks. The atlases show social and economic patterns in a multi-county region surrounding each park. Atlas maps and data assist park managers and planners in integrated planning and public involvement efforts. The atlases are intended to be inexpensive books with companion CD-ROMs. The initial set of pilot atlases produced by NPS was well received and the design and content of the series was standardized. NPS sought collaboration with Penn State faculty and students to streamline and accelerate production of the next set of atlases. This poster highlights examples from 10 park atlases completed with Penn State, describes benefits of the atlases for parks, and explains how the collaboration (facilitated through the Chesapeake Watershed CESU agreement) streamlined and improved data collection and production.

An Analysis of Recreational Target Shooting on the Pawnee National Grasslands, Colorado

Ward McKonly, Graduate Research Assistant, Colorado State University, Fort Collins, Colorado
Peter Newman and George Wallace, Department of Natural Resource Recreation and Tourism, Colorado State University, Fort Collins, Colorado
Population growth along Colorado's Front Range has resulted in increasing use levels on the Pawnee National Grassland (PNG) in general and recreational target shooting in particular. Front Range urbanization has led to the closure of a number of the areas previously used by recreational target shooters and PNG managers have seen an increase in the intensity and spatial distribution of recreational target shooting as well as a number of associated impacts. These social, ecological and managerial impacts include: increased solid waste; damage to soils, vegetation, structures and

archeological sites; conflicts with other users; threats to the safety of other users; impacts to wildlife. This study uses spatial analysis as well as quantitative survey methods to inform managerial decisions that will be made to address these impacts. Objectives for the study include: identify and analyze the intensity and spatial distribution of shooting at the PNG; identify and analyze the characteristics, perceptions, motives, and shooting preferences of recreational target shooters; describe the interaction of recreational target shooters with the activities of other primary stakeholders such as nearby residents, grazing permittees and other visitors to the PNG.

Valuing Scenic Quality on the Blue Ridge Parkway: Does the Type of Scenery Matter?

Leah Greden Mathews, Associate Professor of Economics, University of North Carolina at Asheville, Asheville, North Carolina

The Blue Ridge Parkway Scenic Experience Project was designed to help Parkway managers learn the value of their most important resource, the scenic views along the Parkway. The study was implemented in two sections of the park that have distinct scenic quality amenities and visitation patterns, the southwest Virginia and northern North Carolina sections. Results from both phases of the study indicate that visitors have strong preferences for maintaining Parkway scenic quality and that visitation is sensitive to changes in scenic quality. However, it appears as if visitors to the northern North Carolina section are more sensitive to scenic quality changes than visitors to the southwest Virginia section. This poster will document the scenic resources of the relevant sections of the park, the similarities and differences in the results in the two sections, and offer suggestions for possible interpretations. Implications for scenic quality resource management will also be offered.

A New Species of Platanthera (Orchidaceae) from Yosemite National Park

Peggy Moore, Plant Ecologist, U.S. Geological Survey, El Portal, California
Alison Colwell, Botanist, U.S. Geological Survey, Western Fisheries Research Center, Seattle, Washington

The National Park Service Inventory and Monitoring Program funded surveys of special status vascular plants in the Sierra Nevada Network to increase knowledge regarding species distribution, abundance and status. Surveys in Yosemite encountered an unidentified species of bog orchid that was subsequently determined by the genus author for Flora of North America to be a species new to science. It was subsequently documented from eight sites in an area unglaciated during at least the last two glacial episodes. Discovery of new plant taxa in California is episodic and averaged only five per year over the last several decades. Discovery of new orchid species is even rarer. Management issues had to be addressed immediately upon discovery of the seventh population because it is located at a heavy use site with associated maintenance activities. The I&M Program is contributing invaluable information regarding biodiversity of even our most thoroughly surveyed national parks.

Research Learning Center Fellowships Bring Science to Parks in the National Capital Region

Giselle Mora-Bourgeois, Science Education Coordinator, Urban Ecology Research Learning Alliance, NPS–NCR, Washington, D.C.
Diane Pavek, Research Coordinator, Natural Resources and Science, NPS–NCR, Washington, D.C.

Research Learning Centers extend new opportunities within parks to link science and education and to develop innovative partnerships. Among the new approaches in science education implemented by the Urban Ecology Research Learning Alliance are the writing and web design fellowships at George Mason University, VA, and a fellowship creating an interactive web site for the Potomac River Gorge at George Washington University, DC. These graduate education fellowships offer students with diverse backgrounds the opportunity to increase their ability to communicate about science and resources and offer parks novel approaches to web site development. Partnering with the University of Maryland, we also provided secondary school teachers the opportunity to gain research experience in parks. Teacher fellows are immersed in active research projects in the parks during the summer and translate their experience into classroom activities. In addition, we have professors conducting natural and cultural resource studies as Sabbaticals in the Parks.

Screening Procedures for the Assessment of Deposition-Sensitive Lakes in Rocky Mountain National Parks

Leora Nanus, Research Assistant, University of Colorado at Boulder, Boulder, Colorado
Mark W. Williams, Research Scientist, University of Colorado at Boulder, Boulder, Colorado
Donald H. Campbell, Research Scientist, U.S. Geological Survey, Denver, Colorado

Acidification of high-elevation lakes in the Western United States is of concern because of the storage and release of pollutants in snowmelt runoff combined with steep topography, granitic bedrock, and limited soils and biota. We developed screening procedures to assess lake sensitivity to atmospheric deposition of nitrogen and sulfur in Glacier National Park, Grand Teton National Park, Greater Sand Dunes National Park and Preserve, Rocky Mountain National Park, and Yellowstone National Park. Basin elevation, basin slope, and bedrock type, were determined to be statistically significant and were used as the explanatory variables in the logistic regression model. Modeling results were validated through lake sampling during fall 2004. Results indicate that 85 percent of the lakes sampled were accurately identified by the model as having ANC concentrations less than 200 microequivalents per liter. This is a pilot project that may be applicable to other National Parks with potentially sensitive surface waters.

A "Hands-on" Virtual Experience — "Views of the National Parks" (computer demo)

Bruce Nash, Ecologist, National Park Service Natural Resource Information Division, Lakewood, CO
David Krueger and Erika Matteo, National Park Service NRID, Lakewood, Colorado

"Views of the National Parks" (Views) is a multimedia educational program designed to teach the public and school-age children about national parks and the resources found

in parks. The Views program is composed of two complementary systems, one which presents information from individual parks and the second which offers insights into themes that cut across the entire park system. Views modules currently exist for a number of NPS units and natural resource themes. This computer demonstration will give conference attendees an opportunity for "hands-on" experience with the system. NPS staff and university partners will be available to discuss how each module was created, what multimedia techniques were used, and how parks can begin to create their own Views module. While all completed modules will be available, the demonstration will feature the recently-completed interagency wilderness module, the new virtual Views visitor center, and other recent additions to the system.

"Views of the National Parks": The Great Swamp Wilderness Area (computer demo)

Carollyn Oglesby, Director, Synthesis Support System, NPS Natural Resource and Information Division, Harrisonburg, Virginia

Kathryn Wright and Charlie Tysse, Synthesis Support Center, James Madison University, Harrisonburg, Virginia

Bruce Nash, National Park Service Natural Resource Information Division, Lakewood, Colorado

Tom McFadden, Great Swamp National Wildlife Refuge, Basking Ridge, New Jersey

James Madison University (JMU) created a section of the Wilderness "Views of the National Parks" module that focused on designated wilderness in the Great Swamp National Wildlife Refuge (Morristown, NJ). This multimedia educational system lets the user explore the 3660-acre (1481-ha) Great Swamp Wilderness Area, which is managed by the US Fish and Wildlife Service and was the first DOI-designated wilderness (1968). The Great Swamp is an island of wilderness in a sea of suburbia, within a day's drive for 40 million people. The module includes still and video photography, 360-degree panoramas, audio clips of natural sounds, interviews of wilderness area personnel, and descriptive text. This software complements the other portions of the Wilderness "Views" and will be available on laptop computer for "hands-on" exploration.

Predicting High Alpine Lake Sensitivity to Atmospheric Deposition in Grand Teton National Park Using Basin Characteristics

Susan O'Ney, Resource Management Biologist, Grand Teton National Park, Moose, Wyoming

Scott Woods and Jennifer Corbin, College of Forestry and Conservation, University of Montana, Missoula, Montana

Twelve high-alpine lakes in Grand Teton National Park (GRTE) were sampled to determine the responsiveness of aquatic systems to environmental input and to determine the controlling landscape parameters that regulate lake water chemistry. Limestone was the best predictor for alkalinity, conductivity and major cations. Granite also played a significant role in the prediction of alkalinity, conductivity and calcium. Median slope, metamorphic rock, and young debris served as the best predictors for nitrate concentrations. The amount of sedimentary rock (non-limestone) present in each basin had an influence on conductivity, calcium, magnesium and

sulfate. Relations between measured and predicted concentrations were tested using data collected from surveys conducted in 1986 and 1996 in GRTE. The regression models for alkalinity, conductivity, Ca, Mg, and SO4 reasonably predict values when compared to observed data. Over-prediction was consistent with the Ca/Na ratio model with most of the values being significantly greater than the observed values. Nitrate values were underestimated.

Building Social Capital: The Art and Science of Collaboration

Robert Pfister, Associate Professor, East Carolina University, Department of Recreation and Leisure Studies, Greenville, North Carolina

This poster illustrates a sequential collaborative process to increase social capital of residents through an outreach and training program focused on a world heritage site — Mount Robson Provincial Park. The purpose was to integrate multi-stakeholder interests in protecting the cultural and natural heritage values important to the park and to the quality of life of the residents adjacent to it. The research part was to assess the pre-conditions and the key elements of a collaborative decision-making model. The training component involves a two-year process to deliver four workshops that applied the model to create a preferred vision for the future of the area and to put in place an action plan that ensures protection of the natural and cultural values. The poster reveals the barriers to collaboration and the important roles performed by adult education professionals, protected area managers, residents, business owners, and university facilitators in producing a successful outcome.

ARIS: Air Resources Information System

Ellen Porter, Biologist, NPS Air Resources Division, Denver, Colorado

The Air Resources Information System (ARIS) has been developed by the NPS Air Resources Division to provide park-specific information on air quality, air quality monitoring, and air quality sensitive resources. The intended audience includes park managers and staff, air regulatory agencies, the Environmental Protection Agency, and the public. ARIS can be used by parks for planning and evaluation purposes. ARIS is an outreach and education tool for communicating air quality information and concerns to the public. ARIS also provides information and guidance to States, EPA, and air pollution permit applicants for evaluating potential impacts to parks from sources of air pollution. In addition to having information on the 48 NPS Class I air quality areas, ARIS has information for the 32 Inventory and Monitoring Networks, which include over 270 park units with significant natural resources. ARIS is available to the public on the NPS NatureNet AirWeb.

Contaminant Exposure Data and Monitoring Priorities for Terrestrial Vertebrates at National Parks and Wildlife Refuges

Barnett Rattner, Ecotoxicologist, U.S. Geological Survey, Patuxent Wildlife Research Center, Beltsville, Maryland

K.M. Eisenreich, M.A. McKernan, and B.K. Ackerson, U.S. Geological Survey, Patuxent Wildlife Research Center, Beltsville, Maryland

R.L. Hothem, U.S. Geological Survey, Western Ecological Research Center, Dixon, California

T.W. Custer, U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin

The Contaminant Exposure and Effects-Terrestrial Vertebrates (CEE-TV) database (http://www.pwrc.usgs.gov/contaminants-online) contains 16,696 data records on free-ranging amphibians, reptiles, birds, and mammals residing in estuarine and coastal habitats of the United States. To identify spatial data gaps, CEE-TV records were combined with the boundaries of coastal watersheds, and National Park and Wildlife Refuge units. Recent (1990–2003) terrestrial vertebrate contaminant exposure or effects data were available for only about half of the 343 National Parks and Wildlife Refuges in our study area. When these data gaps were overlaid on watersheds exhibiting water quality problems and/or vulnerability to pollution, 62 National Parks and 76 National Wildlife Refuges were found to lack recent terrestrial vertebrate ecotoxicology data. Delineation of data gaps in watersheds of concern can help prioritize monitoring in areas with impaired water quality and emphasize the need for comprehensive monitoring to gain a more complete understanding of coastal ecosystem health.

Making Your Visitors Count: Collecting and Archiving Visitation Data in U.S. Protected Areas

Jessica Robinson, Graduate Research Assistant/Doctoral Student, North Carolina State University, Department of Parks, Recreation & Tourism Management, Raleigh, North Carolina

Yu-Fai Leung, Assistant Professor, North Carolina State University, Department of Parks, Recreation & Tourism Management, Raleigh, North Carolina

Paul F. J. Eagles, Professor, University of Waterloo, Department of Recreation & Leisure Studies, Waterloo, Ontario, Canada

Like many of their counterparts abroad, U.S. protected areas (PAs) are faced with challenges of visitor management. Overuse and underuse of park resources are two common issues. While overuse can lead to environmental and social effects, underuse of some PAs may put their importance in question and affect their ability to justify funding and expenditures. Addressing these two issues effectively require basic information such as visitation data. This poster highlights an ongoing project for compiling PA visitation data in the U.S. as part of the global effort led by the Tourism and Protected Areas Task Force of IUCN World Commission on Protected Areas to incorporate visitation data into the World Database on Protected Areas for enhanced communication. The variability in availability and quality of visitation data being archived by U.S. protected areas at Federal, state and local levels will be compared. Recommendations for collecting or organizing data will be discussed.

Agricultural Sustainability and the Politics of World Hunger

Peter Samuel, Manager, Heritage Assistance, National Park Service, Northeast Region, Philadelphia, Pennsylvania

The United States has supported policies that have encouraged industrial agriculture dependent on chemical fertilizers, pesticides, herbicides and genetically engineered seeds. The ever-growing corporate mentality of farming and food production has been exported to other countries where traditional agricultural practices, in existence for

thousands of years, are being tragically threatened. The attempt to develop a worldwide dependence on the United States' chemical farming practices threatens not only the health of the environment globally, but could ultimately have impacts on the availability and distribution of food to the many nations already struggling to feed their children. This paper provides an overview of international farming practices, describes what is meant by "sustainable agriculture", and through examples explores the current and future alternatives for achieving a holistic approach to food production and viable solutions to world hunger.

Diversity in the Arctic: Increasing our Knowledge of Species Richness in Northern Alaska Parklands

Diane Sanzone, Ecologist–Arctic Network Coordinator, National Park Service, Fairbanks, Alaska

Jefferson Jacobs, Biological Inventory Coordinator, National Park Service, Fairbanks, Alaska

The National Park Service's (NPS) Inventory and Monitoring Program established 32 long-term monitoring networks nationwide. One of the largest of these networks, the Arctic Network (ARCN), consists of five contiguous NPS units: Bering Land Bridge National Preserve, Cape Krusenstern National Monument, Noatak National Preserve, Kobuk Valley National Park, and Gates of the Arctic National Park and Preserve. ARCN encompasses roughly 19 million acres in Northern Alaska, or roughly 25 percent of all NPS acreage in the United States. From 2000 to 2004 ARCN conducted inventories on vascular plants, mammals, and birds. Many areas of ARCN were floristically unknown prior to the vascular plant inventory and the effort added almost 800 new species accounts to ARCN parks species lists. Of the 800 or so new plant species accounts in the arctic parklands, *Potentilla fragiformis* is new to North America, and *Dupoa labradorica, Draba pauciflora*, and *Festuca edlundiae* are new to Alaska. In the seemingly well studied world of birds and mammals, inventory work has resulted in 37 mammal and 17 bird additions to ARCN park species lists.

Natural Resources Bibliography

Wendy Schumacher, Bibliographic Coordinator, National Park Service–NRPC, Fort Collins, Colorado

The Natural Resources Bibliography significantly improved its usability since the last George Wright Society meeting. The new interface has 3 commonly accepted, and 2 NPS-specific, report functions and allows the user to view a PDF file of the documents when available. In addition, the data entry module allows the user to view all data on the screen instead of in pop-up windows.

Expanding the Dimensions of the Wilderness Continuum from a Two-parameter Model to a Three-parameter Model

Patricia Seiser, Cave and Karst Resources Stewardship Volunteer, National Cave and Karst Research Institute, Carlsbad, New Mexico

The literature suggests that wilderness be evaluated on a two-parameter system, naturalness and wildness. Recent wilderness-based research suggests that measurement of wilderness should include an additional parameter, that of

perception. Perception, based on an individual's knowledge and experiences, strongly influences the shaping of how wilderness is viewed and defined. Understanding the perception parameter in the wilderness model is critical in facilitating stewardship of and support for wilderness areas. These interrelated elements of wildness, naturalness, and perception are illustrated via a model drawn from research exploring the concept of cave wilderness.

Native Tree Plantings on Two Disturbed Sites in Everglades National Park

Lauren Serra, Biological Science Technician, Everglades National Park, Homestead, Florida

Mike Norland and Liz Struhar, Soil Scientist, Everglades National Park, Homestead, Florida

Tree plantings have been successful within Everglades National Park on sites where both anthropogenic and natural disturbances have occurred. The Hole-in-the-Donut is a large-scale restoration effort of over 6000 acres. The removal of exotic Brazilian pepper *(Schinus terebinthifolius)* and disturbed soil has lead to the re-establishment of native plant species on 3000 acres. The slopes of a 30 acre soil disposal mound, left on-site, were planted with native trees. Over the past two years the trees on the DBC mound have grown to simulate a sub-tropical hardwood hammock community within a prairie wetland. Grossman Hammock in Chekika is the second restoration site, and was planted with native trees ten years after Hurricane Andrew caused a severe wind throw in the canopy. Approximately 400 shrubs, sub-canopy, and canopy tree species continue to thrive in a variety of light and moisture conditions within the hardwood hammock.

Amphibian and Reptile Inventories Yield Immediate Payback at Delaware Water Gap National Recreation Area

Jeffrey Shreiner, Biologist, Delaware Water Gap National Recreation Area, Milford, Pennsylvania

Inventories at Delaware Water Gap NRA have identified key habitat and mapped the distribution of special concern species, including the federally-threatened bog turtle and the NJ-listed timber rattlesnake and wood turtle. Park managers have integrated this information into park planning and decision making. Examples include: (1) Park Infrastructure: inventories provided data used in the NEPA analysis to compare alternative sites for a major new recreation site. (2) Invasive Weed Control: key bog and wood turtle habitat, including wetlands and riparian corridors, have been targeted for exotic plant management. (3) Cultural Landscape Management: management of historic landscapes, including agricultural leases, has been reviewed and amended to accommodate wood turtle nesting and foraging. (4) Visitor Education & Safety: an education and information program reduces the likelihood of chance encounters with timber rattlesnakes in areas where park trails intersect key habitat.

Fire and Flooding Effects on Muhly Grass

Jim Snyder, Research Biologist, USGS, Florida Integrated Science Center, Big Cypress National Preserve, Ochopee, Florida

The Cape Sable seaside sparrow is a federally listed endangered species restricted to seasonally flooded grasslands in extreme southern Florida. Muhly grass *(Muhlenbergia capillaris* var. filipes) is often one of the dominant species in this habitat. We studied the response of muhly to prescribed fires done at six times from January to May at three locations in Big Cypress National Preserve. The experimental burns were "micro" burns of individual muhly plants done with metal cylinder as a fire containment device. Because we had no control over water levels in the field, we also set up a more controlled experiment in the nursery using potted plants and small tanks. Sets of plants were burned at six times from March to June and then subjected to three flooding regimes during the rainy summer season. Substantial mortality occurred in both field and nursery experiments when plants were submerged shortly after burning.

Partnering Teachers with Scientists to Restore Dyke Marsh, George Washington Memorial Parkway

Cat Stylinski, Teacher Fellowship Director, University of Maryland Center for Environmental Science, Frostburg, Maryland

The NPS National Capital Region's Urban Ecology Research Learning Alliance (UERLA) and the University of Maryland Center for Environmental Science Appalachian Laboratory (UMCES-AL) are collaborating on a teacher fellowship program that provides valuable support to NPS projects and deepens teachers' understanding of science research and critical natural resources. In 2003 and 2004 four secondary school teachers joined UMCES-AL researchers at Dyke Marsh, part of the George Washington Memorial Parkway, to inventory and map wetland plants in preparation for marsh restoration efforts. The marsh is the largest freshwater tidal wetland in the Washington Metropolitan area but has been diminished by previous dredging and eroded shorelines. The teachers worked alongside researchers gathering and analyzing data, while also developing classroom activities that built on their NPS research experience. They are sharing their experiences and activities with students and other educators. This successful outreach program will continue in summer 2005 with new teacher participants.

Estimating Vegetation Cover in Arid Environments from Aerial Photography Using the Feature Analyst ArcGIS Extension

Kathryn Thomas, Ecologist, U.S. Geological Survey, Southwest Biological Science Center, Flagstaff, Arizona

John Vogel, Geographer, U.S. Geological Survey, Southwest Geographic Science Team, Tucson, Arizona

The National Park Service's Inventory and Monitoring program seeks to monitor the ecosystem health of its park units. The Mojave National Preserve, in southeastern California, supports a diversity of vegetation types, vertebrate species, and invertebrate species, despite occurring in an arid to semi-arid climate. Remotely sensed imagery provides one tool for monitoring this unit; however, accurately estimating the vegetation properties in arid environments using imagery presents many challenges. We will test the automatic feature extraction capabilities of Visual Learning System's Feature Analyst, an ArcGIS extension, by estimating vegetation

cover at a sample plot within the Preserve. The estimates, taken from digitized aerial photography having two different ground resolutions (0.5m and 0.06m pixels) will then be compared against cover estimates made in the field. We hope to contribute a new vegetation properties measurement technique to aid future monitoring efforts in the Mojave National Preserve and other Mojave Desert Park Network units.

Use of a Lake Classification "Expert System" with Data from Nine National Parks

John Turk, Biogeochemist, Water Dipper, Inc., Lakewood, Colorado
Paul Abood, Intern, Air Resources Division, National Park Service, Denver, Colorado
Ellen Porter, Biologist, Air Resources Division, National Park Service, Denver, Colorado
Tamara Blett, Ecologist, Air Resources Division, National Park Service, Denver, Colorado

The "Decision Support System" (DSS) expert system classifies surface waters into six categories of potential impact from acid deposition, geologic sulfur, land use disturbance, and natural organic acids. Data used by the DSS are: acid neutralizing capacity (ANC), sulfate, nitrate, dissolved organic carbon (DOC), sum of base cations (SBC), pH, and specific conductance. The DSS was calibrated by a panel of aquatic chemistry experts for surface waters in the Cascade Mountains, Central and Northern Rocky Mountains, Sierra Nevada, and the Northeastern USA and has been used to evaluate data from nine National Parks. The results from North Cascades National Park (NOCA) serve as an example and the results from all nine parks are to be available in a summary report. Data required by the DSS existed for only 17 NOCA lakes and only one lake was judged to be potentially impacted by acid deposition. Also presented are limitations of the NPS Horizon Reports database that can guide future data collection.

Native Plant Restoration at Stones River National Battlefield

John Vandevender, Plant Materials Center Manager, USDA–NRCS, Alderson, West Virginia

Stones River National Battlefield, located in Middle Tennessee, is the site of one of the significant battles of the War Between the States. The site is host to a number of rare and endemic plant species. The primary project objective is restoration of native plant communities within the battlefield park. Ecologists have targeted approximately twenty native plant species for use. Those species are: *Andropogon ternarius, Andropogon gyrans, Bouteloua curtipendula, Carex* spp., *Chasmanthium latifolium, Dichanthelium* spp., *Eragrostis spectabilis, Leersia virginica, Melica mutica, Schizachyrium scoparium, Asclepias tuberosa, Aster* spp., *Eupatorium* spp., *Lespedeza violacea, Rudbeckia* spp., *Solidago* spp., and *Forestiera ligustrina.* In 2003, Alderson Plant Materials Center personnel collected small quantities of seed from twelve species. Approximately 20,000 seedlings from the 2003 seed harvest were produced in 2004. Ecologists at Stones River National Battlefield will harvest and use seed from these seedlings to restore this historic site's circa 1862 floristic authenticity.

Unification of Nature Protection in Europe — Building a Unified Information System

Pavel Vanis, Researcher, Research Institute of Geodesy, Topography, and Cartography, Zdiby, Czech Republic

All EU members have similar legislation on nature protection. Nevertheless there are different attitudes toward different types and levels of protected areas. A unified data model for upkeep of information on protected areas is missing. There is a NATURE-GIS pan-European project whose target is to create a thematic network of nature-protection organizations and use of geographic information systems in nature protection. An information portal for European protected areas has been created on the Internet to inform the public. The Czech Republic is one of the "national nodes" that take part in this pilot project, whose goal is to support public access to data and information. The poster will stress some difficulties coming from the national differences and will describe the data structure of the system.

Restoration of Stone Walls and Barways at Weir Farm National Historic Site

Greg Waters, Horticulturist / Natural Resource Manager, Weir Farm National Historic Site, Wilton, Connecticut

The landscape at Weir Farm National Historic Site is overlain with an intricate array of dry-laid stone walls of different types. This program will illustrate the process that Weir Farm staff are going through to restore some of the more deteriorated sections of wall and gateposts and to replace rustic horseshoe fence rail brackets. This project has involved a mix of permanent and seasonal NPS staff, volunteers, and adjoining landowners. In addition, the restoration has given the park the an opportunity to hold an annual stonewall repair workshop where attendees learn about restoration principles, and also practice what they have learned.

Institutional Knowledge of Biodiversity in the National Park Service

Mark Wotawa, Ecologist –Biological Inventory Coordinator, NPS, Fort Collins, Colorado

Institutional knowledge in the context of biodiversity results from the collection, organization, and verification of raw field data and their subsequent integration, analysis and dissemination to produce usable scientific knowledge. In 1999, the NPS embarked on an unprecedented effort to build NPSpecies, an information system to store, manage and disseminate data and information on the biodiversity of all taxa in all NPS units, including presence/absence, distribution and abundance. This talk will present an integrated suite of tools and services (NPSpecies, Biodiversity Service Center, Biodiversity Data Store, NatureBib, Nature Guides) available to the NPS and their many partners to ensure institutional knowledge and the protection and management of biodiversity in the NPS, and to ultimately unite biodiversity information from the NPS with that from other networks of parks and natural areas locally, nationally and globally.

Exhibit Abstracts (listed alphabetically by lead author)

Booz Allen Hamilton — A Partner for Managing America's Precious Resources
Tonia Bleecher, Senior Associate, Booz Allen Hamilton, McLean, Virginia
Booz Allen understand that federal agencies constantly respond to increasing demands on public land resources. Agencies strive to strike an appropriate balance between public use, development and enjoyment, and the need for protection and conservation. The problems are complex.Meeting today's challenges involves combining multi-dimensional expertise and talent with a range of proven tools. That kind of talent, experience, and technology requires a world-class organization, one that excels at Information Technology and financial and business processes, along with public land management, environmental regulatory compliance, and public communications and outreach. Booz Allen offers these skills to help your agency realize its greater potential, utilizing and maximizing its existing resources to achieve success and complete your mission.

Stronger Communities, Better Lives through Partnerships
Carmen Domenech, Administrative Assistant, National Park Service Northeast Region, Planning and Partnerships, Philadelphia, Pennsylvania
The Northeast Region of the National Park Service has the nation's only Partnership Wild and Scenic Rivers, the largest of the Rivers and Trails Conservation Assistance Programs, almost half of all of our nation's National Historic Landmarks, and thirteen of the nation's National Heritage Areas. Come see how partnerships are used effectively in the Northeast for resource stewardship. In the Northeast, the National Park Service is working together with partners to build healthy bodies, reconnect diverse groups with their histories, facilitate greening communities, and bridge gaps between governments to improve the quality of life in the region. Information on a myriad of partnership projects and successes will be available to conference attendees.

NPS Natural Resource Program Center Restoration Technical Advisory Group
Greg Eckert, Restoration Ecologist, NPS, Fort Collins, Colorado
This exhibit will display a description of services offered to National Parks for restoration planning and implementation by this national office program. Contact information, case study reports and tools will be available along with information on tools under development. The presenter will plan to spend as much time as possible at the exhibit.

Vanasse Hangen Brustlin, Inc.
Dawn Frost, Environmental Planner/Architectural Historian, Vanasse Hangen Brustlin, Inc., Williamsburg, Virginia
Managing this nation's parks has become a complex challenge in the past decades. A wide range of integrated technical services coupled with fresh approaches to compliance issues is a must today. Vanasse Hangen Brustlin, (VHB) Inc., has consistently produced imaginative and responsive technical services to expedite planning and compliance projects. A key component separating VHB from others is our "cradle to grave" approach. Not only are planning documents prepared, but

technical and engineering guidance and services are also available to clients providing them with a complete and comprehensive project every time. As consultants to the National Park Service (NPS), VHB provides services for all aspects of National Environmental Policy Act (NEPA) compliance including combining NEPA documents with National Historic Preservation Act compliance. VHB's thorough understanding and experience help provide cost-effective and reliable solutions for the 21st century.

The Canon National Parks Science Scholars Program

Lisbet Kugler, Assistant Coordinator, CESU, Washington, DC

The exhibit displays information about the Canon National Parks Science Scholars Program. The program began in 1997 with generous support from Canon USA, Inc. Program partners include Canon, the National Park Service, and the American Association for the Advancement of Science.

The Cooperative Ecosystem Studies Unit Network

Jean McKendry, Deputy National Coordinator, CESU Network, Washington, D.C.

The exhibit displays the full, current map of CESU-affiliated agencies, universities, and other parties, and highlights the current activities of the CESU Network.

Research Learning Centers, Helping to Achieve Scientific and Education Potential

Lynne Murdock, Interpretive Liaison, Natural Resources Stewardship & Science, National Park Service, Washington , D.C.

NPS Research Learning Centers are places where research, education and partnerships come together. This new traveling display is focused on the NPS Research Learning Centers in a 10'x10' concave exhibit format. It has numerous photos from RLCs, a small amount of text and is designed to spark interest. Additionally, publications from several of the NPS RLCs will be on hand to share information about current research that is taking place in national parks.

Tools to Get Results: Measure of Success

Linda Seifert, Program Analyst, National Park Service, Philadelphia, Pennsylvania

The Northeast Region's Rivers and Trails program has put together a Community Toolbox that has been used by communities throughout the nation. Take a look at this and pick up information on other resources available to work with communities to improve outdoor recreation opportunities, reconnect communities with their cultural resources, and involve people in land use decisions. See some examples of how the Northeast has measured success. Pick up a copy of the Farmington River Study and a new study measuring the impact of the Virginia Creeper Trail on the community it traverses. Be introduced to the web resources available through the Northeast Region for measuring success in heritage areas or similar regional constructs. Pick up a guide to both paper and web-based examples of positive economic impacts on communities from historic preservation, natural resource conservation, and new outdoor recreational opportunities.

NPS Conservation Study Institute: New Directions in Conservation

Leslie Shahi, Program Management Assistant, NPS Conservation Study, Woodstock, Vermont

The NPS Conservation Study Institute provides a forum for the NPS and partners to discuss contemporary issues and practice and future directions in the field. Several recent project initiatives will be presented on topics including: successful models of partnerships and approaches to civic engagement; an atlas of people places and products highlighting case studies on stewardship; place-based education as a tool for civic engagement; and international directions on landscape conservation. This exhibit will include publications and two recent DVDs on place-based education and community engagement.