on Parks, Protected Areas & Cultural Sites

March 14–18, 2011 • New Orleans, Louisiana

Abstracts

Concurrent Sessions • Poster Session • Exhibits

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Concurrent Sessions • Monday, March 14 • 10:00–12:05

Session 1 • Napoleon A1/A2 (3rd floor) • Invited Papers

Assessing Vulnerability of Resources to Rapid Climate Change

Chair: John Gross, Climate Change Ecologist, National Park Service, Ft. Collins, CO

Session overview: The goals of climate change vulnerability assessments are to identify which resources are most vulnerable to climate variation, and why. Vulnerability assessments have been identified as a high priority need in virtually every climate change strategy, but there are few examples of completed assessments or widely recognized approaches. A current challenge is to review existing studies to identify and articulate widely applicable templates useful to park management. Assessments can be conducted at local to regional scales, focus on species to biomes, and they can be simple or very complex. There is no 'one size fits all'. Presentations in this session will provide an introduction and background to vulnerability assessments, describing common elements and approaches, and present results from a comparison of different methods. These foundational talks will be followed by case studies from high-priority biomes. The case studies illustrate approaches that differ in level of detail, comprehensiveness, and scale.

Climate Change Vulnerability Assessments for Parks

John E. Gross, Climate Change Ecologist, National Park Service, Ft. Collins, CO

Climate change vulnerability assessments (VAs) identify which resources will respond most strongly and be most impacted by variations in climate. VAs are thus a key input for identifying priorities for action. NPS is engaged in a broad range of activities to develop VAs; this presentation will focus on widely useful guidance, and ongoing activities. A multi-agency effort has produced general guidance for conducting VAs for species, habitats, and ecosystems. This guidance provides a context for VAs and a general framework, describes elements common to most VAs, and it includes a set of case studies that illustrate the principles. As a compliment, NPS has sponsored a broad range of projects to address resource vulnerabilities to climate change. These projects can benefit from and contribute to further developing and establishing methods that are 'best practice' and that are well suited to the specific needs of parks.

Comparison of Climate Change Vulnerability Assessment Methods for Species

Nancy Green, Climate Change Scientist, US Fish and Wildlife Service, Washington, DC

Several methods exist for assessing the vulnerability of species to climate change. This presentation provides results of an evaluation of different methods, focusing on a comparison of features such as variables considered, spatial and temporal scales, treatment of uncertainty, identification of key components of vulnerability as compared to overall vulnerability "scores," and ease of use. Part of the evaluation included using a set of species to compare features of three relatively rapid methods for assessing vulnerability. Another part of the evaluation involved a review of scientific literature to compare other approaches used to assess vulnerability. Results and recommendations from this comparison of methods will be presented.

Vulnerability of Coastal Parks to Sea Level Change, Lake Level Change, and Storms

Rebecca Beavers, Coastal Geologist, National Park Service, Lakewood, CO

Since 2001, the National Park Service Coastal Geology Program has coordinated 28 Coastal Vulnerability Assessments. 22 Vulnerability Assessments were conducted by the US Geological Survey to assess the relative vulnerability of coastal resources to sea level and lake level changes and inform park planning (http://woodshole.er.usgs.gov/project-pages/nps-cvi/). Through the Storm Vulnerability Project, natural, cultural and historic resource-based data products and management documents were produced to aid coastal parks in better managing aspects of storm-preparedness and post-storm response and recovery. The storm recovery window is a unique opportunity in coastal parks to adapt to climate changes. Storm vulnerability assessments were conducted by USGS to assess the relative impacts of storms in 3 Atlantic parks (CALO, CUIS, and FIIS). Storm vulnerability assessments were also completed for GEWA, KAHO and PUHE by university partners.

A Rapid Assessment of Climate Change Vulnerability for Biodiversity Conservation and Management in New Mexico

Carolyn Enquist, Science Coordinator, USA-National Phenology Network and The Wildlife Society (formerly of The Nature Conservancy), Tucson, AZ

I describe an approach for rapidly assessing the regional impact of climate change and prioritizing landscapes for management action. This involved calculating and mapping 36-year trends in a water availability metric, moisture stress (MS), for 74

watersheds across the state of New Mexico. These trends were linked to a database depicting counts of species of concern to indicate a watershed's relative biological importance. We also evaluated projected MS for two future time periods using downscaled global climate models. Three watersheds with high importance showed significant trends in MS exposure. Because climate-linked ecological change is already evident in these watersheds, we identified management options that may reduce habitat loss for species of concern. Four watersheds with high importance showed no change in MS. These watersheds may be more resilient to ongoing climate change and have a greater chance for supporting species of concern at least into the near future.

Vulnerability Assessment of Habitats and Landscapes

Patrick Comer, Chief Ecologist, NatureServe, Boulder, CO

To minimize undesired effects of climate change, we need to understand the relative vulnerability of local ecosystems and habitats to climate variations that are most likely to occur. NatureServe has developed methods to identify resources of concern in the face of climate change, and a process to evaluate climate change exposure, sensitivity, and adaptability. Key challenges remain to effectively predict the intensity of stress, the directionality in species movements, and the speed at which these changes are likely to occur. NatureServe is currently engaged with researchers and public land managers across the nation to document methods for evaluating relative vulnerabilities among habitats and landscapes. Here we report on our progress, using examples from throughout the United States; ranging from local to regional scales of application.

Session 2 • Napoleon B1 (3rd floor) • Contributed Papers

Cultural Landscapes: From Sacred Lands to the Vernacular Urban Fabric

Chair: Bonnie Halda, Chief, Division of Preservation Assistance & Heritage Areas, National Park Service, Northeast Region, Philadelphia, PA

Preservation in a Shifting Landscape: Multi-disciplinary Management of Scenic Resources in Yosemite National Park

David Humphrey, Branch Chief, History, Architecture & Landscapes, Yosemite National Park, El Portal, CA

Kevin McCardle, Historical Landscape Architect, Yosemite National Park, El Portal, CA

When set aside in 1864, Yosemite Valley and Mariposa Grove were the first scenic natural areas in the United States protected for public benefit and appreciation of the scenic landscape. One of the purposes in creating the National Park Service "is to conserve the scenery." The park's natural landscape has changed due to past exclusion of American Indian traditional burning, the suppression of lightning-ignited fire, and human-initiated changes to hydrologic flows. The landscape will likely continue to change as climates shift. A flexible program was created to document vista points and quantifies attributes to prioritize management. This method provides a transparent mechanism and a reasonably predictable program over a wide range of sites. Management intensity of vegetation clearing at each vista is then determined by the vegetation communities present at each vista site. This provides a balance of selection for cultural purposes with sensitive management of the natural resource.

A Productive Estate: Active Agriculture on Historic Properties

Laura Roberts, Conservation Associate, National Park Service, Olmsted Center for Landscape Preservation, Boston, MA

George W. Curry, State University of New York Distinguished Teaching Professor, Department of Landscape Architecture, SUNY College of Environmental Science and Forestry, Syracuse, NY

John Auwaerter, Partner, NPS Olmsted Center for Landscape Preservation and SUNY Research Scientist, Department of Landscape Architecture, SUNY College of Environmental Science and Forestry, Syracuse, NY

One of the biggest challenges faced by managers of historic properties is how to better engage the public with the site's history and legacy. One such property is Eleanor Roosevelt National Historic Site, managed by the National Park Service. Former First Lady and great humanitarian Eleanor Roosevelt strongly believed in the productive use of private land and put this philosophy into practice at Val-Kill, her small country estate in the Hudson River Valley of New York. A burgeoning public interest in sustainable agriculture and local food sources may provide an opportunity for the park to forge a stronger connection between visitors and Eleanor's beloved Val-Kill. This paper examines case studies of active agriculture on historic properties to explore strategies which may be applied at Val-Kill and similar sites.

Adapting Cultural Landscape Preservation to a Changing World

Margie Brown, Senior Project Manager/Historical Landscape Architect, NPS Olmsted Center for Landscape Preservation, Boston, MA

H. Eliot Foulds, NPS Olmsted Center for Landscape Preservation, Boston, MA

Three case studies will illustrate the compatibility between cultural landscape preservation goals and the fundamental concepts of Adaptive Resource Management. Drawing on nearly twenty years of experience guiding the stewardship of cultural landscapes throughout the national park system, the presenters will highlight experiences with projects where resource managers have successfully balanced the preservation of historic landscape character—designed spaces, historic land uses, viewsheds, active agriculture, and circulation networks—with other resource management goals such as protection of endangered species, management of invasive species (and other environmental pests), conservation of water resources, and wildlife corridors.

The Indigenous Cultural Landscape of the Eastern Woodlands: A Model for Conservation, Interpretation, and Tourism

Deanna Beacham, Program Specialist, Virginia Council on Indians, Mechanicsville, VA

The indigenous cultural landscape concept emerged from a region of our country where American Indian descendent tribes and communities have long been invisible to most of the population. A means of defining larger landscapes from the perspectives and lifestyles of pre-Colonial Native peoples, the construct is simultaneously a rationale for land conservation and a magnet for heritage tourism. It can raise awareness of contemporary Indian descendant communities, and engage those communities as crucial partners not only in prioritizing and choosing lands to be protected, but in telling their stories to the larger public, thus stimulating the economies of the American Indian peoples and the regions where they live. The concept can also be implemented on already protected parks, reserves and other areas, as an added value in attracting low-impact visitors and as means to forge partnerships with neighboring tribes and American Indian organizations.

How Cultural Heritage Shaped Sustainable Urban Housing

Jay Edwards, Professor of Anthropology, Louisiana State University, Baton Rouge, LA

This presentation will describe the complex configuration of sociocultural and economic forces which shaped and reshaped a tiny debased form of refugee housing surrounding the center of urban New Orleans in first decade of the nineteenth century. Thrust into a rapidly expanding urban environment, this stigmatized form of vernacular architecture was repeatedly reshaped and expanded through adaptation and processes of creolization. The shotgun family of house types endures to this day… a prime example of a vernacular adaptation that characterizes, and even dominates the urban fabric of New Orleans. The story of the success of the shotgun house is relevant to sustainable recovery efforts in both post-Katrina New Orleans and post-earthquake Haiti. It is a model that gives testimony to the importance of historic resources as a means to shaping plans for rebuilding and sustainable recovery.

Session 3 • Napoleon B2 (3rd floor) • Contributed Papers

Science Communication

Chair: Kathie Adare, Senior Advisor to the Director General National Parks, Parks Canada Agency, Gatineau, Québec, Canada

Broadening the Reach, Closing the Circle: Protected Lands and Environmental Literacy in the 21st Century

Eric Keeling, Post-doctoral Associate, Cary Institute of Ecosystem Studies, Millbrook, NY

Alan Berkowitz, Head of Education, Plant Ecologist, Cary Institute of Ecosystem Studies, Millbrook, NY

Park and protected land education and outreach programs have an opportunity to increase public understanding of important ecological processes that cross boundaries and affect environmental conditions both inside and outside protected lands. Drawing on preliminary findings from a nationwide NSF-funded environmental literacy study we identify key topics relevant to protected lands where public understanding is low (carbon cycling, water cycling, processes that affect biodiversity, climate change). We provide examples of how park outreach programs could include site-specific messages that address common public misconceptions in these topics. We then present a framework that considers the importance of outreach within the broader humanized landscape context of most protected areas. Ultimately, improvement in public environmental literacy should feedback on environmental conditions in protected lands by increasing support for policies that reduce adverse local and global impacts and by increasing community engagement in local land use planning.

Science Communication Internships: Connecting Parks, Science, and People

Sara Delheimer, Science Communication Intern, Schoodic Education and Research Center Institute, Knoxville, TN

Bill Zoellick, Program Director, Schoodic Education and Research Center Institute, Winter Harbor, ME

Sarah Lupis, Communications Specialist for Adapting Livestock to Climate Change CRSP, Colorado State University, Fort Collins, CO

Communicating information on the condition of natural resources is fundamental to the Service's ability to manage park resources, but is often hampered by limited resources and staff time. The Schoodic Education and Research Center (an RLC), Acadia National Park, and the Northeast Temperate Network Inventory and Monitoring Program collaboratively sponsored a summer science communication internship program to increase the capacity for sharing results of past and ongoing scientific research, biological inventories, and natural resource vital sign monitoring in network parks. Since 2009, five student-interns have participated, engaging with park scientists, interpreters, and researchers to create podcasts, posters, promotional material, and project summaries. Lessons learned during the pilot year contributed to better organization and increased productivity in year two. This internship program offers a model that can be used in other Parks, Networks, and RLCs to enhance and expand outreach, while inspiring and developing the next generation of science communication specialists.

Education and Relevancy: Training the Teachers and Engaging the Kids

Bruce Nash, Ecologist, National Park Service, Lakewood, CO
Erika Matteo, Project Coordinator, University of Colorado Denver, Denver, CO
David Krueger, Information Technology Specialist, National Park Service, Lakewood, CO

The NSF-sponsored Rocky Mountain Middle School Math and Science Partnership asked the NPS "Views of the National Parks" team to teach a graduate-level course which presented earth science concepts within a national park framework. In response, the team organized and taught a two-week content course for teachers in 2009 and 2010. The course featured field trips to national parks led by NPS resource specialists, lectures (with hands-on activities) from current and retired NPS, BLM, USGS, and non-Federal experts, a group "capstone project" (writing a General Management Plan for an imaginary park), and multidisciplinary presentations ("Geology and the Civil War," "Using Art to Teach Earth Science Concepts"). Training educators using NPS placed-based examples, providing park-based multimedia content such as "Views," and developing curricula enriched with "real world" issues makes learning relevant, engages our country's youth, and will lead to lasting connections with parks.

New Tools for Science Communication at Yosemite National Park

Niki Nicholas, Chief, Resources Management and Science, Yosemite National Park, Yosemite, CA
Elizabeth Munding, Science Communication Editor, Interpretation and Education, Yosemite National Park, Yosemite, CA

Yosemite National Park (YOSE) assembles and creates a vast amount of scientific information related to the park's natural and cultural resources, including fact sheets, annual reports, scientific papers, public presentations, web pages, social networking tools, and personal collaboration. This information is used across the park as well as by park partner organizations and the public. The challenge has been to determine the best forms to communicate resource information to a diverse audience. YOSE conducted a comprehensive assessment of our science communication program. The first step towards creating a plan and deployment strategy was to compile an inventory of the various forms of science communication already used in the park and then evaluate various methodologies. This presentation will highlight key challenges to successful science communication for national park units and some of the actions that YOSE has taken to improve processes as a result of our assessment.

New Science Communication Products on Mercury Contamination at Acadia National Park: A Collaborative Effort

Colleen Flanagan, Ecologist, NPS Air Resources Division, Denver, CO
Bill Gawley, Biologist, Acadia National Park, Bar Harbor, ME
Sara Delheimer, Science Communication Intern, Schoodic Education and Research Center (SERC) Institute

Decades of research at Acadia National Park indicate elevated and pervasive levels of mercury across the park landscape, including surface waters, sediments, and animals as diverse as fish, eagles, salamanders, and tree swallows. The major source of mercury in the park's environment is deposition from the atmosphere – a result, in part, of emissions from coal-burning power plants. Mercury threatens the very natural resources the National Park Service is charged with protecting. Prior to 2010, findings regarding mercury at Acadia resided primarily in technical publications. Subsequently, the NPS Air Resources Division, Acadia National Park staff, and science communication interns at the Schoodic Education and Research Center collaboratively developed outreach products including a video podcast, fact sheet, and air quality displays. Fostering such awareness is essential to coordinate efforts and reduce threats to the national parks. This joint venture produced several science communication products within a short timeframe, illustrating a model potentially useful for other related projects in national parks.

Session 4 • Napoleon B3 (3rd floor) • Panel Discussion

The Benefits of Utilizing Integrated Science for Research and Management

Chairs: Charles van Riper, ST Research Ecologist, US Geological Survey, Tucson, AZ

Robert Powell, Assistant Professor, Department of Parks, Recreation, & Tourism Management, Clemson University, Clemson, SC

With the increasing complexity of natural and social issues facing protected areas, it is important for managers of these resources to recognize the benefits from utilizing integrated/interdisciplinary science. Interdisciplinary science synthesizes the perspectives of individual disciplines and integrates them during all phases of the research process. This panel brings together nationally recognized members to discuss the benefits and challenges of utilizing interdisciplinary science to answer complex questions at the international, national, regional, and local levels. A short introduction will define interdisciplinary science and discuss why there are increasing calls for its use. This will be followed by 5-minute presentations where panelists will address the following questions: When should interdisciplinary science be utilized? What are the barriers to employing this approach and how can they be overcome? The panel will then engage the audience in a discussion on why integrated/interdisciplinary science is essential to successfully answering complex questions relevant to management.

Panelists: John Donahue, Superintendent, Delaware Water Gap National Recreation Area, National Park Service, Bushkill, PA

Gary Machlis, Science Advisor to the Director, National Park Service, Washington, DC

Jan van Wagtendonk, Research Forester, Emeritus, U.S. Geological Survey, El Portal, CA

Carena J. van Riper, Ph.D. Student, Texas A&M University, College Station, TX

Session 5 • Southdown (4th floor) • Contributed Papers

Managing Tourism Sustainably

Chair: Thomas Bremer, Associate Professor, Rhodes College, Memphis, TN

Tourism Best Management Practices (TBMP): Design and Acceptance by Operators

Linda Kruger, Research Social Scientist, US Forest Service PNW Research Station, Juneau, AK

Mark Needham, Oregon State University

Emily Pomeranz, Oregon State University

Trends such as an increase in the amount and diversity of nature based activities affect commercial outdoor recreation operators, their clients, other visitors and local communities. Tourism is the fastest growing industry in Alaska, a state with over 200 million acres of federal public lands. Given that tourism in this region is focused largely on nature based activities it is dependent on publicly owned land, including many protected areas, to accommodate these activities. Commercial outdoor recreation and tourism on public land has both positive and negative effects on the local community, public resources, and independent recreationists and visitors. Often the increase in activity has unanticipated social and environmental consequences. This research focuses on activities offered by outdoor recreation and tourism guides and outfitters, visitors served, positive and negative effects (e.g., environmental, economic, social, managerial) of commercial operations, and specifically the development of and compliance with tourism best management practices (TBMP).

The Impact of World Heritage Designation on Tourism to Cultural/Natural Heritage Sites

Elizabeth Halpenny, Assistant Professor, University of Alberta, Edmonton, Alberta, Canada

This paper provides a review of research published by consultants, governments and academics regarding the tourism-related outcomes associated with the World Heritage inscription of natural or cultural heritage sites. Anecdotal reports suggest that increases in tourism activity follow the designation of a World Heritage site. Increased tourism activity has been linked to positive impacts such as expanded economic opportunities for the heritage site and local communities and negative impacts such as crowding and a higher incidence of damage to heritage resources. Rigorous documentation of increases in tourism activity, particularly sustained tourism visitation levels and related positive and negative outcomes associated with this activity is lacking. Documentation that had been published on this topic suggests this assumed relationship between WH designation and increased tourism activity is grossly exaggerated and must be understood within the context of the larger tourism system and site specific influences. A program of research designed to clarify this issue will be presented to session attendees.

Social-ecological Resilience and Sustainability of Community-based Nature Tourism Development in the Commonwealth of Dominica

Patrick J. Holladay, Graduate Research Assistant, Doctoral Student, Department of Parks, Recreation & Tourism Management, Clemson University, Clemson, SC

Robert B. Powell, Assistant Professor, Clemson University, Department of Parks, Recreation & Tourism Management, Clemson, SC

What are the conditions needed to build and enhance the resilience and sustainability of community tourism in small island nations? Resilience is the ability of a system to absorb disturbance and to learn and adapt in times of turmoil in order to grow and become more dynamic. From a resilience standpoint sustainability is the ability to create, test and maintain adaptive capability, while development is the process of creating, testing and maintaining opportunity. Despite millions of dollars invested in developing community-based tourism to diversify economies and reduce poverty in the Caribbean, little is known about what conditions lead to sustainable and resilient communities and economies. This project used an integrated mix-methods approach to investigate the conditions needed to build and enhance the resilience and sustainability of community tourism in the Commonwealth of Dominica. Social, ecological, institutional and economic sustainability domains found in this island tourism system will be discussed.

Understanding Factors that Predict Travel Decisions of U.S. Cultural and Heritage Travelers

Xiangping Gao, PhD Student, Texas A&M University, College Station, TX
Michael A. Schuett, Texas A&M University, College Station, TX

U.S. cultural and heritage travelers represent over 100 million travelers that contribute significantly to the tourism industry. This presentation is based on a national survey profiling this specific tourist market (N=1048). The preliminary analysis shows that the visitation to parks, cultural and historical sites can be affected by perceived travel constraints, past experience, consumption behaviors, and tourism motivations. In the analysis, significant travel differences were found among socio-demographic groups, e.g., race/ethnicity. This empirical research will discuss implications for both tourism industry and national park managers to better understand the uniqueness of cultural and heritage travelers and further optimize their managerial strategies for this market segment.

The Importance of Intimate Access to Cultural Sites: Chaco Culture National Historical Park

Wayne Freimund, Arkwright Professor of Wildland Recreation and Protected Area Management, University of Montana, Missoula, MT

Access and experiences of cultural resources are often mediated by interpretive guides or spatial closures. At Chaco Culture National Historical Park, many primary cultural sites remain open to independent exploration by visitors. In this study, the importance of autonomy to the visitor experience is compared to access management to support a general management plan being developed by park staff. Visitors ranked scenarios for management that assumed a doubling of visitation. Approximately half of the visitors supported continued open access with the other half supporting restriction of access at either the site or park level. Visitors were more likely to favor the different systems depending on factors such as convenience, resource quality, and conditions related to soundscapes. This presentation will highlight the findings of the study and discuss how this information supported proactive decision making regarding future visitor use management in the park.

Session 6 • Gallier A/B (4th floor) • Panel Discussion

Coastal Heritage at Risk: Mitigating Threats to Cultural Heritage in Coastal Zones

Chair: Andy, Ferrell, Chief, Architecture and Engineering, National Center for Preservation Technology and Training, Natchitoches, LA

Recent natural events have demonstrated the vulnerability of coastal regions around the world. With increasing frequency and magnitude predicted, coastal storms will continue to threaten these communities and their associated cultural heritage. The purpose of this session is to bring together a panel of experts to discuss how to identify these resources, assess risks, present disaster planning efforts, and discuss mitigation strategies that might be implemented before the disaster. The goal of the session is to create a larger dialog with disaster professionals on the importance of integrating cultural resource protection into disaster preparedness planning and response.

Panelists: Barrett Kennedy, Professor of Architecture, Louisiana State University, Baton Rouge, LA
David Morgan, Director, NPS Southeast Archeological Center, Tallahassee, FL
Patrick Sparks, Principal, Sparks Engineering, Round Rock, TX
David Preziosi, Executive Director, Mississippi Heritage Trust, Jackson, MS
Gustavo Araoz, President, ICOMOS

Session 7 • Nottoway (4th floor) • Panel Discussion

The Nature of History, The History of Nature: Environmental History and National Parks

Chairs: David Louter, History Program Manager, National Park Service, Pacific West Region, Seattle, WA

Rolf Diamant, Superintendent, Marsh-Billings-Rockefeller National Historical Park, Woodstock, VT

This panel of environmental historians will explore the role of environmental history in how we understand national parks and interpret them to the public, as well as the ways that environmental history can inform management policies and decisions for national parks. Each participant will be limited to 10 minutes. The session will open with remarks from Rolf Diamant about the past and future of national parks within the context of the Second Century Commission Report. Next, panelists will address a wide range of topics: how historical research shed light on the oyster controversy at Point Reyes, the place of environmental history in the NPS's science program, interpreting human relationships to the land and the past at Stones River, the ways we can interpret wilderness and its historical values in the Apostle Islands, and the preservation of both at places like Isle Royale. Finally, panelists will discuss their work with the audience for one hour.

Panelists: Timothy Babalis, Historian, National Park Service, Pacific West Region, Oakland, CA

Craig Colten, Professor of Geography, Louisiana State University, Baton Rouge, LA

Rebecca Conard, Professor of History, Middle Tennessee State University, Murfreesboro, TN

Jim Feldman, Professor of History, University of Wisconsin-Oshkosh, Oshkosh, WI

Phil Scarpino, Professor of History, Indiana University-Purdue University Indianapolis (IUPUI), Indianapolis, IN

Session 8 • Oak Alley (4th floor) • Contributed Papers

Genetics

Chair: Robert Winfree, Regional Science Advisor, National Park Service Alaska Region, Anchorage, AK

Incorporating New Science into Management: Developing a Non-invasive Technique to Estimate Population Size Using Fecal-DNA

Mary Kay Watry, Biologist, Rocky Mountain National Park, Estes Park, CO

Kate Schoenecker, Ecologist, U.S. Geological Survey and NREL, Colorado State University, Fort Collins, CO

Gordon Luikart, Research Associate Professor, Conservation Ecology, University of Montana, Missoula, MT

Laura Ellison, Ecologist, U.S. Geological Survey, Fort Collins, CO

Developing non-invasive techniques to study large mammals is the goal of many wildlife managers. Handling ungulates causes stress to animals and risk to humans. In certain places, such as wilderness areas, flying helicopters to radio tag or mark ungulates is heavily scrutinized. The development of viable alternatives is needed. Technological advances have made collecting, extracting and analyzing non-invasive DNA samples possible. We are conducting a study to develop a population estimation technique using fecal DNA. Mark re-capture models will be used to estimate parameters such as population size and survival, where the "mark" is an individual animal's DNA. If this technique is more viable than traditional aerial helicopter monitoring, park managers may be able to determine trends in bighorn sheep and other wildlife populations non-invasively. This would inform a variety of management decisions. We have finished the second field season of this 2-year study. Preliminary results will be presented.

Is Genetic Purity a Problem for the National Parks?

Peter Dratch, Endangered Species Program Manager, National Park Service, Fort Collins, CO

There have been several recent examples where issues of genetic purity, in both animals and plants, pose potential management problems for national parks. North American plains bison (*Bison bison bison*) were saved from extinction by a few ranchers who crossed them with cattle to create a more hardy domestic animal. Using high resolution DNA techniques, bison with cattle ancestry at very low levels are identified in most NPS herds. Other instances where genetic purity has become an issue include the restoration of greenback cutthroat trout (*Oncorhynchus clarki stomias*) in Colorado, proposed utilization of a fungus- resistant hybrid of the American Chestnut (*Castanea dentata*), and use of crops containing genetically modified organisms (GMOs) at national battlefields and other sites. Outlining the molecular methods used to analyze animals and create new hybrid vigor in plants, this paper examines genetic integrity of organisms in light of the environmental challenges facing national parks.

Inbreeding and the Wolves of Isle Royale

Rolf Peterson, Research Professor, Michigan Technological University, Houghton, MI

John Vucetich, Assistant Professor, Michigan Technological University, Houghton, MI
Leah Vucetich, Assistant Research Professor, Michigan Technological University, Houghton, MI
Jennifer Adams, Research Associate, Michigan Technological University, Houghton, MI
Jannikke Raikkonen, Research Scientist, Swedish Museum of Natural History, Stockholm, Sweden
Phil Hedrick, Professor, Arizona State University, Tempe, AZ
The wolf (*Canis lupus*) population in Isle Royale National Park has been considered a genetically isolated population throughout its 60-year history. With usually two-three breeding pairs and average population size of only 23, the wolves are severely inbred. Since 1994 the prevalence of vertebral anomalies has been 100%, yet breeding wolves were productive and lived maximal lifespans, and rates of reproduction and mortality were similar to mainland populations. Analysis of fecal DNA in 1999-2007 revealed that a single immigrant male arrived in 1997 and he bred annually in 1998-2006. A genomic sweep occurred as his genes quickly came to dominate the population. There were no changes in skeletal abnormalities or demographic parameters. This case history illustrates the difficulty of detecting effects of inbreeding from field estimates of demographic parameters, and the challenge of maintaining genetic heterogeneity in small, endangered populations.

Partnership Approach to Nursery Production of Locally Genetic Plants for Park Restoration and Landscape

Betty Young, Director of Nurseries, Golden Gate National Parks Conservancy, San Francisco, CA
Biologists at many parks are coming to understand the importance of using genetically appropriate plant material for restoration and landscaping in their parks. The challenge then becomes how to obtain plants from locally collected propagules, at outside nurseries or to start a nursery at the park. Using the Presidio and Golden Gate National Parks as a case study, this talk will discuss how; to effectively use partnership opportunities to finance and manage nurseries dedicated to the park's mission, take advantage of each partner's expertise; Opportunities for volunteers and making the best use of this resource while providing an enriching experience; through dedicated nurseries and expert staff, attention can be given to providing the most appropriate plant material from propagules collected and grown using practices which promote conservation of local plant genetics while avoiding genetic degradation.

Bison: Yesterday, Today, and Tomorrow

Mietek Kolipinski, Natural Resources Management and Research Program Manager, National Park Service, Oakland, CA
Arthur Scott, Historian, Dominican University of California, San Rafael, CA
Steven Borish, Anthropologist, Department of Human Development, California State University East Bay, Hayward, CA
Kristen Kozlowski, Administrative Coordinator, Department of Natural Sciences and Mathematics, Dominican University of California, San Rafael CA
Sibdas Ghosh, Chair, Department of Natural Sciences and Mathematics, Dominican University of California, San Rafael, CA
No species in North America today more powerfully represents the United States than the bison. Preserving genetic integrity of this species (*Bison bison*) is important to the nation, because its founders brought this magnificent animal so close to extinction. This paper examines the bison's special historic relationship with North American Native American cultures (including hunting, ceremonies, spirituality, etc.), events leading to 19th century near-extinction, early conservation successes, and prospects for future bison. Some individuals and organizations succeeded in early conservation work. However, strong challenges exist today, such as bison-cattle interbreeding and threat of bison genomic extinction. Several bison protection organizations and a Department of Interior bison working group are developing strategies. Their goals include finding and establishing connected habitats wherein buffalo can roam and migrate as they did historically across broad ranges. Maintaining genetic purity and creating safe habitats for bison herds can lead to long-term viability.

Session 9 • Bayside A (4th floor) • Contributed Papers

Visitor Safety and Resource Protection: Impacts of Crime and Illegal Immigration

Chair: Michael Huffman, Associate Professor, University of Memphis, Memphis, TN

Rethinking Crime Prevention in Natural Areas

Joel McCormick, Ph.D. Student, University of Florida, Gainesville, FL
Stephen Holland, Associate Professor, University of Florida, Gainesville, FL
The literature suggests that crime and fear of crime is increasing in recreational settings (Chavez, Tynon, & Knap, 2004, Manning, et al., 2001; Pendleton, 2000; Shore, 1994). However, research on the effectiveness of crime prevention programs in urban parks, rural parks, or national forest/park lands is scarce. In 2006, Tynon and Chavez published an article entitled "Crime in

the national forest: A call for research." This presentation will highlight some of his research in park crime prevention and provide the attendee with a basic understanding of how Crime Prevention Through Environmental Design (CPTED), Situational Crime Prevention, and Environmental Criminology can be applied to the management of parks and natural areas. This talk will be geared towards park managers, not law enforcement personnel, however they are welcome too.

Attributing Responsibility for Visitor Safety in Mount Rainier National Park: An Exploratory Study

Laura Rickard, Graduate student/Student Conservation Association Intern, Cornell University, Department of Communication, Ithaca, NY

Clifford Scherer, Associate Professor, Cornell University, Department of Communication, Ithaca, NY

Attracting hundreds of millions of visitors each year, national parks represent one context in which unintentional injuries are recurrent and fatal. Given unique environmental and infrastructural risks and varied recreational opportunities, who is perceived as responsible for preventing injuries, and how might this relate to perception of risk? How might attribution of responsibility predict visitors' support for preventative risk management? Limited research has considered these questions; yet, increasing promotion of parks to diverse audiences suggests a need to build public support for NPS risk management. Using survey data, this exploratory study found that most MORA visitors perceived themselves as responsible for their own safety, and perceptions of the uncontrollability of park-related risks were positively related to these attributions; however, attribution failed to predict support for preventative risk management. Significant predictors included perceptions of risk, participating in high-risk activities, and traveling companions. We discuss ongoing, related research in two other parks.

Continued Cultivation of Illegal Marijuana Production in U.S. Western National Parks

Jim Milestone, Superintendent, National Park Service, Whiskeytown, CA

Charisse Sydoriak, Sequoia- Kings Canyon National Parks, Three Rivers, CA

Athena Demetry, Sequoia- Kings Canyon National Parks, Three Rivers, CA

Since 2001, several national parks have been used as illegal marijuana cultivation sites by Mexican Cartels. This paper documents the continued use of national park lands as illegal cultivation sites. During the grow season of 2010, the Mexican Cartels began scouting the hills of Whiskeytown in mid-winter. Supplies and personnel to manage the sites were in place as early as March. Rangers detected four grow sites within the park boundary and several sites immediately adjacent to the park. Rangers eventually removed 8,240 plants which had a street value of nearly $33,000,000. Four foreign nationals were arrested and all believed to be associated with the Mexican Cartels. Similar situations occur at Sequoia, Yosemite, Golden Gate, North Cascades and Santa Monica National Recreation Area. As Californian voters decide on a referendum whether or not to legalize marijuana (Proposition 19), park managers believe the threat of marijuana cultivation within park lands will continue even if the measure passes.

On the Border in Everglades and Dry Tortugas: Exploring Immigration Impacts on Florida's National Parks

Amanda Bentley, Research Associate, Texas A&M University, College Station, TX

Michael A. Schuett, Associate Professor & Director, Center for Socioeconomic Research & Education, Texas A&M University, College Station, Texas

David Matarrita-Cascante, Assistant Professor, Texas A&M University, College Station, Texas

This study explored immigration to the United States via south Florida's national parks. The purpose of the study was to examine the impacts of immigration on national park staff and natural resources. Data were collected during January 2010 via on-site interviews with NPS administrators, rangers, law enforcement officers, Border Patrol, Coast Guard, and other key informants. Border Patrol reported 5,254 apprehensions of illegal and legal immigrants in Florida (2008) with nearly one fifth (841) taking place in Dry Tortugas National Park alone. Federal agency coordination is problematic in transporting immigrants out of the national parks. Hazardous materials need to be disposed of which is costly and can cause environmental damage to the resource. Study findings exposed the pressure and costs to NPS staff and management each time immigrants land in national parks. Future research to monitor the impacts of this phenomenon in Florida and Caribbean national parks will be discussed.

Assessing Border-related Human Impacts at Organ Pipe Cactus National Monument

Christopher Sharp, Ph.D. Candidate, Research Assistant, University of Arizona, School of Natural Resources and Environment, Tucson, AZ

Cross-border activities in Organ Pipe Cactus National Monument are a significant source of impact and anthropogenic change.

The park's need for an inventory of off-road vehicle routes and trails suggested the use of remote sensing. The data used was four satellite image steps (4 years of imagery) of Organ Pipe NM. This study measured the accuracy of the remote sensing methodology and analyzed spatial patterns of routes and trails in the monument and correlated them with management actions, changes in the border fence, and increased enforcement presence. This paper reveals the efficacy of remote sensing in trails inventory for remote and difficult settings.

Session 10 • Bayside B/C (4th floor) • Panel Discussion

Global Connections: A History of the National Park Service's International Programs

Chair: Jonathan Putnam, International Cooperation Specialist, National Park Service, Office of International Affairs, Washington, DC

2011 marks the 50th anniversary of the National Park Service's Office of International Affairs (OIA). Created by Secretary of the Interior Stewart Udall, OIA was the first official federal program devoted to international conservation. Over the last five decades, the NPS has had significant impact on the development of national parks and other protected areas, as well as cultural heritage preservation, around the globe. The NPS has likewise been influenced in numerous ways through exchanges with international colleagues. In this panel, Lary Dilsaver will provide an overview of his recent work on the history of OIA, and several individuals with direct experience with NPS international programs will present their perspectives on how these programs have made a difference, both around the globe and at home.

Panelists: Lary Dilsaver, Professor, University of South Alabama, Mobile, AL

David Reynolds, Chief, Natural Resources and Science, Northeast Region, NPS, Philadelphia, PA

Jacob Fillion, Environmental Education Chief and International Programs Coordinator, Grand Canyon National Park, AZ

Alvaro Ugalde, Former Director, Costa Rica National Park Service

Stephen Morris, Chief, NPS Office of International Affairs, Washington, DC

Session 11 • Maurepas (3rd floor) • Contributed Papers

Ecological Restoration

Chair: Julie Whitbeck, Ecologist, Jean Lafitte National Historical Park & Preserve, New Orleans, LA

Restoring Meadows and River Processes through Removal of Abandoned Infrastructure

Judi Weaser, Branch Chief, Vegetation and Ecological Restoration, Resources Management and Science, Yosemite National Park, El Portal, CA

Sue Beatty, Restoration Ecologist, Resources Management and Science, Yosemite National Park, CA

The broad floodplains of Yosemite Valley support relatively rare mid-elevation Sierra habitats—historically characterized by interconnected wet meadows, riparian forests, oak woodlands, and sparse conifer stands. Due to substantial infrastructure development, including roads, utilities, culverts, and ditches, however, much of this floodplain habitat has been altered or destroyed. This pristine open meadow/river system was one of the scenic resources that inspired the creation of Yosemite National Park, as noted in the park's enabling legislation. During the 19th and 20th centuries construction of sewer lines, roads, paved trails, culverts, and ditches altered surface and groundwater hydrology of Valley meadows. These alterations often hydrologically isolated the meadows from surface runoff channels and the Merced River. Vegetation community changes followed. These changes included the persistence of non-native upland grasses planted for hay production in the 1860s, invasion of noxious exotics, and conifer encroachment into the meadow. During the last twenty years, Yosemite has been working to restore meadow hydrology and river process through removal of fill dirt and ditches as well as removal of abandoned utility lines that cross the Merced River and effectively serve as drains for wet meadows. The techniques developed to restore hydrology while having the least impact to these fragile systems is a key component of project success.

The Great Lakes Restoration Initiative: Opportunity for Restoration!

Brenda Waters, Assistant Chief for Natural Resources, NPS Indiana Dunes National Lakeshore, Porter, IN

John Kwilosz, Restoration Biologist, NPS Indiana Dunes National Lakeshore, Porter, IN

Randy Knutson, Wildlife Biologist, NPS Indiana Dunes National Lakeshore, Porter, IN

Daniel Mason, Botanist, NPS Indiana Dunes National Lakeshore, Porter, IN

Charles Morris, Environmental Protection Specialist, NPS Indiana Dunes National Lakeshore, Porter, IN

The first year of the Great Lakes Restoration Initiative has provided Indiana Dunes National Lakeshore with more than $2.3 million to implement restoration projects along southern Lake Michigan. This remarkable natural resource management oppor-

tunity is unprecedented in the park's 45 year history. Discussion and photos will highlight the ambitious nature of planning and restoration efforts undertaken in the first year of a five-year federal initiative. Project implementation will be highlighted including control of invasive species, nuisance wildlife management, significant wetland restoration, and cleanup of contaminated sites. Large planning efforts include a Watershed and Resource Condition Assessment and a Comprehensive Shoreline Restoration and Management Plan/Environmental Impact Statement. Lessons learned will be shared about challenges that arise when the opportunity for substantial habitat improvement knocks.

Coming Full Circle: A Logger's Approach to Forest Restoration at Whiskeytown National Recreation Area

Jennifer Gibson, Ecologist, National Park Service, Whiskeytown, CA

The loss of frequent fire as an ecosystem process within Whiskeytown's high elevation forests has greatly altered forest structure, composition, and function. Areas once fire-maintained as open mixed conifer forests and oak woodlands are encroached by dense, even-aged fir trees; diminishing the cover and diversity of the forest understory. These crowded conditions increase the chance of crown fire, pest outbreaks, and competition-induced stress on older, large diameter trees. With assistance from Humboldt State University, park managers have determined the degree and extent to which these forests have deviated from historic conditions within the past Century. This lead to the park's first mechanically treated forest restoration project, focused on promoting growth and vigor of old growth trees by removing smaller-diameter, fire-sensitive species. Stands of old growth forest are becoming rare throughout the Pacific Northwest and the risk of losing such forests to fire or competition-induced stress gives urgency to restoration.

LiDAR Derived Forest Metrics for Forest Restoration at Redwood National & State Parks

Daryl Van Dyke, GIS Analyst, US Fish & Wildlife Service, Arcata, CA

Lathrop Leonard (no affiliation given)

With the acquisition of LiDAR for the Mill Creek component of Redwood National & State Parks, the opportunity arose to determine relative stand conditions in a manner more cost-effective than a traditional cruise. These metrics quantify tree density, basal area, quadratic mean diameter, and other forest metrics by developing regression equations based on known forest conditions found on surveyed plots. After the first round of calibration, preliminary models specific to both the forest conditions. Results indicate that the LiDAR analysis is an effective means of identifying stands in jeopardy of slowing growth rates, declining health, and possible mortality without achieving late-seral conditions or optimal slope stabilization. This evaluation develops a treatment prioritization to reduce stand densities and improve habitat, slope, and stand stability. The longer term goal should be to treat most of the stands with the highest priority ranking in the next 5 to 10 years.

When, Why, and What to Monitor? A Case Study: Iceplant Removal at Point Reyes

Ellen Hamingson, Restoration Biologist, Point Reyes National Seashore, Point Reyes Station, CA

Dylan Voeller, Point Reyes National Seashore, Point Reyes Station, CA

Large-scale invasive plant removal projects rarely come with adequate funding for monitoring of treatment effectiveness. Yet cost-efficient monitoring is an important component of adaptive management. Point Reyes National Seashore (PORE) has completed two phases of large-scale dune restoration in rare plant habitat (2002-04 and 2008-10), focusing on control of *Carprobrotus edulis* in the Headlands region. Visual transformation of the site has been dramatic, yet more detailed quantification of the results has helped to identify areas where additional management is required. The effectiveness of several monitoring approaches (species composition sampled in plots using ocular cover estimates; species lists; GPS mapping of both rare and invasive species; photo-documentation) will be compared. As the Seashore begins another large-scale invasive species control project, this time focusing on *Cytisus scoparius* parkwide, elements of past monitoring may or not be applicable. Costs and benefits of allocating staff resources to monitoring and analysis will be discussed.

Session 12 • Borgne (3rd floor) • Sharing Circle

Knowledge and Ways of Knowing: Is Science Knowledge the Only Paradigm for Resource Management Decision-Making?

Organizers: Judy Bischoff, CPCESU Research Coordinator, National Park Service, Flagstaff, AZ

Jeff Bradybaugh, Superintendent, Bryce Canyon National Park, UT

Erik Nielsen, Assistant Professor, Northern Arizona University, Flagstaff, AZ

Land management agencies frequently use the "buzz words," science-based management decision-making and have espoused this Western science model for "best practices" in resource management. The notion of other types of knowledge and validity of

using that knowledge for resources management decision-making has been better integrated in Alaska and Canada, where subsistence is recognized as an important part of the decision-making process. This is not true for much of the "lower 48." The intent of this session is to discuss issues in the form of a sharing circle on integration of traditional knowledge into resource management.

Session 13 • Borgne (3rd floor) • Sharing Circle

Resource Literacy, Resource Needs: A Discussion About Improving Dialogue and Knowledge

Organizers: Teresa Moyer, Archeologist, National Park Service, Washington, DC

Sara Melena, Education Specialist, NPS Office of Education and Outreach, Natural Resource Program Center, Fort Collins, CO

Angie Richman, Communication Specialist, Climate Change Response Program, National Park Service, Fort Collins, CO

America faces a crisis in historical and scientific illiteracy. NPS sites hold a wealth of resources to affect visitors' understanding of important issues and topics – a job that is typically placed in interpretive rangers' hands. How can interpreters, resource managers, educators, and others improve their own resource literacy to help visitors with theirs? What avenues in parks, programs, and beyond exist to access and digest the latest relevant scholarship? How does illiteracy affect the relationships between staff and visitors when sensitive or controversial topics are featured? What role can interdisciplinary work play when it breaks down stovepipes between disciplines, programs, and biases? Discussants will address approaches, needs, and concerns.

Concurrent Sessions • Monday, March 14 • 1:30–3:35

Session 14 • Napoleon A1/A2 (3rd floor) • Invited Papers

Adapting to Climate Change Effects in Protected Areas and Across Landscapes

Chair: Cat Hawkins Hoffman, NPS Climate Change Adaptation Coordinator, NPS Climate Change Response Program, Fort Collins, CO

Session overview: The Intergovernmental Panel on Climate Change (IPCC, 2007) defines adaptation as the "adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities." Determining adaptation actions logically follows identification of vulnerable resources or systems. This session presents an overview of current considerations and plans regarding climate change adaptation measures for natural and cultural resources in protected areas and across landscapes. Speakers will address the importance of the science-management partnership in adaptation planning; the National Park Service's role, leadership responsibilities and actions in cultural resource adaptation strategies; recent efforts in the NPS to assess risks and vulnerability of park resources to sea level rise; perspectives of Ontario Parks' managers regarding the desirability and feasibility of climate change adaptation actions; and the most recent information regarding the DOI Landscape Conservation Cooperative network development and programs.

Applying Climate Change Science and Vulnerability Analyses to Adaptation of Natural Resource Management

Patrick Gonzalez, NPS Climate Change Scientist; Climate Change Response Program, Natural Resource Stewardship and Science, National Park Service, Washington, DC

Climate change science provides natural resource managers key information to develop and implement adaptation measures. Contributions of applied climate change research to adaptation include: detection of ecological changes and attribution of causes of observed changes, spatial analyses of climate observations and downscaled projections of climate under a range of emissions scenarios, spatial analyses of the vulnerability of species and ecosystems to climate change that identify vulnerable areas and potential refugia, assessment of potential effects of adaptation measures on the resilience of species and ecosystems, estimation of the potential for forest management to reduce climate change by storing carbon, prioritization of landscape-scale adaptation measures, and monitoring effects of implemented adaptation measures. Recent original research applicable to adaptation includes an analysis of observed and projected climate changes and vegetation shifts that has identified vulnerable areas and potential refugia and analyses of the vulnerability of Canada lynx and wolverines to climate change.

Climate Change and Cultural Resources: NPS Efforts to Address Climate Change Effects on Cultural Resources

Stephanie Toothman, Associate Director, Cultural Resources; National Park Service, Washington, DC

The NPS Climate Change Strategy, published Fall 2010, outlines an interdisciplinary approach to addressing the effects of climate change, on both the resources we manage, and at a landscape level that stretches beyond our borders. This presentation will focus on the progress toward implementation of that strategy within the NPS cultural resource park and partnership programs, including the recruitment of a Climate Change position in WASO to represent cultural resource issues in NPS and other forums, development of a prototype research design for the Pacific Islands, and research on sustainability and historic preservation.

Adapting to Sea-Level Rise: Challenges and Opportunities for the Nation's Coastal Parks and Communities

Maria G. Honeycutt, Coastal Climate Adaptation Specialist, National Park Service, Washington, DC

Sea-level rise (SLR) is a leading climate change driver that is already affecting coastal ecosystems, cultural resources, and infrastructure to varying degrees across the National Park System and in coastal communities nationwide. While our scientific understanding of global and regional sea-level trends is improving, decision-makers charged with managing resources require information about water level changes and related impacts resolved at local scales, including the combined impacts of SLR and coastal storms. This presentation will describe recent efforts within the National Park Service to assess risks and the vulnerability of park resources to SLR, and to develop and implement effective adaptation strategies. The talk will feature specific initiatives aimed at improving park-level managers' access to relevant, reliable data and decision-support tools developed by or in partnership with various Federal, academic, and non-governmental entities.

Climate Change Adaptation in Protected Areas and the 'Real World': Opportunities/Challenges at the Science-Management Interface

Christopher J. Lemieux, Centre for Applied Sciences in Ontario Protected Areas (CASIOPA); University of Waterloo; Waterloo, Ontario, Canada

Numerous scientific publications identify potential adaptations to climate change for protected areas, but without evaluating their suitability from legal, policy, financial, workforce capacity, and other management perspectives. This presentation reviews results of managers' evaluation of 'real world' feasibility of climate change adaptation options within Ontario Parks. Results revealed high agreement regarding the desirability of adaptation options and a moderate level of capacity for policy formulation and management direction, but simultaneously exposed a perception of low capacity for implementation in most program areas. Of the 56 most desirable adaptation options identified, senior decision-makers judged only two as definitely implementable. Managers perceived capacity as particularly limited within research, monitoring and reporting programs. 'Adaptation paralysis' among decision makers as a result of limited internal capacity and resources may lead protected areas managers to maintain status-quo despite concerns about long-term viability of current planning and management practices in an era of climate change.

Enhancing Collaborative Approaches and Application of Science to Conservation Challenges: The Landscape Conservation Cooperative

Douglas Austen, National Coordinator, Landscape Conservation Cooperatives; U.S. Fish and Wildlife Service; Arlington, VA

Numerous conservation challenges, including climate change and other impacts, require increasingly collaborative, science-based actions. In response, Secretarial Order 3289 directs Department of Interior agencies to develop broad partnerships within 21 Landscape Conservation Cooperatives. LCCs are self-directed partnerships among land, water, wildlife and cultural resource management agencies and tribes, as well as interested public and private organizations. Partners in the LCCs identify shared conservation goals, and deliver the science needed to address these priorities. LCC partners strategically address threats to the sustainability of natural resources (wildlife, land, water, and cultural resources), including fragmentation of habitat, invasive species, water availability, and sea level rise. Importantly, LCCs work closely with the USGS National Center for Climate Change and Wildlife Science, and the Regional Climate Science Centers (CSC) to provide science for conservation action. This talk presents current LCC activities, accomplishments, and projections, as well as next steps for continued development of these partnerships.

Session 15 • Napoleon B1 (3rd floor) • Contributed Papers

Establishing New Parks and Networks of Protected Areas

Chair: John Waithaka, Conservation Biologist, Parks Canada, Gatineau, Quebec, Canada

The Federal Lands Contribution to Ecological System Conservation

Lisa Duarte, Stewardship Coordinator, USGS Gap Analysis Program, University of Idaho, Moscow, ID
Jocelyn Aycrigg, Conservation Biologist, USGS Gap Analysis Program, University of Idaho, Moscow, ID
Anne Davidson, Spatial Ecologist, USGS Gap Analysis Program, University of Idaho, Moscow, ID
Alexa McKerrow, Biologist, USGS Gap Analysis Program, Raleigh, NC
Kevin Gergely, GAP Coordinator, USGS Gap Analysis Program, Moscow, ID
J. Michael Scott, Leader and Research Scientist, USGS Idaho Cooperative Fish and Wildlife Research Unit, Moscow, ID

While the conservation community has embraced a landscape scale approach for decision making, lack of relevant and consistent data at a national scale has been an impediment. The recent releases of the US Geological Survey Gap Analysis Program (GAP) National Land Cover data (based on ecological systems) and the Protected Areas Database of the US (PAD-US) facilitates and endorses a landscape analysis. Ecological systems are recurring groups of biological communities found in similar physical environments and influenced by similar dynamic ecological processes. PAD-US contains information on land ownership, management designation and degree of biodiversity conservation for each protected area. Our objective was to evaluate the extent of federal agencies', overall and individually, contribution to biodiversity protection for ecological systems. We were also interested in how many ecological systems were redundant within federal agency boundaries. Our results suggest the federal network of protected lands is invaluable and changes in management could increase the conservation of ecological systems.

Factors Influencing the Establishment of Protected Areas: Canada and Mexico

Angeles Mendoza Sammet, Ph.D. Candidate, Faculty of Environmental Design, University of Calgary, Calgary, Alberta, Canada
Michael Quinn, Associate Professor in Environmental Design, Faculty of Environmental Design, University of Calgary, Calgary, Alberta, Canada

We compare the History and Current challenges that the Monarch Biosphere Reserve ("Monarch"; Mexico) and the Castle Wilderness ("Castle"; Canada) are facing to analyze what influences conservation of biodiversity and the establishment of protected areas in Canada and Mexico. Both protected areas have a history of conflict between conservation and development. The two case studies have been under both federal and provincial/state administration at some point: at the beginning of the 20th Century, the Castle was part of Waterton Lakes National Park and had federal status; it was later transferred to the government of Alberta. In the 1980s, Monarch was a state forest reserve and later became a federal protected area. Regardless of their current designation, the Castle and Monarch are crucial for the preservation of migratory species. Understanding the factors that influence their success is a key step to protect species of concern at North American level.

Creating New National Parks and Marine Conservation Areas: Achievements and Lesson Learned

Kevin McNamee, Director, Park Establishment Branch, Parks Canada Agency, Ottawa, Ontario, Canada

Since 2006, the Government of Canada has taken actions that will protect additional national parks and national marine conservation areas totaling near 90,000 square kilometers. This will bring Parks Canada's network of protected areas to almost 365,000 square kilometers, representing an increase of 30 per cent. These new protected areas include the six-fold expansion of a World Heritage Site in Nahanni National Park Reserve and Parks Canada's first national marine conservation area under the Canada National Marine Conservation Areas Act. The presentation would focus on: (1) a summary of recent additions to our system; (2) the manner in which other governments, Aboriginal people and local communities were engaged; (3) the issues and challenges that were successfully addressed; and (4) the lessons learned from the approach taken in select sites.

Sea-change: A New Approach to Oceans Planning and Management

Nicholas Irving, Project Manager & Planner, Gwaii Haanas NMCA Establishment Initiative, Parks Canada Agency, Vancouver, British Columbia, Canada

In June, 2010 the Government of Canada formally designated Gwaii Haanas National Marine Conservation Area (NMCA) Reserve, the first NMCA established under Canada's National Marine Conservation Areas Act. This designation represents a landmark commitment to a truly innovative oceans management partnership between the Government of Canada and the Haida Nation, reflecting a shared commitment to protect the waters surrounding southern Haida Gwaii, a remote archipelago situated on the NW coast of British Columbia, Canada. This presentation will profile the unique co-operative governance framework that will serve as the foundation for planning and decision-making, through which the parties will pursue the achievement of shared ecological, cultural and sustainable use management priorities. The presentation will also highlight key supporting planning and consultation processes that will ensure that the commercial and recreational fishing sectors, other marine sector stakeholders, island communities and the Canadian public are actively involved in ongoing planning and decision-making.

Theoretical Concerns in Networks of Protected Areas: Symmetry and Asymmetry

Robert Pahre, Professor, Political Science, University of Illinois, Champaign, IL

Most discussion of protected areas assumes a world in which all land managers share a goal of "more wildlife," and in which corridors connect symmetrically-placed preserves and wildlife resources. This paper argues that asymmetry in either goals or natural resources pose easily-understood political challenges of varying difficulty. While the typical land manager may want more members of key species, many managers will desire fewer animals from politically controversial species such as prairie dogs, wolves, or bison. In the case of non-native species and some native pests or predators, most or all managers will want fewer or no animals. Two connected managers may therefore have symmetric goals (both want more, or both want less) or may have asymmetric goals (one wants more, the other wants less). Wildlife species also differ in how they move between protected areas. Some migrate, returning to their home area—another case of symmetry. Others disperse, and do not return—a case of asymmetry. Networks other than those with symmetric goals and migratory wildlife pose easily-predictable challenges, some of which are easier to manage than others.

Session 16 • Napoleon B2 (3rd floor) • Invited Papers

Fire and Resource Management—Monitoring, Reconstruction, and Modeling: Applications of Fire Ecology

Chairs: Richard Schwab, National Burned Area Rehabilitation Coordinator, National Park Service, National Fire Management Program Center, Boise, ID

Nate Benson, Fire Ecologist, National Park Service, National Fire Management Program Center, Boise, ID

Session overview: This session will look at the effects of fire and the tools used to understand a dynamic landscape.

A Methodology for Reconstructing Historic Fire Regimes in National Parks

Caroline Noble, Southern Region Fire Ecologist, National Park Service Southeast Regional Office, Tallahassee, FL

Cecil Frost, Landscape Ecologist/UNC Adjunct Faculty, University of North Carolina, Chapel Hill, NC

Using elements of landscape fire ecology it is possible to reconstruct historical natural fire regimes. We developed such a map of presettlement fire frequency for Cumberland Island National Seashore using a new method that interprets fire history from a synthesis of all available information, applied to landscape layers that include topography, soils and existing vegetation. We had available fire scar chronologies, archaeological reports, meteorological data, and presence of fire-frequency indicator species. Interestingly, the resulting map shows that the highest original fire frequency occurred in the designated wilderness, where several fire dependent species are on the verge of extirpation due to fire exclusion. This raises the need for quick reintroduction of fire to the wilderness to prevent further species loss. We envision creating a protocol for reconstructing natural fire regimes that will be widely applicable for use on individual NPS units nationwide.

Modeling Long-term Changes to Stand Structure and Fuels within Different Burn Severities

Karen Koenig, Student, Northern Arizona University, Flagstaff, AZ

Forest Managers at Grand Canyon National Park have long been using prescribed fire to reduce the potential for extreme fire behavior, and to manage for future desired conditions. However, a better understanding of the long-term changes in stand and fuel characteristics following fire is needed for the continued support of fire as a land management tool in Grand Canyon National Park. This study compares the effectiveness of several different management scenarios across Grand Canyon National Park's ponderosa pine (*Pinus ponderosa*) and mixed conifer forests. FVS was employed using data from Grand Canyon's Fire Effects Monitoring program and simulations were run in FVS-FFE using various management scenarios and differing fire severities to see what these stands will look like in the future. The scenarios included both current and proposed management actions for maintaining the desired conditions of Grand Canyon's forests.

Mixed Conifer Regeneration Following Fires of Mixed Severities of the Last Eleven Years in Grand Canyon National Park

Anna Higgins, Student, Northern Arizona University, Flagstaff, AZ

Like many fire adapted forests, the forests on Grand Canyon's North Rim, AZ have undergone considerable change since fire exclusion began in the late 1800's. The transition zone between pure ponderosa pine and mixed conifer forests has experienced a shift in species composition and change in stand structure leading to an increase in high severity fire. Grand Canyon National Park's fire program began over 20 years ago and uses both prescribed and wildland fire to reduce fuel loading and restore functioning ecological processes. This study compares tree regeneration patterns following several mixed severity fires that have burned in the mixed conifer transition zone since 1999. Preliminary results presented will include amount of regeneration by species compared by different burn severities and burn entries and current forest composition and fuel loading. Implications for fire management in Grand Canyon National Park include number of burn entries and severity levels required to meet the desired forest conditions.

A Multifaceted Analysis of Fire Monitoring Handbook Data from Zion and Bryce Canyon National Parks

Katie Johnson, Masters of Science in Forestry Graduate Student, Northern Arizona University, Flagstaff, AZ

Since 1990, fire and resource managers at Zion and Bryce Canyon National Parks have installed Fire Monitoring Handbook-style vegetation and fuels plots to evaluate ecosystem changes in prescribed fire treatment areas over time. Plot data is being analyzed to determine whether pre-determined management objectives, e.g. increased native grasses, decreased total fuel load, and reduced tree density, are being met. Using time-series analysis, we are quantitatively comparing pre- and post-treatment conditions through time, with an emphasis on native understory, fuels, and tree species. In addition, to simulate the effect of prescribed fire treatments on fire behavior reduction we are using a forest management and fire modeling program to model forest structure, fuels, and fire behavior through time. Results from the time-series analysis and model simulations will be presented, along with how results from this project will be incorporated, through the adaptive management cycle, into an updated Fire Management Plan.

Fire Ecology in the Tallgrass Prairie Region: Integrating Long-term Monitoring with Fire Effects

Mike DeBacker, Ecologist, NPS Heartland I&M Network, Springfield, MO
Sherry Leis, Fire Ecologist, Missouri State University Biology Department, Springfield, MO

The fire effects monitoring project for the central tallgrass prairie region is a truly collaborative effort. Fire effects monitoring is integrated into the Heartland Inventory and Monitoring Program (HTLN) unlike most National Park Service Fire Ecology programs which reside within NPS-Fire. Integrating fire effects monitoring with HTLN allows us to communicate long-term monitoring trends to partners as well as enhance short-term fire driven monitoring efforts. The collaboration facilitates the use of long-term monitoring data in fire planning and outreach efforts. Careful planning and good communication is required for this type of integration to be successful. This discussion will highlight both successes and challenges.

Session 17 • Napoleon B3 (3rd floor) • Invited Papers
Coastal Research and Engineering

Chairs: Rebecca Beavers, Coastal Geologist, National Park Service Geologic Resources Division, Lakewood, CO
Jodi Eshleman, Coastal Engineer, National Park Service, Geologic Resources Division, Philadelphia, PA

Session overview: This session will focus on ongoing coastal engineering challenges and projects in parks and protected areas and the research efforts designed to help improve the baseline information available for project design. Protected areas face increased pressure to balance the impacts of projects outside of their boundaries with the goals of conservation and preservation of natural, cultural and historic resources. Managers often lack information about the state of existing resources and complex physical and biological processes at stake. Current research efforts help to compile data that will allow engineers to develop designs that more closely mimic natural processes, while still affording protecting to resources at risk from coastal erosion and sea level rise.

Coastal Engineering Challenges in National Parks

Jodi Eshleman, Coastal Engineer, National Park Service, Geologic Resources Division, Philadelphia, PA

Coastal National Parks are facing increased pressure on infrastructure and cultural and natural resources from adjacent shoreline hardening and reduced sediment supply. Increased coordination with partners (private, state, federal) is required to achieve common goals through regional attempts to manage sediment and restore natural processes. Managers need to be proactive with planning efforts to prevent future impacts to resources that could result from current projects. Work is ongoing to develop guidance that will help to improve consistency across National Park units and provide tools for parks to interface with partners on sediment restoration projects. This presentation will highlight some current coastal engineering projects that are happening within and adjacent to coastal National Parks and describe efforts to develop tools for parks to engage with partners on sediment restoration projects and improve understanding of National Park Service goals and policies.

A Plan for Coastal Resilience in Mississippi

Susan Ivester Rees, Program Manager, Mississippi Coastal Improvements Program, U.S. Army Corps of Engineers, Mobile, AL
Jason B. Krick, Engineering Lead for MsCIP, U.S. Army Corps of Engineers, Mobile, AL

The US Congress directed USACE to develop a comprehensive plan addressing hurricane storm damage reduction, salt water intrusion, shoreline erosion, fish and wildlife preservation, and other water resource projects in coastal Mississippi. The recommended Mississippi Coastal Improvements Program plan facilitates a resilient coast using system-wide and integrated approaches, risk based plan formulation and phased implementation. A critical component of the plan is the comprehensive restoration of the barrier islands. Early analysis indicated that these barrier islands are the mainland's first line of defense against storm processes. Past hurricanes have reduced the width and elevation of the barrier islands, exposing the Mississippi mainland to increasing storm damage. Analysis and design to optimize sand placement, evaluate the effect of the barrier island restoration on storm waves, currents, circulation, and water quality is being conducted by a multi-agency regional study team consisting of the National Park Service, U.S. Geological Survey, and USACE.

Sea Level Rise Concerns for Everglades Restoration Planning

Glenn B. Landers, Senior Project Manager, Climate Change Studies, U.S. Army Corps of Engineers, Everglades Division, Jacksonville, FL

The Comprehensive Everglades Restoration Plan (CERP) was approved by Congress in WRDA 2000 as the basis for additional detailed design studies and subsequent requests for construction authorizations. CERP goals include restoration of natural hydrologic conditions in the remaining 50% of the historic Everglades while maintaining existing levels of flood protection,

water supply and other project services in developed areas. This presentation will give an overview of forecast climate change concerns related to Everglades Restoration Planning, discuss U.S. Army Corps of Engineers sea level rise (SLR) projections for Florida, identify potential SLR impacts on natural and developed areas of South Florida, and outline interagency efforts to develop enhanced models and other info required for future detailed evaluation of alternative adaptation strategies.

Marine Mapping for Managers in Ocean and Coastal Parks: Making it Possible with Partnerships

Mark Borrelli, Coastal Geologist, Provincetown Center for Coastal Studies, Hiebert Marine Lab, Provincetown, MA
Ashley R. Norton, Graduate Student, Geological Sciences, University of Delaware, Newark, DE
Taylor L.B. Brown, Graduate Student, Environmental, Earth and Ocean Sciences, University of Massachusetts at Boston, Boston, MA

A 3-year, state-funded project to develop methods to map very shallow waters (1–10m) in Massachusetts illustrates the benefits one project can have for multiple stakeholders. The project will provide managers with baseline information regarding natural and cultural resources within and adjacent to the park. The first full field season yielded high-resolution, quantitative data with regards to submerged aquatic vegetation, habitat and bottom types, derelict fishing gear, as well as previously unmapped cultural resources, such as sunken vessels and historic, submerged lighthouses. Cape Cod National Seashore has been an active partner since the beginning of the project and has made significant contributions to the project. The Seashore has provided logistical support and housing in a very popular tourist destination for the principal investigator and summer housing for graduate students working on the project. As a result maps will be developed specifically for the seashore in portions of the park.

Evolution of Cape Lookout and Cape Hatteras National Seashores: Responses to Rising Sea Level

Stanley R. Riggs, Distinguished Research Professor, Department of Geological Sciences, East Carolina University, Greenville, NC

During the last glacial episode (~25,000 to18,000 BP) the NC ocean shoreline was ~110 m below current MSL and ~25 to ~100 km off the present coast. This resilient coastal system migrated upward and landward since the last glacial maximum. NC data predicts a potential 1 to 1.4 m rise in regional sea level by 2100. The resulting forecast for barrier island evolution in response to this amount of sea-level rise could be "no problem" or "catastrophic" depending upon the management policies and natural resiliency of the barrier islands. Cape Lookout NS is a healthy natural barrier island system, while Cape Hatteras NS is a highly modified and managed system. Both Seashores consist of two types of barrier islands (complex- and simple-barrier islands), each type is defined by very different sediment supplies, paleotopography, and storm dynamics. These physical variables, along with very different effects of human modification, will dictate their future evolutionary succession.

Session 18 • Southdown (4th floor) • Panel Discussion

Engaging Local Communities in World Heritage Sites: Experience from the Community Management for Protected Areas Programme

Chair: Jessica Brown, Executive Director, New England Biolabs Foundation, and Chair, IUCN-WCPA Protected Landscapes Specialist Group, Ipswich, MA

For the past decade the Community Management of Protected Areas Conservation Programme (COMPACT) has been testing an innovative model for engaging communities in conservation. An initiative of the UNDP/Global Environmental Facility Small Grants Programme, COMPACT is working with communities near current and proposed World Heritage Sites in nine developing countries. Through extensive on-the-ground experience, and a participatory methodology that takes a scientific approach, COMPACT is demonstrating that community-based initiatives can significantly increase the effectiveness of biodiversity conservation in globally significant protected areas while helping to improve the livelihoods of local people. This panel will present the experience of COMPACT globally and in a few selected regions, and will explore its relevance to protected areas in North America. Introductory remarks (5 minutes) and an overview presentation (12 minutes) will set the stage for three case-study presentations (15 minutes each). A final presentation (15 minutes) will reflect on similar initiatives in North America, leading to a facilitated discussion with the audience on common themes.

Panelists: Terence Hay-Edie, Programme Specialist, GEF Small Grants Programme, UNDP, New York, NY
Julio Moure, Coordinator, COMPACT-Mexico, Sian Ka'an Biosphere Reserve, Punta Allen, Mexico
Celia Mahung, Executive Director, Toledo Institute for Development and Environment (TIDE), Punta Gorda, Belize
Nora Mitchell, Director, Conservation Study Institute, National Park Service, Woodstock, VT

Session 19 • Gallier A/B (4th floor) • Contributed Papers

Interpreting "Hidden" History

Chair: Rebecca Conard, Professor of History, Middle Tennessee State University, Murfreesboro, TN

Historic Restoration: The Re-Emergence of Yosemite and Sequoia's Buffalo Soldiers

Shelton Johnson, National Park Ranger, US National Park Service, Yosemite, CA

African Americans constitute one of the demographics least likely to have a wilderness or national park experience. By using Yosemite's African American stewardship history, a bridge has been created between an underrepresented population and the national parks. This is a model that others can follow. The story of Yosemite's Buffalo Soldiers had been forgotten/overlooked for nearly 100 years, but eventually became part of "The National Parks, America's Best Idea," a documentary film by Ken Burns and Dayton Duncan. How was this accomplished? What was the path from local obscurity to national, even international, recognition? Learn how the media was effectively utilized to restore this story to its rightful place in American history. Profiles/articles in media such as Sunset Magazine, the San Francisco Chronicle, Voice of America, Public Radio International, The Guardian, and local/regional television, helped set the stage for discovery by the creators of The National Parks film.

Les survivants de l'esclavage: The Archeology of Slavery at L'Hermitage Plantation, Maryland

Joy Beasley, Cultural Resources Program Manager, Monocacy National Battlefield, Frederick, MD

In 1793, the Vincendière family came to Frederick County, Maryland from the colony of Saint-Domingue within what is now Monocacy National Battlefield. Bringing 12 of their enslaved laborers with them, the Vincendières acquired land and labor that eventually comprised a 748-acre plantation called L'Hermitage. By 1800, L'Hermitage was home to 90 enslaved African-Americans, making the Vincendières among the largest slaveholders in Maryland. Recent archeological excavations at the L'Hermitage slave village have revealed what is thought to be one of the largest slave sites in the Mid-Atlantic region, including the remains of six dwelling houses and associated features such as enclosures and trash middens. In addition to revealing much about the lives of the enslaved people at L'Hermitage, this project provided applied field and research experiences for students from American University, Hood College, the University of Maryland, and Howard University.

Without Controversy: The Development of Fort Pillow State Historic Park

Benjamin Hayes, Park Ranger, National Park Service / Middle Tennessee State University, Hagatna, Guam

As the site of the most infamous racial atrocity and massacre of the Civil War, Fort Pillow State Historic Park is tasked with interpreting one of the most controversial stories in Tennessee history. Fort Pillow is linked with an equally controversial figure, Nathan Bedford Forrest. Few other sites offer such unique opportunities for the public to explore some of the most pertinent, enduring, consequential issues of the Civil War including the cost of freedom and legacy of slavery and racism. Since the park's inception, however, advocates of conflicting versions of the past have struggled for control. As the park took shape in the late 1970s, it became a battleground for history versus heritage. Despite contentious debate, the greatest obstacle to effectively interpreting and preserving the parks is the state of Tennessee which remains steadfast in its unwillingness to embrace the controversial past of Fort Pillow as a foundation for meaningful interpretation.

The National Underground Railroad Network to Freedom as an Innovative Program

Jenny Masur, Manager, National Capital Region, National Underground Railroad Network to Freedom, National Park Service, Washington, DC

In 1998 Congress mandated the National Park Service to create the National Underground Network to Freedom. A new approach to preservation, this program is unique as a "park without walls," and encompasses both government and private entities. Through the history of resistance to slavery through flight, the program strives to engage new audiences with the national parks. The program's mission combines Underground Railroad preservation and education with the goals of identification, documentation, protection, and commemoration of landscapes and historic sites, regardless of integrity. The key is verifiable association with resistance to slavery through flight through the end of the Civil War. Innovative, the program is creating a network of interested parties to cooperate, educate, and share resources and ideas for preservation. We are proud to have over 400 formal members of the network, plus other informal partners both inside and outside the United States.

Session 20 • Nottoway (4th floor) • Panel Discussion

Toward Natural Lightscapes and the State of Night in the National Park Service

Chairs: Brandi Smith, Doctoral Student and Good Lighting Practices Fellow, Clemson University, Department of Parks, Recreation, and Tourism Management, Clemson, SC

Jeffery C. Hallo, Assistant Professor, Clemson University, Department of Parks, Recreation, and Tourism Management, Clemson, SC

Light pollution is evident in 99% of the world's skies. Studies predict that without effective management, light pollution intensity will continue to increase. Numerous U.S. National Park Service (NPS) units experience conflict between this negative externality and management priorities, producing a range of lighting control tactics believed to be reflective of the importance of night to a specific unit. Best management calls for complete consideration of the role of night in NPS units and successes and challenges in attempts to mitigate stray lighting impacts. The present panel offers expert knowledge from academia and the NPS, representing the realms of astronomy, culture, social science, and community cooperation to discuss the state of night in the NPS and consider its future stature- a necessity if night is to remain a viable resource. It aims to engender intense panel-audience discussion, better informing all parties about this largely unexplored realm of park science.

Panelists: Brandi L. Smith, Doctoral Student, Clemson University, Department of Parks, Recreation, and Tourism Management, Clemson, SC

Chad Moore, Night Sky Team Program Manager, National Park Service, Ft. Collins, CO

Keven Poe, "Dark" Park Ranger, Bryce Canyon National Park, Bryce Canyon, UT

John Kelly, Park Planner, Acadia National Park, Bar Harbor, ME

G.B. Cornucopia, Park Ranger (Archaeoastronomer), Chaco Culture National Historical Park, Nageezi, NM

Session 21 • Oak Alley (4th floor) • Contributed Papers

Streams and Lakes

Chair: Rob Middlemis-Brown, U.S. Geological Survey (retired), Lake Linden, MI

Long-term Monitoring and the Effects of Fire on Stream Morphology and Amphibian Populations

Seth Riley, Wildlife Ecologist, Santa Monica Mountains National Recreation Area, Thousand Oaks, CA

Lena Lee, Data Manager, Mediterranean Coast Network, Thousand Oaks, CA

Katy Delaney, Wildlife Ecologist, Santa Monica Mountains National Recreation Area, Thousand Oaks, CA

Stacey Ostermann-Kelm, Mediterranean Coast Network, Thousand Oaks, CA

Fire can have significant impacts on natural resources in national parks. In urban parks, fire can be a particularly important stressor, as fire frequencies are greater and parklands may be fragmented. At Santa Monica Mountains NRA, we are monitoring freshwater streams and amphibian populations as vital signs of ecosystem health. In October 2005, a fire burned a large portion of the Simi Hills area. In streams where a large proportion of the watershed burned, pools that had been 3-4 feet deep were completely eliminated by the spring of 2006, becoming small 2-3 inch riffles. In one stream, the pools returned by the spring of 2007, amphibians regularly breed there again, and endangered red-legged frogs expanded into this stream in 2009. However in another stream, a large breeding pool for California newts was filled in, was colonized by cattails and willows, and remains a shallow riffle in 2010. Fire can significantly affect streams and amphibian populations, although the effects and recovery time may vary.

Analysis of Trends in Climate and Stream Flow in North Coastal California Park Units

Mary Ann Madej, Research Geologist, U.S. Geological Survey, Arcata, CA

As part of a broader project analyzing trends in climate, stream flow, vegetation, salmon, and ocean conditions in the Klamath and San Francisco Bay Area I&M Networks, we compiled average monthly air temperature and precipitation data from 73 climate stations, stream flow data from 56 river gauging stations, and limited stream temperature data from rivers in north coastal California. Many stations show a statistically significant increase in average maximum air temperature in August during the last century, and even more stations had an increase in minimum August temperatures. Average September precipitation has decreased and summer low flow has decreased in many coastal rivers. Nevertheless, because vegetative cover has also changed during this time period, we cannot ascribe stream flow changes to climate change without first assessing water budgets. Although shifts in the timing of runoff have been documented in snowmelt-dominated watersheds, this was not the case in lower elevation coastal rivers.

Climate-induced Predator Extinctions Modify Aquatic Community Structure in Arid Headwater Streams

Kate Boersma, Doctoral Student, Oregon State University, Department of Zoology, Corvallis, OR
David A. Lytle, Oregon State University, Department of Zoology, Corvallis, OR

Climate projections suggest that many aquatic habitats in arid regions will transition from spatially intermittent (containing fragmented water year-round) to ephemeral (drying completely for portions of the year). This transition could fundamentally change these ecosystems by removing important top predators such as fish and long-lived predatory aquatic insects. I conducted experiments to examine the community consequences of top predator losses in fragmented streams of Chiricahua National Monument, Arizona, and adjacent National Forest lands. Multivariate ordination of community samples from treatments with and without predators revealed distinct communities, suggesting that significant community rearrangement occurs following local predator extinctions. I further documented that microhabitat characteristics of streams pools (depth, temperature, solar exposure) are correlated with predator abundance. My results indicate that conservation efforts aimed at deep bedrock pools may be particularly useful in preserving intact aquatic communities.

Mississippi National River and Recreation Area Water Quality: Assessing Past and Monitoring Future Changes

David VanderMeulen, Aquatic Ecologist, National Park Service, Great Lakes Inventory & Monitoring Network, St. Croix Falls, WI
Brenda Moraska Lafrancois, Aquatic Ecologist, National Park Service, Marine on St. Croix, MN
Sue Magdalene, Assistant Scientist, St. Croix Watershed Research Station, Marine on St. Croix, MN
Kent Johnson, Senior Scientist, Metropolitan Council Environmental Services, St. Paul, MN

Mississippi National River and Recreation Area (MISS) protects a highly developed 72-mile stretch of the Mississippi River within the Twin Cities Metropolitan Area. Long-term (1976-2005) water quality data collected by the Metropolitan Council at six sites within MISS were used to evaluate spatial, seasonal, and long-term concentration and loading trends. Over the period of record, spatial trends were driven largely by nonpoint source inputs from the Minnesota River and, to a lesser extent, by point source inputs from wastewater treatment facilities. Seasonal trends were generally related to hydrologic patterns. Changes in dissolved oxygen, phosphorus, and ammonia appeared strongly linked to improved wastewater treatment practices that reduced oxygen demand and phosphorus and ammonia concentrations. Recent monitoring begun by the National Park Service will help to fill in spatial gaps, contribute to this valuable long-term dataset, and evaluate changes in variables of management interest locally (e.g., phosphorus) and nationally (e.g., nitrate).

Monitoring Benthic Community Structure: An Investigation of Taxonomic Distinctness and Multi-dimensional Scaling

Andrea Woodward, Ecologist, US Geological Survey, Seattle, WA
Alexander Milner, Professor, University of Birmingham, UK
Jerome Freilich, Research Coordinator, National Park Service, Port Angeles, WA
Robert Black, Ecologist, US Geological Survey, Tacoma, WA

Benthic macroinvertebrate community structure is a commonly used metric to describe stream health. Standard monitoring techniques typically compare parameters in relatively unimpaired reference sites with those from the study site to rate the study site on a continuum of impacts from mild to severe. These methods are of questionable utility when the study site could also be a reference site, as pertains in national park monitoring programs. Using data from 22 streams from 4 regions of the U.S. having 7 to 22 years of record, our preliminary results show that alternative metrics have promise as analysis tools for evaluating changes in macroinvertebrate communities in relatively pristine areas. Specifically, we evaluate the metrics taxonomic distinctness, and two versions of multi-dimensional scaling. Additionally, we use a control chart-based approach to assigning probabilities to changes in multi-dimensional scaling.

Session 22 • Bayside A (4th floor) • Panel Discussion

Religion in the Parks: An Interdisciplinary Discussion

Chair: Thomas Bremer, Associate Professor, Rhodes College, Memphis, TN

The recent Supreme Court ruling regarding a Christian cross in Mojave National Preserve demonstrates the complexities and changing role of religion in national parks, monuments, and other government holdings. At some sites religion is central to the interpretive narrative; at others, visitors seek their own spiritual experiences. Increased diversity of visitors brings potential for conflicts between people with differing religious orientations. This panel will consider the perspectives of legal experts, historians, social scientists, religious studies scholars, and park managers in a discussion of the appropriate place of religion in NPS sites. The participants will briefly discuss religion in the parks from their respective disciplinary perspec-

tives, followed by open discussion.

Panelists: Lynn Ross-Bryant, Associate Professor, University of Colorado, Boulder, CO

Kerry Mitchell, Director of Academic Affairs and Comparative Religion, Long Island University, Brooklyn, NY

Judy Bonderman, Assistant Professor, American University, Washington, DC

Dorothy FireCloud, Superintendent, Devils Tower National Monument, WY

Session 23 • Bayside B/C (4th floor) • Invited Papers

Advances in Biodiversity Discovery (All-taxa Biodiversity Inventories, BioBlitzes, etc.) across the National Park System

Chairs: Kirsten Leong, Human Dimensions Program Manager, Biological Resource Management Division, National Park Service, Fort Collins, CO

Sally Plumb, Biodiversity Coordinator, Biological Resource Management Division, National Park Service, Fort Collins, CO

Session overview: This session will consist of papers by parks engaged in Biodiversity Discovery activities, which range from All-Taxa Biodiversity Inventories (ATBIs) to large-scale BioBlitzes in partnership with the National Geographic Society, and individual park efforts at varying scales. All of these activities complement NPS Inventory and Monitoring efforts to improve knowledge of resources in parks; engage youth and citizen scientists of all ages in stewardship of park resources; and help parks remain relevant. Talks will highlight park-specific activities, showcase how knowledge gained can be used to further other park stewardship and educational goals, and address aspects of these efforts that contribute to or need additional coordination from the perspective of a national biodiversity discovery strategy across NPS. Questions raised during this session will be noted for follow-up at an associated Affinity Meeting for interested parks and partners. Talks will be 25 minutes to stay on track with the other concurrent sessions.

From ATBI to BioBlitz: An Introduction to Biodiversity Discovery Initiatives in NPS

Sally Plumb, Biodiversity Coordinator, Biological Resource Management Division, National Park Service, Fort Collins, CO

Kirsten Leong, Human Dimensions Program Manager, Biological Resource Management Division, National Park Service, Fort Collins, CO

Bert Frost, Associate Director Natural Resource Stewardship and Science, National Park Service, Washington, DC

John Francis, Vice President for Research, Conservation, and Exploration, National Geographic Society, Washington, DC

In 1998, Great Smoky Mountains National Park began an All-taxa Biodiversity Inventory to improve knowledge of the full range of species in the park. In 2006, NPS and the National Geographic Society committed to partner together to conduct large-scale, short-duration species inventories ("BioBlitzes") in a different park each year for ten years leading up to the NPS Centennial. In 2008, nine parks received funding to conduct ATBIs and BioBlitzes, and efforts towards a national strategy were initiated. A national Biodiversity Coordinator was hired in 2010 to allow more focused attention to park needs around these efforts. This talk reviews NPS Natural Resource Stewardship and Science biodiversity priorities, discusses the goals of the partnership with National Geographic Society, introduces the range of types of activities occurring across the system, provides an overview of national strategy efforts to date, and identifies areas that need future attention and input from parks and partners.

Development of a Curriculum-based Education Program from an Invertebrate ATBI at Boston Harbor Islands

Marc Albert, Stewardship Program Manager, Boston Harbor Islands National Recreation Area, Boston, MA

The Museum of Comparative Zoology (MCZ) at Harvard University and the Boston Harbor Islands Partnership have been conducting the Boston Harbor Islands ATBI since 2005. Project goals are (1) to catalog terrestrial invertebrate biodiversity on the Boston Harbor Islands, and (2) to excite, engage, and educate the public about local biodiversity. A rigorous scientific approach to sampling and cataloging has yielded more than 155,000 collected specimens and approximately 1,400 identified taxa. From the beginning, project partners have worked to develop products and programs that engage the public, including student field trips, one-day bio-blitzes, posters, a 'bug cart' exhibit, and a 'PredatOR Prey' card game. This presentation details a curriculum-based education program that has been delivered to more than 1000 local students, using real specimens encased in clear plastic resin. Students use the specimens and customized worksheets to learn about taxonomic identification, food webs, and math.

A Nationwide Evaluation of NPS Pollinators (Bees) in Climate Sensitive Habitats

Ann Rodman, Supervisory GIS Specialist, Yellowstone National Park, Gardiner, MT

Insect biodiversity is often overlooked when NPS managers think about the resources they protect. Bees, for example, provide a

critical ecosystem service, pollination, yet we know little about their abundances and distributions across NPS lands, and even less about the possible effects of climate change on bee populations and the subsequent ramifications for native plant communities. High elevation, coastal, and arid areas are particularly vulnerable to climate change and these areas are often hot spots for bee and plant endemism. In 2010, a three year project was started to model the distribution of bee species in these sensitive areas across at least 75 NPS units using simple and inexpensive collection methods. This talk will highlight the preliminary results from 2010, a discussion of lessons learned when implementing multi-park projects, and plans for recruiting more parks in 2011 and 2012.

Discovering Biodiversity in Great Basin National Park: Using the BioBlitz to Initiate All-Taxa Database Development

Gretchen Baker, Ecologist, Great Basin National Park, Baker, NV

The BioBlitz session at the 2009 George Wright Society meeting inspired Great Basin National Park to hold its first BioBlitz later in 2009 and a second one in 2010. These BioBlitzes have helped the park form partnerships with new groups and universities, educate staff and visitors about often-overlooked taxa, and attract additional visitors to the park. They have also been an impetus to examine the biodiversity within the park by developing an All-Taxa Database. Information in NPSpecies, researchers' reports, scientific literature, and more has been collated. The resulting database has allowed the park to better understand what areas still need more study, what taxa may be at most risk due to climate change and external threats, and basic facts about what lives in the park, which until this time has focused primarily on vertebrate species. Methods to interpret and present this data in useful ways are being explored.

Advances from Fourth Annual BioBlitz in Partnership with National Geographic Society at Biscayne National Park

Susan Gonshor, Chief Park Interpreter, Biscayne National Park, Homestead, FL

The fourth BioBlitz in partnership with the National Geographic Society took place April 30-May 1, 2010 in South Florida's Biscayne National Park, one of the largest marine parks in the National Park System. Participants included over 170 scientists and experts; 1,300 students and educators; the general public; 200 volunteer event "Ambassadors," and over 40 partner organizations. This effort resulted in documentation of over 300 new species on the park's NPSpecies list, including the park's first survey of algae. To complement scientific efforts, Biscayne's interpretive park staff developed a creative, education-based program, Biodiversity University, which encouraged students to earn various levels of "degrees" depending upon how many activities they successfully completed. Activities ranged from general biodiversity to mapping and counting. In addition, advances were made in coordinating data management and curation of photos and specimens. All of these activities will improve future Biodiversity Discovery activities across the National Park System.

Session 24 • Maurepas (3rd floor) • Contributed Papers

Carrying Capacity

Chair: Ryan Sharp, Visitor Use Specialist, National Park Service, Denver, CO

Informed User Capacity Management Decision Making: Linking Visitor Use Levels to Visitor Experience

David Pettebone, Social Scientist, Yosemite National Park, El Portal, CA
Susan Vezeau, Social Scientist, Yosemite National Park-Visitor Use and Social Science Branch, El Portal, CA
Bret Meldrum, Branch Chief, Yosemite National Park-Visitor Use and Social Science Branch, El Portal, CA
Todd Newburger, Monitoring Program Coordinator, Yosemite National Park-Visitor Use and Social Science Branch, El Portal, CA
Colin Leslie, Social Science Technician, Yosemite National Park-Visitor Use and Social Science Branch, El Portal, CA

In order to determine recreational user capacities, managers need a comprehensive understanding of both the descriptive and evaluative components of visitor use within their park. Contemporary visitor use research attempts to collect descriptive and evaluative data simultaneously in order to understand how visitor use levels affect various aspects of visitor experience. This paper describes result from two projects that correlate actual visitor use levels to experiential conditions. At Crystal Caves in Sequoia National Park, visitor use levels are correlated to crowding and the ability to hear cave tour guides. In Devils Postpile National Monument, visitor use levels are correlated to crowding. In both cases, visitor use levels are then correlated to inbound vehicle levels to determine how vehicle traffic conditions affect visitor experience. The results from these projects provide NPS managers with practical easy-to-use data to inform user capacity related management decision making."

Alternative Indicators of Crowding at Alcatraz Island: A Comparative Analysis

Nathan Reigner, PhD Student, University of Vermont, Park Studies Lab, Burlington, VT

Robert Manning, University of Vermont, Park Studies Lab, Burlington, VT
Steve Lawson, Resource Systems Group, White River Junction, VT
Mike Savidge, Golden Gate National Recreation Area, Fort Mason, San Francisco, CA
Amy Brees, Golden Gate National Recreation Area, Fort Mason, San Francisco, CA
Indicators and standards of quality are central to contemporary park and public land management. Their power as the basis for management frameworks comes largely from their ability to express complex management objectives via concise measurable and manageable variables. By quantifying management objectives in terms of indicators and standards of quality, resource and experiential conditions can be empirically described and practically monitored. Indicator and standards based frameworks have been applied with particular enthusiasm to management of visitor crowding and congestion. This study monitored and developed relationships among alternative indicators of crowding on the Michigan Avenue area of Alcatraz Island, an intensively visited site within Golden Gate National Recreation Area. Indicators monitored include direct observations and visitor perceptions of visually and spatially based visitor density. Results reveal strengths and weaknesses of alternative indicators and associated monitoring techniques and suggest the appropriateness of each indicator and monitoring technique for addressing specific management objectives.

"Standardized Standards": Using Geospatial Data to Generalize Crowding Standards

Jeremy Wimpey, Research Associate, Virginia Tech, State College, PA
Nathan Reigner, PhD Student, University of Vermont, Park Studies Lab, Burlington, VT
Robert Manning, University of Vermont, Park Studies Lab, Burlington, VT
Steve Lawson, Resource Systems Group, 55 Rail Road Row, White River Junction, VT
Brett Kiser (no affiliation given)
Normative crowding standards of visitors and other stakeholders are increasingly used to measure and manage visitor capacity in parks and outdoor recreation areas. This approach is commonly used in applications of management frameworks such as Limits of Acceptable Change and Visitor Experience and Resource Protection. Crowding norms are often measured using visual simulations of a range of visitor use levels and asking visitors to rate their acceptability. However, resulting standards are site specific and cannot easily be generalized to other areas. This study added a geospatial component to this research approach, allowing expression of crowding norms in standardized physical metrics (i.e., visitors/unit area). Resulting normative standards can be applied more generally and allow for direct comparison of standards across recreation sites. Further, standards expressed in terms of physical area can be integrated with visitor use modeling to estimate crowding-related "Levels of Service". This study was conducted in Yosemite National Park.

In Search of the Magic Number: The Limitation of Visitor Numbers as a Last Resort in Müritz National Park, Germany

Christopher J. Garthe, Consultant, Freelance Researcher, PhD Candidate, Institute of Environmental Planning, Leibniz University Hannover, Germany, Hannover, Niedersachsen, Germany
In a river stretch of the Müritz National Park the numbers of canoeists have been strongly increasing during the last years. The associated ecological effects have developed into massive impacts on flora and fauna. The national park administration (NPA) has implemented various soft instruments of visitor management including a cooperation with local stakeholders from the tourism sector and a voluntary agreement on environmentally responsible canoe tourism. Despite these efforts the environmental situation has continued to degrade. Thus, more restrictive instruments, comprising the limitation of canoes, was considered as the last resort for the NPA. Before the background of the problems associated with ecological carrying capacity assessment a social science method was adjusted to the situation and used to determine the maximum number of canoes on this river stretch. The result was reviewed by the NPA and local stakeholders. Finally, problems and benefits of the used method for carrying capacity assessment are discussed.

An Investigation of Photograph Order-Effects in Visual-Based Outdoor Recreation Research

Adam Gibson, Graduate Research Assistant, Colorado State University, Manteo, NC
Peter Newman (no affiliation given)
Steve Lawson (no affiliation given)
Paul Bell (no affiliation given)
Jake Benfield (no affiliation given)
Visual-based research methods are commonly used to provide an empirical basis for formulating indicators and standards of quality for recreation areas. Visual research methods applied in this context are subject to several potential measurement biases.

This paper examines order-effect bias in visual-based recreation research methods. In a lab setting, respondents evaluated one of six different order sequences of recreation photographs from Rocky Mountain National Park regarding the acceptability of the number of people at one time (PAOT). Results indicate photograph acceptability ratings were not affected by photograph presentation order.

Session 25 • Borgne (3rd floor) • Sharing Circle

Healing Historical Trauma

Organizer: Nathalie Gagnon, Senior Analyst, Aboriginal Affairs Secretariat, Parks Canada, Gatineau, Quebec, Canada

Karen Little Thunder, Member, Sicangu Lakota Oyate, Rosebud, SD

Conceptualized in the 1980s, historical trauma is defined as "the collective emotional and psychological injury both over the life span and across generations, resulting from a cataclysmic history of genocide." Healing historical trauma requires, first, acknowledging its existence and, second, developing an understanding of the trauma. In rethinking protected areas, we pose the question: who is protecting what and from whom? In a changing world, the circle remains an unchanged symbol of life for many indigenous cultures. A Sharing Circle is a safe, conversational environment where comfort may be found in knowing that interruptions and criticism are not tolerated. Respect is paramount. Each contributor to the circle is encouraged to talk about "whatever is in your heart or on your mind." The session is open to all, particularly those seeking greater awareness of the challenges faced by indigenous communities in Rethinking Protected Areas in a Changing World.

Session 26 • Borgne (3rd floor) • Sharing Circle

An Interdisciplinary Discussion about Fire / Fuels Science and Management

Organizer: Vita Wright, Principal Investigator, Northern Rockies Fire Science Network, RMRS / NPS, Kalispell, MT

The interagency Joint Fire Science Program is developing a network of regional consortia to strengthen communication between managers and scientists. The consortia are called Knowledge Exchange consortia to emphasize that communication about managers' science needs and research results must be a two-way street. In addition to employing traditional science delivery approaches, the consortia strive to foster personal interaction and relationship building between managers and scientists. The consortia started by asking fire managers and scientists what they desire in terms of content and activities. However, the JFSP recognizes that managers from many other disciplines have science needs related to fire and fuels management. This sharing circle will host a discussion of what the JFSP Knowledge Exchange Consortia can do for managers in other ecological and cultural disciplines to help identify research needs, disseminate results, and build relationships.

Session 27 • Napoleon A1/A2 (3rd floor) • Invited Papers

Communicating about Climate Change to Internal and External Audiences

Chair: Susan Sachs, Education Coordinator, Appalachian Highlands Science Learning Center – NPS, Lake Junaluska, NC

Session overview: The five presentations in this session will focus on creative ways to inform varying audiences about the results of climate change research on resources in National Parks. Park managers need the information in format that speaks to them, students in another and park visitors in many additional ways. The messages vary from the big impacts such as melting glaciers to more subtle ones such as shifts in phenology. Techniques vary from citizen science to virtual methods of communication. The parks represented include Glacier NP, Great Smoky Mountains NP, Kenai Fjords NP, Denali NP, Gateway NRA and Yellowstone NP.

Communicating Climate Change through Citizen Science

Tara Carolin, Director, Crown of the Continent Research Learning Center, Glacier National Park, West Glacier, MT

Since 2005 the Crown of the Continent Research Learning Center has been fostering a sense of stewardship in park visitors who are trained to monitor focal species of concern and contribute reliable data to Glacier National Park. In 2008 we initiated the High Country Citizen Science Program, which focuses on species of concern due to climate change, emphasizing mountain goats and pikas. Participants learn how to safely identify and observe the species, about their behavior and habitat, and why managers are concerned for their future under a changing climate. More than 400 individuals have been trained as citizen scientists, including several high school student groups that have traveled across the country to engage in scientific data collection and learn about climate change. We have found that engaging the public in data collection instills a strong sense of responsibility and a desire to promote resource conservation on behalf of the park.

From Melting Glaciers to Subtle Shifts: Strategies to Communicate a Range of Climate Change Impacts

Susan Sachs, Education Coordinator, Appalachian Highlands Science Learning Center, Great Smoky Mountains National Park, Lake Junaluska, NC

Jim Pfeiffenberger, Education Coordinator, Ocean Alaska Science and Learning Center, Kenai Fjords National Park, Seward, AK

The challenges of educating the public about climate change vary depending on your geographic location. At the Ocean Alaska Science and Learning Center, visitors interact with big examples such as melting glaciers and sea level rise. The changes predicted for the parks of the Appalachian Highlands Science Learning Center are much more subtle and harder for visitors to grasp. The two Research Learning Centers have found creative ways to tell both the "in your face" and the less obvious stories of climate impacts on park resources. Examples including citizen science monitoring, creative interpretative programs and video podcasting will showcase how parks can give visitors a better understanding of climate impacts on the resources they cherish.

Using Climate Change Modeling for Park Planning at Gateway National Recreation Area

Mark Christiano, National Park Service, Gateway National Recreation Area, Staten Island, New York

Norbert Psuty, Institute of Marine and Coastal Science, Rutgers University, New Brunswick, New Jersey

Gateway National Recreation Area is one of the first national parks to consider the quantified effects of global climate change as part of its long-term planning process through the General Management Plan (GMP). The GIS team, partnered with Rutgers University, has been developing sea level rise (SLR) and storm models to help park planners predict the long-term effects of climate change on Gateway's assets and infrastructure. Currently many of the fundamental resources of Gateway are close to sea level. Some examples include historic Fort Hancock's Officer's Row, the Jamaica Bay Wildlife Refuge, and the historic life-saving station at Sandy Hook. The analysis is used in conjunction with facilities management information (FMSS) and the List of Classified Structures (LCS) to help guide park management decisions and aid GMP planners. The park has begun shifting its policies and looking for innovative ways to preserve the fundamental resources of Gateway for future generations.

Using Great Tools from Multiple Programs to Better Understand Pollinators and Climate Change

Ann Rodman, GIS Specialist, Greater Yellowstone Science Learning Center, Yellowstone National Park, Mammoth, WY

The NPS Research Learning Center (RLC) websites and the NPS Inventory and Monitoring (I&M) Program data portal, IRMA, are perfect forums for disseminating the knowledge and information gained from large scale projects that affect multiple

parks. RLCs are excellent at communicating the knowledge gained through science in the NPS. The I&M Program has developed an infrastructure of databases to store, organize, and serve very large datasets. Both programs are spread across the entire country and serve parks in all 5 regions. In 2010, a three year project was funded through the Climate Change Response Program to model the distribution of pollinators (bees) in climate sensitive habitats across at least 75 NPS units. The RLCs are helping with data collection and communicating the results of the study to park staff and the general public. Databases developed by I&M program are being used to store and disseminate the data from the project.

Session 28 • Napoleon B1 (3rd floor) • Day-Capper

The National Park Service Institutional Animal Care and Use Committee (NPS IACUC): What You Need to Know and How to Use It

Chair: John A. Bryan II, DVM, NPS IACUC Chair and Attending Veterinarian, Biological Resource Management Division, Fort Collins, CO

The NPS IACUC was inaugurated in January, 2010. Mandated by the Animal Welfare Act (AWA), its regulations (AWAR), and the Interagency Research Animal Committee (IRAC), the NPS IACUC is charged with the authority to review and permit NPS programs involving the use of vertebrate animals in exhibition, research and teaching. Issues concerning animal welfare and AWA compliance have the potential to directly affect research in park units, and becoming well-acquainted with the NPS IACUC and its driving principles is an invaluable asset for NPS personnel working with scientific permitting or study implementation. Topics to be covered include overviews of the AWAR and the IRAC principles, functions and responsibilities of the NPS IACUC, the organizational layout of the NPS IACUC, and how these relate to NPS employees and park units. Following an introductory period, the presenter will provide several scenario (mock) projects. The audience will then break into sample (mock) IACUCs to review, discuss, and present their conclusions concerning their respective projects within the context of NPS IACUC guidelines. The presenter will facilitate and encourage lively discussion/debate.

Session 29 • Napoleon B2 (3rd floor) • Panel Discussion

Monitoring and State of the Park Reporting Systems for Parks Canada and the U.S. National Park Service

Chair: Stephen Woodley, Chief Ecosystem Scientist, Parks Canada, Gatineau, Quebec, Canada

National parks in both Canada and the United States come from similar historical traditions, and the enabling legislation and policies in the two countries provide for similar expectations. Managers at the park and agency level need to communicate complex information about the condition of key park resources and values, and how well we are managing the resources (accountability to the taxpayers), to park visitors, park staff, the general public, and government oversight entities. Both park services are involved in developing programs to monitor the condition of natural and cultural resource condition, visitor services, and facilities/infrastructure, for use in informing management plans and interpretation efforts and to demonstrate accomplishments and accountability. This joint session between Parks Canada Agency and the U.S. National Park Service will provide an overview of progress made, key lessons learned, and the challenges yet to be overcome in developing meaningful monitoring and reporting programs. There is a lot going on!

Panelists: Donald McLennan, National Monitoring Biologist, Parks Canada Agency, Gatineau, Quebec

Stephen Woodley, Chief Ecosystem Scientist, Parks Canada, Gatineau, Quebec,

Stephanie Toothman, Associate Director, Cultural Resources, USNPS, Washington, DC

Bert Frost, Associate Director, Natural Resource Stewardship and Science, USNPS, Washington, DC

Session 30 • Napoleon B3 (3rd floor) • Panel Discussion

Advancing Wild and Scenic River Planning across the National Park Service

Chair: Tracy Atkins, Community Planner, NPS, Denver Service Center- Planning Division, Denver, CO

Rivers are protected under the Wild and Scenic Rivers Act to conserve certain values: the river's outstanding resources, water quality, and free-flowing character. To enhance consistency across agencies in WSR studies and planning, the Interagency Wild and Scenic Rivers Coordinating Council has developed guidelines for identifying a river's Outstandingly Remarkable Values (ORVs). Protection of ORVs, water quality, and free flow provides the basis for Comprehensive River Management Plans (CRMP), which are required by WSR legislation. With interagency guidance, NPS developed a standardized ORV workshop format to evaluate and identify ORVs. Three workshops were held in 2010. The workshop format includes identifying overall ORVs, water quality and free-flowing condition, evaluation of ORVs by river segment, developing ORV statements, mapping of issues and identification of potential stakeholders in preparation for public scoping on the CRMP. Come learn about this process and how it can be applied to your wild and scenic river.

Panelists: Bill Hansen, Acting Chief, NPS NRPC Water Rights Branch, Fort Collins, CO
Gary Weiner, Regional WSR Coordinator, NPS Rivers, Trails and Conservation Assistance, Bozeman, MT
Jennifer Carpenter, Park Planner, NPS Grand Teton National Park, Jackson, WY
Chris Church, Project Manager, NPS Denver Service Center, Planning Division, Denver, CO

Session 31 • Southdown (4th floor) • Contributed Papers
Wilderness

Chair: Dick Anderson, Environmental Protection Specialist, Alaska Regional Office, National Park Service, Anchorage, AK

What Wilderness Needs: A Proposed Framework for Managing Commercial Services in Wilderness

Michele Dauber, Professor of Law and Sociology and Bernard Bergreen Faculty Scholar, Stanford University, Stanford, CA
Mark Fincher, Wilderness Specialist, Yosemite National Park, Yosemite, CA
Jordan Dentler Segall, Stanford University Law School and Department of Sociology, Stanford, CA

The Wilderness Act strictly limits commercial services, such as packstock and hiking guides, in wilderness areas. Agencies may authorize commercial services only to the "extent necessary" to fulfill the purposes specified in the statute, such as recreation, education, and science. Recently, environmental groups have successfully challenged the legality of agencies' processes for issuing commercial permits, focusing particularly on the Forest Service's "public-need" approach, which determines the extent of services necessary on the basis of visitor desire for those services. This paper proposes a new system that instead authorizes the minimum level of commercial services necessary to fulfill the wilderness purposes after taking into account existing noncommercial use. We argue that commercialism is inherently inconsistent with wilderness character and was therefore intended by Congress to be strictly limited. Our method is more faithful to the wilderness-protective mandates of the Wilderness Act and to the anti-commercial views of its early proponents.

Alaska Case Study: Decision Making for Science in Wilderness

Judy Alderson, Regional Wilderness Coordinator, National Park Service, Alaska Region, Anchorage, AK
Robert Winfree, National Park Service, Alaska Region, Anchorage, AK

For several years, an NPS interdisciplinary working group assigned by the regional director has been working to improve the way decisions are made about scientific work in Alaska park wilderness. The group was tasked with developing products or guidance to improve decision making consistency between parks, address internal and external concerns about the cumulative impacts related to a growing number of facilities and installations in wilderness, and address the perception that NPS was presenting an unwelcoming atmosphere for scientists. It's true that "Alaska is different" and nowhere is this more so than in the magnitude and scale of the wilderness resources, the challenges of logistics and access, and the unique legal requirements and policies that were established through the Alaska National Interest Lands Act of 1980 that set aside many of these areas. The products and process steps that were developed and are being implemented will be reviewed and discussed.

Wilderness Inter-group Encounters: An Examination of Monitoring Practices, Standards, and Management Implications

Robert Dvorak, Assistant Professor, Central Michigan University, Mount Pleasant, MI
William T. Borrie, Professor, University of Montana, Missoula, MT
Alan E. Watson, Research Social Scientist, USDA Forest Service, Aldo Leopold Wilderness Research Institute, Rocky Mountain Research Station, Missoula, MT
Ann Schwaller, Natural Resource Wilderness Specialist, USDA Forest Service, Superior National Forest, Duluth, MN

Wilderness and protected area managers are charged with, among other important attributes, providing outstanding opportunities for solitude. To meet this challenge, managers need to understand the issues surrounding wilderness inter-group encounter monitoring. Previous research has developed measures of inter-group encounters and examined procedures to predict encounter rates. However, despite advances in data collection technology and modeling software, a fundamental question still remains, "What are we measuring and monitoring and why?" This paper examines several questions: (1) How are wilderness encounters precisely being defined, (2) how are wilderness encounters being measured, and (3) how are managers utilizing this information to compare against standards and other applications? Using recent monitoring data, it explores how to better define inter-group encounters, the cost and feasibility of monitoring, and whether greater thought and precision is necessary in encounter standards. It also considers other applications of these ideas, such as effects on quotas and day use.

Perspectives on Wilderness Rock Climbing Fixed Anchors: Joshua Tree National Park, California, Case Study

Erik Murdock, Ph.D. in Natural Resource Studies, University of Arizona, Tucson, AZ

The issue of fixed anchors in wilderness challenges interpretations of the Wilderness Act. The Wilderness Act can be interpreted to allow or preclude fixed anchors in designated wilderness areas depending on whether the interpreter chooses a literal or general interpretation of the Act. Authorizing fixed anchors in Wilderness constitutes an interpretation that considers the entire Act as opposed to formalistically defining fixed anchors as 'installations'. At Joshua Tree National Park, results reveal that wilderness climber destination choice is not dependent on fixed anchors, but other destination attributes. Therefore, place-based management options, supported by descriptive and evaluative studies, may be more closely aligned to Wilderness Act directives than nationwide, blanket regulations. This study's results can be used as the basis for promoting place-based policy and demonstrate that fixed anchors can fit within the confines of the Wilderness Act as it is applied to the modern era of wilderness management.

Naturalness vs. Wildness: Visitor Support for Management Alternatives to Anthropogenic Changes in the Bridger Wilderness

Andrea Davidson, Graduate Student, University of Idaho, Moscow, ID

Troy Hall, Associate Professor of Protected Area Visitor Studies, University of Idaho, Moscow, ID

Currently, there is debate about whether to emphasize naturalness (typically through restoration) or wildness (typically through preservation) when managing anthropogenic changes in wilderness. We examined wilderness visitors' opinions about this dilemma and factors that influence support for different management approaches. Trailhead questionnaires (N= 147) were administered on site to Bridger Wilderness (WY) visitors in 2010. Visitors were presented five issues (fish stocking, invasive weeds, non-native mountain goats, whitebark pine decline, and wildfire) and asked to select their preferred management alternative from among several choices that varied in protection of naturalness or wildness. They also listed factors that influenced their decisions. While most visitors favored alternatives involving some form of active restoration, self-expressed knowledge of wilderness and frequency of wilderness visits did not predict support for different management alternatives. Wilderness managers are currently faced with complex decisions in a time of rapid change and are supported by the public to take action.

Session 32 • Gallier A/B (4th floor) • Contributed Papers

Responding to Disaster: Katrina and Deepwater Horizon

Chair: Barrett Kennedy, Professor, Louisiana State University, Baton Rouge, LA

How an Over-emphasis on Shoreline Resource Protection May Have Made the Gulf Oil Spill Worse

Sean Anderson, Assistant Professor, California State University Channel Islands, Camarillo, CA

The 2010 Deepwater Horizon oil spill presented a mixture of unique and familiar environmental challenges to scientists, and managers, and policy makers. Intensive dispersant application at both the 1500 m-deep wellhead and sea surface attempted to foster an oil-dispersant emulsion at depth, while reducing the mass of floating mousse. This decision was a trade-off, limiting the amounts of floating oil transported to the beach and marsh over the first five months of the blowout at the expense of unknown chronic impacts on pelagic organisms and communities out of sight beneath the sea surface. This unfamiliar spill of subsurface pelagic oil at depth presents huge challenges to science, which can offer no historical guidance on risk of injury and is largely unprepared to track dispersions at depth or document injuries. Unwelcome surprises may lie ahead should trophic cascades ensue or stealth transport of subsurface oil impact the shoreline of such concern.

Irreplaceable Heritage at Risk: Preparing for Disasters in the Coastal Zone (and Elsewhere…)

Barrett Kennedy, Professor, Louisiana State University, Baton Rouge, LA

Andy Ferrell, LEED AP, National Center for Preservation Technology and Training, Natchitoches LA

Recent (and ongoing) disaster events have demonstrated the vulnerability of coastal regions around the world (…notably for the Gulf Coast, Hurricanes Katrina, Rita, Gustav, Ike… and the BP Oil Blowout). Historically, the majority of the world's population has lived in the coastal zone, meaning that a wealth of irreplaceable heritage sites around the globe are increasingly at risk due to the effects of climate change, rising sea levels, human error, and associated cataclysmic disaster events. This presentation will demonstrate a rapid, cost-effective approach to capturing baseline data about heritage resources in these high-risk coastal settings. This approach can also advance effective disaster planning and mitigation processes that anticipate a future of increasing coastal vulnerability. The broader goal of the presentation is to encourage an inclusive dialog about how

emerging data collection technologies and information systems can advance cultural resource protection as an integral part of disaster preparedness and response activities.

Important Interpretive Elements Associated with the Story of Hurricane Katrina and Other Significant Hurricane Disasters

Donald Rodriguez, Associate Professor and Chair Environmental Science and Resource Management Program, California State University Channel Islands, Camarillo, CA

Sean Anderson, Assistant Professor, California State University Channel Islands, Camarillo, CA

Douglas Meffert, Xavier University, New Orleans, LA

Hurricane Katrina made landfall on the Gulf Coast more than five years ago. The storm ripped apart the landscape, lives, and social fabric of much of the region. In particular, the failure of the levee protection system that allowed 80% of the City of New Orleans to flood in the wake of this storm, and subsequent others including hurricanes Rita, Gustav, and Ike, have had an unprecedented influence upon the social, political, and environmental systems of the surrounding Gulf Coast Region. The focus of this paper will be to identify many of the important elements of "Living with Hurricanes" and to suggest a diverse interpretive approach that will embrace the complex nature of these important historical disasters in American history and their applications to natural resource and parks, both in urban and rural settings.

Post-Deepwater Horizon Marine Spatial Planning as an International Model for Marine Protected Areas

Shannon Sims, Law Student, University of Texas School of Law, Houston, TX

Marine spatial planning is an increasingly important concept around the world for the creation of marine protected areas. This paper addresses how marine spatial planning can be used as a tool to address some of the challenges to marine conservation exposed by the BP Deepwater Horizon oil spill. Between the fields of coastal development law and marine conservation, there is room to address how the energy industry can be linked in to the development of marine protected areas. Using examples from Texas, Brazil and the Mediterranean Sea, this paper examines how international and national law both succeeds and fails at preserving coastal and marine protected areas. Further, this paper addresses how endangered species protection and tourism development impact the development of marine protected areas and the future of marine spatial planning. (Keywords: marine spatial planning, coastal development, oil spill, marine protected areas, endangered species, tourism. Areas studied: Gulf of Mexico, Texas, Brazil, Mediterranean Sea.)"

Strategic Sciences and the Deepwater Horizon Oil Spill

Gary Machlis, Science Advisor to the Director, National Park Service, Alexandria, VA

Marcia McNutt, Director, US Geological Survey, Reston, VA

In response to the Deepwater Horizon oil spill, the Department of the Interior established a Strategic Sciences Working Group, composed of an interdisciplinary mix of federal and nonfederal scientists. The Working Group's assignment was to develop alternative scenarios of how the oil spill and its cascading consequences could affect the Gulf of Mexico as a coupled natural-human system. This paper reports the results of the Working Group, including a description of the scenario-building methods, a summary of the five scenarios developed to date (with special emphasis on consequences to protected areas), and an analysis of how the scenarios have been used by policy and decision-makers. The need to establish a standing capacity for strategic sciences in order to deal with future environmental challenges is described.

Session 33 • Nottoway (4th floor) • Panel Discussion

Knowledge All Around You: Cultural Landscapes Management from a Landscape Point of View

Chair: Jill Cowley, Historical Landscape Architect, National Park Service IMR Historic Preservation Programs, Santa Fe, NM

An ethnographic approach to cultural landscape management assumes that landscape use informs personal and cultural identity. Cultural landscapes are evidence of continuing and changing relationships between particular places and the inhabitants of those places. As these relationships grow and change, cultural landscapes provide information about race, class, and gender as constructs of nature as well as culture. Speakers will discuss three case studies that speak to this topic: the relationship between the African-American community of Cemetery and the Stones River National Battlefield in Tennessee; studying visitors' creative responses to the Ghost Ranch landscape in northern New Mexico; and how traditional Hawaiian knowledge of a female deity (Pelehounaumea) can guide management decisions at Hawaii Volcanoes National Park. After a five minute introduction, each speaker will have fifteen minutes, with Q&A and discussion following.

Panelists: Elizabeth K. Goetsch, Park Ranger, Stones River National Battlefield, Murfreesboro, TN

Jill Cowley, Historical Landscape Architect, National Park Service Intermountain Region, Santa Fe, NM
Laura Shuster, Chief, Cultural Resource Division, Hawaii Volcanoes National Park, HI

Session 34 • Oak Alley (4th floor) • Day-Capper

Five Minutes of Fame: Using Video to Promote Science and the Parks

Chairs: Ted Gostomski, Science Writer/Biologist, National Park Service, Great Lakes Inventory and Monitoring Network, Ashland, WI

Sara Melena, Education Specialist, National Park Service Office of Education & Outreach, Fort Collins, CO

Many national park units have a 20-30-minute movie that extols the virtues of the park and its reasons for being. A more recent development is the use of videos lasting only 1 to 5 minutes that tell a short story about the parks and the work being done in them, namely science and research. These videos inspire (as in the story of George Wright) and educate the public, and they are available online so anyone can see them at any time. This session will showcase some of the "video shorts" developed to reach a broad audience. Included will be screenings of three shorts: one on George Melendez Wright, one titled "Science in Parks," and one called "Get Involved." Group discussion afterwards will include how successful these videos are in reaching the intended audience and the specifics (cost and equipment) of making such a film.

Session 35 • Bayside A (4th floor) • Invited Papers

Tracking Global Change at Local Scales: Phenology for Science, Conservation, Management, Education, and Outreach

Chairs: Jake Weltzin, Executive Director, USA National Phenology Network, Tucson, AZ

Brian Mitchell, Inventory and Monitoring Program Manager, Northeast Temperate Network, National Park Service, Woodstock, VT

Session overview: One of the most visible effects of global change is changes in phenology, the timing of biological events. Shifts in migration, flowering, and other aspects of phenology are already occurring, and reflect biological responses to climate change at local to regional scales. Changes in phenology have important implications for ecology and resource management, and because they are place-based and tangible, serve as an ideal platform for education, outreach, and citizen science. The USA National Phenology Network (USA-NPN) facilitates the development and integration of public and agency phenology monitoring. In this session, National Park Service and USA-NPN staff present their perspectives on the development of phenology monitoring across NPS. The session includes 5 20-minute presentations (including Q&A) on several developing local and regional projects and includes 20 minutes for general discussion of new projects and initiatives. Participants are also encouraged to attend the related phenology affinity meeting.

The Potential Contribution of Phenology to the National Park Service

Abraham Miller-Rushing, Science Coordinator, Acadia National Park, Schoodic Education and Research Center, Bar Harbor, Maine

Studying phenology in parks offers the dual opportunities of (1) gathering important data for managing natural resources in a changing climate and (2) engaging the public in doing science and seeing the effects of climate change with their own eyes. Understanding changes in phenology is key to forecasting biological responses to climate change. In many cases, phenology data are also necessary to properly interpret historical monitoring data. In addition, members of the public can actively participate in monitoring—in fact, amateur naturalists have been observing and recording phenology since the beginning of agriculture, leading to many of our best long-term ecological data sets. Because phenology is changing everywhere the climate is changing, it provides a local impact of climate change that people can see nearly everywhere, an impact that affects both ecology and people's day-to-day lives.

The California Phenology Network (CPN): Integrating Phenology Monitoring Across Protected Areas in California

Angela Evenden, NPS, Californian CESU Research Coordinator, Berkeley, CA

Christy Brigham, Chief of Planning, Science, and Resources Management, Santa Monica Mountains National Recreation Area, Thousand Oaks, CA

Sylvia Haultain, Plant Ecologist, Sequoia and Kings Canyon National Parks, Three Rivers, CA

In 2010 the National Park Service funded a three year effort to establish integrated phenology monitoring and citizen science efforts across all of the National Park units within California. The network will also engage broad participation across neighboring land management agencies, CESU academic and NGO partners including the UC Natural Reserve System. The goals of this project include selecting target species for monitoring, developing phenophases and monitoring protocols for pilot

parks in each NPS network, and testing several different citizen science approaches to engage the public in phenology monitoring. The CPN project is a partnership between USGS National Phenology Network National Coordinating Office, the University of California, Santa Barbara Phenology Stewardship Program and NPS. We will report on our preliminary efforts to identify phenology and climate change research questions and select species for monitoring as well as our overall approach and the educational/outreach tools we will test.

Watching, Photographing, and Listening: Phenology Monitoring in the Northeast Temperate Network

Brian Mitchell, Inventory and Monitoring Program Manager, Northeast Temperate Network, National Park Service, Woodstock, VT

Phenology monitoring is an important tool for tracking the effects of climate change within National Parks. The Northeast Temperate Network (NETN) is working with the USA-NPN and other organizations to develop an integrated phenology monitoring protocol that will help document the effects of climate change on phenology while engaging citizens in stewardship of natural areas. The monitoring will use observations submitted by casual observers and dedicated volunteers, with quality control provided by "plantcam" photographs and audio recordings at a subset of locations. Automated analysis of audio recordings will provide phenology records at sites and times that are hard to sample with volunteers, and "phenocams" will sample tree phenology at the stand level. This presentation will provide an overview, current status, and preliminary results from the NETN protocol development process, which is scheduled to finish in 2012.

Phenology at Great Smoky Mountains National Park

Keith Langdon, Inventory & Monitoring Coordinator, Great Smoky Mountains National Park, Gatlinburg, TN

Due to the topographic and biological complexity of the Great Smokies, seasonality notes on flora and fauna have been made in the park since the 1930's to inform tourists about floral and foliage displays. The resulting legacy data, plus studies in the intervening years, are now being incorporated into new databases for new needs. New needs for phenology data include: synchronizing the collection of scientific data each year (instead of calendar dates), predicting new phenomena requested by the public, predicting changes in species/ecological interactions, tracking impacts of climatic change. New issues: recruiting a citizen science corps to collect abundance level data on multiple species at plots, linking/analyzing plot measurements with new remote sensing tools, serving data to different user groups locally and globally.

Role of the USA National Phenology Network: Tools and Opportunities

Jake F. Weltzin, Executive Director, USA National Phenology Network, National Coordinating Office, Tucson, Arizona

The USA National Phenology Network (USA-NPN; www.usanpn.org), established in 2007, is a national science and monitoring initiative focused on phenology as a tool to understand how plants, animals and landscapes respond to climatic variability and change. Core functions of the National Coordinating Office (NCO) of USA-NPN are to provide a national information management system including databases, develop and implement internationally standardized phenology monitoring protocols, create partnerships for implementation, facilitate research and the development of decision support tools, and promote education and outreach activities related to phenology and climate change. The purpose of this talk is to describe programs, tools and materials developed by USA-NPN to facilitate science, management and education related to phenology of plants, animals and landscapes within protected areas at local, regional and national scales. Example tools and materials include databases, user interfaces, web services, support materials for partnership development, communication, education and outreach.

Session 36 • Bayside B/C (4th floor) • Invited Papers

Managing Use on Half Dome: Investigation, Simulation, and Monitoring to Inform Planning and Visitor Management in Yosemite National Park

Chair: Bret Meldrum, Branch Chief, Visitor Use and Social Sciences, Division of Resources Management and Science, Yosemite National Park, El Portal, CA

Session overview: The popularity of hiking Half Dome in a day has increased significantly in the past decade. As a result, crowding and visitor experience concerns have been identified at this wilderness destination and along the trail accessing it. Specifically, the cable system is a park-maintained structure that enables nontechnical ascents to occur on one of the park's most iconic geologic features. Visitor falls while on the cables have caused fatal injuries. Daily visitor use levels that lead to impediments in 'free flow' visitor movement has developed as the nucleus of this visitor use issue. Specific use levels have been documented to increase time spent on the cables, prolonging exposure and fatigue. A comprehensive pro-

gression of management interest, primary research, interim decision making, monitoring and simulation modeling scenario analysis will be highlighted. This commitment to adaptive visitor use management serves as an exemplary case study for balancing safety, recreation access, and wilderness values.

Implementing Crowding Induced Changes to the Wilderness Management of Half Dome

Mark Marschall, Wilderness Manager, Visitor Protection Division, Yosemite National Park, Yosemite, CA

In 2009, the Yosemite National Park (YNP) leadership team received visitor use study results confirming that the Half Dome Cable Route is experiencing high day use on Saturdays and holidays. Additionally, search and rescue incidents have shown a dramatic increase since 2005. YNP believes that the high amount of visitor use negatively influences both safety and wilderness character on Half Dome. As a result, YNP instituted an interim Half Dome permit program to more aggressively manage use on Half Dome in 2010 and 2011. The permit system restricts daily use to 400 people Friday through Sundays and federal holidays. The permit system has successfully reduced use on permit days but has created other situations of interest. Adjustments to the interim permit system for the 2011 peak season will be discussed. YNP is learning valuable information through lessons learned within a concurrent interim permit program and planning process.

Investigating Day Use on Half Dome: Visitor Behavior and Perceptions of Crowding and Risk

Nathan Reigner, Graduate Research Assistant, University of Vermont, Burlington, VT
Adam Gibson, Graduate Research Assistant, Colorado State University, Fort Collins, CO
Peter Newman, Associate Dean, Academics, Colorado State University, Fort Collins, CO
Steve Lawson, Director, Public Lands Management and Planning , Resource Systems Group, Inc., White River Junction, VT
Janet Choi, Senior Associate, Resource Systems Group, Inc., White River Junction, VT
Bret Meldrum, Branch Chief, Visitor Use and Social Sciences, Resources Management and Science Division, Yosemite National Park, El Portal, CA
David Pettebone, Social Scientist, Resources Management and Science Division, Yosemite National Park, El Portal, CA

In 2008 two investigations were conducted to describe day use on Half Dome and characterize the visitor experience. In response to management interest, these studies focused on dimensions of crowding and risk associated with the cabled route that leads visitors to Half Dome's summit. Statistical relationships were developed from both direct observations of visitor use and behavior and self-reported perceptions of the cables experience. Analyses of behavioral observations, including hiker counts, travel times, and photographs of the cables route, suggest that crowding, both in spatial and temporal terms, was occurring and influencing visitor behavior. Survey research assessed visitors' perceptions of this crowding as well as risks associated with the cables route and experiential satisfaction with the cables experience. The resulting empirical and cognitive relationships provide a basis for modeling visitor use on Half Dome and information to support planning and implementation of an adaptive visitor use management program.

Half Dome Cables Scenario Analysis and Modeling

Brett Kiser, Research Associate, Resource Systems Group, White River Junction, VT
Steve Lawson, Director, Public Lands Management and Planning , Resource Systems Group, Inc., White River Junction, VT
Janet Choi, Senior Associate, Resource Systems Group, Inc., White River Junction, VT
Nathan Reigner, Graduate Research Assistant, University of Vermont, Burlington, VT
Bret Meldrum, Branch Chief, Visitor Use and Social Sciences, Resources Management and Science Division, Yosemite National Park, El Portal, CA
David Pettebone, Social Scientist, Resources Management and Science Division, Yosemite National Park, El Portal, CA

A computer simulation model of visitor use on the Half Dome Cables was developed to complement visitor crowding and safety research conducted during summer 2008 and on-the-ground monitoring conducted during summer 2010. A primary use of the model is to estimate the number of permits that could be issued per day for hikes to the summit of Half Dome while maintaining visitor use on the Half Dome cables route within safety and crowding-related thresholds. More generally, the computer model is being used to support a proactive approach to managing visitor use on the Half Dome Cables by simulating the potential effectiveness of a range of management options for addressing visitor safety and wilderness experience quality. The integration of modeling results with on-the-ground monitoring and visitor research findings provide a strong empirical basis with which to analyze and evaluate alternatives for managing visitor use on the Half Dome Cables.

Monitoring the effects of the Half Dome Interim Permit System in Yosemite National Park

David Pettebone, Social Scientist, Resources Management and Science Division, Yosemite National Park, El Portal, CA

Bret Meldrum, Branch Chief, Visitor Use and Social Sciences, Resources Management and Science Division, Yosemite National Park, El Portal, CA
Colin Leslie, Social Science Technician, Yosemite National Park, El Portal, CA
Steve Lawson, Director, Public Lands Management and Planning , Resource Systems Group, Inc., White River Junction, VT
Nathan Reigner, Graduate Research Assistant, University of Vermont, Burlington, VT

Yosemite National Park (YNP) committed to monitoring the efficacy of the interim permit system to maintain 'free flow' visitor movement on the Half Dome Cables. In 2010, Visitor Use and Social Sciences Branch staff collected similar data to that of the initial research in 2008. The goal of the monitoring is to evaluate changes in visitor use movements between permit and non-permit days across the peak visitor season. Results indicate that 'free flow' visitor movement is maintained under the permit system. Recreation displacement to historic non-peak days will be discussed. Travel time, trail use estimation, crowding metrics and repeat photography methods served as key components of the monitoring program and will be highlighted. These results directly inform the ongoing Half Dome Trail Stewardship Plan to improve safety and the quality of visitor experience for long term management. The monitoring of visitor use, post interim permit implementation, serves as a unique example of inquiry to greater inform numerical capacity determinations.

Half Dome Cables Historic Overview and Environmental Planning

Daniel Schaible, Historical Landscape Architect, Resources Management and Science Division, Yosemite National Park, El Portal, CA
David Humphrey, Branch Chief, History, Architecture & Landscapes, Division of Resources Management & Science. Yosemite National Park, El Portal, CA
Echo Davenport, Compliance Specialist, Division of Project Management, Yosemite National Park, El Portal, CA

In 1875, George Anderson made his inaugural ascent of Half Dome. This feat was widely celebrated and Anderson's route remained in place for several decades before being replaced in 1919 with the present day cables. As a part of ongoing research related to nominating the site to the National Register, discussion will focus on the history and significance of Anderson's initial route and the Half Dome Cables. Innovative aspects of this process and the inherent challenges of nominating a rock-climbing route to the National Register will be outlined. Historic significance is one factor being considered with the Half Dome Trail Stewardship Plan. Additionally, the environmental assessment must consider all ways to protect and enhance wilderness character while providing unimpeded travel conditions. This includes a range of alternatives; from removal of the cables to access restrictions potentially involving day-use permits. An interactive, education-based public involvement effort has been a balance of Wilderness Act instruction, safety education, and solicitation of input.

Session 37 • Maurepas (3rd floor) • Invited Papers

Advances in Understanding Human–Wildlife Habituation in and Around Protected Areas

Chair: Kirsten Leong, Human Dimensions Program Manager, Biological Resource Management Division, National Park Service, Fort Collins, CO

Session overview: This session will advance understanding of human–wildlife habituation in and around protected areas. For the past two years, the Biological Resource Management Division and a steering committee of NPS wildlife biologists have been working on this issue in collaboration with Antioch University and Cornell University. The session will begin with talks describing: advances to improve communication about habituation; a situation analysis evaluating current understanding about human behavior under risk that influences human–wildlife interactions and describing the NPS management context; and the steering committee's response to this new information. For the remainder of the session, presenters and steering committee members will serve as panelists to discuss with the audience future needs related to managing human–wildlife interactions in parks and protected areas. We encourage participation of managers, visitor protection, social scientists and others who are tackling this management issue. Talks will be 25 minutes to track with other concurrent sessions.

Improving Communication about Habituation and Other Learned Behaviors in Wildlife to Inform Management

Lauren Barish, Biological Technician, Biological Resource Management Division, National Park Service, Fort Collins, CO
Kirsten Leong, Human Dimensions Program Manager, Biological Resource Management Division, National Park Service, Fort Collins, CO
Tania Schusler, Core Faculty, Antioch University, Keene, NH
Kurt Fristrup, Scientist, Natural Sounds Division, National Park Service, Fort Collins, CO
Frank Turina, Planner, Natural Sounds Division, National Park Service, Fort Collins, CO

Scientific studies have addressed wildlife habituation for over fifty years, yet the term has been used with multiple meanings, resulting in confusion about the implications of habituation and how best to manage habituated wildlife. Using basic animal behavior principles, we developed a framework to examine the historical use of "habituation" and offer suggestions to improve communication about the topic. In a content analysis of 93 articles on habituation published from 1970 to 2009, we found that while over half of the articles (61%) used the classical definition of habituation at least once, most (76%) provided conflicting definitions or did not acknowledge behavioral learning as a process. Developing consistent terminology will be crucial for managers to effectively learn from and communicate with each other; can inform strategic management of wildlife habituation and related processes; and can advance future studies of anthropogenic disturbance on wildlife.

A Situation Analysis of Human–Wildlife Habituation in NPS Units

Heather Wieczorek Hudenko, Graduate Research Assistant, Cornell University, Ithaca, NY

Daniel J. Decker, Director, Human Dimensions Research Unit, Cornell University, Ithaca, NY

In collaboration with NPS, we conducted a situation analysis of human-wildlife habituation in parks. To advance knowledge of the human components of human-wildlife habituation, we reviewed the published literature related to understanding and managing human behavior that results in wildlife habituation. To explore the NPS management context, we conducted an online survey of NPS managers, held workshops at professional conferences, and systematically collected and analyzed NPS guidance documents related to the management of human-wildlife habituation and human-wildlife interactions across the National Park system. Through this situation analysis, we identified elements of visitor decision-making around wildlife that were particularly relevant to both NPS managers and the process of habituation. Future research will involve an examination of the potential influence of these elements such as a visitor's: emotions; prior experience with wildlife; and expectations for wildlife encounters. In addition, communication efforts that incorporate these elements will be evaluated.

Steering Committee Reflections on Advances in Knowledge

Human-Wildlife Habituation Steering Committee

Members of the steering committee will reflect on the previous presentations outlining advances in the understanding of wildlife behavior, human dimensions, and the managerial context associated with human-wildlife habituation. With respect to this new information, they will describe additional research and management needs associated with habituation, the current state of management of human-wildlife interactions in NPS units, how well biological knowledge/understanding about habituation and the related human behaviors and underlying attitudes are integrated into NPS management approaches, and implications of wildlife habituation in parks with respect to the NPS mission.

The remainder of the session will be conducted as a panel discussion with audience participation. Presenters and steering committee members will serve as panelists to discuss future directions and research needs, as well as answer audience questions.

Session 38 • Borgne (3rd floor) • Sharing Circle

Keeping Parks Relevant to a Changing American Public

Organizers: Erik Eichinger, Director, NPCA's Center for Park Management, Dallas, TX

Cyndi Szymanski, Director, NPCA's Center for Park Management, Golden, CO

Tom Ferranti, Deputy Associate Director, Workforce Management, Washington, DC

In order for parks to remain relevant to an ever-changing American demographic, they must embrace the diverse nature of that constituency. Using the inclusion and diversity program NPCA's Center for Park Management (CPM) is conducting in partnership with the NPS' Workforce Management leadership as a starting point, we will be discussing how parks of all types remain relevant "In a Changing World." We'll discuss various necessary elements including developing a definition/vision for the organization, putting the right culture and leadership in place, and making systemic changes in policies and practices. The CPM/NPS project is designed to improve the levels of inclusion and diversity, at the workforce level—from WASO to the individual park—and in terms of visitor engagement and park interpretation.

Session 39 • Borgne (3rd floor) • Sharing Circle

Organizers: Oil Spills and Protected Areas: Management Considerations

Fritz Klasner, Resource Management Team Leader, Kenai Fjords National Park, Seward, AK

Jeff Mow, Superintendent, Kenai Fjords National Park, Seward, AK

The impacts from both the Mississippi Canyon (Deepwater Horizon) Oil Spill of April 20, 2010 and Exxon Valdez Oil Spill of

March 24, 1989 on areas such as Gulf Islands National Seashore and Kenai Fjords National Park, encompassing both marine and coastline resources, were significant; as were the impacts to local and regional communities. This session provides a brief review—from both oil spills—of the initial incident, subsequent response, immediate impacts to local protected area managers, and long-term implications for management. We hope to prompt discussion and an improved understanding of the benefits of making basic preparations for such a catastrophic incident, which go beyond simply being ready to respond and extend to management of information, partnerships within the community, education and outreach programs, and maintaining diversity in skill sets and staff experience.

Session 40 • Napoleon A1/A2 (3rd floor) • Panel Discussion

Civic Engagement: What Does that Mean Again?

Chair: Molly Russell, Master's candidate, University of Maryland, College Park

Civic engagement is a concept and practice that has gained momentum within the National Park Service. Its benefits range from encouraging the stewardship of resources, to increasing workforce diversity, to enlivening holistic and inclusive thought. As a principle it transcends programmatic divisions and has been used across the NPS, from Archeology, to Law Enforcement, Planning and Special Studies, Tourism, Wilderness, and many more. In considering civic engagement's myriad benefits and applications, it offers a strong mechanism for accomplishing the Director's four priorities: stewardship, relevancy, education, and workforce. But what is 'civic engagement'? And how does it differ from 'public involvement' and 'collaboration'? Our panel will provide insights and experiences to engage panel participants in a discussion about what civic engagement means—from its concepts to the role it can play in shaping the future of the National Park Service.

Panelists: Nora Mitchell, Director, Conservation Study Institute, National Park Service, Woodstock. VT

Barbara Little, Archeologist and Editor of CRM Journal, Archeology Program, National Park Service, Washington, DC

Rick Potts, Chief of Conservation and Outdoor Recreation, National Center for Recreation and Conservation, National Park Service, Washington, DC

Dean Reeder, Chief of Tourism, Office of Sustainable Tourism, National Park Service, Washington, DC

(Note: The late David Larsen, NPS Interpretation and Education Training Manager, Harpers Ferry Center, Harpers Ferry, WV, was to have presented in this session. The panel organizers wish to acknowledge his contributions to civic engagement and would like to dedicate this session to his great energy and passion for this work.)

Session 41 • Napoleon B1 (3rd floor) • Invited Papers

Sea Level Rise: Science and Applications in Coastal Parks

Chairs: Rebecca Beavers, Coastal Geologist, National Park Service, Lakewood, CO

Maria G. Honeycutt, Coastal Climate Adaptation Specialist, National Park Service, Washington, DC

Session overview: Impacts anticipated from sea level rise include inundation and flooding of beaches and low lying marshes, shoreline erosion of coastal areas, and saltwater intrusion into the water table. Barrier islands along the coast of Louisiana and North Carolina may have already passed the threshold for maintaining island integrity in any scenario of sea level rise (U.S. Climate Change Science Program Synthesis and Assessment Program Report 4.1). Consequently, sea level rise is expected to hasten the disappearance of historic coastal villages, coastal wetlands, forests, and beaches, and threaten coastal roads, homes, and businesses. This session will highlight the science and applications in coastal parks related to sea level rise. Invited speakers will also describe efforts to incorporate SLR information into decision-making frameworks for management of natural resources, cultural resources, and infrastructure in the face of a changing climate.

Trends in Sea Level Rise Science

Leonard Pearlstine, Landscape Ecologist, Everglades and Dry Tortugas National Parks, Homestead, FL

There has been a wealth of new sea level rise research since release of the International Panel on Climate Change, Fourth Assessment Report. Global sea level is a function the steric effects of ocean temperatures, salinity and pressures as well as ice sheet and glacier contributions. The major cause of sea level rise during the 20th century is attributed to seawater expansion as it heats up . Many authors believe flow of ice sheets into the oceans will be an increasingly major source of sea level rise for at least the next several centuries. Sea level rise is not uniform across the Earth's oceans however. This presentation summarizes our current understanding of the different components of sea level rise and some anticipated consequences of sea level rise for Everglades National Park.

Measuring Coastal Elevation

Christine Gallagher, Program Analyst, NOAA, Silver Spring, MD

Tim Smith, GPS Program Manager, NPS, Lakewood, CO

Maintaining a network of highly accurate elevation control points strategically placed throughout a park allows for the efficient management and protection of resources facing risks from sea level rise. Elevation points must be measured relative to both (1) the terrestrial reference frame used to construct buildings or roads and (2) the local water levels that incorporate tide fluc-

tuations and local sea level changes. Additionally, the geodetic reference network must be highly accurate because a very slight slope in a coastal area can result in a different horizontal location by several feet if the vertical elevation is in error. Advances in technology have greatly simplified the computation of accurate elevations, so with careful planning and minimal training a robust network of highly accurate survey monuments can help ensure accurate elevations are easy to monitor at vulnerable or valuable sites within a park.

Planning for Coastal Storms: Using Scientific Tools to Guide Recovery in the Context of Sea Level Rise

George Rogers, Professor, Hazard Reduction and Recovery Center, Texas A&M University, College Station, TX

Eric Bardenhagen, Ph.D. Candidate, Hazard Reduction and Recovery Center, Texas A&M University, College Station, TX

A Storm Recovery Plan focusing on natural and cultural resources has been created for Cape Lookout National Seashore to assist both local recovery efforts and outside Incident Management Teams. The plan uses three specific scientific bases to inform incident responders. First, a stakeholder preference approach identifies priority resources in the park for their contribution to the park's aesthetic character and the importance of their function in the park. Secondly, GPS-Photo Link data and images are incorporated into resource assessment checklists and condition reports for use in funding requests and crafting of long-term recovery actions. Finally, local and regional sea level rise predictions, coupled with known resource locations and priority status allow scenarios to be developed and discussed for potential adaptation actions that can be taken for vital resources prior to losses due to storm events and/or sea level rise.

Supporting Coastal Resource Management and Increasing Resilience: NOAA Sea-Level Rise Products and Services

Paul M. Scholz, Division Chief, NOAA Coastal Services Center, Charleston, SC

Understanding the impacts of sea-level rise (SLR) on coastal ecosystems and communities (including the role of SLR in exacerbating storm-related coastal inundation) has become a necessity for coastal resource managers and other decision-makers, who face decisions daily on how to reduce risk and adapt to unavoidable climate change. Sea levels nationally and regionally exhibit considerable variability in both space and time; often the most readily available SLR data and future projections are not at a local scale or in a form that coastal decision-makers can use. This presentation will give an overview of the primary SLR data, models, and derivative products and services that NOAA and its partners provide that directly support coastal resource management decisions. Examples will include pilot projects where NOAA worked hand-in-hand with state and local resource managers to design coastal inundation products that met their unique needs and capabilities.

Cultural Resources: Management Challenges in Light of Global Climate Change

David L. Conlin, Chief, National Park Service Submerged Resources Center, Lakewood, CO

For more than 30 years the National Park Service's Submerged Resources Center (SRC) has tackled the issue of site preservation and site stability for cultural resources- a non-adaptive, non-renewable part of the NPS mandate. The rise in global sea-level, coupled with the likely intensification of ocean based storms, will have a diverse effect on some of the best preserved and important cultural resources within the National Park Service system. While many would argue that sea-level rise and storm intensity will have an across the board detrimental effect on these resources, our experience tells us that this is not necessarily the case. Using examples from our past research, this paper will discuss some possible scenarios for environmental impacts on submerged, littoral and emergent sites in National Parks system wide.

Session 42 • Napoleon B2 (3rd floor) • Invited / Contributed Papers

Managing Protected Areas in the Face of Increasing Urbanization: An Overview

Chairs: Christy Brigham, Chief of Planning, Science and Resources Management, Santa Monica Mountains NRA, Thousand Oaks, CA

Seth Riley, Wildlife Ecologist, Santa Monica Mountains NRA, Thousand Oaks, CA

Session overview: Protected areas everywhere are facing increasing pressures from human development as varied forms of urbanization creep towards park boundaries or crop up next to parks in response to economic opportunities found within protected areas. This session will provide an overview of the challenges and opportunities facing resource managers as the matrix surrounding parks becomes ever more urbanized. Urbanization can act as a stressor on many of the organisms that managers are trying to conserve and can fundamentally alter ecosystem functioning in many smaller park units. Speakers will discuss socio-political constraints as well as threats to resources that occur as a result of increasing urbanization. We will also present tools and approaches that may benefit resource managers in their work to conserve protected areas at the urban interface.

The Crucial Role of Urban Parks and Ecology in an Increasingly Urban World

Ray Sauvajot, Natural Resources Program Chief, NPS Pacific West Region, Oakland, CA

The field of urban ecology has grown steadily, particularly with increasing interest in the compatibility of human and natural environments. This is especially relevant for parks, where urban areas abut park boundaries, recreational activities occur, and park facilities introduce urban elements into otherwise undisturbed environments. Parks provide excellent sites for urban ecology studies and results can be especially important for park managers. Parks have formidable urban ecological challenges, including habitat fragmentation, invasive species, pollutant impacts, human-wildlife conflicts, and more. These challenges are being addressed at national parks as diverse as Gateway NRA, Saguaro NP, and Kaloko-Honokohau NHP. Ultimately, application of research findings will help protect resources in urban parks and in more remote park units where visitor activities, developments, and other uses imbed urban challenges within natural areas. Urban ecology and parks are also critical for increasing awareness of resource values and improving human/wildland coexistence in an increasingly urban world.

The Dilemma of Managing Parks Based upon Narrow Legislation within a Regional Ecological Context

Dan Sealy, Acting Chief, NPS Center for Urban Ecology, Washington, DC

Urban units of the National Park Service are often small and fragmented. Park legislation may focus on maintaining a battlefield landscape related or a single feature yet; the highest ecological value of the park may be captured by managing the resources within a regional or larger landscape level. Examples: Several smaller parks may protect patches of hardwoods forests that collectively provide sufficient habitat range to support bird species, only if managed across park boundaries. Portions of streams running through parks may provide the opportunity to manage for watershed level ecological values, only when managed through common practices. NPS legislation addresses the need to manage the parks as a system, as well as through park-specific legislation. I will discuss some examples of the role smaller, urban parks can lead to significant ecological purpose and the policy, legal and legislative mandates that allow parks to see their resources beyond their boundaries.

Engaging New Audiences in Park Stewardship at the Urban Edge

Christy Brigham, Chief of Planning, Science and Resources Management, Santa Monica Mountains NRA, Thousand Oaks, CA

Although urbanization presents many challenges to park managers, it also brings with it some exciting opportunities. With urbanization comes people and with people comes the chance to engage a new generation of park stewards. Resource management programs, scientific information, and hands-on participatory science are some of the strongest hooks for bringing new audiences to protected areas. I will provide a broad overview of the different types of opportunities available to engage new audiences at the urban edge utilizing science and resource management information and programs. I will also provide specific examples of engagement tools from the Santa Monica Mountains N.R.A. including science festivals, internship programs, employment programs, and citizen science monitoring efforts. This broad overview should be relevant to any park managers seeking to engage new audiences in stewardship or increase the relevancy of their protected area to surrounding populations.

Challenges of Ecosystem Restoration and Protection in the New York / New Jersey Metropolitan Region

Doug Adamo, Chief of Resources, Gateway National Recreation Area, New York, NY

Protecting and restoring the natural resources of Gateway National Recreation Area (GATE) present a variety of challenges, including improving degraded water quality; control of invasive insects, animals, and plants; political concerns, heavy visitor use, and more. This paper describes the efforts of natural resource managers at the park in their attempts to overcome the myriad human- and non-human induced impacts on coastal habitats that despite years of deterioration, exhibit a resiliency that provides part of the motivation for these efforts to continue. This paper summarizes the complexities of NPS partnerships (at all levels of government as well as NGOs), research, planning, and monitoring of completed ecosystem restoration projects, as well as planning for desired future conditions of these ecosystems. The emphasis on natural resource stewardship and planning relative to impacts and providing visitors with excellent resource-based recreation are discussed in terms of the complexities and challenges associated with the highly urbanized setting. Short- and long-term benefits of the NPS approach at GATE include providing the National Park experience to one of the largest urban centers in the world.

Urban Fear Factor: An Examination of Fear Expectancy of Urban Youth & Intentions to Visit Cuyahoga Valley National Park

Timia Thompson, Research Assistant–Doctoral Student, North Carolina State University, Raleigh, NC
David C. Santucci, M.S. Student, North Carolina State University, Raleigh, NC
Candice Bruton, Doctoral Student, North Carolina State University, Raleigh, NC

Myron F. Floyd, Professor & Director of Graduate Programs, North Carolina State University, Raleigh, NC

National parks provide opportunities for achieving numerous psychological and physiological benefits. However, many have not fully realized their potential to facilitate achievement of such benefits for diverse audiences. Cuyahoga Valley National Park (CVNP) was established to bring the national park experience closer to populations in the greater Akron-Cleveland metro area. To successfully draw surrounding populations to CVNP, it is important to understand user expectations and preferences related to natural environments. Examining fear expectancy is one way of doing this. This presentation will provide baseline data on perceived fear related to natural environments and on future intentions to visit CVNP. We will discuss implications for community- and park-based interpretation aimed at decreasing fear of the outdoors among urban youth and increasing their involvement in the outdoors through national parks.

Session 43 • Napoleon B3 (3rd floor) • Invited Papers

Engaging America's Youth the Future of Conservation and Preservation

Chairs: Susan Teel, Director, Southern California Research Learning Center, National Park Service, Thousand Oaks, CA

Kevin Schallert, Southern California Research Learning Center, National Park Service, Thousand Oaks, CA

Nick de Roulhac, Southern California Research Learning Center, National Park Service, Thousand Oaks, CA

Session overview: America's youth must understand the issues, impacts, and threats to natural and cultural resources towards protecting them for the present and future enjoyment by all Americans. Youth programs from across the county seek to transform the lives young Americans while growing the next generation of conservation and community leaders. The ability to engage youth is essential for open space and protected lands to remain relevant into the future. This session will pool a group of projects based on successful youth engagement programs. Session attendees will gain understanding of successful youth programs which may serve as models for similar use by their organizations. The session will include presentations of five case studies including moderated question/answer sessions geared to share lessons learned and information on how attendees can implement similar youth programs at their parks, agencies, or organizations.

Looking for Polar Bears: Intern Journeys in DC's National Parks

Giselle Mora-Bourgeois, Science Education Coordinator, Urban Ecology Research Learning Alliance, NPS National Capital Region, Washington, DC

One of the most frequently asked questions to interpreters and the communications office of the National Capital Region is whether we can "see" climate change effects in the treasured national parks of Metropolitan Washington, D.C. In the summer of 2010, a group of eight Climate Change Communication Interns of diverse backgrounds embarked on the journey to identify and develop communication messages about climate change in parks of the National Capital Region. This talk will discuss the lessons learned from the process of identifying the public's questions and will present the products developed by the youth.

Research Internships: Bridging Research and Education to Benefit National Park Service Managers

Joy Marburger, Research Coordinator, Great Lakes Research and Education Center, Porter, IN

The Great Lakes Research and Education Center provides opportunities to undergraduate and graduate students to investigate management-related research needs in 10 Great Lakes National Parks. Since 2005 the program has supported 36 research internships, for a total cost of $108,560. The program is based on annual funding of $3,000 for each project to cover student housing, travel, field work, and reporting results. The students are mentored by both university scientists and park service managers. Students have presented their results at national meetings, such as those hosted by NPS Water Resources Division, Western Great Lakes Research Conference, Society of Wetland Scientists Conference, and Ecological Society of America, to name just a few. Several projects have involved multiple parks using the same investigative methods. An example is the evaluation of overabundant deer on park vegetation in Indiana Dunes National Lakeshore and Sleeping Bear Dunes National Lakeshore. Other examples will be discussed.

The Misbehaving Spring: Studying Unique Underground River Flow Patterns with Advanced Middle School Science Students

Shannon Trimboli, Education Program Specialist, Mammoth Cave International Center for Science and Learning, Mammoth Cabe, KY

Scientists have long known that the spring for one of Mammoth Cave's primary underground rivers will sometimes "misbehave." This "misbehavior" takes the form of a stable reverse flow pattern that brings surface water into the cave instead of taking

cave water out to the surface. Although interesting, little research has been conducted on this phenomenon or its possible impacts to the cave ecosystem. In 2009, the Mammoth Cave International Center for Science and Learning and a local middle school science class embarked on a research project that monitors the unique flow pattern of this underground river and its spring. This session presents a case study of that project and includes information about developing the project with the students, the students' surprising discoveries, and things we learned along the way. We also offer suggestions, based on our experiences, for others interested in working with students to conduct research.

Climate Change Ambassadors: Learning, Exploration, and Leadership

Nick De Roulhac, Research Associate, Southern California Research Learning Center, National Park Service, Thousand Oaks, CA
Kevin Schallert, Research Associate, Southern California Research Learning Center, National Park Service, Thousand Oaks, CA
Susan Teel, Director, Southern California Research Learning Center Southern California Research Learning Center, National Park Service, Thousand Oaks, CA
Melissa Sladek, Science Communication Specialist, Crown of the Continent Research Learning Center, National Park Service

The National Park Service seeks to attract, engage and educate the public while managing 84.4 million acres of land. The Southern California Research Learning Center and the Crown of the Continent Research Learning Center have executed a replicable citizen science program that fulfills these goals. National Park Staff in California initiated a climate change project by interacting with an after school, minority serving science program. The Students at the Elementary Institute of Science were enrolled in a leadership and educational program focused on the impacts of global climate change. The research and study phase of their curriculum culminated in a service learning expedition to Glacier National Park to study climate change in the National Parks. This pilot program resulted in a replicable scientific engagement model for land management agencies and organizations. This paper will explore challenges, logistics and best practices for this type of collaborative project.

Youth in Parks Science Internships

Jessica Luo, Point Reyes National Seashore, CA
Melanie Gunn, Point Reyes National Seashore, CA
Ben Becker, Point Reyes National Seashore, CA

Providing quality science education for youth in parks is a goal of the NPS. The Pacific Coast Science and Learning Center (PCSLC), recruits and places local under-served youth, non-traditional user groups, and urban communities into 3-4 month internships and 1 week summer science sessions at Bay Area National Parks. The high school and college interns are paired with individual mentors in Interpretation, Natural Resource Management, Cultural Resource Management, and Science Divisions. They work in either a field internship where students are directly involved with ongoing science and resource management or an interpretative / science communication internship where they will be communicating about the science and natural resources of the parks. We will provide an overview of the programs successes and challenges.

Session 44 • Southdown (4th floor) • Invited Papers

Stewardship through Communication

Chair: Mike Whatley, Chief, Office of Education and Outreach, National Park Service, Fort Collins, CO

Session overview: Public enjoyment and the protection of the natural integrity of parks are mutually dependent. Interpretation and education efforts that connect people to park resources, raise public awareness about conservation issues, and invite discussion about stewardship are the future for managing park resources. Just as public enjoyment and protection are integrated, so must resource management integrate with interpretation and education in order to achieve stewardship goals. This session explores stewardship through communication. Successful examples of citizen science, resource volunteer programs, web technology, and concerted efforts to bring resource information to interpreters will be shared. Ultimately, the success of stewardship lies in the partnership and shared vision of professional resource managers and communicators.

Stewardship through Communication

Julia Washburn, Associate Director for Interpretation and Education, National Park Service, Washington, DC

Land managers are increasingly called upon to make difficult resource decisions, some of which may be highly controversial. Interpretation and education programs can provide opportunities for civic engagement with visitors, Indian tribes and residents and officials of gateway and neighboring communities, the region, and the state(s) surrounding a park and beyond. Such opportunities for civic dialogue about resource issues and broad initiatives are often the most effective means for elim-

inating resource threats and gaining input and feedback from stakeholder constituents. For interpretation of resource issues to be effective, frontline interpretive staff must be informed about the reasoning that guided the decision-making process, and interpreters must present balanced views. Involving interpreters in the early stages of planning for managing resource issues can lead to proactive communication efforts that benefit park stewardship.

Telling the Air Quality Story in Great Smoky Mountains National Park

Susan Sachs, Education Coordinator, Appalachian Highlands Science Learning Center

Great Smoky Mountains National Park has been collecting data on the amount and impacts of air pollution on its natural resources since 1988. This information has been "fed" to interpreters since the beginning and over the years, the park has developed a number of different interpretative products and programs to educate a wide audience about the research. The early years relied mostly on brochures and slideshows; today we are using some old school techniques plus podcasts, citizen science monitoring and a portable exhibit that fits in the back of a NPS Toyota Prius hybrid.

A Powerful World of Sound

Lelaina Marin, Outdoor Recreation Planner, Natural Sounds and Night Skies Division, National Park Service, Fort Collins, CO

Deanna Ochs, Park Ranger, Rock Creek Park, Washington, DC

Some of our most profound experiences in life are not seen; they are heard. Sounds embed themselves deep into the human psyche and often illicit a visceral response. Intrinsic sounds in national parks offer powerful connections to the resource. Interpretation is critical to encouraging visitors to experience these intrinsic sounds. Through soundscape–related interpretive programs, the visitor can gain access to an unexpected meaning in the resource. The NPS Natural Sounds Program developed an Interpretive Handbook to provide interpreters the tools for developing programs that will inspire visitors and connect them to resources through their auditory senses. The Handbook acts as a reference for learning more about sound in conservation lands as well as provides example programs that can be used or adapted to meet a park's needs. In a time when people are demonstrably less willing to read interpretive text in parks, acoustic resources offer another avenue for reaching them.

Ambassadors of the Night

Chad Moore, Night Sky Program Manager, Natural Sounds and Night Skies Division, National Park Service, Fort Collins, CO

A significant proportion of resource concerns belong in a category over which parks and protected lands have little authority or control. Protecting dark starry night skies is one such issue. The NPS Night Sky Program has developed a volunteer initiative around night sky protection and restoration. In its fourth year, the Astro VIP program recruits nationally, trains volunteers, strategically places them in parks, and shepherds growing stargazing programs for 3-4 years. Volunteers become ambassadors of the night, sharing the beauty and wonder of the cosmos, conveying data collected by scientists, and educating the public on what they can do. The stargazing programs supported by these volunteers are often the most popular type of program in the park, driven by increasing public interest. This program is an essential ingredient for protection of a resource that is affected by development hundreds of kilometers away, whereupon restoration is energized through citizen concern.

NPS Herbaria Go Global

Ann Hitchcock, Senior Advisor for Scientific Collections and Environmental Safeguards, National Park Service, Washington, DC

Park flora gains new exposure when parks join other agencies, universities, museums, and conservation organizations to create unified regional virtual herbaria on the World Wide Web. Virtual herbaria visitors search for plant specimens and images, use identification keys, and find checklists for specific localities—from park and tribal lands to their own backyards. Used by researchers, managers, educators, students, and hobbyists, the virtual herbarium fosters cooperative conservation. In Arizona, parks are participating in a demonstration project with the Southwest Environmental Information Network (SEINet), to make specimen-based data from multiple herbaria simultaneously searchable on the Web. Through CESU cooperative agreements, universities and museums digitally photograph park specimens, posting the images on SEINet. This presentation showcases this virtual herbarium of Southwest flora, describes the open-source content management system supporting it, and explores how parks in other areas of the country may join regional networks and help build the nascent U.S. Virtual Herbarium.

Session 45 • Gallier A/B (4th floor) • Contributed Papers

Wildlife Management: Mammal Species

Chair: Mary Kay Watry, Biologist, Rocky Mountain National Park, Estes Park, CO

Partnering for Pikas: A Multi-park Monitoring Protocol for the American Pika

Mackenzie Jeffress, Research Associate, University of Idaho / Upper Columbia Basin I&M Network, Boulder City, NV
Lisa K. Garrett, Program Manager, Upper Columbia Basin I&M Network, Moscow, ID
Tom J. Rodhouse, Ecologist, Upper Columbia Basin I&M Network, Moscow, ID

The American pika is a charismatic species in many western parks, and evidence of recent extirpations in some areas has led to concerns about the impacts of climate change on this heat-intolerant animal. Four National Park units (Crater Lake NP, Craters of the Moon NM&P, Lassen Volcanic NP, and Lava Beds NM) have formed a partnership with the Upper Columbia Basin I&M Network to develop a rigorous, peer-reviewed protocol for monitoring pika occupancy patterns over time. The protocol is being adopted by other parks and has been incorporated into the NPS Climate Change Response Program funded "Pikas in Peril" research project. We implemented the protocol in four parks in 2010 and conducted pilot surveys in prior years. The proportions of habitable park areas occupied by pikas varied considerably between parks, and, in some areas, were influenced by elevation, substrate, and vegetation. These results provide important insights into pika population ecology.

Stable Isotope Ecology of Small Mammals in Great Basin National Park

Bryan Hamilton, Wildlife Biologist, Brigham Young University / Great Basin National Park, Baker, NV
Beverly L. Roeder, Department of Biology, Brigham Young University, Provo, UT
Kent A. Hatch, Department of Biology, Long Island University, Brookville, NY
Dennis L. Eggett, Department of Statistics, Brigham Young University, Provo, UT
Dave Tingey, Department of Geology, Brigham Young University, Provo, UT

Increases in the rate of groundwater pumping adjacent to Great Basin National Park could lower water tables, reduce stream flows, and xerify riparian vegetation. These alterations to the riparian habitat template could affect small mammal communities. We used to stable isotopes of nitrogen, carbon, deuterium and oxygen to characterize small mammal communities and we use this information to discuss the potential effects of groundwater withdrawal on small mammal communities. Partitioning was primarily seen in nitrogen and carbon isotopes which reflect feeding ecology (trophic level and primary production source), but was also seen in 18O. Major differences in 15N and 13C isotopes were between taxonomic groups, while similarity was highest within these groups. Contrary to a previous study, oxygen isotopes were inversely related to water use efficiency. If groundwater withdrawal alters groundwater levels, stream flows, vegetation, microclimate, and invertebrates riparian dependent small mammals will be negatively affected resulting in a decrease in diversity and loss of riparian species from affected areas.

Cruise Ship–Humpback Whale Interactions in Glacier Bay National Park

Scott Gende, Coastal Ecologist, Glacier Bay Field Station, Juneau, AK
A. Noble Hendrix, R2 Resource Consulting, Redmond, WA
Karin R. Harris, University of Washington, School of Marine Affairs, Seattle, WA

Cruise ships provide access to Glacier Bay National Park for hundreds of thousands of visitors each year but can have deleterious impacts on marine mammals (collisions, sound exposure). To investigate ship-whale encounters, observers were placed on 380 cruises from 2006-2009. Ship-whale encounters were frequent, spatially aggregated, and often severe (very close). Ships that entered the park during the peak July-August season had a >40% chance of a 'near miss' where the whale passed within 100m of the bulbous bow. Using a Bayesian change-point model, the relationship between encounter distance and ship speed changed at 12.1 knots (95% credible interval: 10.9-14.2. knots) with average encounter distances above the change point (faster than 12.1 knots) averaging 160m closer to the ships than encounters occurring at slower speeds. Ship speed may be an important mitigating measure for reducing the probability of a collision between ships and whales in Glacier Bay and globally.

Elk Culling at Rocky Mountain National Park: Rethinking Traditional Federal and State Roles

Gary Miller, Wildlife Biologist, National Park Service, Rocky Mountain National Park, Estes Park, CO
John A. Mack, Natural Resource Branch Chief, Rocky Mountain National Park, Estes Park, CO
Ben Bobowski, Chief of Resource Stewardship, Rocky Mountain National Park, Estes Park, CO

Lethal removal of elk (*Cervus elaphus nelsoni*) was the most controversial element in the development and implementation of Rocky Mountain National Park's Elk and Vegetation Management Plan. Park personnel collaborated with Colorado Division of Wildlife (CDOW) staff on a strategy that mitigated the most commonly expressed concerns and leveraged the strengths and responsibilities of both agencies. Instead of paid contractors or staff, we relied primarily upon volunteers — private citizens selected and trained through a rigorous process co-administered by the 2 agencies. Carcasses were distributed to the public via a state-administered lottery unless chronic wasting disease was suspected, in which case they were used in research. The potential for erroneous public perceptions were countered with a very transparent process, including a media day in which journalists observed and reported on a typical culling operation. Elk reduction objectives are being met, and public response to culling has been neutral to positive.

Movement of Elk in Great Sand Dunes National Park in Response to Water Resource Availability

Sarah Garza, Graduate Student, Colorado State University, Fort Collins, CO

The elk (*Cervus elaphpus*) populations in the San Luis Valley of south-central Colorado will often inhabit the Great Sand Dunes National Park; distribution of elk is influenced by several factors including water resources. The Park Service is in the process of capping several artificial water wells within park boundaries. My research will address the question of how this changing water availability will affect elk herd movements. To do so, I will assess the importance of these wells, how the elk interact with them, and how the elk may be affected by future closures. I will integrate spatial GIS data of the park with five years of VHF-tracking datasets of 28 radio-collared elk to determine correlations between elk movements and water wells. These data will be used to model the implications of restricted water resources on wildlife populations and add new dimension to the understanding of wildlife responses to environmental changes.

Session 46 • Nottoway (4th floor) • Invited Papers

Thresholds for Ecological Systems and Their Management

Chair: Amy Symstad, Research Ecologist, USGS Northern Prairie Wildlife Research Center, Hot Springs, SD

Session overview: The USGS National Park Monitoring Project supports USGS research on priority topics identified by the NPS Inventory and Monitoring (I&M) Program. This session presents the results of four studies addressing one of these priority topics: defining ecological thresholds, limits of acceptable variation, or management trigger points for vital signs used by I&M networks. Beginning with a talk presenting clear definitions of three types of thresholds relevant to ecosystem management and a framework in which to use them, the session will continue with three more talks using case studies to illustrate a variety of methods for determining ecological, utility, and decision thresholds or the ecological models that support them. The session will conclude with a wrap-up discussion among presenters and the audience. Each of the four presentations and the concluding discussion will be allotted 25 minutes.

Thresholds for Conservation and Management: A Conceptual Framework

M.J. Eaton, Research Ecologist, USGS Patuxent Wildlife Research Center, Laurel, MD
J. Martin, Wildlife Ecologist, Fish and Wildlife Research Institute, St. Petersburg, FL
J.D. Nichols, Research Wildlife Biologist, USGS Patuxent Wildlife Research Center, Laurel, MD
C. McIntyre, Wildlife Biologist, NPS Denali National Park, Fairbanks, AK
M.C. McCluskie, Coordinator, NPS Central Alaska Network, Fairbanks, AK
J.A. Schmutz, Research Wildlife Biologist, USGS Alaska Science Center, Anchorage, AK
B.L. Lubow, Research Associate, Natural Resource Ecology Laboratory, Colorado State University, Fort Collins, CO

We define three types of thresholds relevant to ecological systems and their management. "Ecological thresholds" refer to either of two situations: (1) where relatively small changes in state or environmental variables bring about relatively large changes in system dynamics; (2) where a small change in a state or environmental variable leads to attainment of a specified value of a parameter underlying system dynamics. "Utility thresholds" represent values of state variables that separate regions of state space that are desirable from those that are undesirable. They are relevant to management and conservation and are often a component of formal objective statements. "Decision thresholds" are values of state variables that separate regions of state space at which different management actions are optimal (or recommended). Under optimal decision-making, decision thresholds are completely determined by ecological models (with their ecological thresholds), objective functions (with their utility thresholds), available management actions, and estimated system state.

Utility Values and Simulation to Optimize Bioassessment Designs

D.R. Smith, Statistician, USGS Leetown Science Center, Kearneysville, WV

C.D. Snyder, Research Ecologist, USGS Leetown Science Center, Kearneysville, WV
N.P. Hitt, Research Fish Biologist, USGS Leetown Science Center, Kearneysville, WV
J. Daily, Technician, USGS Leetown Science Center, Kearneysville, WV

When developing bioassessment programs, managers must establish decision thresholds, account for uncertainty, and control costs. In this presentation, we illustrate how utility values and simulation techniques may be used to optimize bioassessment designs with a case study of macroinvertebrate communities in the Shenandoah National Park. Utility values arise from management values and can be assigned to bioassessment outcomes. For example, high utility can be assigned to correctly classifying resource condition. However, correctly classifying impairment might be most important and receive higher utility than correctly classifying reference. We simulated over 3500 monitoring designs to determine power to detect change and costs. We also compared decision thresholds using expected utility values, which integrated statistical power and differential risk tolerance for type I and II error rates. Simulation provided a flexible approach to evaluating alternative bioassessment designs, and utility values quantitatively linked management values and decision thresholds.

Ecological Thresholds for Salt Marsh Nekton and Vegetation Communities

Mary-Jane James-Pirri, Marine Research Associate, University of Rhode Island Graduate School of Oceanography, Narragansett, RI
Jeffrey L. Swanson, Graduate Student, University of Rhode Island Department of Computer Science and Statistics, Kingston, RI
Charles T. Roman, Coastal Ecologist, NPS Northeast Regional Office, Narragansett, RI
Howard S. Ginsberg, Research Ecologist, USGS Patuxent Wildlife Research Center, Kingston, RI
James F. Heltshe, Professor, University of Rhode Island Department of Computer Science and Statistics

We describe the condition of relatively undisturbed salt marsh communities to those with various levels of anthropogenic stress and develop thresholds for resource management action. Salt marsh nekton and vegetation community data were compiled from over 180 datasets from Maine to Virginia. Multivariate techniques elucidated patterns of community change along a gradient of hydrologic impact and watershed development. Several levels of community complexity, species abundances, and guild-based groupings were used to identify variables that could be used as indicators of change. The nekton community displayed shifts in guild structure along a gradient of watershed human population size. Vegetation guilds from undisturbed marshes were dominated by obligate halophytes with low proportions of invasive plants. Tide-restricted marshes had fewer halophytic obligate plants, and more facultative and invasive plants. Thresholds are presented for nekton and vegetation communities enabling resource managers to characterize marsh condition and evaluate responses to restoration or degrading impacts.

Richness and Diversity Responses to Management and Weather in Great Plains Grassland Plant Communities

Jayne L. Jonas, Research Scientist, IAP World Service Inc., Brighton, CO
Amy J. Symstad, Research Ecologist, USGS Northern Prairie Wildlife Research Center, Hot Springs, SD
Deborah A. Buhl, Statistician, USGS Northern Prairie Wildlife Research Center, Jamestown, ND

Species richness and diversity may serve as useful indicators of grassland quality. Ideally, their response to a variety of natural drivers and anthropogenic stressors would be clearly understood, allowing separation of trends caused by management from fluctuations caused by natural variability. Several networks of the National Park Service's Vital Signs monitoring program use these metrics as measures of ecosystem health in Great Plains grasslands. To support these networks, we used existing datasets from Great Plains grasslands to assess the relative importance of multiple weather models for explaining interannual variability in these metrics under a variety of management regimes. Although our results were highly variable among sites, native richness tended to have a stronger relationship to temperature than to precipitation, while the reverse was true for exotic richness. Our results also indicate that management practices can influence grasslands' responses to weather by altering plant species composition.

Discussion of Ecological, Utility, and Decision Thresholds

Amy J. Symstad, Research Ecologist, USGS Northern Prairie Wildlife Research Center, Hot Springs, SD

A brief summary of other ecological threshold and management trigger point projects funded by the USGS National Park Monitoring Project will be presented, followed by ample time for discussion among session presenters and the audience.

Session 47 • Oak Alley (4th floor) • Invited Papers

Recreation and Resource Impacts: Ecological and Human Dimensions

Chairs: Yu-Fai Leung, Associate Professor, Dept. of Parks, Recreation & Tourism Management, North Carolina State University,

Raleigh, NC

Christopher Monz, Assistant Professor, Department of Environment and Society, Utah State University, Logan, UT

Jeffrey Marion, Field Station Leader, Patuxent Wildlife Research Center, U.S. Geological Survey, Blacksburg, VA

Session overview: Recreation impacts on protected area resources continue to challenge managers and researchers to develop and implement effective management strategies and actions. Decades of recreation ecology research have yielded a body of knowledge and a repertoire of techniques that contribute to protected area and visitor capacity management. Much work, however, is still needed to address long standing and emerging impact issues. In the past few years significant efforts have been directed toward establishing the ecological and social significance of recreation impacts, applying useful technologies in research and monitoring, and examining efficacy of management actions. This session includes five papers that exemplify some of the current research themes about recreation impacts and visitor use management in protected areas, including informal trails, visitor perceptions, spatial analysis and technology applications.

Establishing the Ecological Significance of Informal Trail Indicator in Yosemite National Park through an Integrated Meadow Analysis

Yu-Fai Leung, Associate Professor, Dept. of Parks, Recreation and Tourism Management, NC State University, Raleigh, NC

Todd Newburger, Program Manager, Visitor Use and Impact Monitoring, Resources Management and Science Division, Yosemite National Park, El Portal, CA

Liz Ballenger, Biologist, Resources Management and Science Division, Yosemite National Park, El Portal, CA

Kevin Bigsby, Doctoral Student, Dept. of Forestry and Environmental Resources, NC State University, Raleigh, NC

Chris Kollar, Masters Student, Dept. of Parks, Recreation and Tourism Management, NC State University, Raleigh, NC

Yosemite National Park has been engaged in a long-term monitoring program as the crucial component in an adaptive management framework to sustain the park's natural, social and cultural resources and inform visitor and resource management decisions. Informal trail proliferation in meadows was identified as a key indicator with monitoring and analysis protocols recently developed and implemented. Informal trails have been characterized based on their extent, conditions and degrees of fragmentation. In order to establish the ecological significance of this indicator, meadow vegetation was assessed in the summer of 2010 with concurrent informal trail monitoring, yielding the dual datasets for an integrated analysis of informal trail effects on meadow vegetation. Specifically, meadow conditions are compared across different patch size classes and the relationships between meadow conditions and proximity to informal trails are examined. Analytical results are presented with implications for management and monitoring. The needs for establishing ecological and social significance of impact indicators to support adaptive park management frameworks are also discussed.

Assessing the Development of Emerging Informal Trail Networks in Denali National Park and the Arctic National Wildlife Refuge

Jeremy Wimpey, Research Associate, Dept. of Forest Resources and Environmental Conservation, Virginia Tech, Blacksburg, VA

Jeffrey Marion, Field Station Leader, Patuxent Wildlife Research Center, USDI, U.S. Geological Survey, Blacksburg, VA

Christopher Monz, Assistant Professor, Dept. of Environment and Society, Utah State University, Logan, UT

Denali National Park (NPS: DENA) and the Arctic National Wildlife Refuge (USFWS: ANWR) are managed for trail-less conditions. Increasing visitor use and access to DENA and ANWR have resulted in the emergence of informal visitor-created trails in both protected areas. Methods to inventory and monitor the emergence trails in these vast settings were developed through collaboration with NPS and USFWS managers. Challenges associated with these surveys include the size of the areas to be assessed, the dynamic nature of informal trails, large game travel and migration routes, and the unique characteristics of tundra and arctic ecosystems. We developed and field tested a tiered inventory protocol that allows for efficient field work within spatially defined regions, with a feedback loop that uses inventory data to create and modify targeted inventory areas. The protocols and data are presented, with discussion of how data can be used to improve informal trail management decision-making.

Classifying Campsites Using Multivariate Analyses: A Replacement for Condition Classes?

Christopher Monz, Assistant Professor, Department of Environment and Society, Utah State University, Logan, UT

Paul Twardock, Associate Professor, Outdoor Studies Department, Alaska Pacific University, Anchorage, AK

This study classified backcountry campsites in Prince William Sound, Alaska, USA via a multivariate analysis procedure. Sites (N=146) were assessed for a range of resource impacts and factor analysis of ten indicator variables produced three dimensions of campsite impact—tree and vegetation disturbance, areal disturbance and visitor behavior-related disturbance. Three

types of campsites, which differed substantially in the types of impact exhibited, were then derived from a cluster analysis of the factor scores. Further analysis revealed a significant relationship between the types of substrates where campsites were located and the types of campsites derived from the analysis. This work illustrates the utility of multi-indicator monitoring approaches and the use of multivariate methods for classifying campsites, as the campsite types identified would likely require different management strategies for limiting the proliferation and expansion of impacts.

Identifying Indicators of Quality for the Backcountry Visitor Experience at Kenai Fjords National Park, Alaska

Kelly Goonan, Doctoral Student, Dept. of Environment and Society, Utah State University, Logan, UT
Christopher Monz, Assistant Professor, Dept. of Environment and Society, Utah State University, Logan, UT
Laura Phillips, Ecologist, National Park Service, Kenai Fjords National Park, Seward, AK
Fritz Klasner, Natural Resource Program Manager, USDI National Park Service, Kenai Fjords National Park, Seward, AK

Managing visitor use impacts in coastal areas of Alaska National Parks is an increasing challenge. At Kenai Fjords National Park (KEFJ), suitable landing beaches and camping areas are topographically limited, thus concentrating visitor use in more accessible areas. This higher density of users in specific areas yields the potential for more rapid and severe impacts to resource and social values. A program of research was initiated to identify indicators and standards of quality for these areas. A survey incorporating a series of open and close-ended questions was developed to identify potential indicators of quality, and administered to backcountry visitors during the summer of 2010. Preliminary results suggest that opportunities for solitude, the scenic quality of the natural environment, wildlife-viewing opportunities, kayak/tour boat interactions, and natural soundscapes are important to the quality of the visitor experience. Results will inform a second phase of research to identify visitor standards for coastal backcountry conditions.

Sustainably Designed Trails: Recent Recreation Ecology Findings on Design Factors Affecting Soil Loss

Jeffrey Marion, Field Station Leader, Patuxent Wildlife Research Center, U.S. Geological Survey, Blacksburg, VA
Jeremy Wimpey, Research Associate, Dept. of Forest Resources and Environmental Conservation, Virginia Tech, Blacksburg, VA

Achieving conservation objectives in protected natural areas requires the ability to sustain visitation while avoiding or minimizing adverse impacts to the environment. Trails are an essential infrastructure component that limits resource impacts by concentrating use on hardened treads designed and maintained to sustain traffic while limiting trampling impacts. This is particularly challenging when visitation is heavy or when higher impacting uses, such as equestrian or motorized use, must be accommodated. Soil loss is perhaps the most significant form of environmental impact because of its long-term nature and secondary impacts: eroded soil often enters waterways, causing impacts to aquatic environments. This presentation examines the influence of managerial factors that affect soil loss and the sustainability of trails, particularly trail design, construction, and maintenance. Sustainable trails are defined as well-designed and constructed trails whose treads remain in good condition over time with minimal tread maintenance. Unsustainable trails deteriorate quickly under traffic, are more difficult to use, and require substantially greater maintenance efforts.

Session 48 • Bayside A (4th floor) • Contributed Papers

Climate Change Monitoring

Chair: Rebecca Stanfield McCown, Graduate Research Assistant, University of Vermont, Burlington, VT

Geotemporal Dimensions of Change: Two-Dimensional Coastal Geomorphologcal Monitoring in the Northeast Coastal and Barrier Network

Norbert P. Psuty, Director, Sandy Hook Cooperative Research Programs, Institute of Marine and Coastal Sciences, Rutgers University, Highlands, NJ
Tanya M. Silveira, Sandy Hook Cooperative Research Programs, Rutgers University, Highlands, NJ
Dennis Skidds, Data Manager, Northeast Coastal and Barrier Network, NPS, University of Rhode Island, Kingston, RI
Sara Stevens, Program Manager, Northeast Coastal and Barrier Network, NPS, University of Rhode Island, Kingston, RI

With the need to track and understand changing coastal topography under the drivers of sea-level rise and natural and cultural alterations to sediment budget, a rigorous two-dimensional monitoring protocol has been established by the Northeast Coastal and Barrier Network to record spatial and temporal vectors of evolution of the beach-dune-cliff systems. This monitoring protocol has a scientific foundation, addresses significant management issues, and is implementable at the local and regional level. Data collection is conducted with a RTK-GPS unit with centimeter scale accuracy, and measurements are tied to local survey monuments registered to NAVD88. Networks of geodetic monuments have been established in parks and

function as sites for repetitive surveys and local controls. Frequency and timing of the surveys document seasonal, annual, and long-term geotemporal patterns of change. Data are stored in park and regional geodatabases and have been used to support resource management decisions.

Ice in the Everglades: Impacts of the 2010 Cold Event on Flora and Fauna and Implications for Monitoring and Resource Management

David Hallac, Chief, Biological Resources, Everglades and Dry Tortugas National Parks, Homestead, FL

Everglades National Park experienced two weeks of unusually cold temperatures in January, 2010. Air and water temperatures declined to -2.0° Celsius and 5.0° Celsius, respectively. These cold temperatures had impacts on both plants and animals in the Park. The Park compiled observations on biological impacts from aerial and water-based surveys and from reports provided by recreational anglers, fishing guides, scientists, and law enforcement staff. In general, observations indicated substantial mortality of plants, manatees, crocodiles, pythons, native marine fish, and non-native freshwater fish. For some fish species, such as the recreationally-important common snook, population level impacts occurred; consequently, resource managers implemented special harvest regulations. Higher frequencies of extreme temperature events, associated with climate change, may be increasingly important to consider in the monitoring and management of plants and animals in natural areas.

Climate Change, Saguaros, and Perennial Vegetation at Saguaro National Park

Adam Springer, Ph.D. Candidate, University of Arizona, Tucson, AZ

Kara O'Brien, Saguaro National Park, Tucson, AZ

Don E. Swann, Saguaro National Park, Tucson, AZ

Andy Hubbard, Sonoran Desert Inventory and Monitoring Network

Becky MacEwen, Saguaro National Park, Tucson, AZ

In 2009, Saguaro National Park was declared one of America's twenty-five national parks most imperiled by climate change. This is largely due to the increasing threat of invasive grasses, especially buffelgrass, which fuels wildfires in a desert ecosystem that is not fire-adapted. As the park develops strategies for managing resources under a scenario of projected climate change, we are also exploring the potential impacts climate has already had. The Saguaro Census, established in 1990, is one tool for quantifying long-term ecological change. The 2010 Saguaro Census provided an opportunity to monitor trends of both saguaros and the perennial vegetation communities of the Sonoran Desert. Results indicate the saguaro population is now increasing in the park, with significant recent recruitment at several sites. This paper provides an analysis of two decades of vegetation monitoring data at Saguaro in the context of climatic change in the Desert Southwest.

Managing Climate Station Data to Reduce Errors During Analysis

Mike Tercek, Ecologist, Walking Shadow Ecology, Gardiner, MT

Managing large quantities of climate data can be challenging as there are frequently a number of errors that can be hard to find. These errors can affect analysis and therefore the understanding of what climate trends are occurring. The Climate Data Screener and Summarizer is a free, stand-alone, GUI application that spots common flaws in climate data, such as duplicated lines, outliers, transposed values, and large numbers of missing values that prevent correct calculation of means. Once the screening functions have been used, the program generates publication-quality tables and graphs that show monthly totals / averages, departure from 30-yr averages, Accumulated Growing Degree Days (growing season length) and a number of other indices. The software is currently being used by the Greater Yellowstone Network, The Rocky Mountain Network (divisions of the National Park Service Inventory and Monitoring Program), and the Wyoming State Climate Office at the University of Wyoming.

Session 49 • Bayside B/C (4th floor) • Panel Discussion

Natural Resources Emeritus Program: The Transfer of Institutional Knowledge

Chair: Lynne Murdock, Interpretive Liaison, National Park Service, Washington, DC

The transfer of institutional knowledge is an integral component of successfully managing natural resources within the National Park System. Launched in the summer of 2010, the Natural Resource Emeritus program is designed for scientists and park managers who have retired as specialists in their discipline and are available to contribute their knowledge in a volunteer capacity. This session will provide an overview of this new program and current Emeritus members will communicate specific examples of field projects in progress. On-going work includes: the internationally significant Geo-Parks project, field

work to document potential new National Natural Landmark sites on the east coast and developing a comprehensive wilderness plan for Sequoia Kings Canyon National Park. Program administration will be addressed and information will be available if workshop participants are interested in other aspects of this successful new program.

Panelists: Lynne Murdock, Interpretive Liaison, NPS, Washington, DC
David Parsons, Emeritus Program, NPS, Missoula, MT
Lindsay McClelland, Emeritus Program, NPS, Washington, DC
Mark Flora, Emeritus Program, NPS, Fort Collins, CO
Gary Johnston, Emeritus Program, NPS, Washington, DC

Session 50 • Maurepas (3rd floor) • Invited Papers

Successful Restoration of Threatened and Endangered Species in National Parks

Chair: Peter Dratch, Endangered Species Program Manager, National Park Service, Fort Collins, CO
Nancy Brian, NPS Endangered Species Botanist, Fort Collins, CO
Tim Pinion, NPS Southeast Regional T&E Coordinator, Atlanta, GA
Mietek Kolipinski, NPS Pacific West Regional T&E Coordinator
Diane Pavek, NPS National Capital Regional T&E Coordinator

Session overview: For over a decade, the NPS Endangered Species Program has funded augmentation and restoration efforts in national parks. There have been some marked successes, from the seabeach amaranth on East coast to the California condor in the West. This session reviews park efforts from across the country to address threats, secure sensitive habitats and restore listed species. It includes perspectives of park biologists as well as regional T&E Coordinators and the WASO Biological Resource Management Division, and help on writing a success endangered species project proposal. It concludes with suggestions by several presenters on directions for restoration in an era of rapid environmental change.

Introduction: The Endangered Species Program and its Impact on National Parks

Nancy Brian, NPS Endangered Species Botanist, Fort Collins, CO
Peter Dratch, NPS Endangered Species Program Manager, Fort Collins, CO

To meet its obligations under both the Organic Act and the Endangered Species Act for proactive conservation of federally listed species, the NPS works to restore and maintain listed species' habitats and to reestablish locally extirpated populations to maintain the species. In 2009, the NPS had 1,059 park populations of 394 federally listed species. Plants comprise the majority of the species while mammals comprise the majority of park populations. This session will highlight the restoration activities conducted in each of the seven regions of the NPS. Between 2000 and 2012 the NPS will have spent $6,970,000 on 70 park projects that address on-the-ground conservation efforts at restoring species and the habitats upon which they depend. An overview of the NPS Endangered Species Program will be followed by presentations of successful restoration projects. The session will conclude with how to write a successful T&E proposal, particularly addressing changing environmental conditions.

Propagation and Augmentation of Federally Listed Mussels in the Big South Fork

Steve Bakaletz, Wildlife Biologist, Big South Fork National River and Recreation Area, TN
Tim Pinion, NPS Southeast Regional T&E Coordinator, Atlanta, GA

Historically, as many as 71 mussel species were present in the Big South Fork of the Cumberland River, but in recent years only 26 species have been found. The purpose of this project was to augment existing populations of six federally listed mussels where natural reproduction occurs in low numbers, and to reintroduce historical populations of four federally listed mussels in the Big South Fork National River and Recreation Area (BISO). Since 2008, mussels have been collected from outside the park, propagated, and prepared for transplantation to the BISO. Over 620 common mussels representing 15 species and 300 endangered mussels representing 4 species were collected by the Tennessee Wildlife Resources Agency and held in the Gallatin, TN quarantine and holding facility. These mussels were then released into the BISO. In 2009, 100 of the endangered mussels were tagged with passively induced transmitters (pit tags) for monitoring purposes.

Black-footed Ferret Restoration in Badlands National Park: An Example of Multiagency Cooperation over Multiple Jurisdictional Boundaries

Brian Kenner, Supervisory Resource Management Specialist, Badlands National Park, Wall, SD
Cay Ogden, NPS Intermountain T&E Coordinator, Denver, CO

The black-footed ferret *(Mustela nigripes)* is the most endangered land mammal in North America. Success of a captive-breeding program, begun in 1987, made ferrets available for reintroduction. As part of a multi-agency effort, the Conata Basin/Badlands Experimental Population Area released captive-born ferrets into the wild from 1994 to 1999. The success of ferret recovery in the Conata Basin/Badlands has been closely tied to the ability to make adaptive management decisions in the reintroduction process, the amount of high quality, disease free, black-tailed prairie dog habitat available in the area, and excellent cooperation among all agencies involved. With the recent arrival of sylvatic plague (*Yersinia pestis*) to the Conata Basin/Badlands area, new challenges are presented to the multi-agency recovery effort. Establishment of a ferret population at nearby Wind Cave National Park, with plague threatening there as well, requires expansion of this collaborative effort as well as the challenges it faces.

Restoration of Threatened and Endangered Species in Golden Gate National Recreation Area

Mietek Kolipinski, Pacific West T&E Coordinator, Oakland, CA

Darren Fong, Aquatic Ecologist, Golden Gate National Recreation Area, San Francisco, CA

Bill Markle, Wildlife Ecologist, Golden Gate National Recreation Area, San Francisco, CA

Golden Gate National Recreation Area (GOGA) faces complex challenges retaining its biodiversity. The federally listed endangered and threatened species include 12 endangered or threatened plant species and 23 endangered or threatened animal species. Proximity to urban development and high visitor use place pressures on protecting and restoring these species. Numerous highly invasive non-native species add to this threat by altering unique and diverse habitats. Park personnel, with partner institutions and volunteers, are restoring many species. Examples include enhancement of ecological communities that support rare plants, mission blue butterfly, San Francisco garter snake, and California red-legged frog. Some GOGA species occur in nearby Point Reyes National Seashore (PORE). Both parks with partners restore species collaboratively. For instance state and federal officials recently released over 170 endangered tidewater gobies in Tomales Bay State Park, adjacent to PORE with intent to establish an adjacent thriving population of this highly vulnerable fish.

Strategies for Successful T&E Restoration Proposal and Projects

Peter Dratch, NPS Endangered Species Program Manager, Fort Collins, CO

Diane Pavek, National Capital T&E Coordinator, Washington, DC

Because the severity of the threat facing plants and animals listed under the Endangered Species Act, combined with their importance to many National Park Service units, there have been many successful projects funded under the Service-wide Comprehensive Call. The Regional Endangered Species Coordinators annually rate project proposals for the T&E funding source, and that panel has been rigorous is choosing the projects that not only have the greatest need but also show the greatest promise for success in making a difference on the ground for these species. It has not been the most charismatic endangered species that have generally been selected for funding. Using examples of successful project proposals, this presentation goes through the ranking system used by the panel and demonstrates what makes a proposal rate high for each criterion. Its goal is a new group of outstanding proposals that address the new threats these species face.

Session 51 • Borgne (3rd floor) • Sharing Circle

Tribal Coalition Project to Protect Cultural Resources in California Desert

Organizer: Anthony Madrigal, Director, Cultural Resources, San Manuel Band of Mission Indians, Highland, CA

In April 2010 the California Tribes for Protection of Indigenous Resources, CTPIR, a coalition of most of the Southern California Tribes organized in order to protect cultural resources that are under grave threat by the development of a large number of renewable energy projects, including solar farms and wind farms in the California desert. The Fernandeno Tatavium Tribe utilized grant funds in association with other California tribes to employ University of California Riverside Indian students working out of the UCR California Center for Native Nations to begin work assembling information regarding the impacts on cultural resources caused by the many solar and wind projects sited in the California Desert. This work has included researching and reporting status of individual renewable energy projects as they proceed through a fast track evaluation and approval process as well as background on the Governors Renewable Energy Initiative and the Federal Energy Policy Act, both of which promote and offer incentives for development of renewable energy (Solar, Wind, Geothermal). This project is a unique in that a coalition of tribes in association with UCR Indian students has undertaken to protect cultural sites and landscapes under threat by federal and state initiatives. The project documents tribal culture and preserves sites and landscapes central to tribal identity. This Project also has provided training and expertise to young Indian students who will join tribal cultural resource management departments.

Session 52 • Borgne (3rd floor) • Sharing Circle

What Will It Take for NPS to be a High-performing Agency?

Organizer: Kate Richardson, Program Manager–Workplace Enrichment, National Park Service, Sausalito, CA

NPS has an exceptionally purpose-driven, committed and motivated workforce. Ironically, it has scored in the bottom third of Best Places to Work in the Federal Government for the past seven years. Employee scores around leadership, work and personal life balance, performance management, and diversity in the workplace have both low scores and some of the greatest declines. Research has shown that organizations with high levels of employee engagement produce dramatically better results. And for the NPS, that means improved public service to our resources, our visitors, and our communities. This Sharing Circle will use facilitated discussion to discover what participants believe works well at NPS—programs, processes, accomplishments, and/or people that exemplify the future NPS and to solicit honest thoughts and ideas to inform the NPS Workplace Enrichment Program.

Session 53 • Rhythms I–III (2nd floor) • Panel Discussion

National Park Service Inventory & Monitoring Keynote Session: The State of the Program • NPS Science Initiative

Chair: Steve Fancy, Chief, Inventory and Monitoring Division, National Park Service, Fort Collins, CO

Panelists: Bert Frost, Associate Director, NPS NRSS, Washington, DC

Steve Fancy, I&M Program Leader, Fort Collins, CO

George Dickison, Center Director, NPS NRSS Natural Resource Program Center, Fort Collins, CO

Margaret Beer, NPS I&M Data Manager, Fort Collins, CO

Gary Machlis, Science Advisor to the NPS Director, Washington, DC

Jon Jarvis, NPS Director, Washington, DC (invited)

The Inventory and Monitoring Program (I&M) provides funding, technical assistance, and coordination for parks to complete basic natural resource inventories and to monitor the condition or "health" of park natural resources based on key vital sign parameters. The first I&M networks were established 10 years ago. In addition to conducting "boots on the ground" data collection, analysis, and reporting, staff from the 32 I&M networks are involved in numerous activities such as organizing and cataloging data collected by network staff and others, data analysis and synthesis, modeling, providing data and expertise to park planners, providing data and expertise for natural resource assessments, and contributing to performance reporting. This plenary session for the I&M Program will include a "State of the Program" update, key lessons learned from reviews of the first 24 I&M networks, an update on the NPS Science Initiative, and the outlook and priorities for the program for the next 5 to 10 years.

Session 54 • Napoleon A1/A2 (3rd floor) • Panel Discussion

Creating Connections with Communities: Case Studies of Civic Engagement Principles and Practices

Chair: Katherine Faz, Community Planner, Pecos National Historical Park, Pecos, NM

The National Park Service remains committed to practicing civic engagement principles within the communities they serve through a variety of programs and activities. The NPS Rivers, Trails, and Conservation (RTCA) Program demonstrates the NPS commitment to these principles by supporting community-led projects that address conservation and recreation goals. RTCA staff engage with community partners to establish physical and social connections to protect "community-conserved areas." The session will highlight the civic engagement practices that RTCA uses to help establish ecological, recreational, and social connections between parks and communities. This moderated panel discussion features three case studies of projects that engaged citizens in carrying out the NPS mission with parks and in their surrounding communities. The discussion will begin with 15 minutes of introductory remarks followed by three 20-minute case studies. The remaining 45 minutes will be used for dialog between panelists and questions from attendees.

Panelists: Alison Bullock, Community Planner, NPS Rivers, Trails, and Conservation Assistance Program, Chattanooga, TN

Katherine Faz, Community Planner, Pecos National Historical Park, Pecos, NM

Liz Smith-Incer, Mississippi Field Office Coordinator, NPS Rivers, Trails, and Conservation Assistance Program, Ocean Springs, MS

Jim Foster, Executive Director, Gulf Coast Heritage Trails Partnership, Ocean Springs, MS

Session 55 • Napoleon B1 (3rd floor) • Invited Papers

Climate Change at High Latitudes

Chair: Jim Lawler, Arctic Network Inventory and Monitoring Program Manager, National Park Service, Fairbanks, AK

Session overview: A substantial body of evidence indicates that temperature is increasing globally and that climate change is especially evident in northern regions. Long-term changes in climate result in changes in the abundance and distribution of organisms, as well as physical attributes of the landscape. This session will examine the how climate and climate change affects the distribution of tree species and caribou in a changing northern landscape. Speakers will also present on the association and distribution of shallow lakes and permafrost in a northern landscape, and changes in glacial extent over a 20 year period. Lastly, the role of inventories, monitoring and focused research to facilitate adaptation to ongoing and future ecological change will be explored.

The Abundance and Distribution of Trees on the Landscape of Denali National Park and Preserve

Carl Roland, Plant Ecologist, Denali National Park and Preserve, Fairbanks, AK

The abundance and distribution of trees on the landscape of Denali National Park and Preserve is strongly influenced by a suite of biophysical factors relating to the occurrence of permanently frozen soil (permafrost). The tree community in areas of continuous permafrost is sparse and comprised primarily of black spruce (*Picea mariana*) and tamarack (*Larix laricina*). Thawed areas of the landscape support productive forest types that include large white spruce (*Picea glauca*) and Alaska birch (*Betula neoalaskana*), among others. Analyses of data from a network of over 1100 permanent vegetation plots installed in Denali by the Central Alaska Network vegetation monitoring program allow us to quantify the specific factors governing the distribution of each tree species that occurs in the Park. These data suggest that expected thawing of permafrost could result in dramatic transformation of the vegetation mosaic of the Park as tree species respond individualistically to changes in edaphic conditions.

Caribou in a Changing World

Kyle Joly, Wildlife Biologist, Arctic Network Inventory and Monitoring Program/Gates of the Arctic National Park and Preserve, Fairbanks, AK

David R. Klein, Professor Emeritus, University of Alaska/Institute of Arctic Biology

Vast caribou herds are an iconic symbol of the North. Yet, there is concern that climate change may be driving them towards extinction. The ecology of caribou is characterized by complexity and resilience. Caribou numbers naturally oscillate in dramatic fashion on the time-scale of decades. Key population drivers include climate, habitat, predation, parasites, insects, diseases, human influences, invasive species, competition, stochastic events, and caribou themselves. The relative influence of

each driver varies throughout their global distribution. Humans affect caribou through hunting, disturbance, industrial pollution, facilitating invasive species and reindeer grazing. While human influence is increasing in the Arctic, it is much greater in the southern portions of caribou distribution where populations have been extirpated and most endangered populations reside. The effects of rapid climate change on terrestrial and marine environments are already obvious in the Arctic and will alter the drivers that affect caribou population ecology in the future.

Impacts of Permafrost Degradation on Shallow Lakes and Wetlands in Kobuk Valley National Park

Amy Larsen, Aquatic Ecologist, Yukon Charley Rivers and Gates of the Arctic National Park and Preserve, Fairbanks, AK

Kobuk Valley National Park is located in northwestern Alaska and lies on the southernmost edge of continuous permafrost. In 2009 the Arctic Network initiated a long term monitoring program to track changes within this wetland complex. The Arctic Network monitors lake size and abundance, lake chemistry, macroinvertebrate composition, vegetation composition, and permafrost distribution. Preliminary results show that lake surface area has decreased substantially within the park over the past 20 years. Lake surface area has decreased by approximately 14% in the Ahnewetut Wetlands and by 20% in the Nigeruk Plain. Lake loss in the Ahnewetut wetlands appears to be gradual while in the Nigeruk Plain it appears to be catastrophic. In 2010 the network had a team of scientists investigate the mechanisms of lake drainage. Field investigations indicate lake drainage in this region is largely due to permafrost melting, terrain subsidence leading to channel incision and subsequent lake drainage.

Glacier-Change Mapping in the Southwest Alaska National Parks

Bruce Giffen, Geologist, Natural Resources Science Team, Alaska Regional Office, Anchorage, AK
Dorothy Hall, Cryospheric Scientist, Cryospheric Sciences Branch, NASA/Goddard Space Flight Center, Greenbelt, MD

Landsat Thematic Mapper (TM) satellite imagery has been used to map approximately 5000 km2 of glacierized terrain across the glacier bearing Southwest Alaska Network (SWAN) national parks: Kenai Fjords, Katmai and Lake Clark. Park-wide glacier mapping and analysis of the change in glacier extent was determined for two time periods in each park (1980s to 2000s). Landsat imagery was automatically classified for glaciers using simple band math techniques followed by manual correction in areas of misclassification, all within an ArcGIS work session. There are several issues that complicate the automated classification of glacier ice in Landsat imagery: debris cover, shadows, clouds, fresh snow, and lingering snow from the previous season. Results show that there has been a reduction in the extent of glacierized terrain in all three parks over the study period. This mapping project is being expanded to the other glacierized national parks in Alaska.

Managing Arctic Biodiversity in a Changing World: Proactive Adaptive Management in Canada's Arctic National Parks

Donald McLennan, National Monitoring Biologist/Biologiste Surveillance Nationale, Parks Canada Agency/Agence Parcs Canada, Hull, Quebec, Canada

This presentation uses work completed under the CiCAT Tundra IPY Project to demonstrate the development, key components (process-based inventory, effective monitoring, focused research, and management modeling), and applications of a management knowledge system aimed at providing park managers with critical information on park ecological change, intended to facilitate adaptation to ongoing and future ecological change. It is now well documented that arctic landscapes have been changing and are continuing to change more rapidly than any other terrestrial landscapes on the planet. Canada's arctic national parks have been established to 'maintain or restore the ecological integrity' of 10 protected areas over about 160,000 km2 of the Canadian arctic, and ongoing ecological change presents a complex challenge for park managers and scientists. The presentation focuses on applications of the process-based ecotype inventory as a knowledge system for designing effective monitoring, and as the basis for wildlife habitat suitability, landscape simulations, and vulnerability analysis.

Session 56 • Napoleon B2 (3rd floor) • Invited Papers

Listen in on the Sounds of Bryce Canyon and Zion National Parks

Chairs: Ericka Pilcher, Visitor Use Project Specialist, NPS Denver Service Center, Lakewood, CO
Sarah Haas, Park Biologist/Compliance Specialist, Bryce Canyon National Park, Bryce, UT
Karen Trevino, Program Director, NPS Natural Sounds Program, Fort Collins, CO

Session overview: What's that sound? Bryce Canyon and Zion National Parks asked this very question, and have opened up their ears and acoustical monitoring stations to listen in on their unique soundscapes. Join this session and learn why researchers explored the acoustical and psychological experiences of sounds in Bryce Canyon; listen to the wail of recovering peregrine falcons at Bryce Canyon National Park and consider how noise intrusions could impact their habitat; find out how Zion

National Park collected acoustic data in developed and wilderness areas to establish soundscape standards; delve into the "lessons learned" of Zion's recently completed Soundscape Management Plan; and finally gain insight into the value of soundscapes from both resource and visitor experience perspectives, and consider how soundscapes fit into the larger NPS planning framework.

A Multi-Methodological Approach to Analyzing the Soundscape of Bryce Canyon National Park

Britton L. Mace, Professor of Psychology, Southern Utah University, Cedar City, UT
Grant C. Corser, Assistant Professor of Psychology, Southern Utah University, Cedar City, UT

National park soundscapes are complex and multi-dimensional, requiring several methodological protocols to adequately capture the acoustic and psychological experience. One field procedure that has proven effective is audibility logging. Attended logging captures audibility using PDA software developed by the NPS Natural Sounds Program. Eight audibility logged sites (6 frontcountry, 2 backcountry) show variations in the type, frequency, and duration of anthropogenic and natural sounds. High density areas were found to have anthropogenic sounds (vehicles, voices) over 90% of the time. Remote frontcountry viewpoints and backcountry trails had lower percentages, however high altitude jets remain audible 25-30% of the time. Wind, insects, and birds were the most frequent natural sounds. Percent-time-audible data and on-site recordings were used in a series of laboratory experiments to assess anthropogenic (helicopters, planes) and natural sounds on a variety of human dimensions, with results showing important implications for soundscape policy development and management.

Acoustical Monitoring in Peregrine Falcon Territories at Bryce Canyon National Park

Sarah Haas, Park Biologist/Compliance Specialist, Bryce Canyon National Park, Bryce, UT
Ericka Pilcher, Visitor Use Project Specialist, NPS Denver Service Center, Denver, CO
Joseph Flower, Biological Science Technician, Bryce Canyon National Park, Bryce, UT

Noise is an issue of concern at Bryce Canyon National Park because of effects on wildlife, visitor experiences, and natural soundscapes. Helicopters and propeller planes have been observed flying below the rim and in close proximity to peregrine falcon eyries. Consequently, acoustical and peregrine behavioral studies were launched to address the following objectives: 1) determine sound levels at known peregrine breeding territories, 2) determine territory occupancy and recruitment success of peregrines, 3) assess noise impacts on peregrine breeding success using acoustical information and peregrine behavior observations, and 4) incorporate data into future Soundscape Management and Air Tour Management Plans. This project partnered acoustic monitoring with peregrine falcons - a species of special management concern – therefore taking an ecologically based approach to soundscape and air tour planning. Preliminary results are presented from research conducted during the 2009 and 2010 breeding seasons.

The History Behind the Creation of the Zion National Park Soundscape Management Plan

Kristin L. Legg, Greater Yellowstone Network Program Manager, Bozeman, MT
Kezia Nielsen, Environmental Compliance Specialist, Zion National Park, Springdale, UT

Zion National Park completed the first ever National Park Service Soundscape Management Plan (SMP). The park has a 20 year history of developing an understanding and value of natural soundscapes. This history created the foundation for the SMP. In the 1990's management recognized the importance of collecting acoustical data to understand what sounds may be impacting the natural soundscape and the visitors' experience. The 2001 GMP specifically identified the importance of protecting natural sounds and the need to develop a plan guiding park management. The potential loss of natural quiet, especially in the park's wilderness areas, was further emphasized with the proposed expansion and relocation of the St. George airport. This triggered a second phase of data collection in the early 2000's that would serve as the baseline for the SMP. This long history and understanding of the value of natural soundscapes and threats was the groundwork for the SMP.

Soundscape Management Planning at Zion National Park

Frank Turina, Planner, NPS Natural Sounds Program, Fort Collins, CO
Kezia Nielsen, Environmental Protection Specialist, Zion National Park, Springdale, UT

In September 2010, Zion National Park completed the first Soundscape Management Plan (SMP) prepared under Directors Order 47. DO 47 requires Superintendents to preserve natural soundscapes and address inappropriate noise sources through NPS planning processes. DO 47 specifically calls for development of a Soundscape Management Plan, if needed, to deal with particularly complex or urgent noise issues. Park managers have monitored the acoustic environment for years in response to high levels of aviation activity over the park and the proposed expansion of nearby St George Airport. In addi-

tion, the park articulated desired soundscape conditions in their GMP and called for the development of a SMP. Park managers worked closely with Natural Sounds Program to expand, clarify, and elaborate the desired future conditions for soundscapes, and establish resource objectives, standards and potential management actions. This session discusses the development of the SMP, including "lessons learned" during development of the plan.

Integrating Soundscapes into National Park Service Planning

Vicki McCusker, Planner, NPS Natural Sounds Program, Fort Collins, CO

Kerri Cahill, Visitor Use Technical Specialist, NPS Denver Service Center, Denver, CO

Natural sounds are increasingly recognized as an important component of resource conditions and visitor opportunities in national parks because, as a growing body of research suggests, human-caused noise can be disruptive to natural ecological processes and visitor experiences. Yet soundscapes are often overlooked or the impacts are understated or even dismissed in National Park Service (NPS) planning and decision making processes. The value of soundscapes from both resource and visitor experience perspectives is still not yet fully appreciated and there is a shorter history associated with policy and court decisions. This session will illustrate the importance of soundscapes and how soundscapes fit into the NPS planning framework using examples from existing and draft plans. In addition, the presentation will identify important questions that remain for future research to help park staff better understand, evaluate and plan for the future of soundscapes in the national parks.

Session 57 • Napoleon B3 (3rd floor) • Panel Discussion

Gulf to Gulf: Protected Areas of the Gulf of Honduras meet the Gulf of Mexico

Chair: Brent Mitchell, Vice President, QLF Atlantic Center for the Environment, Ipswich, MA

Jessica Brown, Executive Director, New England Biolabs Foundation, Ipswich, MA

Contiguous and semi-enclosed, the Gulf of Mexico and Gulf of Honduras share many features, and growing systems of protected areas. Large and diverse, they also share many issues, including coastal development, devastating storms, fisheries management, and oil exploitation. The panel will introduce examples of coastal and marine protected area conservation in the gulfs. Among the panelists will be past participants in an ongoing exchange of conservation professionals between the Gulf of Honduras and Gulf of Maine. The panel and audience will discuss experiences in creating and managing marine and coastal protected areas in Belize, Mexico and the US. Of topical interest are issues of recent oil development in a protected area, against the protest of indigenous community managers of a national park, and efforts to ban offshore oil drilling in Belize in the wake of spills in the Gulf of Mexico.

Panelists: Celia Mahung, Executive Director, Toledo Institute for Development and Environment (TIDE), Punta Gorda, Belize

Gregorio Ch'oc, Executive Director, Sarstoon Temash Institute for Indigenous Management, Punta Gorda, Belize

Luis Fueyo MacDonald, Director (Comisionado), National Commission on Natural Protected Areas, Mexico

Julio Moure, Coordinator, COMPACT-Mexico (Community Management of Protected Areas Conservation Programme, Sian Ka'an Biosphere Reserve, Punta Allen, Mexico

Session 58 • Southdown (4th floor) • Panel Discussion

Building Resiliency

Chair: Carol Guy, PRIZIM, Inc., White Bear Lake, MN

In order for an organization to succeed or for an ecosystem to survive in today's changing world, it must be resilient. It must have the ability to withstand disruption and change, and be prepared to adapt. How can natural resource managers ensure that both their team of employees and the ecosystems they manage are resilient? This panel will discuss resiliency as it relates to unpredictable events, unpredictable budgets, changing climate, changing regulations, revolving staff, etc. The panelists will present an array of expertise and experiences, sharing lessons learned from the 2009 bushfires in Victoria, Australia, Hurricane Katrina and the BP oil spill. Aspects covered would include: remedial actions to offset erosion and other further environmental damage; early and continuing community consultation to seek input and inform progress; ecological restoration; actions to facilitate an early return of visitation; the 'opportunity' afforded to suitably replace infrastructure; and strategic planning for future change.

Panelists: Gerard O'Neill, Deputy Chief Executive, Parks Victoria, Australia

Doug Meffert, Schwartz Professor for River & Coastal Studies, Tulane University, New Orleans, LA

Elizabeth "Boo" Thomas, President & CEO, Center for Planning Excellence, Baton Rouge, LA

Sean Anderson, Assistant Professor of Environmental Science and Resource Management, California State University–Channel Islands, Camarillo, CA

Session 59 • Gallier A/B (4th floor) • Contributed Papers

Inside Management: Understanding the Decision-making Process and the Effectiveness of its Outcomes

Chair: TBD

Connecting Sense of Place to Management Decision-making within the Great Barrier Reef Marine Park

Connecting Place Meanings to Environmental Governance at the Great Barrier Reef Marine Park

Carena van Riper, Research Assistant, Texas A&M University, College Station, TX

Gerard Kyle, Associate Professor, Texas A&M University, College Station, TX

Amanda Stronza, Associate Professor, Texas A&M University, College Station, TX

Stephen Sutton, Senior Research Fellow, Fishing and Fisheries Research Centre, James Cook University, Townsville, Queensland, Australia

Renae Tobin, Research Fellow, Fishing and Fisheries Research Centre, James Cook University, Townsville, Queensland, Australia

Place meanings and related concepts that reference human attachment to the physical world have received considerable research attention. Although much work has focused on understanding key stakeholders' attachments to the landscape, the perspectives of managers have been absent from these investigations. This study explores the meanings that managers associate with places under their jurisdiction, the broader governance context that managers exist within, and the interrelationships between these two ideas. A thematic analysis was conducted of 35 semi-structured interviews with managers from three agencies charged with protecting the Great Barrier Reef Marine Park. Results illustrate that managers construct perceptions of place based on a variety of values and find utility in their own attachments to the physical world, a governance system surrounding management entails formal and informal regulations that guide policy outcomes, and the ideas of place meanings and governance interact in terms of power relations between managers and the public.

Scientific Inference about Natural-resource Management Actions Under the Watch of Four Presidents

Robert Gitzen, Post-doctoral Fellow, Department of Fisheries and Wildlife Sciences, University of Missouri, Columbia, MO

Bruce Weisman, Chief of Resource Management, Mount Rushmore National Memorial, Keystone, SD

Daniel S. Licht, National Park Service Midwest Region Wildlife Biologist, Rapid City, SD

Joshua J. Millspaugh, Professor, Department of Fisheries and Wildlife Sciences, University of Missouri, Columbia, MO

Marcia Wilson, Biological Technician, National Park Service Northern Great Plains Inventory and Monitoring Network, Rapid City, SD

Small parks often implement natural-resource management actions affecting a large portion of each park. Such management actions should be evaluated in an adaptive-management context to assess effects on specific resources and improve future decisions. Although experimental studies are necessary for determining cause-and-effect statistically, formal experiments to assess treatment effects often are problematic at the scale of a small park. Nonetheless, managers need information. In the absence of experimental control, managers and scientists still can develop alternative hypotheses about treatment effects, and use carefully collected data and prior knowledge to assess correlative evidence for alternative hypotheses. We illustrate the strengths and limitations of this approach with a study of small mammal communities in relation to forest management at Mount Rushmore National Memorial (MORU). We used occupancy data to examine probable effects of past management actions and for refining our hypotheses about effects of the current round of treatments occurring at MORU.

Effective Organizations for Management Effectiveness: Another View of Protected Areas Development

Lloyd Gardner, Manager, Environmental Support Services, LLC, St. Thomas, VI

In the Caribbean, protected areas site and system development has been driven primarily by funding from external sources, mainly bilateral and multilateral agencies. In such cases, it is customary for management interventions to focus primarily on natural resource management strategies, with inadequate attention given to institutional development. As a result, protected areas management institutions have generally foundered with the termination of project financing, constantly searching for new grant funding, struggling to keep staff, and generally failing to protect the resources within the protected areas for which they are responsible. These sites appear to be stuck in an early development phase. This paper characterizes the different stages of development of protected areas, and identifies the institutional structures and support systems that are required to achieve effective management in each phase.

Management Assessment of the Daymaniyat Islands and Ras al Hadd Nature Reserves, Oman

Stewart Fefer, Fish and Wildlife Biologist, US Fish and Wildlife Service, Gulf of Maine Coastal Program, Falmouth, ME

David Manski, Resource Management Specialist, Acadia National Park, Bar Harbor, ME

Emily Kilcrease, Project Manager, U.S. Department of the Interior, International Affairs, Washington, DC

A team from the US Department of Interior's Technical Assistance Program visited Oman's Daymaniyat Islands Reserve and Ras al Hadd Reserve to assist the Ministry of Environment and Climate Affairs (MECA) in building capacity for reserve management. These reserves contain significant marine and terrestrial habitats supporting a diversity of wildlife populations including internationally recognized sea turtle nesting beaches. Coastal areas of Oman have experienced unprecedented growth. Oman has established excellent laws and regulations to safeguard the reserves and MECA has demonstrated great effort to manage the reserves. In order to provide a status of the environmental threats and an evaluation of reserve management, we employed the Management Effectiveness Tracking Tool (Stolton et al. 2007) rapid assessment to help monitor the progress being made at protecting/managing these reserves. The tracking tool has been replicated on these reserves and will continue to be used to track progress in reserve management over time.

The Nature of Conservation: A Cultural Values Approach to National Parks in Uganda

Arthur Mugisha, Manager, Cultural Values and Conservation Project in Uganda, and Country Representative, Fauna and Flora International Uganda, Kampala, Uganda

Nelson Guma, Cultural Values and Conservation Project leader, Uganda Wildlife Authority, Kampala, Uganda

Esseza Byentaro, Ankole Cows Conservation Association (ACCA), Lake Mburo National Park, Kampala, Uganda

Protected areas cover 12% of the planet but are failing to deliver effective conservation of biodiversity in many developing countries where they are concentrated. The failure of parks to deliver promised economic benefits and erosion of values associated with the natural world is contributing to a lack of popular and political support for parks, resulting in inadequate protection. Despite decades of efforts using economic incentives, lack of support from local communities for parks, remains a critical concern. This paper shares experiences from the Cultural Values approach to conservation and management of two national parks in Uganda to demonstrate how integrating the cultural values of local communities into the design and management of parks positively impacts on relationships between protected area managers and communities. Re-examining the thinking underpinning contemporary conservation will encourage parks to include the cultural values and institutions of local communities, helping to build support for parks and conservation.

Session 60 • Nottoway (4th floor) • Invited Papers

Imagination, Management and Survival: Investigations into the Historical Geography of American Parks

Chair: Terence Young, Associate Professor, California State Polytechnic University, Pomona, CA

Session overview: This session of four presenters will survey the historical geography of select parks, park use and park planning. In particular, speakers will emphasize the importance of time and place in their presentations to demonstrate how American parks have developed and been influential over the last century. The first two speakers, Peter Blodgett and Yolonda Youngs, will discuss shifting views toward Grand Canyon and other western protected areas in the imaginations of protected area promoters and tourists. The second pair of papers, by Terence Young and Lary Dilsaver, and by Craig Colten, will investigate park management with the first paper focusing on the diffusion of that management by the NPS and the second one exploring the uncertain fate of southern Louisiana parks following Hurricane Katrina. Each presenter will speak for 18-20 minutes, leaving 40 minutes for a lively Q&A with the audience. There will be no discussant.

Outdoors, Indoors and Four Doors: Automobility and the Evolving Character of Outdoor Recreation, 1920–1941

Peter J. Blodgett, H. Russell Smith Foundation Curator of Western Historical Manuscripts, Huntington Library, San Marino, CA

The 1920s and 1930s witnessed an enormous increase in the volume of American domestic tourist travel, powered by the expanding private ownership of personal automobiles and the widening availability of paid vacations. Among the most popular destinations for these new travelers were the wonders of the national parks and forests. In planning their excursions, many of these tourists sought more active diversions than simply enjoying the contemplation of natural settings. Their growing enthusiasm for many different kinds of outdoor activities imposed new and greater demands upon the nation's recreational landscapes. With the ever-more reliable automobile at their disposal, recreationists could go further afield in search of their favorite outdoor experiences while carrying more of the appurtenances of home and hearth. In doing so, these tourists frequently revised the terms on which they preferred to encounter forest and stream, merging indoors and outdoors in the pursuit of domestic comfort and convenience.

The Abstract Wild: Postcards, History, and Visual Narratives at the Grand Canyon

Yolonda Youngs, Visiting Assistant Professor, Oklahoma State University, Stillwater, OK

For over a hundred years, postcards have been a popular and inexpensive way for visitors to relate their experiences in Grand Canyon National Park back to their friends and loved ones at home. From 1898 to 1978, Curt Teich and Company, Inc. was a leading printer of linen postcards in the world and a prominent manufacturer of Grand Canyon postcards. This paper presentation assesses 259 Curt Teich postcards manufactured from 1936 to 1955 through a content analysis and interpretation of the postcards subjects and geographical locations. The images are grouped into nine themes that represent a selective and repetitive visual catalog of Grand Canyon scenes. These images represent the canyon as an abstraction and background instead of the main attraction for tourist activities. The results of this paper offer insights into the historic promotion of the Grand Canyon and suggestions for interpreting the canyon's visual and historical resources.

Exporting the Park: The National Park Service's Diffusion of Nature Management around the World

Terence Young, Associate Professor, California Polytechnic State University, Pomona, CA
Lary Dilsaver, Professor, University of South Alabama, Mobile, AL

On October 27, 1966, the National Park Service announced that it would send a team of twelve specialists to Jordan to work with the Jordanian Tourism Authority and Antiquities Department on Qumran, Jericho, Samaria and Jerash, Petra and around Amman. According to Director George Hartzog, "This is the first major international cooperative project the NPS has undertaken." Before creation of the Office of International Affairs (OIA) in 1961, the Park Service had cooperated with foreign park agencies on an ad hoc basis, but once the OIA was in place, the frequency and degree of interaction increased markedly. This presentation will characterize the evolving interactions between the National Park Service and foreign park agencies, with a focus on the Service's visitor and resource management systems as well as many aspects of the material culture that shaped people's interactions with nature in protected areas across the globe.

Did Nature Survive in the Unnatural Metropolis? Parks in Post-Katrina New Orleans

Craig Colten, Professor, Louisiana State University, Baton Rouge, LA

Several years ago, I published observations on a related set of efforts to preserve wetland environments in the New Orleans urban area. The city's zoo installed a successful exhibit highlighting local swamp and marsh fauna in the 1980s and a second organization created a "nature preserve" as an educational destination for the city's school children. In addition, the National Park Service received Congressional approval to create the Barataria Preserve near the city and the Fish and Wildlife Service inherited a sprawling wetland tract within the city limits. Both federal sites had endured substantial human transformations and required extensive maintenance to retain the appearances of "natural" wetlands. Hurricane Katrina in 2005 devastated much of the urbanized landscape and also impacted these wetland showcases. What have been the ramifications of this disruptive storm to these places that provided a means to educate the region's population to the plight of its perilous coastal environment?

Session 61 • Oak Alley (4th floor) • Panel Discussion

Managing Caves and Bats in the NPS in the Face of White-Nose Syndrome

Chair: Rickard Toomey, Director, Mammoth Cave International Center for Science and Learning, Bowling Green, KY

Since 2006 White-Nose Syndrome (WNS), a fungal disease, has killed more than one million cave-dwelling bats in the U.S. First found in caves/mines in New York, it has spread south and west and into Canada. Little is known about WNS. Limited evidence indicates some spread of WNS may be linked to human traffic from cave-to-cave. This disease poses a serious threat to cave-roosting bats and associated ecosystems throughout North America. As WNS spreads, challenges for managing the disease continue to increase. Many agencies have closed caves and modified or suspended some bat research. Five members of the NPS working group will discuss and answer questions about the agency's response to WNS. Presentations will be ten minutes long and about one hour will be devoted to discussion and questions. Perspectives will include national, regional, and park. The panel will discuss response, reducing threat of human spread, surveillance, and monitoring bat populations.

Panelists: Steven C. Thomas, Monitoring Program Leader, Cumberland Piedmont Network (NPS), Mammoth Cave, KY
Kevin T. Castle, Wildlife Veterinarian, WASO-Biological Resource Management Division (NPS), Fort Collins, CO
Cay Ogden, Wildlife Ecologist and T&E Coordinator, Intermountain Region (NPS), Denver, CO
Tom Rodhouse, Ecologist, Upper Columbia Basin Network I&M Program (NPS), Bend, OR

Session 62 • Bayside A (4th floor) • Contributed Papers

Estuary & Coastal Environments

Chair: Lewis Sharman, Ecologist, Glacier Bay National Park and Preserve, Gustavus, AK

Canal Reclamation at the Barataria Preserve Unit, Jean Lafitte National Historical Park and Preserve, Louisiana

Haigler "Dusty" Pate, Natural Resource Program Manager, National Park Service, Jean Lafitte National Historical Park and Preserve, New Orleans, LA

David P. Muth, Chief of Planning and Resource Stewardship, Jean Lafitte National Historical Park and Preserve, New Orleans, LA

Kevin Heatley, Senior Scientist, Biohabitats Inc., Baltimore, MD

Stephen W. Parker, Senior Scientist, The Louis Berger Group, Inc., Kansas City, MO

The National Park Service has reclaimed canals and spoilbanks, the linear piles of spoil created as canals were dredged, in the Barataria Preserve, a unit of Jean Lafitte National Historical Park and Preserve. The unique ecosystem at the 23,000-acre Preserve contains the only estuarine floating marsh in the National Park System, along with cypress-tupelo swamps and bottomland hardwood forests. To date, approximately 5.4 miles of canals have been reclaimed by degrading spoilbanks to adjacent wetland elevations and partially backfilling open water with the spoilbank material. The areas reclaimed are allowed to revert to marsh, swamp, and shallow water habitat by natural processes. Benefits include improvements to hydrology and sediment, nutrient, and aquatic species movement, as well as enhanced ecosystem resilience in the face of subsidence and climate change impacts. Our experience indicates that canal backfilling is an effective, technically simple, relatively low-cost method of wetland restoration.

Coastal Wetland Management in Europe: A Case Study from the Ebro River Natural Park (Catalonia, Spain)

Peter J. Sharpe, US National Park Service, Natural Resources and Science, Fredericksburg, VA

Carles Ibáñez, IRTA, Aquatic Ecosystems Program, St. Carles de la Ràpita, Catalonia, Spain

John W. Day, Department of Oceanography and Coastal Sciences, School of the Coast & Environment, Louisiana State University, Baton Rouge, LA

Jason N. Day, Comite Resources, Inc., Zachary, LA

Narcís Prat, Departament d'Ecologia, Facultat de Biologia, Universitat de Barcelona, Barcelona, Catalonia, Spain

The Ebro River Natural Park lies within the 330 sq-km Ebro River Delta in Catalonia, Spain. The park itself comprises nearly 80 sq-km of brackish and saline wetlands considered some of the most important wetland areas in the western Mediterranean. Today many of the park wetlands and much of the Delta are under threat from sea level rise and marsh subsidence. Our principal hypothesis was that a brackish marshes within the park that receive inorganic sediments and fresh water amendments from the Ebro River would exhibit significantly higher rates of soil accretion, resulting in a greater resistance to subsidence and sea level rise compared to isolated salt marsh habitats with no river subsidy. Marsh sites representative of the wetland ecosystems within the Ebro River Natural Park and Delta were selected based on plant community type, porewater salinity, and landscape position. The results supported the research hypothesis, suggesting that a brackish marsh that receives river subsidies (i.e., possess a hydrologic connection to the Ebro River) exhibited a significantly higher ($F_{3,4} = 31.55$, $P < 0.01$) rate of vertical accretion compared to more hydrologically-isolated salt marsh systems. Accretion data also showed that only the riverine-influenced brackish marsh site met the minimum predicted rate of relative sea level rise (RSLR range of 5-8 mm yr-1) for the Ebro Delta. This research provides the first quantitative record of marsh subsidence and accretion dynamics in the Ebro Delta using Surface Elevation Tables (SET), marker horizons, and 210Pb techniques. This study also illustrates the importance of sediment and fresh water subsidies in deltaic environments.

Understanding Marsh Loss in an Urban Estuary: Jamaica Bay, Gateway National Recreation Area, New York

Patricia Rafferty, Coastal Ecologist, National Park Service, Northeast Region, Patchogue, NY

Charles T. Roman, North Atlantic Coast CESU Director, National Park Service, Northeast Region, Narragansett, RI

Jamaica Bay was once more land than water; however, from 1951 to 2003, 63% of the Bay's salt marsh islands were converted from emergent vegetated habitat to submerged and intertidal habitat. The National Park Service has worked with university and federal partners to identify and understand the causes of marsh loss in this urban estuary. Changes in sediment availability, distribution, and accumulation have been evaluated using hydrodynamic modeling, radionuclide techniques, and sediment elevation tables. In addition, research to evaluate the effect of eutrophication on soil respiration, vegetation structure and function, and sulfide cycling are currently being investigated as mechanisms contributing to marsh loss. The long-term success of restoration efforts in the Bay will be dependent upon identification and remediation of the causes of marsh loss.

Twenty Years of Rocky Intertidal Monitoring at Cabrillo National Monument: Analysis of Long Term Trends

Benjamin Pister, Chief of Natural Resources Management and Science, Cabrillo National Monument, National Park Service, San Diego, CA

Tom Philippi, Inventory and Monitoring Program, National Park Service, Ft. Collins, CO

Cabrillo National Monument (CNM) initiated a rocky intertidal monitoring program in 1990 after many intertidal populations declined. Monitoring plots were replicated in three areas along shore or "zones" corresponding to a steep visitation gradient. This design allows us to test whether trends could be caused by visitor impacts, a question facing many parks. Several taxa are targeted including mussels, barnacles, gooseneck barnacles, rockweed, surfgrass, kelp, an algal turf complex, ochre seastars, black abalone, and giant owl limpets. Results vary by species. Notable changes include a sudden crash of mussels across all zones in the early 1990s, followed by a moderate recovery in the zone with highest visitation. A slow but significant decline in limpet size has also been observed across all zones due to the loss of the largest individuals. Our sampling design suggests these changes are not the result of heavy visitation despite hosting 100,000 visitors per year.

Monitoring Salt Marsh Elevation Change in the Northeast: Anticipating Habitat Responses to Sea Level Rise

Charles Roman, Coastal Ecologist, National Park Service, Narragansett, RI

Kelly Medeiros, Hydrologist, Cape Cod National Seashore, Wellfleet, MA

Donald Cahoon, Coastal Ecologist, USGS Patuxent Wildlife Research Center, Beltsville, MD

James Lynch, Coastal Ecologist, USGS Patuxent Wildlife Research Center, Beltsville, MD

Salt marsh surface elevation must keep pace with sea level rise. With relative sea level rise greater than marsh surface elevation increase, marshes will become submerged, often resulting in conversion of vegetated marsh to mudflat or open water. The National Park Service, in cooperation with the USGS, has been monitoring salt marsh elevation change at Cape Cod (MA) and Fire Island National Seashores (NY) and Gateway National Recreation Area (NY/NJ) for over a decade. The findings among sites are variable – some marshes are keeping pace with relative sea level rise, while at others the marsh is in an elevation deficit. Factors associated with this observed variability (e.g., hydroperiod, sediment supply, bioturbation) will be discussed. The concept of elevation capital is presented as a method for coastal managers to apply Sediment Elevation Table data toward forecasting the long-term status of salt marshes under a regime of rising sea levels.

Session 63 • Bayside B/C (4th floor) • Panel Discussion

The Evolving Role of Tribes in Wildlife Restoration in Conjunction with the NPS

Chair: Jim Stone, Executive Director, Inter Tribal Buffalo Council, Rapid City, SD

The panel discussion will detail some of the work being done by Tribes and organization in conjunction with NPS and others. It will highlight the on-going Yellowstone National Park issues, the Confederated Salish and Kootenai's work at the National Bison Range and the work with the Oglala Sioux Tribe at Badlands National Park South Unit. ITBC will detail on going efforts in these activities as well as discuss an upcoming Buffalo Summit which will be called to discuss the evolving issues confronting the Tribes in these issues and others in the overall mission of bison restoration.

Panelists: Jim Stone, Executive Director, Inter Tribal Buffalo Council, Rapid City, SD

Ervin Carlson, President ITBC, Blackfeet Tribe, Browning, MT

Birgil Kills Straight, Executive Director, Oglala Sioux Tribe, Kyle, SD

Tom MacDonald, Director, Natural Resources, Confederated Salish and Kootenai

Session 64 • Maurepas (3rd floor) • Contributed Papers

Up Close with Danger: Managing Human Behavior Around Predatory Animals

Chair: James Gramann, Visiting Social Scientist, National Park Service, and Professor, Texas A&M University, College Station, TX

Visitor-Carnivore Conflicts in National Parks: Any Reprieve for Large Predators?

John Waithaka, Conservation Biologist, Parks Canada, Gatineau, Quebec, Canada

Wildlife are often subject to control when they are perceived to threaten the lives, livelihoods, and lifestyles of people. In some parts of the world, national parks have been created in order to protect some of these animals from humans, where coexistence is not achievable because conflicts can neither be resolved nor mitigated. As is the case in parts of the world, large carnivores are still not safe even in national parks if they continue to threaten the lifestyles of park visitors who, in search of more authentic wilderness experience, chose to venture into areas known to be habitats for large carnivores, fully aware that an

encounter with wild predators would be catastrophic. The management response to a human attack often results in the destruction of the animal (if it can be found out). This raises a serious conservation challenge: what do we do when carnivores in parks set aside for their protection from humans threaten, injure or kill people as a display of instinctive predatory behavior? How can we reconcile the need to keep these animals wild and the recreational adventures of the people? This paper reviews how national park authorities in different parts of the world have responded to this challenge.

Bear Viewing in Katmai National Park: Understanding Bear and Human Use through Time-lapse Photography

Carissa Turner, Coastal Biologist, Katmai National Park and Preserve, King Salmon, AK

Katmai National Park contains the world's largest protected population of brown bears in the world, which attracts thousands of visitors to the park each year. Although remote and difficult to access, coastal bear foraging sites are experiencing increased human activity for bear viewing and wildlife photography. In 2007, 2008 and 2009, cameras with time-lapse controllers were installed on a hillside overlooking Geographic Harbor, a brown bear foraging area popular with bear viewers. Data collected from the photographs is being analyzed to compare bear activity patterns in the presence and absence of people. By measuring the effects of bear viewing on bear activity levels the park will be able to evaluate current management practices and determine future management needs at these remote locations.

Twenty Years of Brown Bear-Human Conflict Management at Brooks River, Katmai National Park and Preserve

Cory Mosby, Biological Science Technician, Katmai National Park and Preserve, Malden, MO
Troy Hamon, Chief of Natural Resources, Katmai National Park and Preserve, King Salmon, AK

From 1989–2009, a total of 1,430 bear management reports were recorded at Brooks Camp and were placed into 9 categories of bear-human interactions. Analysis of these categories identified aggressive bear behavior towards staff in management situations increasing ($P = 0.035$). Construction of an elevated walkway and an electric fence both marked decreases in bear-human interactions ($P < 0.05$). Adjustment of fish retention regulations marked a decrease in fish stealing ($P = 0.002$), whereas efforts to facilitate visitor traffic in specific areas have marked increases in bear-human interactions ($P = 0.002$). Bear habituation to human activity may have contributed to minimizing general interactions and increasing aggressive bear behavior towards staff. We provide examples of successful adaptive management tactics in a visitor oriented setting that may be beneficial to other bear viewing areas."

Day Hikers in Bear Country: A Study of Knowledge, Fear, and Protection Motivation

Ariel Blotkamp, Graduate Student, University of Idaho, Moscow, ID
Sam Ham, University of Idaho Professor and Director of the Center for International Training & Outreach, Moscow, ID
Troy Hall, University of Idaho Professor, Moscow, ID

Human-bear conflicts on Grand Teton National Park trails are increasing. Using Protection Motivation Theory, this study examined day hikers' perceptions of risk associated with hiking in bear habitat as well as their knowledge about bear behavior and how hikers can protect themselves in bear country. On-site questionnaires completed by 351 hikers at four trailheads revealed low knowledge levels (an average of just 62% correct answers). The percentage reporting carrying out NPS-recommended risk-avoidance behavior (e.g., carrying bear spray, clapping, etc.) was also low. Few relationships were found between knowledge scores and self-reported risk-avoidance behaviors. In addition, hikers' perceptions of vulnerability and risk severity were not very predictive of risk-avoidance behavior. These results call for a more strategic approach to hiker education programs that target specific knowledge deficiencies and hikers' misconceptions about hiking in bear country.

Federal Preemption of State Intensive Management of Predators in Protected Areas

Julie Joly, Associate Professor of Resources Law and Policy, University of Alaska–Fairbanks, Fairbanks, AK

Predator control in Alaska is part of a larger state sponsored umbrella program- Intensive Management (IM). IM is responsible for many more predator deaths than is recognized by those concerned only with the narrower label of predator control. IM encompasses liberalized bag limits, hunting seasons, methods, and other techniques that result in predator deaths, all in the name of increasing human hunting opportunity. IM occurs across wide, and ever-expanding, swaths of parks, refuges, and other protected areas in Alaska. On protected lands managed by the National Park Service and US Fish and Wildlife Service this type of activity runs counter to laws such as the National Park Service Organic Act, National Wildlife Refuge System Improvement Act, Alaska National Interest Lands Conservation Act, Wilderness Act, and others. Agencies should preempt the state in its attempts to reengineer natural systems to benefit human hunters in order to maintain fidelity to congressional requirements.

Session 65 • Borgne (3rd floor) • Sharing Circle

Native Plant Nurseries in Parks: Their Unique Challenges and Opportunities

Organizer: Betty Young, Director of Nurseries, Golden Gate National Parks Conservancy, San Francisco, CA

Join this round table discussion, if you manage or work in a native plant nursery, are responsible for financing one or are thinking about building one. Learn from others' experience, discuss common challenges and lessons learned. We'll discuss: how to decide when an on-site nursery is needed, at what production level it is cost effective, staffing requirements by number of plants needed, how to find expert staff, what qualifications a nursery manager should have, financing options for the building project and on-going operations, seed collection and growing challenges and share ideas and solutions, volunteer programs, education programs, record keeping, informational resources, maybe even propagation, and other nursery issues in which participants are interested.

Session 66 • Borgne 3rd floor) • Sharing Circle

Engaging Indigenous Peoples in the Management and Protection of Protected Areas

Organizer: Nathalie Gagnon, Senior Analyst, Aboriginal Affairs Secretariat, Parks Canada, Gatineau, Quebec, Canada

Indigenous peoples have been stewards of their traditional landscapes for millennia. However, as more and more lands have come under the jurisdiction of non-Indigenous peoples, the connection to their traditional territories had become tenuous. We have come a long way since the establishment of Yellowstone National Park in the United States and Banff National Park in Canada where for decades Indigenous peoples who had inhabited these lands were excluded from their traditional practices on these historically used lands and their participation in management. Today, it would be unthinkable to manage these lands and establish new parks without the help and support of Indigenous Peoples who's traditional knowledge help inform the management and protection of these special places. This circle will be a dialogue between Indigenous and non-Indigenous peoples who want to ensure that all worldviews are included in the protection, connection and presentation of these special places.

Session 67 • Rhythms I/II (2nd floor) • Invited Papers

Inventory and Monitoring Data Analysis and Synthesis I

Chairs: Tom Philippi, Quantitative Ecologist, NPS Inventory and Monitoring Division, Fort Collins, CO

Tom Rodhouse, Ecologist, NPS IMD Upper Columbia Basin Network, Bend, OR

Session overview: This two-part session includes 9 presentations of analysis and reporting of Inventory and Monitoring Vital Signs data. Each presentation will include the case study itself, and information on why that approach was chosen, how it was performed, and any lessons learned for other networks with similar vital signs. Note that the final time slot of session II will be a "swap meet." All presenters from both sessions will be available to answer additional questions, provide demonstrations of their analyses and tools, and offer copies of the presentation or code or other tools.

Using Distance Sampling to Estimate Dall's Sheep Abundance in Gates of the Arctic National Park and Preserve and Wrangell-St. Elias National Park and Preserve

Joshua Schmidt, Data Manager, NPS IMD Central Alaska Network, Fairbanks, AK

Kumi Rattenbury, Ecologist, NPS IMD Arctic Network, Fairbanks, AK

Jim Lawler, Coordinator, NPS IMD Arctic Network, Fairbanks, AK

Maggie MacCluskie, Coordinator, NPS IMD Central Alaska Network, Fairbanks, AK

Dall's sheep (*Ovis dalli*) were selected for long-term monitoring by the Arctic and Central Alaska Networks. We tested distance sampling to estimate sheep abundance across Gates of the Arctic National Park and Preserve (GAAR) in 2009 and 2010 and northern Wrangell-St. Elias National Park and Preserve (WRST) in 2010. We surveyed 20km transects systematically distributed across all potential sheep habitat (n=308 in GAAR in 2009, n=318 in GAAR in 2010, n=148 in northern WRST in 2010). We fit Bayesian models to the data using WinBUGS, and estimated 8,564 (95% CI: 6,586-11,130) sheep in GAAR in 2009. Results from the 2010 surveys will also be presented. Our findings suggest that distance sampling and a Bayesian hierarchical modeling approach are practical and efficient alternatives to the traditionally used minimum count surveys for monitoring Dall's sheep populations and can provide precise estimates of abundance over large areas such as national park units.

Harbor Seal Distribution Related to Anthropogenic Disturbance and Natural Variation During 1982–2009

Ben Becker, Marine Ecologist, Pacific Coast Science and Learning Center, Point Reyes National Seashore, Point Reyes Station, CA

David Press, Ecologist, NPS IMD San Francisco Area Network, Point Reyes National Seashore, Point Reyes Station, CA
Sarah Allen, Oceans Program Coordinator, Pacific West Region, Point Reyes National Seashore, Point Reyes Station, CA

To better understand harbor seal vulnerability to anthropogenic disturbance and displacement effects in a National Park, we used data collected between 1982 and 2009 to explore potential mechanisms which may affect the proportion of Point Reyes (California) harbor seals (*Phoca vitulina*) selecting haul-out sites within a large colony (Drakes Estero), and utilization of that colony in relation to other nearby colonies. We will discuss the interpretation of cause and effect in field studies and demonstrate the use a variety of methods to strengthen inferences when using monitoring data. These include (1) well thought out a priori hypotheses, (2) use of generalized mixed-models to account for within group variation, (3) a variety of useful statistical distributions for modeling count and proportional data, (4) use of generalized estimating equations when underlying distributions are unclear, and (5) a comparison of frequentist and Bayesian approaches (using WinBUGS) in this typical single species count dataset.

Monitoring of Fish Communities in Prairie Streams of Tallgrass Prairie National Preserve

Hope R. Dodd, Fisheries Biologist, NPS IMD Heartland Network, Republic, MO
David G. Peitz, Wildlife Biologist, NPS IMD Heartland Network, Republic, MO
Lloyd M. Morrison, Quantitative Ecologist, NPS IMD Heartland Network, Republic, MO

Changes in land use has altered habitat of prairie streams, impacting many native fish populations. Tallgrass Prairie National Preserve (TAPR) provides prairie stream habitat critical for native fishes. In 2001, a long-term monitoring program was initiated at TAPR to determine the status and trends of fish assemblages and stream habitat conditions. Univariate and multivariate control charts were used to assess trends and annual variation in fish communities. Using control charts, species richness, diversity, and index of biotic integrity were found to fall above the critical threshold established with three years of baseline data, indicating these fish metrics are stable across time. Individual species abundances were also found to be similar across years with the exception of two sample sites. Using control charts for long-term data analysis can give park managers an early detection system to discern if a natural resource vital sign is significantly declining or going "out of control."

Long Term Datasets with High Annual Variability: A Review of the San Francisco Bay Area Network Salmonid Monitoring Program

Michael Reichmuth, Fishery Biologist, NPS IMD San Francisco Bay Area Network, Point Reyes Station, CA
Leigh Ann Starcevich, Consulting Statistician, Corvallis, OR

The National Park Service (NPS) Inventory and Monitoring Program is currently monitoring populations of coho salmon (*Oncorhynchus kisutch*) in watersheds within and adjacent to NPS lands in Marin County, CA. This program currently uses the Salmonid Monitoring Protocol for the San Francisco Bay Area Network (Reichmuth et al. 2010) to obtain observational data made over multiple life stages and currently has continuous datasets using approved methods since 1997. Long term datasets were summarized and analyzed using linear mixed models for trend (Piepho and Ogutu, 2002). Although some datasets were not used for trend analysis, these data were used for multiple life stage analyses to determine mortality rates between life stages and possible habitat constraints. The NPS coho monitoring program serves as an example of how multiple life stage monitoring can support science based management decisions to help protect coho populations in the face of extinction.

Implications of Model Specification and Temporal Revisit Designs on Trend Detection

Leigh Ann H. Starcevich, Consulting Statistician, Corvallis, OR
Kathryn M. Irvine, Assistant Professor, Department of Mathematical Sciences, Montana State University, Bozeman, MT
Andrea M. Heard, Physical Scientist, NPS IMD Sierra Nevada Network, Three Rivers, CA

A mixed model is versatile for estimating fixed temporal trend as well as components of spatial and temporal variation. We evaluate the test size and power to detect trend for three linear mixed model approaches and four temporal revisit designs that include cases of unbalanced data structures. Monte Carlo power simulations are used to avoid large-sample assumptions when sample sizes are modest. Pilot data from surveys of lakes in the Sierra Nevada Network (SIEN) of the National Park Service (NPS) are used to compare the three approaches. We find that the linear mixed model proposed by Piepho and Ogutu (2002) provides nominal trend test size and better power approximations for a range of variance compositions, population trends, sample sizes, and revisit designs. Analyses of power to detect trend may be misleading if the trend test does not achieve nominal test size.

Session 68 • Rhythms III (2nd floor) • Panel Discussion

Effective Science Communication

Chairs: Ted Gostomski, Science Writer/Biologist, National Park Service, Great Lakes Inventory and Monitoring Network, Ashland, WI

Megan Nortrup, Science Communicator & Writer, National Park Service, National Capital Region Inventory and Monitoring Network, Washington, DC

Sara Melena, Education Specialist, National Park Service Office of Education and Outreach, Natural Resource Program Center, Fort Collins, CO

The information produced through inventory and monitoring in national parks is valuable to support park planning, management, and interpretation. At the same time, the question of how to best communicate this information leaves many people guessing. This session will highlight successful examples of communication products developed by I&M Networks around the country. How do we best convey our findings to resource managers? To superintendents? To any park employee or visitor? Come find out how some Networks are doing this and share your own ideas.

Panelists: Megan Nortrup, Science Communicator & Writer, NPS, National Capital Region Inventory and Monitoring Network, Washington, DC

Cory Nash, Science Communications and Outreach Coordinator, Hawaii-Pacific Islands CESU/University of Hawaii, Honolulu, HI

Janine Waller, Editorial Assistant, Yellowstone Center for Resources, Yellowstone National Park, WY

Paulina Starkey, Science Communication Specialist, U of Idaho/Upper Columbia Basin Inventory & Monitoring Network, Moscow, ID

Michelle O'Herron, Science Communications Specialist, NPS/Golden Gate National Parks Conservancy, San Francisco, CA

Session 69 • Edgewood A/B (4th floor) • Invited Papers

Web-based Display of Geospatial Data

Chair: Nigel Shaw, GIS Coordinator, Northeast Region, Boston, MA

Session overview: An ongoing challenge facing parks is the ability for a wide range of staff to view, manipulate, and query a variety of geospatial data—data that are essential to managing and understanding park resources. Most NPS resource managers and staff are not GIS specialists and frequently geospatial data have been difficult to access and use. This session will provide information and demonstrations of different approaches and tools that have been developed within NPS for presenting geospatial data via the Web, and that are designed with the non-GIS specialist in mind.

The Park Atlas: An Overview of Web-Based Mapping Technology for Park Planning (1:30–1:50)

Nell J. Blodgett, GIS Specialist DSC, Denver, CO

The park atlas concept covers a range of data collection, data management, cartography, and web-mapping activities that serve as a cohesive GIS-based planning support system. The concept involves the design of a paper map atlas and complimentary web-based mapping system for an individual national park undergoing a specific planning project such as a General Management Plan or Foundation Statement. The web-based mapping system utilizes either Web ADF or Flex API technology provided by the Geocortex platform. Utilizing ArcGIS Server's feature service technology, web-based editing sites can also be set up to support alternative management zone development or issues and opportunities mapping. ArcGIS mapping and feature services are hosted locally on the DSC/IMR servers or accessed from other internal region or program servers.

Using NPMap to Create Web Maps (1:50–2:10)

Nate Irwin, EGIS & Web Mapping Coordinator, WASO RISD, Lakewood, CO

NPMap is an NPS-built web mapping framework that makes it easy for NPS users to create and deploy web mapping applications that target a variety of different user groups, both technical and non-technical. This presentation will include an overview of the capabilities of NPMap, along with a demonstration of how you can use the new admin console to make your spatial and tabular data available through NPMap and build a web mapping application that you can share with your users.

Development of Web-based Mapping and Analyses Tools to Support Program Initiatives in the Southeast Region (2:10–2:30)

David L. White, Director of Environmental Informatics, Cyberinstitute Technology Integration, Clemson University, Clemson, SC

Web mapping is increasingly a dynamic and pervasive technology. From social media, weather and driving directions information and data are visualized using mapping technology. However, these technologies have limited functionality and are intended for visualization and reference. Advanced web-based GIS applications such as spatial analyses and other functions have been limited due to the technical challenges in developing functional software for the Web. Although some success was realized in the past with ESRI's Internet Map Server and the University of Minnesota's MapServer, these platforms were limited by performance (generally slow) and the users GIS knowledge (needed to be good). Recent advances in ESRI's ArcGIS Server have allowed for the development dynamic and functional Web applications leveraging widgets to deliver applications or functions within a common framework. Recent efforts in the Southeast Region in partnership with Clemson University have focused on the development of these latest technologies to support rich-functional applications using the ESRI's Flex Viewer.

Internet GIS Delivery for NPS Resource Management (2:30–2:50)

Bill Slocumb, Research Associate, Center for Earth Observation, North Carolina State University, Raleigh, NC

Justin Shedd, Research Associate, Center for Earth Observation, North Carolina State University, Raleigh, NC

In an effort to provide full access to mapped resource information, the NPS NE Region GIS research program has developed a prototype enterprise GIS solution for decision support at the park and program level. The concept is to provide web mapping services that connect managers with resource maps and data (e.g., I&M, facilities, fire, etc.) in an environment that requires no user training nor any specialized client software or hardware. This internet GIS program allows direct connection to the varied program databases with no transferring of files thereby reducing issues with data versioning and system maintenance. In addition, the same system provides a data service that can be connected to desktop GIS programs for more complex GIS operations. The presentation focuses on demonstration of system generated maps and analysis in natural, cultural, fire, and facilities management and will discuss development and deployment experiences and progress. The demonstrated system connects resource data from MS SQL data structures to customized ArcGIS Server interfaces.

Developing Interactive Google Earth Maps for Use on Your Website (2:50–3:10)

Adam Kozlowski, Data Manager, Northeast Temperate Network, Woodstock, VT

Looking for a way to quickly distribute and browse spatial data without relying on ArcGIS? Would you like to overlay park data sets onto the latest color imagery or even turn-back-the-clock to view historical imagery? Quickly zoom to numerous areas of interest or parks, view multiple data layers at once, view attributes, take measurements, capture screen shots, post pictures, and provide maps for citizen scientists all on the web? It doesn't get much better than this: free and easy! We will walk through the steps for converting any shapefile to a KML file, post-process it in Google Earth, and post it to your website for all or NPS-only users to access. If you have the shapefiles, you can have something basic up and running for your network in less than a day. Although this presentation focuses mostly on natural resource data, it is equally applicable to any spatial data (cultural resources, trails, management areas, partners, law enforcement, etc.).

Expediting the Deployment of the Google Earth Browser Plug-in, Open Layers, and Google Maps: A Suite of Sweet Tools (3:10–3:30)

Roland Duhaime, Research Associate at University of RI, Kingston, RI

Serving GIS data over the web continues to be a very active area, with a wide array of development tools at our disposal. We have ArcMap with which to create great maps; Google Earth, which allows us to view our data in a 3D model of the world; and open layers and Google Maps, which allow us to view map data in 2D. The advantage of using these technologies is that the developer no longer needs to spend lots of time maintaining server software, but rather can focus on application development using efficient data formats such as KML Super Overlays. This presentation will attempt to tie some of these different technologies together using National Park Service (NPS) data layers as an example. Using NPS GIS data with the above server technologies can prove challenging given the diverse formats in which it is stored. However, I will highlight the use of Python to better streamline the development process, as well as introduce the GDAL toolkit and demonstrate how GDAL can be used to create KML Super Overlays and the HTML files needed for serving these data.

Session 70 • Evergreen (4th floor) • 2-hour Workshop

Vegetation Inventory Workshop: Consultation, Q&A, and Strategizing

Chairs: Karl Brown, NPS Vegetation Inventory Coordinator, Fort Collins, CO

Tammy Cook, NPS Vegetation Inventory Ecologist, Fort Collins, CO

Karl Brown and Tammy Cook will be available to talk with individuals planning or working on the vegetation mapping inventory for any of the I&M parks.

Session 71 • Oakley (4th floor) • Invited Papers

Stress Management for Ecological and Visitor Impacts of Climate Change in Ocean Parks

Chairs: Cliff McCreedy, Marine Resource Management Specialist, NPS Ocean and Coastal Resources Branch, Washington, DC
Sarah G. Allen, NPS Pacific West Region, Point Reyes Station, CA

Session overview: The National Park System includes ocean and Great Lakes waters with coral reefs, kelp forests, tidewater glaciers, estuaries, and wetlands, all of which provide tremendous biological, cultural and recreational value to the nation. This session will discuss ways to assess and respond to climate change impacts on habitats, marine life and recreational experiences. Impacts of ocean warming, acidification, and changes in lake and sea-levels are exacerbated and accelerated by intense population growth and consumptive uses of land, water, and fish populations. In addition to these chronic stressors, parks also grapple with acute or episodic events such as coral bleaching and storms. Ocean and Great Lakes parks offer lessons in applying science and policy for managing marine systems in the face of multiple stressors. These efforts will increase our understanding of climate change impacts, may strengthen the adaptability of marine systems and maintain their value to visitors.

Giacomini Wetland Restoration: Enhancing Ecological Resilience in the Tomales Bay Watershed

Brannon Ketcham, Hydrologist, Point Reyes National Seashore, Point Reyes Station, CA

With 80 miles of coastline, Point Reyes National Seashore has completed several large-scale projects to restore natural hydrologic and shoreline process. This process-based restoration approach is consistent with adaptation approaches and will enhance resilience of park resources to changing conditions associated with Climate Change. Low-gradient transitional environments such as wetlands are the most vulnerable to habitat loss as a result of sea level rise. Removal of levees and fill from marsh habitat in the Giacomini Wetland Restoration Project (a 550 acre dairy pasture) has restored hydrologic connectivity, floodplain process and tidal inundation, and thereby enhanced the ability of the marsh ecosystem to adapt to change. Hydrodynamic modeling of the project for vulnerability to sea level rise predicts that subtidal waters and intertidal mudflats will increase, but unlike many other wetlands, upland area is available for inland progression of marsh.

Impacts on the Visitor Experience at Great Lakes National Parks

Bob Krumenaker, Superintendent, Apostle Islands National Lakeshore, Bayfield, WI

Climate change is already affecting air and water temperatures in the Great Lakes, which impacts on the length of the winter ice season and on Great Lakes water levels. In addition to ecosystem changes in Great Lakes national park units, visitor experience is changing and may be profoundly different in the coming decades. The winter recreational season will shorten while the summer season will lengthen. Docks which have served well for decades may be high out of the water. The generally calm, warm surface waters may lull boaters into dangerous situations, as the calm is expected to be punctuated by more frequent and more intense storms. Recreational fisheries will be different. This paper discusses the implications for managing Great Lakes national parks in this new and different environment.

Long-Term Monitoring Pays Off in Healthier Kelp Forest Ecosystems

Russell Galipeau, Superintendent, Channel Islands National Park, Ventura, CA

Channel Islands National Park includes five islands and the surrounding 50,000 hectares of diverse and productive marine waters. The Park began marine ecological monitoring in 1982 to establish baselines and enhance understanding of ecosystem function. Fisheries-independent data from monitoring informed the Channel Islands public process that culminated in the state of California closing approximately 20% of park waters to harvest in 2003. Expanded monitoring inside and outside of these new reserves is beginning to demonstrate positive ecological changes. In addition, monitoring of a small ecological reserve established in 1968 at Anacapa Island, demonstrated that more complex community structure may enhance resiliency. With the amelioration of one stressor (overfishing), the park is seeking to partner with Federal, State and academia to monitor ocean chemistry to better understand potential resilience to climate change impacts.

Raising the Bar for Water Quality in Coastal Parks

Eva DiDonato, Marine Pollution Ecologist, NPS Ocean and Coastal Resources Branch, Fort Collins, CO

Supporting good water quality in our National Parks can go a long way towards increasing ecosystem resilience in the face of climate change. Compromised coastal water quality often results from regional population growth and local development, and most stressors of coastal water quality originate from beyond park boundaries. Though not a simple challenge, changes that provide protection for park resources can be initiated under the Clean Water Act through EPA criteria and the State Water

Quality Standards triennial review process. Currently, coastal states are in the process of developing nutrient criteria for estuarine and coastal waters under the guidance of the EPA. In Florida, for example, NPS has been working closely with EPA to ensure park needs are considered in criteria development. An explanation of the process and opportunities for parks to be part of that process will be presented.

Virgin Islands Corals in Hot Water Again

Jeff Miller, South Florida/Caribbean Inventory and Monitoring Network, St. John, VI & Palmetto Bay, FL

Seawater temperatures on reefs within National Parks in the US Virgin Islands have been exceptionally warm. From October 2009 through September 2010, the monthly average temperature equaled or exceeded the maximum monthly averages from 1988-2004, with temperatures for August 2010 exceeding the threshold at which most corals begin to lose their symbiotic zooxanthellae and bleach. Bleaching last occurred on VI reefs in 2005 when water temperatures peaked in September causing over 90% of the corals at 5 long-term study sites to bleach. An outbreak of coral disease occurred as the corals were recovering from bleaching resulting in over 60% coral mortality by the end of 2007. Hurricane Earl passed the VI on August 29-30, 2010 decreasing temperatures >1°C in 24 hours but tumbled corals in shallow water. Monitoring will reveal how the corals that survived the 2005/2006 bleaching and disease outbreak will fare in 2010 and beyond.

Session 72 • Napoleon A1/A2 (3rd floor) • Day-Capper

Science and Stewardship in the National Park Service: New Faces, New Challenges Ahead

Chairs: Beth Johnson, Deputy Associate Director, NRSS, National Park Service, Washington, DC

Bert Frost, Associate Director, NRSS, National Park Service, Washington, DC

Elaine Leslie, NRSS, National Park Service, Washington, DC

The Natural Resource Stewardship and Science Directorate, under the leadership of Associate Director Bert Frost, has some new faces and positions to help us tackle the many complex challenges ahead. Conference attendees are encouraged to attend, meet and greet the new faces and Bert Frost and Beth Johnson, and participate in dialogue on how we face these challenges together. Let's discuss! What are the priority challenges facing our park resources, what are the solutions? You can actively participate in ensuring that science and stewardship meet these challenges ahead! Bert Frost, and his Deputy Beth Johnson, and the Natural Resource Program Center Director and Division Chiefs will be available for an informal Q&A session. Come and get acquainted or reacquainted!

Session 73 • Napoleon B1 (3rd floor) • Invited Papers

Science, Money, and Lawsuits: Current Conversations in Ungulate Conservation Management in the National Park Service

Chairs: Therese Johnson, Biologist, Rocky Mountain National Park, Estes Park, CO

John Mack, Branch Chief of Natural Resources, Rocky Mountain National Park, Estes Park, CO

Ryan Monello, Wildlife Biologist, National Park Service, Biological Resource Management Division, Fort Collins, CO

Glenn Plumb, National Park Service Wildlife Program Manager, National Park Service, Biological Resource Management Division, Fort Collins, CO

Ben Bobowski, Chief of Resource Stewardship, Rocky Mountain National Park, Estes Park, CO

Session overview: Nationally and internationally, there is an active conversation amongst government agencies, non-government organizations, and the private sector about ungulate management in the National Park Service (NPS). Natural and anthropogenic influences across landscapes in and adjacent to national parks often result in ungulate management issues ranging from natural resource conditions outside the natural range of variability and impacts on specific natural or cultural resources to impacts on park neighbors, human safety and political concerns. While NPS Management Policies provide guidance, ungulate management in specific NPS units must also incorporate fidelity to the law, park-specific mandates, best available science, stakeholder positions, and public interest. Ungulate management in NPS units has embraced some approaches and techniques that may be unfamiliar or unpalatable to NPS stakeholders. This session will review historical ungulate management in the NPS, present illustrative case studies, and synthesize findings to stimulate informed discussion amongst GWS members and stakeholders.

The Re-emergence of Active Management Programs for Abundant Ungulate Populations in National Park Units

Ryan Monello, Wildlife Biologist, U.S. National Park Service, Biological Resource Management Division, Fort Collins, CO

Many national parks have experienced substantial increases in ungulate populations in the past several decades—numbers that are now considered by many managers and scientists to exceed historic levels. This has resulted in a variety of management strategies by NPS units to restore ecosystem function and reduce elk and deer populations by up to 90%. There are now more parks actively managing ungulates than ever before. To date, we lack a comprehensive review of recent ungulate management activities across the NPS in light of management paradigms such as 'natural regulation'. This presentation will describe the history, status, and purpose of ungulate management in the NPS; the range of tools being considered and implemented, such as sharpshooters, fencing, fertility control, and re-distribution; the supporting science of recent NPS management plans; the role of stakeholders and adjacent landowners; and the implications of these efforts for wildlife management by the NPS.

Managing Elk in the Absence of an Intact Ecosystem: Challenges in Rocky Mountain National Park

Therese Johnson, Biologist, Rocky Mountain National Park, Estes Park, CO

John Mack, Branch Chief of Natural Resources, Rocky Mountain National Park, Estes Park, CO

Ben Bobowski, Chief of Resource Stewardship, Rocky Mountain National Park, Estes Park, CO

Following intensive research and interagency planning Rocky Mountain National Park is implementing an Elk and Vegetation

Management Plan. Though specific management approaches generate controversy and public debate, there is broad consensus among stakeholders that actions to reduce and redistribute the elk population are needed. Lack of a full complement of native predators and outside development are factors that contribute to overabundant elk, resulting in significant resource impacts. There are regional constraints to restoring predators and hunting is not appropriate in the park, so other management strategies are needed to work toward ecosystem restoration. Plan implementation relies on a combination of conservation tools, including redistributing and culling elk, and fencing. Elk and vegetation are monitored, with results used to guide adaptive management to meet measurable objectives. Successful Management will require flexibility, persistence, interagency cooperation, and continued public support. We will discuss challenges and consider what long-term success will look like.

White-tailed Deer Management at Catoctin Mountain Park

Lindsey Donaldson, Biologist, Catoctin Mountain Park, Thurmont, MD
Becky Loncosky, Biologist, Catoctin Mountain Park, Thurmont, MD
Scott Bell, Resource Manager, Catoctin Mountain Park, Thurmont, MD

By the 1980s, Catoctin Mountain Park staff believed that an overabundant deer herd could cause a long term decline in the abundance and diversity of native plants. Data collected by Park staff indicated that forest regeneration was nearly absent within the Park. Deer exclosures were established to show the forest regeneration potential in the absence of deer and deer density was monitored. The Park developed a Deer Management Plan that supports forest regeneration and provides for long-term protection, conservation, and restoration of native species and cultural landscapes through the use of lethal actions to manage deer impacts. Deer reduction was initiated in 2010. Federal Employee sharpshooters removed 233 white-tailed deer from the Park, and 4,200 pounds of meat were donated to area Food Banks. Deer management will continue annually at Catoctin, with deer density estimates and analysis of vegetation data used to help resource managers set population and removal goals.

Adaptive Risk Management of Bison at Yellowstone National Park: Carrying Capacity, Migration, and Brucellosis

PJ White, Acting Chief Aquatic and Wildlife Resources, Yellowstone National Park, WY
Rick Wallen, Wildlife Biologist, Yellowstone National Park, WY
Doug Blanton, Biotechnician, Yellowstone National Park, WY
Chris Geremia, Biotechnician, Yellowstone National Park, WY
Mike Coughenour, Research Scientist, Natural Resource Ecology Laboratory -Colorado State University, CO
Glenn Plumb, National Park Service Wildlife Program Manager, National Park Service, Biological Resource Management Division, CO

Yellowstone bison are managed to reduce the risk of brucellosis transmission to cattle while allowing some migration out of Yellowstone National Park to winter ranges in Montana. Management near park boundaries maintained separation between bison and cattle, with no transmission of brucellosis. However, brucellosis prevalence in the bison population was not reduced and the management plan underestimated bison abundance, distribution, and migration, which contributed to larger risk management culls than anticipated. Culls differentially affected breeding herds, altered gender structure, created reduced female cohorts, and dampened productivity. Managers have proposed adaptive management adjustments to implement smaller selective culls through hunting and relocating disease-free bison after quarantine. Increased tolerance for bison in Montana should be attainable through vaccination, strategic fencing of remaining cattle operations, hazing bison to prevent range expansion, keeping cattle off grazing allotments until the significant risk of brucellosis transmission is past, and regulating the bison population size between 2,500–4,500.

To Ungulate or Not to Ungulate: Is that the Question?

Glenn Plumb, National Park Service Wildlife Program Manager, National Park Service, Biological Resource Management Division, CO

The 2006 NPS Management Policies instruct, that for ungulate populations "parks provide only one of the several major habitats they need, and survival … in parks also depends on the existence and quality of habitats outside the parks." Ungulates are amongst the largest body sized wildlife remaining in national parks, often with evolved life histories and ecologies scaled from temporal and spatial landscape conditions that often no longer exist. Additionally, both free-roaming and constrained ungulates in national parks occupy trophic positions capable of facilitating or disrupting ecosystems dynamics. To achieve the NPS mission, it will be crucial to reconcile how anthropogenic and non-anthropogenic influences across landscapes in and adjacent to national parks underpin discordant ungulate ecologies; and accordingly identify collaborative opportunities for effectively conserving not only ungulates, but also where possible, their evolved social, herbivory, predator-prey, nutrient transport, and movement dynamics.

Session 74 • Napoleon B2 (3rd floor) • Invited Papers

Fire and Resource Management: Our Landscapes are Being Invaded!

Chairs: Richard Schwab, National Burned Area Rehabilitation Coordinator, National Park Service, National Fire Management Program Center, Boise, ID

Mark Fitch, Smoke Management Specialist, National Park Service, National Fire Management Program Center, Boise, ID

Session overview: With climate change and increasing frequency of wildfires, our post-fire natural landscapes are being attacked by invasive species. This session will look at how invasives are changing fire regimes and the effectiveness of using fire and other treatments to manage non-native species.

Perennial Invasive Grass Fires Threaten to Convert the Sonoran Desert Ecosystem

Dana Backer, Restoration Ecologist, Saguaro National Park, Tucson, AZ

Perry Grissom, Restoration Ecologist, Saguaro National Park, Tucson, AZ

Pyrophilic buffelgrass (*Pennisetum ciliare*) is invading many ecosystems in the United States and abroad, including the Sonoran Desert. Buffelgrass, an African bunch grass, poses a significant threat to Saguaro National Park's natural and cultural resources. A buffelgrass-fueled fire is likely to cause unprecedented and irreparable damage to the desert ecosystem. Iconic Sonoran Desert species such as the saguaro cactus and desert tortoise are not fire-adapted and will suffer fire-induced mortality from buffelgrass fueled fires. Buffelgrass will contribute to a positive grass-fire cycle with the potential to convert the Sonoran Desert ecosystem into an exotic grassland. Land managers in the Sonoran Desert face novel challenges beyond large scale control treatments, including developing restoration techniques, fire management strategies, and post-fire treatments. The Park has been managing buffelgrass for more than 10 years; we will present fire behavior results, economical and logistical issues of controlling buffelgrass in a wilderness, and lessons learned.

Fire and Exotic Plant Management in Southern Florida

Jim Burch, Supervisory Botanist, Big Cypress National Preserve, Ochopee, FL

For at least two decades Big Cypress National Preserve (BICY) has maintained an aggressive and successful program to eliminate and control non-native plants. Similarly, BICY Fire Management has led the National Park Service in acres burned during prescribed fire management. Fire can be a valuable tool for managing invasive plants, but the biology of the exotic and its surrounding living community should be considered. Depending on the nature of the invasive exotic and the ecology of the surrounding area, fire may release or inhibit the plant's invasive properties. Here we look at two different exotics that produce significant compromises to southern Floridian biological communities, techniques used for their management, the effects of fire on these plants, and possible methods for integrating prescribed fire with exotic plant control.

Fighting Cheatgrass Instead of Fire in Zion National Park—Summary of Treatment Effectiveness and Lessons Learned

Eric Lassance, Biological Science Technician, Zion National Park, Springdale, UT

Cheryl Decker, Vegetation Program Manager, Zion National Park, Springdale, UT

This presentation will summarize treatment effectiveness and lessons learned from ten years of cheatgrass work at Zion National Park including two landscape scale projects through the National Park Service Burned Area Emergency Response Program. Lessons learned include types of biomass reduction, timing of treatments, herbicide rates and methods, delivery systems, herbicide combinations, and seeding. We will also illustrate how Zion has synthesized these lessons into creating fuel breaks in Zion's cheatgrass dominated main canyon.

A New Challenge for Resource Advisors: Preventing the Spread of Aquatic Invasive Species During Fire Operations

Sandee Dingman, Natural Resource Specialist, Lake Mead National Recreation Area, Boulder City, NV

Wildland firefighting equipment moves large volumes of raw water during fire incidents in order to extinguish flames or control fire growth. This water movement may serve as pathways for aquatic invasive organisms to be moved between water bodies and watersheds. The equipment used may become contaminated and serve as vectors for future invasions across large geographic areas, both within a single incident and between incidents. This is a recently recognized issue that has presented many challenges to the firefighting community, including Resource Advisors. New guidelines recommend prevention practices and the application of sanitation solutions using quaternary ammonium compounds for decontaminating wildland fire equipment. These guidelines, the results of efficacy testing of various sanitation methods, and future research and policy direction will be discussed.

Effects of Post-fire Restoration Work in Zion National Park: Battling Cheatgrass with Large-scale Applications of Herbicide

Andrea Thode, Assistant Professor, Northern Arizona University, Flagstaff, AZ

In the summers of 2006 and 2007 two of the largest fires in the history of Zion National Park burned more than 8,000 ha total. Due to the threat of cheatgrass invading the burned areas and causing vegetation type conversions, over 4,800 ha of high-severity burned area was treated with Imazapic herbicide and, on one fire, a combination of seeding and herbicide. We monitored the effects of these treatments across 5 sites with over 250 plots. We will present a summary of the results for this effort including the effects on cheatgrass and the native plant community for both the understory and seedbank. The use of landscape scale applications of herbicide in protected areas has not been common practice in the National Park Service. However, in changing times with a changing climate and invasive species all the tools for land management need to be understood.

Session 75 • Napoleon B3 (3rd floor) • Invited Papers

Conserving Aquatic Species within the National Park System

Chairs: John Wullschleger, Fish Program Lead, National Park Service Fish Program Office, Fort Collins, CO

Nic Medley, Fisheries Biologist, NPS-NRPC, Fort Collins, CO

Session overview: Within the United States, aquatic species, notably native fish and shellfish, have suffered from a longstanding out-of-sight-out-of-mind management paradigm. Even within protected areas such as the National Parks, managers have tolerated practices that would be highly controversial if applied to terrestrial species or habitats. Examples include, commercial and recreational harvest, stocking of nonnative species, and modification of habitats to facilitate human activities. Although disparities between terrestrial and aquatic conservation practices have narrowed over time, a legacy of past management is that a high percentage of aquatic species (freshwater and marine) have been extirpated, are at risk and / or have special status under federal or state endangered species laws. This session provides a sampling of the diverse work being conducted by NPS biologists to recover and protect native aquatic species their habitats ongoing and emerging threats.

Reef Fish Movements from the Dry Tortugas National Park Research Natural Area

Michael Feeley, Marine Ecologist, National Park Service, South Florida/Caribbean Network, Palmetto Bay, FL

Alejandro Acosta, Associate Scientist, Florida Fish & Wildlife Research Institute, Marathon, FL

Ted Switzer, Associate Scientist, Florida Fish & Wildlife Research Institute, St. Petersburg, FL

John Hunt, Program Manager, Florida Fish & Wildlife Research Institute, Marathon, FL

Paul Barbera, Research Associate, Florida Fish & Wildlife Research Institute, Marathon, FL

Danielle Morley, Biological Scientist, Florida Fish & Wildlife Research Institute, Marathon, FL

Matt Patterson, Network Coordinator, National Park Service, South Florida/Caribbean Network, Palmetto Bay, FLThe Dry Tortugas region includes a network of four marine protected areas (MPAs) and provides an excellent system to address the efficacy of MPAs as an ecosystem-based management tool and their effect on fisheries in surrounding open use areas. For most reef fishes, the indirect benefits of MPAs ultimately depend on either spawning activities within MPA boundaries or connectivity between populations within or across MPA boundaries and known spawning aggregations. Spatial and temporal rates of movement of acoustically tagged snappers and groupers are being measured in the Tortugas region with a multi-agency managed array of in-situ omnidirectional hydrophones. Data collected will be used to assess habitat utilization patterns, residence times, migration patterns and timing of multispecies aggregations. Inshore to offshore spawning migration movements of mutton snapper, *Lutjanus analis*, indicate a possible corridor exists between the Research Natural Area located within the Dry Tortugas National Park and offshore spawning grounds.

The Invasion of the Indo-Pacific Lionfish in Biscayne National Park

Vanessa McDonough (no affiliation provided)

Following its spread throughout surrounding waters of the Atlantic Ocean and Caribbean sea, the first documented case of the Indo-Pacific lionfish (*Pterois volitans/miles* complex) present in Biscayne National Park waters occurred in June of 2009. Because of its voracious appetite, lionfish have the potential to detrimentally affect native marine resources, including many fish and invertebrate species that are already compromised due to overfishing, declining habitat quality, marine pollution, and other factors. Park managers have entered into collaborations with scientists from other agencies and institutions to explore the biology and ecology of this invasion. Topics addressed through these collaborations include ecological impacts of the lionfish, genetic relationships of lionfish in BISC to lionfish settling throughout American and Caribbean waters, and assessing if and how abiotic and biotic habitat parameters affect the abundance and size distributions of lionfish in different areas

of the park. This presentation is a brief overview of the invasion, present results from the collaborative studies, including an assessment of the efficacy of the implemented lionfish management plan.

Using Stereo-video Technology as a Means of Noninvasively Measuring Fish Length to Monitor Population Dynamics of the Critically Endangered Devils Hole Pupfish, *Cyprinodon diabolis*

D. Bailey Gaines, Death Valley National Park, Pahrump, NV
Kevin Wilson, Death Valley National Park, Pahrump, NV
Michael R. Bower, Bighorn National Forest, Sheridan, WY

Length frequency has long been used by fisheries managers to understand population dynamics, assess age structure, identify spawning strategies and timing, and pinpoint age-specific bottlenecks. However, this basic information is difficult to collect when handling the target species is impractical. Photogrammetric techniques were explored as an alternative to methods that require handling. Measurements using a stereo-video camera system were found to be more accurate and precise than visual estimates. Bias was low (mean error = 0.05 mm) and the level of precision, as measured by coefficient of variation for observed and true lengths was 4.5%, versus almost 10% for visual estimates. Stereo-video techniques should improve resolution to detect important differences in the length of small-bodied fishes like the Devils Hole pupfish, Cyprinodon diabolis as well as improving consistency. We report preliminary results of stereo-video monitoring of Devils Hole pupfish, which began in March of 2010.

Development and Application of a RIVPACS Biological Assessment Model for Streams in Alaskan National Parks

Trey Simmons, Central Alaska Network, Fairbanks, AK
Jeffrey Ostermiller, Ostermiller Consulting, Logan, UT

Historically, assessment of water quality focused on chemical measures. Over the last 20 years, however, the emphasis has shifted to biological measures of water quality, with the focus on assessing the biological integrity of aquatic ecosystems. Because benthic macroinvertebrates are ubiquitous, occur at high densities, and respond sensitively to environmental stressors, most biological assessment programs rely on these organisms as indicators of ecosystem condition. RIVPACS is a robust biological assessment tool that uses natural environmental gradients to predict the species composition of invertebrates that would be expected to occur at streams in the absence of anthropogenic stress. Deviations from the expected species composition constitute a measure of biological impairment. We will discuss the development of a RIVPACS model for the Central Alaska Network, and its application both for contemporary bioassessment of potentially impaired streams, and as a potential tool for assessing future effects of climate change in pristine streams.

Long-term Monitoring at New River Gorge National River Yields Valuable Insights

Jesse M. Purvis, New River Gorge National River, Glen Jean, WV

Managers often make decisions about threats to resources based on limited information, which, in the absence of data, may be the judgment of subject matter experts. Dedicated monitoring programs detect changes that are not apparent from one-time sampling and are necessary to ascertain trends and changes that occur over time. Two long-term monitoring programs at New River Gorge National River support decision-making based on sound science. A water quality monitoring program that began in 1980, has identified problems, led to millions of dollars in wastewater treatment improvements, and documented improved water quality. A long-term ecological monitoring program initiated in 1988 for fish, macroinvertebrates, algae, and vascular flora is regarded as the New River's annual "health check-up." We will provide examples of the data collected by these programs, describe their value in making management decisions and discuss how conclusions may be influenced by monitoring program term.

Session 76 • Southdown (4th floor) • Day-Capper

New Orleans Musical Heritage: Songs of the Underground Railroad

Chair: Carol Clark, Superintendent, Jean Lafitte & New Orleans Jazz National Historical Parks, New Orleans, LA

Park Rangers Bruce Barnes and Matt Hampsey of New Orleans Jazz National Historical Park lead a program of freedom songs and spirituals often associated with the Underground Railroad due to their veiled meanings and double entendres. Not only do African American spirituals offer an unbroken link to the tribulations and aspirations faced by people denied their freedom, they also played a significant role in the development of jazz. Accompanying the Park Rangers will be talented New Orleans gospel singers/musicians to authentically interpret and recreate the soul stirring experience of "Songs of the Underground Railroad."

Session 77 • Gallier A/B (4th floor) • Contributed Papers

Technology for Cultural Resources Management: GIS and Other Techniques

Chair: Bonnie Halda, Chief, Division of Preservation Assistance & Heritage Areas, National Park Service, Northeast Region, Philadelphia, PA

Historical GIS and the Pre-Park Population of Mammoth Cave National Park

Katie Algeo, Associate Professor, Western Kentucky University, Bowling Green, KY

When Mammoth Cave National Park was authorized in 1926, an estimated 500 families lived in the area. As with Great Smoky Mountains and Shenandoah National Parks, both authorized at the same time, a period of land acquisition and clearance ensued. While significant interpretive efforts have been undertaken of the pre-park populations for those two parks, this has never been done for the Mammoth Cave region. This paper presents the Mammoth Cave Historical GIS, which documents and enhances understanding of the history of the area's pre-park inhabitants. It maps the 1920 manuscript census at the household level, representing not only land owners, but also renters and tenants, fostering a more complete picture of the pre-park community. The project is methodologically innovative in its use of qualitative techniques to map rural households at a time when street addresses were not in use. Visualization is enhanced with a multi-resolution topographic map and by linking photographs taken by a CCC photographer of dwellings that were razed.

How Battlefields Disappear

John Knoerl, Program Manager, National Park Service, WASO CRGIS Program, Washington, DC

Conflicts among competing priorities such as preservation and urban development have been in play ever since the National Historic Preservation Act was signed into law in 1966. Resolving these conflicts is often hampered by our inability to visualize the nature of the conflict. In the case of Civil War battlefields, urban development tends to fragment these landscapes. Borrowing from the field of landscape ecology, a set of landscape metrics including fragmentation analysis was undertaken using Geographic Information Systems on eleven battlefields both within National Park Service units and outside. The results suggest that it may be possible to use this information along with other considerations to plot out a strategy for protecting key areas that optimally function to halt continued fragmentation of the landscape.

What Lies Beneath: Design Techniques for Volumizing and Revealing Layers of an Archaeological Park

Laurie Matthews, Cultural Resource Planner, MIG, Portland, OR

Fort Yamhill State Heritage Area is embarking on the creation of an archaeological park, one that not only reveals the history of the site, but also aspects of the profession of archaeology to its visitors. Located in Oregon, the site served as a critical pivot point between Native Americans and early pioneers at the dawn of western settlement. Today nearly all of the fort's visible features are gone. Using a mixture of revealing and volumizing design techniques and hands-on educational and interpretive activities, the history of the site will be revealed with traditional and contemporary design features. Combining the fields of art, archaeology, landscape architecture, historic preservation, and architecture has resulted in an innovative plan for the future – one that teaches future generations and reveals a portion of our history."

Creating Cultural Resource Spatial Data Standards

Deidre McCarthy, Historian, National Park Service, Cultural Resource GIS Facility, Washington, DC

Locational information is critical in understanding cultural resources and how we steward them. Organizationally, specialists separate cultural resource categories and catalog them in databases which may not include location and often do not share information. Geography can integrate these disparate sources, using one location to reference various descriptive databases. To accomplish this however, spatial data standards are essential. OMB Circular A-16 designates the National Park Service as the lead agency for the cultural resource spatial data theme, responsible for the creation of such standards through the Federal Geographic Data Committee (FGDC). Since 2002 the NPS Cultural Resource GIS Facility has led this effort within the NPS and with our Federal partners. Adopted in February 2010, the NPS standards focus on documenting cultural resource spatial data and linking it to descriptive data. This paper will provide an overview of the NPS standards and how they relate to the ongoing FGDC effort.

Using High-Density LiDAR and Three-Dimensional GIS in the Preservation of the Abo Painted Rocks Pictographs

Derek Toms, Chief of Resources, National Park Service/Casa Grande Ruins National Monument, Coolidge, AZ

Dietrich Evans, CEO/Founder-3D Poet, 3D Laser Imaging, Inc., Yuma, AZ

Salinas Pueblo Missions National Monument contracted NPS/3DI (3D Laser Imaging, Inc) to use stationary terrestrial LiDAR in an effort to generate a highly detailed three-dimensional (3D) model of the Abo Painted Rocks pictograph site. The Abo Painted Rocks site is a nationally significant, well-known, park resource consisting of numerous monochrome and polychrome Native American pictographs. The purpose of the project was to provide monument management with a 3D model and data which could then be used by park management in the development of site specific preservation and treatment strategies. The scanned features included the rock shelter surrounding the Abo Painted Rocks site as well as the individual pictographs. 3DI (3D Laser Imaging, Inc) was successful in recording and cataloging the integrity of the site using a technology that has the ability to create a "clone of reality."

Session 78 • Nottoway (4th floor) • Contributed Papers

Managing Visitor Activities in Wilderness

Chair: David Parsons, Emeritus Program, NPS, Missoula, MT

Management Implications Based on Visitor Use Data from Nordhouse Dunes Wilderness

Carol Griffin, Professor, Natural Resources Management, Grand Valley State University, Allendale, MI

We collected data about users to the Nordhouse Dunes Wilderness in 2009-10. Users completed a voluntary self-registration at five main entrances to the wilderness. Wilderness issues include: wilderness is scarce in the region, the wilderness is small, it is near several metropolitan areas, use levels are high enough that solitude may be impaired, one boundary is a heavily-used USFS recreation area, dogs off-leash may affect the endangered piping plover, and the number of people who complete the trail register is very low compared to observed use levels. In some cases the USFS estimates of user demographics and patterns of use were consistent with the trail register, but in many cases there were significant differences in their predictions and recorded use levels. Management implications of this research include revising educational messages (personal contact, website, trailhead kiosk), modifying regulations, and increased enforcement in selected areas.

Learning from Locals: Using Oral History in the Wilderness Planning Process

Alison Steiner, Ph.D. Candidate, University of California–Davis, Davis, CA

Daniel R. Williams, Research Social Scientist, USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO

Wilderness managers are tasked with implementing regulations and creating policies that protect the nation's wilderness areas. However, managers often have limited information about the decisions and practices that have shaped an area's past and that will impact its future. Guided by this concern, Sequoia and Kings Canyon National Parks (SEKI) developed an oral history project meant to inform their new Wilderness Stewardship Plan. The project asked 23 long-time employees, commercial operators, and private visitors to reflect on how wilderness resources, as well as their personal wilderness experiences, changed over the last five decades. Used in conjunction with quantitative resource and visitor studies, this qualitative approach allows the Parks to more thoroughly understand environmental change, its causes, the historical context within which it occurs, and its effect on various user groups. This presentation uses SEKI as a case study to explore the value of oral history projects in the wilderness planning process.

Frontcountry and Backcountry Visitor Attitudes Towards Leave No Trace: Are We Preaching to the Choir?

Derrick Taff, Graduate Research Assistant, PhD Student, Human Dimensions of Natural Resources, Colorado State University, Fort Collins, CO

Peter Newman, Associate Dean and Associate Professor, Warner College of Natural Resources, Colorado State University, Fort Collins, CO

Wade Vagias, Wilderness Stewardship Division, National Park Service, Natural Resource Specialist & National Outdoor Ethics Coordinator, Washington, DC

Adam Gibson, Graduate Research Assistant, PhD Candidate, Human Dimensions of Natural Resources, Colorado State University, Fort Collins, CO

David Pettebone, Social Scientist, Resource Management and Science Division, Yosemite National Park, Yosemite, CA

Leave No Trace (LNT) is a prominent educational program used to influence behaviors of protected areas visitors with the goal of sustaining or improving resource conditions. Originally designed to educate backcountry users on proper practices, increasingly the program is being used with frontcountry visitors for two reasons: 1) high visitation in these areas, and 2) the assumption that they may have less knowledge of proper minimal impact ethics, and therefore exhibit inappropriate actions. Alternatively, backcountry visitors are thought to hold attitudes of appropriate behaviors, be more knowledgeable and there-

fore act more appropriately. This study examined if attitudinal differences existed between NPS frontcountry-day-users and backcountry-overnight visitors regarding perceived knowledge, practices, and support of LNT. Samples were drawn from Olympic National Park and Rocky Mountain National Park visitors. Findings indicate frontcountry and backcountry visitor attitudes are somewhat congruent and deeper understanding of similarities and differences is necessary before educational strategies are employed.

Solving Trampling and Erosion in Wilderness

Sue Beatty, Restoration Ecologist, Resource Management & Science Division, Yosemite National Park, El Portal, CA
Dave Kari, Trails Supervisor, Facilities Management Division, Yosemite National Park, El Portal, CA
Mark Fincher, Wilderness Management, Visitor Protection, Yosemite National Park, El Portal, CA
David Pettebone, Social Scientist, Resource Management &Science Division, Yosemite National Park, El Portal, CA

Yosemite National Park has developed an interdisciplinary approach to resolve erosion and trampling on off-trail routes in designated wilderness. Climbing use on Mt. Hoffman and Cathedral Peak has increased dramatically in the last decade escalating the number of social trails and trampling. The resolution of these resource impacts required a team effort including Wilderness Managers, Trails Supervisor, Restoration Ecologist, Hydrologist, and Social Scientists. This team identified the resources at risk, possible mitigations, wilderness minimum tools, and implemented a plan to restore the eroded areas. One route was defined as the best for sustainability and protecting resources. After this route was defined, multiple social trails to the peaks were removed and restored to natural conditions. This successful approach will be continued on other wilderness social trails in the future and may be applied to other parks with similar problems.

Yosemite Wilderness Visitor Travel Patterns: Implications for Trailhead Permit Quotas

Mark Douglas, Graduate Research Assistant, Humboldt State University, Arcata, CA
Steven R. Martin, Professor, Natural Resources Recreation, Humboldt State University, Arcata, CA

Yosemite National Park uses a trailhead quota system to manage wilderness visitors. Park scientists set user capacities in the 1970s for backcountry zones and trailhead quotas from prevalent travel patterns and a computer simulation model. Limiting how many visitors start at a trailhead each day maintains overnight travel zone use within capacity. This is valid if 1) use patterns remain similar to the 1970s, and 2) visitors adhere to planned permit itineraries. Evidence suggests travel patterns have changed since this system's inception. Research then revealed 62 percent of parties changed their trips. Data on which the original trailhead quotas were based, and the data relating itinerary modification, are nearly forty years old, and the supposition is that trips are now shorter. Consequently, travel zone capacities are being exceeded. An accurate account of wilderness use and itinerary deviation to develop a contemporary model may recalibrate quotas to best manage the resource.

Session 79 • Oak Alley (4th floor) • Invited Papers

Vernacular Cultural Landscapes within Lake Superior Area National Parks

Chair: Brenda Williams, Preservation Landscape Architect, Quinn Evans Architects, Madison, WI

Session overview: The landscapes associated with Lake Superior and the northern Great Lakes region emanate sublime beauty accented by whitecaps, woodlands, and massive rock outcrops. The region's appeal today is enhanced by the extreme environmental conditions and remote situations that historically created ruthless circumstances for settlers. Natural resources drew trappers, traders, miners, fishermen, mariners, and recreationalists to the area. The communities they created were typically built using local materials and expertise, reflecting the surrounding environment. This session will provide an introduction to the extensive cultural landscapes in the region, and illuminate the unique resources they contain. The session will include five twenty minute presentations followed by twenty-minutes for question/answers and discussion in a panel format. The panel includes professionals who are intimately familiar with the region's resources, passionate about cultural landscapes, and excited to come together to discuss them with conference attendees.

Managing Historic Light Station Properties at Apostle Islands National Lakeshore

David J. Cooper, Branch Chief, Cultural Resources, Apostle Islands National Lakeshore, Bayfield, WI

In 2009, Apostle Islands National Lakeshore received a Congressional appropriation for protecting five of its nationally significant light stations. As a first step, the park, along with a team of historical architects, historical landscape architects, and environmental planners, as well as cultural resource professionals from the Midwest Regional Office and Denver Service Center planners, undertook a massive effort to complete a comprehensive Historic Structures Report, Cultural Landscape Report, and Environmental Assessment for all five properties. This presentation will discuss findings of the documentation effort and

consider lighthouses within the context of the cultural landscapes. It will also touch on other vernacular cultural landscapes within the park.

Addressing Layers of Time in the Landscape at Grand Portage National Monument

Marla McEnaney, Historical Landscape Architect, Midwest Regional Office, National Park Service, Omaha, NE

Grand Portage National Monument sits on the north shore of Lake Superior. Historically, the site acted as a nexus for Aboriginal and European American cultural and commercial connections. The National Park Service, along with a team of historical architects and historical landscape architects, recently completed a cultural landscape report for park. The study establishes a physical timeline of landscape change, and provides recommendations for managing and interpreting cultural resources: archeology, adapted vegetation, and 20th century reconstructed buildings. These resources are located within the contemporary community of the Grand Portage Band of Minnesota Ojibwe, adding complexity to the decision making process and broadening the audience for treatment recommendations beyond the typical range. This presentation will discuss how archeology and vegetation provided the basis for making treatment decisions in a multi-layered landscape, allowing the team to widen the visitor experience beyond the 19th century fur trade and make the site relevant today.

Preserving and Interpreting Fishing Camps at Isle Royale National Park

Liz Valencia, Chief, Interpretation and Cultural Resources, Isle Royale National Park, Houghton, MI

At the time Isle Royale National Park was created in 1931, the archipelago was home to a thriving commercial fishing industry. A United States Biosphere Reserve preserving 132,018 acres of land, the park contains over 450 islands. The majority of the park was designated as wilderness in 1976. Washington Harbor, located at the southwest end of the archipelago, and Edisen Fishery at the northeast end, retain cultural landscape resources related to commercial fishing. The areas are excluded from the wilderness with the intent of preserving the cultural resources for interpretation and use by visitors. Washington Harbor included an active community for over seventy years, and members of the original fishing families continue to serve as caretakers of the island buildings and landscapes. This presentation will provide an overview of the physical development of commercial fishing landscapes and illustrate techniques used to evaluate landscape integrity.

Managing the Historic Industrial Landscapes at the Quincy Mining Company Historic District National Historic Landmark

Brenda Williams, Preservation Landscape Architect, Quinn Evans Architects, Madison, WI

The Quincy Mining Company historic landscape is an outstanding example of the development of the United States copper industry from the 1840s through 1920. The 1,120 acre Quincy Unit of Keweenaw National Historical Park contains extensive evidence of mining activities. Mining transformed the landscape with widespread grading, vegetation removal, and additions of massive industrial structures, railroads, poor rock piles and company housing locations. The copper played a primary role in America's industrial revolution—feeding more copper to the growing country than any other region. The demise of copper mining in the locality resulted in abandonment of these resources, many of which are reaching a critical point in their existence. The "partnership park" strives to protect and interpret the rich resources and history of the region. This presentation will provide an overview of the physical development of the landscape and illustrate techniques used to evaluate landscape integrity and develop treatment recommendations.

Early Twentieth Century Recreational Landscapes of Northern Minnesota Lakeside Camps, Cabins, Cottages, and Lodges

David Driapsa, Historical Landscape Architect, Voyageurs National Park, International Falls, MN

Voyageurs National Park preserves historic camps, cabins, cottages, lodges and landscapes associated with recreational tourism in the early – to mid-twentieth century on the Rainy Lake watershed. Examples of "Polite Architecture" are rare and of "Polite Landscape Architecture" even rarer. The regional vernacular integrates buildings and landscapes created from local building materials and traditions of craftspeople developed over generations, mimicking the spare frontier character, aboriginal culture, and orientation to scenery of water, rock and forest. Remoteness necessitated extended stays of visitation, rarely a weekend getaway, and often for the season. Site planning accommodated the unique social conditions of recreational activities with multiple structures of many forms for varying necessities. This presentation will provide an introduction to heritage recreational landscapes of Voyageurs National Park, the North Woods regional vernacular that evolved, and illustrate techniques used by the National Park Service to document historic landscapes and make them accessible for day use destinations.

Session 80 • Bayside A (4th floor) • Panel Discussion

Drawing the Circle: People, Productive Habitats, and Interdependent Communities

Chair: Mary Ruffin Hanbury, Historic Preservation Consultant, Hanbury Preservation Consulting, Raleigh, NC

Christine Arato, Senior Historian/NHL Program Manager, NPS-SER, Atlanta, GA

A place—like a painting or a book or a life—embodies many experiences, images, and values and engenders multiple and often conflicting interpretations. The creation of protected areas is a product of human volition, and often inscribes precise boundaries and valuations on living communities that, in contrast, emerge and evolve in complex webs of natural, social, and historical relationships. This roundtable brings together resource managers working in public and private partnerships to probe the limits of established strategies and to chart a course of best practices in a variety of protected areas. Panelists will present case studies and facilitate discussions about recognizing and maintaining living landscapes. Topics include working with multiple partners; fostering a conservation ethic; preserving local character and productive habits and habitats; frameworks for recognizing tangible and intangible cultural heritage; and creating a protected space for civic engagement.

Panelists: Christine Arato, Senior Historian/NHL Program Manager, NPS-SER, Atlanta, GA

Kathleen Jenkins, Superintendent, Natchez NHP, Natchez, MS

Augie Carlino, President & CEO, Rivers of Steel NHA, Homestead, PA

Session 81 • Bayside B/C (4th floor) • Panel Discussion

Addressing Invasive Exotic Insects Affecting Eastern Parks

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

Invasive insects like hemlock woolly adelgid, Asian long-horned beetle and emerald ash borer are impairing park resources by defoliating and killing large tracts of forest and culturally significant trees. Most parks are not adequately prepared to address these impacts. This panel will provide a forum to discuss the spread of these insects, their known and potential impacts, and current and future mitigation measures. Topics include inter-agency cooperation, prevention, early detection, monitoring, research, education, suppression and management. Each of the five panelists will have 15 minutes to present, allowing at least 45 minutes for open discussion. Panelists will present (1) a broad overview of causes and consequences; (2) relevant NPS policies and national and regional support efforts; (3) a review of the recently released "Rapid Response to Insect, Disease & Abiotic Impacts" guide; (4) cultural resource implications; and (5) the role of cooperating federal and state agencies.

Panelists: Faith Campbell, Senior Policy Representative, The Nature Conservancy, Arlington, VA

Dave Reynolds, Chief Natural Resources and Science, NPS NER Philadelphia, PA,

James Akerson, Exotic Plant Management Team Liaison, Supervisory Ecologist, Shenandoah NP, Luray, VA

Charlie Pepper, Deputy Director, Olmsted Center for Landscape Preservation, Boston, MA

Paul Chaloux, National Emerald Ash Borer Program Manager, USDA APHIS, Riverdale, MD

Session 82 • Maurepas (3rd floor) • Panel Discussion

Resource Stewardship Strategies: Learning from the Pilot Parks

Chairs: Guy Adema, Physical Scientist, Denali National Park and Preserve, Denali Park, AK

Larissa Read, Natural Resource Specialist, Denver Service Center – Planning Division, Denver, CO

Resource managers need a tool to link conceptual planning with implementation decisions, and a means to facilitate integrated resources management. Thirteen pilot parks have been developing a Resource Stewardship Strategy (RSS) as such a tool. RSSs link General Management Plans, Foundation Statements, and Desired Conditions to on-the-ground decisions and activities. RSSs also support project prioritization, and they help managers strategize how to integrate projects and funding requests for interrelated resources. An overview of the RSS program will begin the session, including outcomes from a workshop held in April 2010. Next, panelists will share their experiences as pilot parks, sharing information about their processes, funding and personnel decisions, challenges and successes, and programmatic innovations. A facilitated Q&A period will close the session, to stimulate ideas for program enhancement. The diverse panel will represent small and large parks from both cultural- and natural-resource focused units.

Panelists: Fred Armstrong, Resource Management Specialist, Guadalupe Mountains NP, Salt Flat, TX

Joy Beasley, Cultural Resources Program Manager, Monocacy NB Frederick, MD

Jill Cowley, Historical Landscape Architect, IMR Historic Preservation Programs, Cultural Landscapes, Santa Fe, NM

Philip Hooge, Assistant Superintendent, Resources, Science, and Learning, Denali NP & Preserve, Denali Park, AK

Rick Slade, Chief, Science and Resource Management, Chattahoochee River NRA, Sandy Springs, GA

Session 83 • Borgne (3rd floor) • Sharing Circle

Including Non-federally Recognized Tribal Descendent Communities in Land Conservation, Planning, Interpretation, and Education Activities

Organizers: John Reynolds, Chair, Captain John Smith Chesapeake National Historic Trail Advisory Council, Crozet, VA
Deanna Beacham, Captain John Smith Chesapeake National Historic Trail Advisory Board, Mechanicsville, VA
John Maounis, Superintendent, Chesapeake Bay Office, National Park Service, Annapolis, MD

Non-federally recognized tribal descendent communities live in many regions of the country where treaties between tribes and the United States government do not exist. Often, in some parts of the country, such tribes had treaties with European powers before the United States was formed. These tribal communities comprise a rich yet seldom acknowledged tradition of cultures that persist from before the time of European conquest through the present. As such, in total and individually, these communities hold opportunities for rich contribution to the full story of America's cultural and natural history. Their contributions can materially enhance land conservation, planning, interpretation, education, and partnership activities. This circle will explore the pros and cons, the potentials and pitfalls of inclusion of these tribes in our land conservation and interpretation related activities. The organizers reflect a variety of viewpoints which will be used to frame the beginning dimensions of the discussion.

Session 84 • Borgne (3rd floor) • Sharing Circle

Meeting Our Mission through Environmental Compliance: How Can We be More Efficient?

Organizer: Linda Mazzu, Chief, Environmental Quality National Park Service, Yellowstone National Park, WY

Environmental compliance processes are key tools that should be at the forefront of our management responsibilities to protect the natural and cultural resources of our NPS units. Complying with the various statutes and regulations required of the NPS to protect our resources can be a daunting and not always welcome step in the project planning process, though. While NPS guidance is available at various levels, the nitty gritty of getting the appropriate level of compliance documentation to the decision point takes some nuance and detailed timing of process that only those of us doing it regularly can appreciate. Therefore, I would like to use this sharing circle to explore the kind of processes (flow charts, checklists, team organization, etc) that our NPS units are using to get compliance processes completed efficiently in our parks. I will bring to the table the compliance process recently instituted by Yellowstone to handle our complex situation and would welcome learning about other park processes. While the sharing circle will focus mainly on the National Environmental Policy Act (NEPA), I'd like to explore other statute and regulatory responsibilities in regards to how they are handled by parks under the umbrella NEPA process. I would also like to foster discussion around the struggle to complete compliance efficiently within project proposal/funding cycles that do not always allow for appropriate early participation of compliance.

Session 85 • Rhythms I/II (2nd floor) • Invited Papers

Inventory and Monitoring Data Analysis and Synthesis II

Chairs: Tom Philippi, Quantitative Ecologist, NPS Inventory and Monitoring Division, Fort Collins, CO
Tom Rodhouse, Ecologist, NPS IMD Upper Columbia Basin Network, Bend, OR

Session overview: This two-part session includes 9 presentations of analysis and reporting of Inventory and Monitoring Vital Signs data. Each presentation will include the case study itself, and information on why that approach was chosen, how it was performed, and any lessons learned for other networks with similar vital signs. Note that the final time slot of session II will be a "swap meet." All presenters from both sessions will be available to answer additional questions, provide demonstrations of their analyses and tools, and offer copies of the presentation or code or other tools.

Strip Adaptive Cluster Sampling with Application to Cave Crickets and Lemhi Penstemon

Kurt Helf, Ecologist, NPS IMD Cumberland Piedmont Network, Mammoth Cave, KY
Tom Rodhouse, Ecologist, NPS IMD Upper Columbia Basin Network, Bend, OR

Adaptive cluster sampling (ACS) is a strategy for sampling rare, clumped populations and can provide more precise estimates for population means and totals than other designs such as simple random sampling (SRS). Adaptive sampling responds in real-time to conditions on the ground and allows sampling effort to increase where clusters of observations of interest occur. We present two case studies involving cave crickets in Mammoth Cave National Park and Lemhi penstemon in Big Hole National Battlefield. We used strip ACS, a 2-stage extension to standard ACS designs, to estimate population sizes of these rare endemics and considered both the practical and statistical performance of these approaches relative to SRS. We demonstrate the practical implementation of both cases and briefly discuss issues such as plot set-up and data management, computation of population estimators and confidence intervals, and our honest assessment of its utility.

Using Advanced Satellite Products to Better Understand Inventory and Monitoring Data within a Larger Context

Kevin M. James, Plant Ecologist, NPS IMD Heartland Network, Republic, MO

Jeffrey T. Morisette, Assistant Center Director for Science and Head, Invasive Species Science Branch, USGS Fort Collins Science Center, Fort Collins, CO

Colin Talbert, Information Science, USGS Fort Collins Science Center, Fort Collins, CO

Based on the notion that parks are part of a larger ecosystem, we are working to integrate I&M data from three networks with satellite products. The work is being done through the joint NPS/USGS National Park Monitoring Program. The goal is to better understand how the plant community vital signs monitored in the Great Plains reflect the larger trends observed throughout the corresponding ecoregions. The talk will describe our compilation of publicly available data on vegetation phenology at a relatively course spatial resolution (250m) and monthly data a higher spatial resolution (30m). We will show how our project is using ArcGIS Explorer to display this imagery in conjunction with I&M data. Finally we will describe our plans for using habitat modeling techniques to combine the I&M data with the remote sensing data and climate information to extrapolate the measurements throughout the park and into the areas around the park.

Developing Wetland Bioassessment Models in Support of Long Term Vital Signs Monitoring

E. William Schweiger, Ecologist, NPS IMD Rocky Mountain Network, Fort Collins, CO

James B. Grace, USGS National Wetlands Research Center, Lafayette, LA

David Cooper, Professor, Department of Forest, Rangeland and Watershed Stewardship, Colorado State University, Fort Collins, CO

Donald R Schoolmaster, Jr., IAP World Services, USGS National Wetlands Research Center, Lafayette, LA

Glenn R. Guntenspergen, USGS Patuxent Wildlife Research Center, Laurel, MD

Katherine M. Driver, NPS IMD Rocky Mountain Network, Fort Collins, CO

Key challenges for the NPS Vital Signs program are the distillation and interpretation of monitoring data to permit evaluation of ecosystem condition, a capacity to detect temporal changes, and translation for management. We present results and findings from a research project that evaluates and demonstrates methods for measuring condition and temporal changes in condition for wetlands using bioassessment models. We discuss the process for development of multimetric indices and present initial results for Rocky Mountain and Acadia National Parks. Using gradients in anthropogenic disturbances, we describe the various dimensions of biotic integrity that indicate human impacts on the wetlands in these parks. We also develop causal networks to aid the interpretation of multimetric indices for specific disturbance types. Alterations in landscape condition, hydrology, and invasive species were associated with human disturbance. This information is applied to an understanding of reference conditions and its relevance to park management is demonstrated.

Analyses of Long-term Kelp Forest Monitoring at Channel Islands National Park

David Kushner, Marine Biologist, Channel Islands National Park, Ventura, CA

Stacey Ostermann-Kelm, Program Manager, NPS IMD Mediterranean Coast Network, Thousand Oaks, CA

Tom Philippi, Quantitative Ecologist, NPS IMD, Fort Collins, CO

Channel Islands National Park has a long history of extensive natural resource monitoring, including over 25 years of kelp forest monitoring at a set of 32 sites spread across 5 islands. A collaboration between park, network, and Fort Collins-based staff has the dual goals of reducing the time and effort required for the production of annual reports and increasing the effectiveness of the reports in communicating results to park managers and interpreters. Graphs were developed for visual presentation of long-term changes in size distributions of individual species, and of species composition, including comparison across islands. Appropriate control charts were developed to rapidly communicate which species and sites are within their normal range (accounting for ocean temperature or ENSO effects), and identify species or sites that may require management attention. R scripts automate generation of these figures and tables, allowing the lead investigator to focus on discussing and interpreting the results.

"Swap Meet"

During this time slot, presenters from all 9 talks will be available to answer questions, further demonstrate their work, and share copies of their presentations and code or other tools. Such "swap meets" have been useful components of IMD data managers' meetings.

Session 86 • Rhythms III (2nd floor) • Invited Papers

Using GIS to Evaluate Park Resources

Chairs: Peter Budde, GIS Team Lead, National Park Service, Inventory & Monitoring Program, Fort Collins, CO

Neil J. Blodgett, GIS Specialist, National Park Service, Denver Service Center Planning Division, Lakewood, CO

Session overview: Available geospatial data and tools provide an invaluable resource for National Park Service program and park managers to objectively evaluate and report on conditions of park natural, cultural, and physical resources. Assessments commonly consist of a combined inventory of existing resources, potential stressors to resources at risk, and analysis of current status and trends in resource qualities. This session will highlight examples where system-wide approaches have been developed to report on resource conditions through the use of GIS methods and available regional and site-specific data sources.

Assessing Cultural Resources in the Wake of a Disaster

Deidre McCarthy, Historian, NPS, Cultural Resources GIS Facility, Washington, DC

Hurricane Katrina devastated the Gulf Coast and created the largest disaster for cultural resources in the US since the inception of the National Historic Preservation Act (NHPA) in 1966. The NHPA created the National Register of Historic Places and stipulates that any Federal undertaking which may adversely affect National Register eligible resources be mitigated. Beginning in 2006, at the request of FEMA, CRGIS created a strategy to help FEMA meet its NHPA obligations in New Orleans. Combining GIS and GPS, CRGIS constructed a methodology to identify and evaluate all potentially effected properties and determine their historic significance. The GPS documentation of resources, derived GIS data and method of review for NHPA was completely digital for the first time, reducing the typical assessment time from 90 to 14 days per resource. The methodology proved extremely efficient and the data generated will serve as a record to assess damage in future disasters.

Use of GIS to Evaluate Sensitivity of I&M Parks to Effects from Atmospheric Nitrogen Deposition

Tim Sullivan, Biological Scientist, E&S Environmental Chemistry, Inc., Corvallis, OR

T.C. McDonnel, E&S Environmental Chemistry, Inc., Corvallis, OR

G. T. McPherson, E&S Environmental Chemistry, Inc., Corvallis, OR

E. Porter, National Park Service, Air Resources Division

S.D. Mackey, E&S Environmental Chemistry, Inc., Corvallis, OR

D. Moore, E&S Environmental Chemistry, Inc., Corvallis, OR

Nitrogen (N) deposition from air pollution can alter plant and algal communities in parks, reducing biodiversity. Effects have been most convincingly demonstrated for arctic and alpine herbaceous communities, meadows, wetlands, and arid or semi-arid lands. A GIS approach is used to analyze and map three factors to assess the level of risk at national parks: N pollutant exposure, inherent ecosystem sensitivity, and park protection mandates. National parks and networks are then ranked according to each of these themes. An overall risk ranking is calculated based on averages of the three theme rankings. Networks that showed highest risk included four western mountain networks (Sierra Nevada, North Coast and Cascades, Greater Yellowstone, and Klamath), one wetland dominated network (South Florida/Caribbean), one desert network (Mojave Desert), and the Great Lakes Network. These results constitute a first approximation of overall ecosystem risk in response to nutrient enrichment from atmospheric N deposition.

Renewable Energy and Landscape Alteration Surrounding U.S. National Parks

Susan McPartland, GIS Specialist, NPS, Intermountain Region Geographic Resources Program, Lakewood, CO

Jordan Hoaglund, NPS Intermountain Region, Lakewood, CO

With the rapid increase of renewable energy production, a key question of where such development is taking place is raised. The National Park Service (NPS) is one agency which currently finds itself grappling with difficult managerial decisions concerning renewable energy development. The alteration of landscapes visible from or associated with National Parks is highly likely to occur as renewable energy development expands throughout the U.S. The question then becomes how will renewable energy structures visually impact a landscape and in turn, will those impacts affect NPS park visitors? Two projects highlight how that question can be addressed using a combination of Geographic Information Systems (GIS) and social sciences. The first project addresses how GIS can be used to anticipate landscape alterations and the second on how GIS and social sciences can be used together to ask and answer questions about visitor experience.

Development of Protocols Using NAIP Imagery for Temporal Change Analysis in Grand Teton National Park

Kathryn Mellander, GIS Coordinator, Grand Teton National Park, Moose, WY

The GRTE GIS Office will partner with the University of Wyoming in developing techniques for temporal change analysis of critical habitats in the park. The protocols developed from this project are to be used in-house at GRTE. We will be using temporal sets of no-cost NAIP imagery for the project, rather than satellite imagery, because of its higher spatial resolution and the addition of the near-infrared band in flights since 2000. Although the overall project goal is to have a suite of techniques to use remotely sensed data for determining the effects of climate change, this project will include specific and immediate areas of interest for resource management in the park, including change analysis in alpine and subalpine habitats (in particular, areas of whitebark pine and movement in the alpine/subalpine interface), and possibly characterization of changes in sagebrush steppe areas. The work is to be done during Spring and Summer, 2011. The presentation will include the overall project work plan, and examples in trial areas of analytical techniques using the NAIP imagery.

Mapping Mercury Vulnerability of Aquatic Ecosystems across NPS I&M Program Parks

Michelle Lutz, Physical Scientist, USGS Wisconsin Water Science Center, Middleton, WI
D. Krabbenhoft, USGS Wisconsin Water Science Center, Middleton, WI
N. Booth, USGS Wisconsin Water Science Center, Middleton, WI
M. Fienen, USGS Wisconsin Water Science Center, Middleton, WI

About 20 years ago, researchers at a few locations across the globe discovered high levels of mercury in fish from remote settings lacking any obvious mercury source. We now understand that atmospheric deposition is the dominant mercury source, and that mercury methylation is the key process that translates low mercury loading rates into relatively high bioaccumulation/exposure levels. Literally no aquatic ecosystem is protected from this seemingly ubiquitous problem, yet site-specific information on methylmercury (MeHg) levels is rare. To fill this information gap, the USGS and NPS have constructed a model that predicts surface water MeHg concentrations across NPS parks using general information on water quality and land cover (pH, dissolved organic carbon, sulfate, and wetland abundance). This presentation will show the model results and introduce the interactive web tool that will be available to NPS managers to understand the relative likelihood that methylmercury may be problematic at their location.

Session 87 • Edgewood A/B (4th floor) • Panel Discussion

Making Science Relevant for Parks and People

Chairs: Mike DeBacker, Network Program Manager, Heartland I&M Network, Republic, MO
Sherry Middlemis-Brown, Biologist–Information Specialist, Heartland I&M Network, Lake Linden, MI

How do I&M networks increase science literacy to enhance understanding of potential threats to park resources and an appreciation for preservation of those resources? Panel members frame challenges and highlight successes in science communication between a network and parks. We provide specific examples from the Heartland I&M Network regarding use of the network-park partnership in interpreting science in predominantly cultural parks, facilitating interdivisional collaboration, and connecting schoolchildren to real world management questions. The same methodology that effectively informs the public about local park issues applies to global issues, such as climate change. By taking scientific information and making it relevant to park visitors and partners, and integrating that information into school curricula, we develop people's connection to park resources. Connecting inventory and monitoring results to place, park resources, and visitor experience will help managers attain the goals of their individual parks and the NPS.

Presenters: Mike DeBacker, Network Program Manager, Heartland I&M Network, Republic, MO
Sherry Middlemis-Brown, Biologist–Information Specialist, Heartland I&M Network, Lake Linden, MI
Diane Eilenstein, Park Ranger, George Washington Carver NM, Diamond, MO
Theresa Johnson, Science Teacher, Miller High School, Miller, MO
Erica Cox, Education Specialist, Missouri State University, Springfield, MO
Meg Plona, Biologist, Cuyahoga Valley National Park, Brecksville, OH

(Note: The late David Larsen, NPS Interpretation and Education Training Manager, Harpers Ferry Center, Harpers Ferry, WV, was to have presented in this session. As part of our panel, we will show portions of a video presentation David made in preparation for this session. The panel organizers wish to acknowledge his contributions to our work and would like to dedicate the session to his memory.)

Session 88 • Evergreen (4th floor) • 2-hour Workshop

Phenology Monitoring in Protected Areas: Networking to Improve Communication, Coordination and Collaboration

Chairs: Jake Weltzin, Executive Director, USA National Phenology Network, Tucson, AZ

Brian Mitchell, Network Program Manager, Northeast Temperate Network, Woodstock, VT

Changes in phenology—the timing of life-cycle events such as flowering, nesting, and migration—serve as local indicators of regional or global climate change. Because phenology is critical to the function of nearly all ecological systems, and because it is easy to observe, it provides an excellent framework for place-based monitoring (as well as education and outreach) within and across protected areas. Although an increasing number of phenology-related programs and activities are being initiated within protected areas across the country, coordination between protected area units has been limited. Join this meeting to network with representatives from protected areas and NPS monitoring networks who have initiated, or are considering initiating, phenology monitoring. Our goal is to facilitate communication, coordination and collaboration to minimize duplication and maximize consistency. The session consists of short informal introductions to projects or ideas and break-out group discussions. Participants are also encouraged to attend the related invited paper session on phenology.

Session 89 • Oakley (4th floor) • 2-hour Workshop

Natural Resource Information Portal: NPSpecies Workshop

Chair: Alison Loar, Functional Analyst, National Park Service Inventory & Monitoring Program, Fort Collins, CO

NPSpecies is a key component of the Natural Resource Information Portal (NRInfo), accessible at http://nrinfo.nps.gov, and it serves as the primary NPS database for managing information on the presence and status of species in NPS units. NPSpecies has undergone a complete redesign as it has begun the transition to the NRInfo Portal, and it now offers many new and easy-to-use functions and reports. This session will provide an overview of major features of NPSpecies in the NRInfo Portal, then will address specific components such as taxonomy, observations, vouchers, match lists, and basic statistics such as species richness reports. Ample time will be provided for questions, answers, and live demonstrations.

Special Evening Sessions • Tuesday, March 15 • 7:30–9:30

The BP Oil Spill Response: Reflections from Two Agency Directors (7:30–8:30)

Moderator: Gary Machlis, Science Advisor to the Director, National Park Service, Washington, DC

Presenters: Jonathan B. Jarvis, Director, National Park Service, Washington, DC

Marcia McNutt, Director, U.S. Geological Survey, Reston, VA

Jon Jarvis and Marcia McNutt will share their thoughts on the response of their respective agencies to the Deepwater Horizon Gulf oil spill of 2010. Both directors spent considerable time in the region after the spill, and will share with us their perceptions of the strengths and weaknesses of the federal response of USNPS and USGS.

The NPS Science Initiative: A Dialogue on Progress (8:30–9:30)

Gary Machlis, Science Advisor to the Director, National Park Service, Washington, DC

The NPS has embarked on a Science Initiative to advance the role of science in the NPS, and the role of the NPS within the scientific community. The purposes of this workshop are to: 1) update interested GWS meeting participants on the Science Initiative, 2) describe proposed actions and projects that could be part of the Initiative, and 3) gather input from participants on how best to advance science within the NPS.

Session 90 • Napoleon A1/A2 (3rd floor) • Contributed Papers
Responding to Climate Change: Where We've Been, Where We Need to Go
Chair: Matthew T.J. Brownlee, Ph.D. Candidate, Clemson University, Clemson, SC

The History of Climate Science
Mary Foley, Regional Chief Scientist, National Park Service, Boston, MA
Scientific investigations of climate have for at least the last two centuries largely focused on trying to understand the mystery of ice ages and causes of climate. Scientists began to investigate and under the consequence of significant increases in atmospheric carbon dioxide over a hundred years ago. By the 1970's scientists were beginning to predict that an exponential rise in atmospheric carbon would drive global temperatures to levels not experienced for over 1000 years. But is has only been in the last few decades that scientists began a serious study of the implications of anthropogenic global warming. This paper looks at the development of climate science in the US and the world from late 1800's to the current emphasis of scientific inquiry with a general acceptance of the role of human activities and a move towards greenhouse mitigation, carbon sequestration and adaptation.

Climate Change, Management Decisions, and the Visitor Experience: The Role of Social Science Research
Matthew T.J. Brownlee, Ph.D. Candidate, Clemson University, Clemson, SC
Jeffery C. Hallo, Clemson University, Clemson, SC
Robert B. Powell, Clemson University, Clemson, DC
To balance the complexities of resource management, park officials often need relevant and timely field-based data to inform their decisions. During the last four decades, social science data from visitor studies have assisted managers dealing with the difficulty of interpretation design, park neighbor relationships, and visitor management plans. Today, NPS employees are confronted with the challenges of climate change interpretation and communication for a visiting audience who holds diverse views about the phenomenon of climate change. Therefore, well-conducted studies that explicitly address visitors' perceptions of climate change can significantly inform park management decisions regarding public communication and interpretation. This presentation highlights visitor-related climate change situations in U.S. National Parks, and outlines how social science research currently and potentially contributes to addressing and adapting to climate change. Specifically, the presenter discusses the application of visitor studies to 1) climate change interpretative design, 2) climate change communication, and 3) the development of climate related policy.

Climate Friendly Park Employees, Part I: Overview of the IMR's Climate Change Training Assessment Project
Theresa Ely, Physical Scientist, National Park Service Intermountain Region, Natural Resources, Lakewood, CO
In 2009 the IMR partnered with the University of Arizona, School of Natural Resources and the Environment, to perform a Climate Change Needs Assessment Project. This project has assessed the climate change knowledge level of IMR employees and will recommend training for employees to increase their basic understanding and awareness of climate change science. By leveraging existing climate change information resources, the IMR plans to increase basic understanding and awareness of issues, and the ability of NPS IMR employees to accommodate rapidly changing science and information. This project has service-wide applicability as all job series were surveyed providing a baseline of training needs relevant to program areas. The overview will provide project background, discuss the partnership with the university and an IMR Core Team, the types of surveys conducted and survey results.

Climate Friendly Park Employees, Part II: Recommendations for Intermountain Region Climate Change Training
Gregg Garfin, Assistant Professor, University of Arizona, School of Natural Resources and the Environment, Tucson, AZ
Mabel Crescioni-Benitez, Research Associate, University of Arizona School of Public Health, Tucson, AZ
Holly Hartmann, Director, University of Arizona Arid Lands Information Center, Tucson, AZ
Lisa Graumlich, Dean, University of Washington College of the Environment, Seattle, WA
Jonathan Overpeck, Co-Director, University of Arizona Institute of the Environment, Tucson, AZ
University of Arizona assessed climate change training needs for 5,000+ employees in the NPS Intermountain Region. Baseline assessment of climate literacy, information technology, and learning preferences suggests a mighty task: to cover topics from

greenhouse gases to global atmospheric circulation to local impacts, mitigation and adaptation actions, with communication strategies for addressing skeptical employees and publics, in a nutshell, and accommodating a strong employee preference for in-person small group sessions, on a shoestring budget! To meet diverse needs, within fiscal constraints, we recommend a flexible and modular program, leveraging existing climate change information resources. We present a decision tree, with multiple pathways for employees to garner knowledge, based on job duties and degree of exposure to the public. We discuss these aspects: transparent communication of uncertainties and common misconceptions; emphasizing adaptation to many scales of climate variability; communicating economic advantages of sustain part 2 able management; train-the-trainer program; increased communication across NPS jobs.

Policy Directions for Climate Change and Protected Areas in Canada: A Perspective from Parks Canada

Catherine Dumouchel, Manager, Policy, National Parks Directorate, Parks Canada Agency, Gatineau, QC, Canada
Karen Keenleyside, Senior Advisor, Ecological Restoration, Parks Canada Agency, Gatineau, QC, Canada
Donald McLennan, National Ecological Integrity Monitoring Ecologist, Parks Canada Agency, Gatineau, QC, Canada
Marlow Pellatt, Coastal Ecologist, Parks Canada Agency, Vancouver, BC, Canada
Stephen Woodley, Chief Scientist, Parks Canada Agency, Gatineau, QC, Canada
Mike Wong, Executive Director Ecological Integrity, Parks Canada Agency, Gatineau, QC, Canada

Increasingly, individual countries, the scientific community, and conservation organizations are recognizing that healthy, well-managed ecosystems, including protected areas, are an essential part of the response to climate change. Actions that enhance ecosystem resilience also enhance the capacity of these systems, and the communities and economies that depend on them, to adapt to change. In refining its own policies, Parks Canada is bringing focus to the importance of ecosystem-based adaptation approaches that include a key role for well-connected, well-managed, resilient networks of protected areas. As the Agency examines how its programs can adapt to climate change, it is also identifying policy options to enhance the potential role of protected area establishment, monitoring and restoration in supporting Canada's resilience and adaptive capacity more broadly. While maintaining a focus on protected areas' contribution to climate change adaptation, Parks Canada is also evaluating potential synergies between actions that contribute both to climate change adaptation and mitigation through, for example, carbon storage and sequestration.

Session 91 • Napoleon B1 (3rd floor) • Contributed Papers

Human Dimensions of Wildlife Management

Chair: John Waithaka, Conservation Biologist, Parks Canada, Gatineau, Quebec, Canada

Swimming with the Manatee: Rethinking Policy of a Protected Species?

Joel McCormick, Ph.D. Student, University of Florida, Gainesville, FL
Stephen Holland, Associate Professor, University of Florida, Gainesville, FL

Studies suggest that recreational swimming programs with manatee may threaten the survival of this endangered species. Citrus County is the only place in the US that allows swimming with the manatee and annually attracts 100,000 tourists participate in "swim-with" the manatee programs. Environmental groups are filing a law suit demanding an end to manatee swim programs. This study compares 35 years of recorded manatee fatalities (1974 to 2009). Data was analyzed using descriptive statistics and T-test. The west coast (that allowed swim programs) had statistically fewer manatee fatalities even though they had more registered water craft and higher population levels in the study area. Results may be explained by Rational Choice Theory. The economic benefits to the people living on the west coast study area may help explain why it is in their best interest to protect manatees. More research in this area is strongly suggested.

Appealing to the Moderates in Issues of Animal Eradication: Lessons Learned from Point Reyes National Seashore

Natalie Gates, Chief, Natural Resource Management, Point Reyes National Seashore, Point Reyes, CA
Anthony DeNicola, President, White Buffalo Inc., Moodus, CT

Between 2007 and 2009, Point Reyes NS managers and contracted staff successfully removed 142 axis deer (*Axis axis*) and 536 European fallow deer (*Dama dama*) from the Seashore. The program effectively extirpated axis deer and resulted in a remnant, non-reproductive herd of fallow deer. Land managers worldwide are weighing whether to implement animal eradication programs to conserve native biodiversity. Historically, eradication projects have posed a high risk of failure for a variety of reasons, ranging from species-specific biological and logistic difficulties to political and sociological pressures. This case study demonstrates how biological obstacles can pale in comparison with sociological ones. Lessons were learned in tailor-

ing public outreach and targeting education to those stakeholders who were most receptive. Although viewpoints on either extreme of the opinion spectrum tended to generate headlines and sound bites, park resource objectives were best served by communication and education of the "middle ground."

Identifying Common Ground in California Condor Recovery

Daniel George, Condor Program Manager, Pinnacles National Monument, Paicines, CA

Jim Petterson, Lead (Pb) Awareness Outreach Specialist, Pinnacles National Monument, Paicines, CA

Captive breeding of California condors has been extraordinarily successful – more condors are now hatched in captivity each year as were in the world at the low point of the population in 1982. Condor biologists have developed effective techniques to release captive-reared condors into the wild and facilitate re-establishment of wild nests, dispelling fears in the 1980s and 1990s that captive reared condors would lose the skills necessary to survive in the wild. The basic mechanisms for re-establishment of the species have thereby succeeded. The primary challenges that remain in condor recovery are those of ecological interactions in landscapes utilized by both humans and condors. Pinnacles National Monument has been working for several years on outreach efforts related to non-lead ammunition and is now broadening collaboration between private land owners, agencies, and independent organizations to celebrate and retain working rural landscapes that both condors and humans depend upon.

Understanding Motivations for Illegal Transport and Release of Wild Boar Adjacent to the Great Smoky Mountains National Park

Elizabeth Baldwin, Assistant Professor, Clemson University, Clemson, SC

Matthew Brownlee, Clemson University, Clemson, SC

Jeffry Skibins, Clemson University, Clemson, SC

Parks do not exist in a vacuum and there have been calls from both park managers and scientists to focus more on management and research strategies to understand natural and social factors from the border out. Recently, feral pigs exhibiting domesticated features have been documented in the Great Smoky Mountains National Park. Additionally, park officials have been alerted to alleged illegal transport and release of feral pigs on lands bordering the park. This artificial stocking raises concerns of brucellosis and pseudo-rabies contamination to park wildlife and agricultural swine in adjacent counties. An exploratory study was conducted with experts in the region to build an understanding of the motivations for unwanted behavior related to wild boar. Semi-structured, in-depth interviews were conducted with wildlife experts, community members, outdoor recreation professionals, and resource management professionals (n = 7). Findings suggest reasons for transport and release, as well as other related social drivers.

Session 92 • Napoleon B2 (3rd floor) • Invited Papers

Fire and Resource Management: Tools and Techniques for Better Fire and Resource Management Decisions

Chairs: Richard Schwab, National Burned Area Rehabilitation Coordinator, National Park Service, National Fire Management Program Center, Boise, ID

Bill Yohn, Fire Management Specialist, National Park Service, National Fire Management Program Center, Boise, ID

Session overview: The fire management community is on the leading edge of developing fire tools that will benefit the resource manager in order to make informed decisions.

Techniques Developed to Improve the Accuracy of Monitoring Trends in Burn Severity (MTBS) Data Products

Eric Gdula, Fire GIS Specialist, Grand Canyon National Park, Grand Canyon, AZ

Monitoring trends in burn severity (MTBS) data provides an excellent means of mapping burn severity. Grand Canyon National Park has developed methods for improving the accuracy of the severity product that the MTBS program provides. Methods discussed will include the following: Evaluation and cautions about the initial assessment product. Techniques for mapping first entry fires in varying vegetation types as well as fires which are a combination of first entry and second entry burns. Methods for mapping second entry fires with a short fire return interval between fires. Lastly, techniques for mapping fires which are entirely second entry, but have multiple time intervals between the first and 2nd entries.

Using Landsat Imagery to Create Historic Fire Atlases within the Southeast Region

Joshua Picotte, GIS Fire Specialist, Tall Timbers Research Station, Tallahassee, FL

Although Monitoring Trend in Burn Severity (MTBS) is currently mapping the burn perimeters and severity of all fires >450

acres in size using Landsat satellite imagery, the great majority of prescribed and wildfires that occur within southeastern National Parks are smaller than the MTBS area cutoff. Accurate burn severity estimates of these smaller fires are needed to improve the ability of managers to assess the landscape level effects of fire on pyrogenic ecosystems. To fill this unmet need of the southeastern National Parks, we have created fire atlases that provide burn perimeter and severity imagery for each of the (100-450 acre) mappable 1984-present fires. We have also drafted guidelines for the proper use of burn severity imagery that clearly defines the limitations in using burn severity imagery within the Southeast. We expect that burn severity imagery will be widely used in the future in research applications and land management decisions.

Using National Park Service Lightning Climatology to Better Understand Wildfire Management Opportunities

Bill Yohn, Fire Management Specialist, National Park Service National Fire Management Program Center, Boise, ID

The new guidance for implementation of Federal Wildland Fire Policy gives wildland fire managers increased opportunities to manage wildfires for multiple objectives. However, the number and types of resources necessary to manage this workload is based on the previous model of entire wildfires either being "good" or "bad." Characteristics of today's workload that differ are; the duration of wildfires managed for multiple objects are often longer, there is an increased number of wildfire being managed for multiple objectives simultaneously, and fires maybe located in closer proximity to areas with values at risk since portions can be managed for protection objectives while other portions are managed for benefits. During this period when the skills of the workforce are transitioning, it is particularly important to understand the comparative climatology of lightning occurrence across the NPS because the skilled positions are often shared and the best opportunities for successful management should be selected.

How Quickly Can a Hoodoo Form? Measurements of Severe Erosion Following Fires at Bryce Canyon

Sean Eagan, Chief of Resources Management, Bryce Canyon National Park, Bryce, UT

Bryce staff constructed 15 erosion fences before the 2010 monsoon season to measure soil loss in the 2009 Bridge wildfire, the 2008 Puma prescribed burn and a control site. Several intense thunderstorms hit the burned area, including one which delivered 1" of rain in 45 minutes. Erosion rates were in the 10-35 tons per acre range which is at least one order of magnitude above soil development rates. Down watershed observations include: a 15-foot deep gully, a 12-inch thick layer of new sediment covering several acres and a small drainage that carried above 2,000 cfs. Bryce Canyon has erodible soils derived from the Claron formation, a monsoon rainy season and vegetation which supports periodic fire. This presentation will examine the hypothesis that severe erosion caused by the combination of wildfire and thunderstorms creates hoodoos in bursts of activity every few hundred years.

Management Prioritization of Wilderness Fires Using Lightning Fire Ignition Distribution Analyses

Kent Van Wagtendonk, Geographer, Yosemite National Park, El Portal, CA

Fires in Yosemite National Park burn across the landscape in many vegetation and elevation zones. Fire records dating from 1930 to 2010 have been used to determine the spatial distribution of lightning ignitions in the park. A density analysis of all lightning starts provided an interesting landscape pattern as a basis for this investigation. Evaluating variables such as vegetation type and density, fuels, slope, elevation, aspect, and duration of snow pack assisted in determining what factors affected the distribution of lightning starts in Yosemite. When lightning does ignite fires, park managers have to prioritize which fires to manage in the Wilderness or to suppress. This analysis will provide park managers with a means to prioritize management of ignitions based on the historic distribution of starts, in addition to other external factors such as current and forecasted weather, natural and cultural resources concerns, and overall fire resource availability.

Session 93 • Napoleon B3 (3rd floor) • Contributed Papers

Engaging Youth

Chair: Lavell Merritt, Jr., ProRanger Program Manager, National Park Service, San Antonio College, San Antonio, TX

Beyond Outreach: Practicing Deep Engagement in Youth Programming

Rebecca Stanfield McCown, Graduate Research Assistant, University of Vermont, Burlington, VT
Daniel Laven, Management Assistant, National Park Service Conservation Study Institute, Woodstock, VT
Robert Manning, Professor, University of Vermont, Burlington, VT
Nora Mitchell, Director, National Park Service Conservation Study Institute, Woodstock, VT

Research has found consistent and substantial evidence of the underrepresentation of people of color in national parks and has

identified potential reasons for this underrepresentation and barriers to participation. However, there has been limited research on cases where the National Park Service (NPS) has begun to successfully engage diverse audiences, particularly youth. This study examined how programs at two study areas were successful at engaging youth of color. Using qualitative interviews to examine seven programs from Santa Monica Mountains National Recreation Area and Boston Harbor Islands National Recreation Area, this study developed a model of "deep engagement". The model highlights six processes through which parks can engage diverse and traditionally underserved audiences. This paper reviews these processes and suggests how park staff can use study findings to successfully develop and implement diversity programs.

Stewardship 101: An Evaluation of the Great Smoky Mountains National Park Junior Ranger Program

Susan Vezeau, Social Scientist, Yosemite National Park, El Portal, CA
Robert. B. Powell, Department of Parks, Recreation, and Tourism Management, Clemson University, Clemson, SC
Marc J. Stern, College of Natural Resources Virginia Tech University, Blacksburg, VA

This presentation highlights results from the Great Smoky Mountains National Park Junior Ranger program evaluation, implemented to examine the program's effectiveness in improving awareness and interest in park resources and promoting stewardship attitudes and behaviors among youth participants ages 8-13 and their accompanying parents or guardians. Results suggest that the program is successful at positively enhancing the visitor experience, improving awareness, interest, and engagement toward park resources and positively influencing attitudes, in-park behaviors and behavioral intentions associated with stewardship. The evaluation provided evidence that awareness, interest, engagement, attitudes, subjective norms, and empowerment are positively correlated with stewardship behaviors. Participants, both children and adults, reported almost universal immediate positive effects on all outcomes under investigation and six months after attending the program, children reported retaining increases in awareness, attitudes, empowerment, and in-park behaviors. The results of the study provide a basis for programmatic improvement and management implications will be discussed.

Technology in Parks: Using Underwater Remotely Operated Vehicles (ROVs) to Explore and Educate

Laurie Harmon, Assistant Professor, George Mason University, Manassas, VA
Mark Gleason, Chief Marine Scientist, Great Lakes Naval Memorial and Museum, Muskegon, MI

Increasing challenges of getting youth to care about the outdoors are associated with the challenge of getting them outdoors. One time competitor is their interest in technology-related activities, e.g. online activities, gaming, and television (Kaiser Family Foundation, 2010). In this paper, we will share previous research and programs where underwater remotely operated vehicles (ROVs) were used to educate youth and adults on the importance of protecting underwater natural resources. Since 2004, we implemented and systematically assessed over thirty ROV public education programs from the Great Lakes to Chesapeake Bay. Participants operated ROVs in underwater parks and protected areas, e.g. Thunder Bay National Marine Sanctuary, Chesapeake Bay, or observed underwater exploration via national broadcasts from dive sites. As a result of participation, individuals became connected to, expressed pro-environmental attitudes toward, and indicated a propensity to engage in protective behaviors toward those places upon completion of the program.

Rocky Mountain National Park Eagle Rock Internship Program: A Productive Partnership for Youth Engagement

Ben Baldwin, Research Learning Specialist, Rocky Mountain National Park, Estes Park, CO
Jon Anderson, Instructor, Eagle Rock School, Estes Park, CO
Judy Visty, CDRLC Director, Rocky Mountain National Park, Estes Park, CO
Ben Bobowski, Chief of Resource Stewardship, Rocky Mountain National Park, Estes Park, CO

The Eagle Rock (ER) Internship Program is a collaborative partnership between Rocky Mountain National Park and Eagle Rock School and Professional Development Center, a purposefully diverse residential high school located in Estes Park, Colorado. This internship program focuses on bridging the critical years between high school and college when students are making decisions that will influence their career choices. Students receive hands-on experience, connections to the existing workforce, and active mentoring as they begin their working relationship. The ER Internship Program begins with a volunteer (service learning) experience, followed by a full-time, paid, temporary position at the park, complemented by professional development training. Its innovative educational and development program emphasizes active, interdisciplinary, experiential learning. The ER Internships develop opportunities for students to connect with national parks, fosters student interest in science and public lands, and ultimately provides a path for students to pursue careers in the National Park Service.

The Rocky Mountain Sustainability and Science Network: A Partnership Using Public Lands and Student Internships to Engage Diverse Students in Science

Gillian Bowser, Research Scientist, Colorado State University, Fort Collins, CO

Mark Brown, Colorado State University, Fort Collins, CO

The Rocky Mountain Sustainability and Science Network is a research coordinated network (RCN) funded by the National Science Foundation. This RCN focuses on undergraduate biology education and the retention of under-represented students in the sciences using public land internships and informal learning. The goal of the network is to create global leaders in sustainability and science who understand the challenges facing parks and protected areas under climate change. The network uses an intensive academy with the USA National Phenology Network (USA-NPN) to introduce students to sustainability, science concepts and informal data collection. Students are then placed in summer internships on public lands. A blog and participation in the USA-NPN database were used to encourage collaboration and discussion of the students' summer experiences. The introduction will discuss the network and its relationship to the Rocky Mountains CESU. The panelists will spend 10 minutes each talking about RMSSN and USA-NPN efforts.

Session 94 • Southdown (4th floor) • Invited Papers

Kwáavichuyam 'ókkiwuntum—Pechanga Tribe's Models to "Preserve and Protect" Cultural Resources

Chair: Lisa Woodward, Archivist, Pechanga Cultural Resources Department, Temecula, CA

Session overview: The Cultural Resource Department for the Pechanga [Pe-chong-ga] Band of Luiseño Indians was established to house a number of programs that support and perpetuate tribal self-determination. The department's current projects include, cultural resource management, heritage preservation, language revitalization, artifact curation and the creation of an in-house archival collection and library. The Tribe's GIS Department has become an integral partner with the Pechanga Cultural Resources Department. For instance, the development of the Luiseño territory map, created from tribal knowledge and ethnographic resources, has become a nexus for defining the traditional landscape. As southern California continues to be devoured by expanding development, these projects become invaluable tools for advancing our mission to protect and preserve Luiseño cultural heritage

Cultural Applications Using GIS

Shelly Knight, GIS Director, Pechanga Tribal Government, Temecula, CA

The practical applications of GIS to Tribal Cultural Resources management will be discussed in relation to mapping traditional place names, archaeological sites, and landscapes. A demonstration of GIS tools will be presented using Flex Dashboard software.

Preservation through Defining the Cultural Landscape in Southern California

Jim McPherson, Monitor Supervisor, Pechanga Cultural Resources Department, Temecula, CA

For years archaeology has been defining what is significant while conducting CRM work in California. As this process is project specific it has resulted in many "Archaeological Sites" being labeled as "temporary camp sites" or "seasonal use areas" without regard to the larger picture. Nobody connects the dots. We hope to demonstrate that by taking control of the information Native Americans can begin to impact the process and have a say in what is "significant."

The Process of Mapping Traditional Properties Using Ethnographic and Historic Resources

Lisa Woodward, Archivist, Pechanga Cultural Resources Department, Temecula, CA

Traditional place name information can be found in anthropological sources on southern California Tribal communities. Additional sources can assist in the research of these locations, such as; historic maps, government land office records, photographs, and ethnographic songs and stories. These resources help to pinpoint the localities and strengthen their importance as traditional places.

Museum Best Practices vs. Native American Values in Collections Management

Teresa Lorden, Curator, Pechanga Cultural Resources Department, Temecula, CA

Museum best practices and collections care often conflicts with traditional Native American values. This talk will deal with the ways in which the Pechanga Cultural Resource repository balances these two perspectives.

Preservation Challenges from a Native American Perspective

Paul Macarro, Coordinator, Pechanga Cultural Resources Department, Temecula, CA

The Pechanga Cultural Resources Department works with multiple lead agencies and has to constantly reinvent and redefine what is culturally significant. The mitigation process does not guarantee preservation of cultural areas. Even if an area is preserved, how will it protected and cared for in a respectful manner.

Session 95 • Gallier A/B (4th floor) • Invited Papers

Managing Cultural Resources Along the River's Edge

Chair: Frances McMillen, Landscape Historian, National Park Service, National Capital Region, Washington, DC

Session overview: The National Capital Region of the National Park Service is home to some of the most iconic landscapes and historic sites in the country—from the Lincoln Memorial to the Civil War battlefields of Antietam and Manassas. Some of the region's lesser known sites are located along the Shenandoah and Potomac Rivers. Once the source of life and livelihood in the region, they are now the greatest threats to riverside cultural resources. This session explores the issues facing three parks located along these waterways: Theodore Roosevelt Island, the Big Slackwater section of the Chesapeake and Ohio Canal, and Halls Island at Harper's Ferry, West Virginia. Pending threats of increased flooding, erosion and other effects of climate change, present recurring and unknown challenges in the planning and management of these cultural landscapes. Format: A brief introduction to three 25 minute papers. Each presentation will be followed by a 10 minute Q&A.

From Factory to Forest: A Cultural Landscape on the Shenandoah Riverfront, Harpers Ferry, WV

Deana Poss, Historical Landscape Architect, National Capital Region, National Park Service, Washington, DC

Halls Island, a once bustling industrial center is now a quiet riparian forest community in Harpers Ferry National Historical Park. Waterpower from the Shenandoah River fueled a constant evolution of industry and inventiveness on the island that helped shape the town of Harpers Ferry throughout the 19th century. From 1798-1861 Halls Island was the site of the first U.S. Rifle Factory, which grew to include up to forty workshops and dwellings at its peak. The Rifle Factory began as a workshop for noted inventor John H. Hall, a leader in arms manufacturing who pioneered the early development of mass production in America. Mature trees and herbaceous understory now screen the remaining factory ruins. This presentation explores how a cultural landscape report was used to extensively evaluate and document the island's landscape, and provide recommendations for a preservation methodology to balance interpretation of the industrial past with the reclaimed riparian forest of today.

DC's Island Sanctuary: Managing Nature and Culture on Theodore Roosevelt Island

Saylor Moss, Historical Landscape Architect, National Capital Region, National Park Service, Washington, DC

Theodore Roosevelt Island National Memorial is a tranquil, wooded oasis in the middle of the Potomac River between Washington D.C.'s lively Georgetown neighborhood and the high-rises of Arlington, Virginia. It has a dynamic history as a family farm, a training ground for Union troops, a Freedman's refugee camp and a Frederick Law Olmsted Jr.-designed forest, currently serving as a living monument to Roosevelt. Trees in the center of the island enshroud the largest memorial in DC, a statue of Roosevelt designed by Paul Manship. The near 90-acre island, accessed only by a pedestrian bridge or boat, was donated to the Federal Government in 1932. This session will discuss the challenges facing the NPS in the areas of archeological resource management, maintenance of an Olmsted Jr. landscape, interpretation of history, preservation of the quiet integrity of the site and the provision of visitor access in an ever-changing environment.

On the Waterfront: Managing a Cultural Landscape Along the Chesapeake & Ohio Canal

Sam Tamburro, Cultural Resource Program Manager, Chesapeake & Ohio Canal National Historical Park, Hagerstown, MD

In the summer of 2010, the 184.5-mile Chesapeake and Ohio Canal National Historic Park began a project to re-establish the Canal's historic towpath along a 2.5-mile section at Big Slackwater, located just north of Antietam National Battlefield. Big Slackwater is one of two places on the Canal where difficult topography prohibited constructing a canal channel in the 1830s. To bypass the terrain, the C&O Canal Company constructed a towpath on the bank of the Potomac River allowing boats to travel the river's impounded waters. The result is a dramatic cultural landscape that is unique along the C&O Canal. However, reoccurring river flooding has slowly reclaimed canal resources just as new recreational river uses have created new management challenges. This presentation explores the park's efforts to re-establish the towpath at Big Slackwater while balancing recreational uses and the need to retain the historic integrity of a cultural landscape.

C&O Canal Quarters Interpretive Program: Unlocking a Re-Usable Past for Park Visitors

Sam Tamburro, Cultural Resource Program Manager, Chesapeake & Ohio Canal National Historical Park, Hagerstown, MD

My paper focuses on the development of Canal Quarters, a new innovative interpretive pilot project at Chesapeake & Ohio Canal National Historical Park. The program, launched in November 2009, offers park visitors the rare opportunity to have an overnight interpretive experience in a historic lockhouse (see www.canalquarters.org). This program invites visitors to learn more about the legacy of the C&O Canal while being immersed in a canal company building and the history it embodies. Three historic lockhouses are currently in the program, which is a cooperative effort between the park and the C&O Canal Trust, a not-for-profit park friends group. My presentation will discuss the challenges and rewards of adaptive reuse of historic structures in National Parks, the nexus with park partners to manage cultural resources, and interpretive and educational objectives of the C&O Canal Quarters Program. The presentation will also cover lessons learned and the future of the program.

Session 96 • Nottoway (4th floor) • Contributed Papers

Wetlands

Chair: Rob Middlemis-Brown, U.S. Geological Survey (retired), Lake Linden, MI

Reestablishing Natural and Cultural Landscapes in U.S. National Parks Through Wetlands Restoration

Joel Wagner, Wetlands Program Leader, National Park Service, Natural Resource Program Center, Water Resources Division, Denver, CO

The National Park Service manages more than 16 million acres of wetlands, including marshes, swamps, peatlands and other shallow aquatic habitats. Their significance as biological and hydrologic resources and their recreational opportunities and cultural landscape contributions make wetlands an integral part of the visitor experience. Unfortunately, widespread drainage, dredging, filling and other modifications since colonial times have adversely affected thousands of acres of wetlands on NPS lands. Since the mid-1990's, the Water Resources Division's Wetlands Program has focused much effort on restoring degraded wetlands. This presentation reviews significant restoration projects at Sequoia NP, Grand Teton NP and other NPS units where primary benefits are to natural landscapes, functions and processes. It then reviews projects at Hubbell Trading Post NHS, Palo Alto Battlefield NHP, and other units where wetland restorations also contribute directly to the restoration of cultural landscapes and interpretation of the historic events that occurred there. "

Vegetation Restoration in Salt Marsh Dieback Areas Using Erosion Control Fabric (Cape Cod, MA)

Stephen Smith, Plant Ecologist, Cape Cod National Seashore, Wellfleet, MA

Salt marsh vegetation dieback from crab (*Sesarma reticulatum*) herbivory is a serious problem on Cape Cod. Continuous grazing by large populations of these crabs eventually cause plant mortality. This, in turn, has created large, barren areas of marsh that are highly susceptible to sediment loss through erosion. In fact, the deterioration of peat platforms and broader geomorphic changes have become widespread and quite severe over the last few decades. In 2010, studies were undertaken to assess whether erosion control fabric could be used to limit or prevent such losses. The basic premise was that permeable fabric with relatively small mesh size laid on top of denuded (bare sediment) areas would prevent the majority of Sesarma crabs from accessing the surface of the marsh and consuming the aboveground foliage of either transplants or new ramets spreading from adjacent stands. Initial results show that erosion control fabric permits normal plant growth to occur, while suppressing or completely preventing herbivory—thus allowing vegetation to thrive in dieback areas where grazing pressure is high. Variability in the results is mostly related to heterogeneity in grazing pressure among sites and the integrity of the exclusion walls surrounding the experimental plots. Notwithstanding, this method has the potential to aid in the preservation and eventual recovery of sizeable areas of denuded marsh.

Road to Restoring Prisoners Harbor Coastal Wetland, Santa Cruz Island, Channel Islands National Park

Paula Power, Ecologist, Channel Islands National Park, Ventura, CA

Joel Wagner, Wetland Scientist, NPS Water Resources Division, Denver, CO

Mike Martin, Hydrologist, Natural Resource Program Center Water Resources Division, Ft. Collins, CO

Kevin Noon, Wetland Scientist, NPS Water Resources Division, Denver, CO

Marie Denn, Aquatic Ecologist, Point Reyes National Seashore, Point Reyes Station, CA

Kate Faulkner, Chief Natural Resources Division, Channel Islands National Park, Ventura, CA

Prisoners Harbor, site of the largest backbarrier coastal wetland on the Channel Islands, was occupied by native people for 5,000

years until the 1810s. The wetland was filled by ranchers in the late 1800s to make way for sheep and cattle corrals and transportation. The associated stream which drains the central part of the island was channelized disconnecting it from the coastal wetland, and inadvertently causing erosion of the 5,000 year old village site. In 2005 the park proposed restoring the ecologic and hydrologic function to 3.1 acres wetland and 1 mile of riparian corridor by removing 10,000 yds of fill, the berm separating the creek from its floodplain, and 1800 invasive eucalyptus trees on land owned jointly by NPS and The Nature Conservancy. This presentation discusses the challenges of project planning and implementation.

"Ecads! (Salt Marsh Fucoid Algae): Ecosystem Engineers of North Temperate Marshes

Megan Tyrrell, Research and Monitoring Coordinator, Cape Cod National Seashore, Wellfleet, MA

Jennifer Burhkardt (no affiliation given)

At the seaward edge of some north temperate salt marshes, the biomass of fucoid algae exceeds that of *Spartina alterniflora*. We removed salt marsh fucoids from plots on the marsh platform to examine their effect on a suite of physical conditions that affect sediment dynamics as well as the biotic community. For many of the physical parameters, the differences between treatments were visible and dramatic. Salt marsh fucoids may be particularly important in reducing erosion and stabilizing banks, so we compared sediment deposition and relative flow on creek banks. We surveyed several Cape Cod marshes for salt marsh fucoids to gain an improved understanding of how widespread and applicable our results may be both within and between marshes. We conclude that salt marsh fucoids are understudied ecosystem engineers whose influence on important physical and biotic marsh processes in the lowest sections of north temperate marshes rivals that of *Spartina alterniflora*.

Session 97 • Oak Alley (4th floor) • Panel Discussion

Surviving Katrina: Historic Preservation and Recovery of the Gulf Coast—A Toolbox for Future Disasters

Chair: Hampton Tucker, Chief, Historic Preservation Grants Division, National Park Service, Washington, DC

In August of 2005, Hurricane Katrina swept across the Gulf Coast, displacing hundreds of thousands of residents and damaging or destroying historic properties and archeological sites throughout the Gulf Coast Region. In response to this disaster, in FY 2006 and 2007, Congress appropriated a total of $53 million from the Historic Preservation Fund to aid in the recovery of the thousands of historic properties ravaged by the storm. Since 2006, the National Park Service has worked in partnership with the Gulf Coast State Historic Preservation Offices to administer these funds and distribute them to the owners of damaged properties listed in or eligible for the National Register of Historic Places. Additionally, in Louisiana, the NPS Cultural Resources GIS Facility identified and evaluated all affected properties in Orleans parish. The lessons learned from these ongoing recovery efforts will serve as a toolbox for preservation professionals responding to future disasters.

Panelists: Jenifer Eggleston, Katrina Recovery Grants Administrator, National Park Service, Holly Springs, MS

Nicole Hobson-Morris, Executive Director, Louisiana State Historic Preservation Office, New Orleans, LA

Ken P'Pool, Deputy SHPO, Mississippi Department of Archives and History, Jackson, MS

Elizabeth Brown, Deputy SHPO, Alabama Historical Commission, Montgomery, AL

Deidre McCarthy, GIS Specialist, National Park Service, Washington, DC

Session 98 • Bayside A (4th floor) • Invited Papers

Promoting Health of All Species: One Health Demonstration Projects in the NPS

Chair: Kevin Castle, Wildlife Veterinarian, National Park Service, Fort Collins, CO

Session overview: Stewards of animal and human health face unprecedented challenges associated with emerging pathogens, climate change, loss of biodiversity, and changes in human interactions with the environment. An interdisciplinary "One Health" approach is needed that involves veterinarians, physicians, biologists, social scientists, public health experts, and environmental health professionals, working collaboratively to address health concerns associated with these complex issues. One Health fits seamlessly into management in the National Park Service (NPS) because it promotes health of all species and the environment. In this session, we will explore implementation of One Health demonstration projects in the NPS through presentation of five invited papers. Topics include improving health communication, understanding human health benefits gained from natural environments, and projects that integrate protection of human and wildlife health.

Evaluating One Health Communication of the NPS: A Case Examination of Plague Response at Grand Canyon National Park

Rich Stedman, Katherine McComas, Dan Decker, Laura Rickard, Darrick Evensen, Chris Clarke, Cornell University, Ithaca, NY

Chuck Higgins, NPS Office of Public Health, Washington, DC

David Wong, NPS Office of Public Health, Albuquerque, NM
Margaret Wild, NPS Biological Resource Management Division, Fort Collins, CO

The One Health Initiative of NPS seeks to improve health in all species. Implementation involves an interdisciplinary approach including not only multiple aspects of biological sciences but also social sciences. Because the One Health Initiative is so recent, little research has focused on indicators of effectiveness and how these differ across Parks with different risks, users, and management contexts. To explore an emblematic case of One Health, we examined the Grand Canyon National Park (GRCA) managerial and communication response to an NPS employee's death from plague after handling an infected mountain lion. Focusing on the communication and management of risk, we conducted in-depth interviews with NPS staff, community residents, and other affected parties, and held a two-day workshop with GRCA staff. We report insights into key elements associated with success of the response, the linkages between specific outcomes and the One Health Initiative, and applicability of this case elsewhere.

Communicating One Health

Darrick Evensen, Cornell University, Ithaca, NY
Dan Decker, Cornell University, Ithaca, NY
Rich Stedman, Cornell University, Ithaca, NY
Katherine McComas, Cornell University, Ithaca, NY

Two goals are integral to the National Park Service's mission: to protect natural and cultural resources and to enhance positive visitor experiences. Negative reactions to wildlife diseases around NPS units could lead to visitor disassociation from natural spaces or diminished support for wildlife conservation, thereby hampering NPS goals. One Health messages can address these potential negative impacts. The One Health concept affirms the interconnections between human, animal, and ecosystem health and well being. Optimally, communication could not only assuage concerns about disease, but also increase appreciation of wildlife. A case study of risk perceptions and reactions to Type E botulism in Sleeping Bear Dunes National Lakeshore reveals how park communication focused on One Health reduced community members' apprehension about interacting with wildlife while amplifying commitment to the local ecosystem and increasing willingness to take action to protect it. We discuss implications for NPS units seeking to communicate about One Health.

Rabies Prevention from a One Health Perspective

Amy Chanlongbutra, NPS Office of Public Health, Washington, DC
Kevin Castle, NPS Biological Resource Management Division, Fort Collins, CO

Although an ancient disease, rabies continues to threaten human and animal health. In the U.S., human cases of rabies have declined significantly from 100 or more per year at the turn of this century to about 2 or 3 per year; however, an estimated 40,000 people receive post-exposure prophylaxis annually. Animal cases have shifted dramatically in the last half century, from detection primarily in domestic animals to current outbreaks in several wildlife species. We will review current distribution of rabies strains in wildlife species, including a newly emergent strain in fox and skunks in northern Arizona. A One Health approach to education and disease prevention via vaccination in humans and animals currently provides the most effective means to manage the disease. We will discuss specific actions being taken to prevent rabies in employees and visitors as well as wildlife in the national parks.

NPS One Health Initiative: Effects of Exposure to Natural Sounds on Individual and Public Health

Karen Trevino, NPS Natural Sounds Division, Fort Collins, CO

Exposure to the sounds of nature is often an overlooked and poorly understood aspect of human health. Research has suggested links between exposure to natural sounds and a reduction in stress indicators such as blood pressure, skin conductance level (SCL), cognitive performance, and self reported stress levels. Noise on the other hand, has been associated with psychosocial effects such as annoyance, irritability, increased stress levels, heart rate and blood pressure increases and an overall decrease in cardiovascular health. This session describes research being conducted by the Harvard School of Public Health in cooperation with the Natural Sounds and Night Skies Division and Harvard Medical School to investigate the relationships between the acoustic stimuli and health. The study will focus on potential effects of exposure to natural sounds within a national park context on human physiology and overall health and well being.

An NPS One Health Disease Outbreak Investigation Team

Keven Castle, NPS Biological Resource Management Division, Fort Collins, CO

David Wong, NPS Office of Public Health, Albuquerque, NM
Adam Kramer, NPS Office of Public Health, Denver, CO
Each year, dozens of infectious disease case reports and outbreaks occur at National Park Service (NPS) units among humans, wildlife species, or both. Responding to these events often requires collaboration across multiple NPS divisions and outside agencies. In October 2008, the NPS Disease Outbreak Investigation Team (DOIT) was established by the NPS Office of Public Health and Natural Resource Program Center's Wildlife Health Program, to provide a formal NPS mechanism for investigating such adverse health events. The DOIT is a multi-disciplinary team rooted in the concept of One Health, which advocates cooperation between veterinary and human medicine to combat diseases that are shared between people and other animals to improve global health. Since its inception, the DOIT has been officially and unofficially invoked to investigate a number of disease outbreaks. This presentation discusses the roles of and triggers for the DOIT and presents a synopsis of two investigations.

Session 99 • Bayside B/C (4th floor) • Contributed Papers
Economics and Protected Areas

Chair: Frank J. Priznar, President/CEO, PRIZIM, Inc., Gaithersburg, MD

The Potential of Aguajal Concessions in the Peruvian Amazon for Profitable Conservation

Justin Taillon, PhD Candidate, Texas A&M University, College Station, TX
Chris Schalk, Texas A&M University, College Station, TX
Aguaje palms are dioecious trees in the Amazon Rainforest. These trees produce fruits known as aguaje, which are consumed by people and wildlife. People typically harvest the fruits by cutting down the female trees, which results in male biased sex ratios within populations. These current practices are not conducive to conservation, yet, aguaje palms lend themselves towards being a manageable product due to potential economic profitabilities of the resource. The Peruvian government has historically established concession areas for profitable natural resource usage including ecotourism, castaña (Brazil nut) harvesting, mining, and timber. A similar natural resource usage framework is proposed in this study. The proposed framework is based upon two data sources: a comparative quantitative study conducted between aguajales (palm swamps) in protected and unprotected areas in the Peruvian Amazon and semi-structured interviews conducted with people working in aguajales. A further study on economic benefits is proposed based upon these findings.

The Economic Impact of Canada's National, Provincial and Territorial Parks 2009

Erik Val, Director, Yukon Parks Branch, Yukon Environment, Whitehorse, Yukon, Canada
Over the last decade understanding the role of national, state, provincial and territorial parks in supporting regional and local economies has become increasingly more important. Park related spending by government and visitors produce economic impacts that are commonly measured in terms such as Gross Domestic Product, employment and wages, and tax earnings. Other related economic benefits are of a more personal nature that the individual gains from visiting and enjoying a park or simply knowing that they exist. Parks also provide larger scale societal benefits or "public goods" such as producing clean air and water. This paper will summarize recently completed economic impact research undertaken in 2009 by the Canada Parks Council, a national body of park agency directors from across Canada. The paper also will generally describe the economic model used to calculate these impacts; and, briefly will identify other ongoing efforts and challenges related to evaluating the personal and societal benefits associated with parks and other protected areas.

Protected Areas and Poverty Alleviation: Comparing Experiences in Canada, Tanzania, and Ghana

Rick Rollins, Professor, Vancouver Island University, Nanaimo, British Columbia, Canada
Rosaline Canessa, University of Victoria, Victoria, British Columbia, Canada
Sarah Poirier, University of Victoria, Victoria, British Columbia, Canada
Support for protected areas is derived in part from the perceived flow of benefits and costs to adjacent communities. This paper describes a 5-year research project comparing local support for protected areas in Ghana, Tanzania and Canada. In each country the issues are comparable but local context differs. The project is illustrated with research at Pacific Rim National Park in Canada, where reintroduction of sea otters into park waters has improved biodiversity. However this has resulted in a diminished sea urchin harvest through predation by sea otters. This cost is compared with possible tourism benefits, based on interviews with 390 wildlife viewers to the area. Results indicated higher visitor satisfaction (sustainable local tourism) when sea otters were observed. Further, attitudes and behaviors toward marine conservation were higher, but only when sea otter interpretation was provided.

Katmai National Park and Preserve Economic Significance Analysis

Ginny Fay, Assistant Professor of Economics, Institute of Social and Economic Research, University of Alaska–Anchorage, Anchorage, AK

Jim Stratton, Alaska Regional Director, National Parks Conservation Association, Anchorage, AK

Mary McBurney, Subsistence Program Manager, Katmai National Park and Preserve, Homer, AK

This study conducted an economic significance analysis of visitation to Katmai National Park and Preserve using a standard economic input/output model then compared the results to the NPS's Money Generating Model (MGM) methodology. The input/output model estimated that visitors spent nearly $51.2 million in Alaska, with almost one-quarter of that spent inside Katmai NPP a relatively high level of expenditure for a remote Alaska park. The visitor expenditures generated $75.5 million in total output and added a value of $38.3 million to the Alaska economy. The study's findings suggest that the current MGM model may significantly underestimate the economic contributions of park visitors to the state and local economies of Alaska. It also highlights the importance of utilizing a customized economic model using park-specific visitor data to create a more accurate picture of economic impacts of visitation to Alaska's national parks.

Ecosystem Services in Decision Making for Public Lands: A BLM Case Study

Kenneth Bagstad, Postdoctoral Associate, University of Vermont, College Station, TX

Robert Winthrop, Senior Social Scientist, U.S. Department of Interior, Bureau of Land Management, Washington, DC

Darius Semmens, Research Physical Scientist, U.S. Geological Survey, Rocky Mountain Geographic Science Center, Lakewood, CO

Joel Larson, Social Science Program Analyst, U.S. Department of Interior, Bureau of Land Management, Washington, DC

Ecosystem services are increasingly advocated as a framework to support conservation and resource management. Along with recreation, protected areas provide a host of other services valuable to both neighboring communities and distant beneficiaries. In this study, we evaluated emerging ecosystem services assessment tools to assist decision making for the Bureau of Land Management. Our case study site, the San Pedro River in Sonora and Arizona, is internationally recognized for its high biodiversity and ecological significance, and contains significant BLM, NPS, and Forest Service land. We evaluated ecosystem services identified as important by local stakeholders and scientists – those derived from water, biodiversity, carbon, and cultural values. We used primary valuation, value transfer, and the InVEST and ARIES modeling tools to map and value these services. Results of this work quantitatively demonstrate tradeoffs in ecosystem service provision under current conditions and alternative management scenarios. They also highlight the strengths and weaknesses of alternative assessment methods in different resource management settings.

Session 100 • Maurepas (3rd floor) • Contributed Papers

Next-Tech: Online Tools in Service of Parks, Protected Areas, and Cultural Sites

Chair: Melia Lane-Kamahele, Management Assistant, NPS, Pacific West Regional Office, Honolulu, HI

Using the Google Earth Plug-in for Viewing NPS GIS Information from within a Web Browser

Roland Duhaime, Research Associate IV, University of Rhode Island, Kingston, RI

Nigel Shaw, National Park Service, Boston, MA

We are developing an experimental web platform that allows users to employ the power of Google Earth to view spatial data of the National Parks in the Northeast Region from within their web browser. This technology allows park-wide or regional data layers to be displayed and attributes to be viewed within a 3D Google Earth Environment using a free browser plugin provided by Google. Example data layers include Park Boundaries, National LandCover data (Source: USGS), near real-time fire-potential data (Source: NASA and the Fire Information For Resource Management System), and real-time weather data (Source NOAA). Features of the application include the ability to share massive raster datasets (e.g. imagery can stream at various resolutions via the KML super-overlay) and use of the Google Earth tour functionality for park interpretation.

Blending iPhone/Android Apps and Citizen Science with Early Weed Detection to Better Serve Urban Parks

Irina Irvine, Restoration Ecologist, Mediterranean Coast Network and Santa Monica Mountains NRA, Thousand Oaks, CA

A free iPhone/Android app was developed in partnership with the Santa Monica Mountains National Recreation Area and UCLA researchers. The app enables iPhone/Android users to photograph invasive plants within the park, generates maps and transmits photos with embedded GPS coordinates to parks. Park staff verifies the data for tracking the presence and spread of invasives. Data and maps are available to the public online. This novel, high-tech approach works particularly well in urban

settings with ample cell phone coverage and visitation. App use has spread to 18 additional protected places. Data collection by the lay public, citizen scientists, volunteers and park staff expands the area that can be surveyed through invasive plant early detection programs. Preliminary app data collected in 2009/2010 detected new introductions and the spread of existing populations when compared to 2005 data. This technology will be incorporated into the Mediterranean Coast Network's invasive plant monitoring protocol.

Improving Scientific Communication through the Use of U.S. Geological Survey Video Podcasts

Michelle Moorman, Hydrologist, U.S. Geological Survey, Raleigh, NC
Douglas A. Harned, Supervisory Hydrologist, U.S. Geological Survey, North Carolina Water Science Center, Raleigh, NC
Gerard McMahon, Research Geographer, U.S. Geological Survey, North Carolina Water Science Center, Raleigh, NC

The effective communication of scientific information from scientists to resource managers, public officials, and the general public is a challenging task. Technologies such as video and audio podcasts are being used as an outreach tool to communicate complex scientific results from the U.S Geological Survey (USGS) National Water-Quality Assessment Program (NAWQA). The goals of these bi-lingual podcasts are to summarize scientific research and methods from the NAWQA program and share scientific results with decision makers and the wider public. Podcasts utilize video clips to illustrate important scientific results and concepts in simple language during brief 3-5 minute broadcasts. Creating concise messages that convey technical information helps improve the understanding of research findings, but the production process requires significant time, expertise, and resources. Feedback suggests that the podcasts are an effective means to reach out beyond the scientific community for the purpose of sharing scientific results with the wider public.

Bringing the Field Inside: Challenges and Lessons about Science Writing Online

Susan Simpson, Science Communication Biological Technician, National Park Service, Great Smoky Mountains NP, Gatlinburg, TN

"Dispatches from the Field" is an online publication at Great Smoky Mountains National Park. It started as a way to inform other park employees, partners, and the public about resource management and science. Its goal: bring people into the (virtual) field to not only see novel science and discoveries, but also reveal the everyday questions and decisions behind the science that makes our parks (and many protected lands) function. Over two years the design has been adapted in response to usage statistics and feedback from user groups including park managers, educators, and law enforcement rangers. Along the way the project also sparked complementary multi-media tools to increase awareness of park science. This presentation details some lessons learned in making online content intriguing, accurate, and relevant to multiple audiences, as well as how working within online content management systems can meet the high-tech, social-media-centered demands of the public today.

The Wiki Approach to Keeping National Parks and Protected Areas on the Global Map

Charles Besancon, Head of Protected Areas Programme, UNEP-WCMC, Cambridge, United Kingdom
Craig Mills, WDPA Manager, UNEP-WCMC, Cambridge, United Kingdom
Arianna Granziera, WDPA Content Officer, UNEP-WCMC, Cambridge, United Kingdom
Amy Milam, WDPA Content Officer, UNEP-WCMC, Cambridge, United Kingdom
Bastian Bomhard, Senior Programme Officer, UNEP-WCMC, Cambridge, United Kingdom
Colleen Corrigan, Senior Programme Officer, UNEP-WCMC, Cambridge, United Kingdom
Zoe Wilkinson, Programme Officer, IUCN, Gland, Switzerland

High-quality and standardized Protected Areas (PAs) data is fundamental for assessing progress towards global biodiversity protection targets. UNEP-WCMC and IUCN strive to collate the best PA data and make it available to the general public through the World Database on Protected Areas. ProtectedPlanet.net is their newest initiative to put digital PA information at the fingertips of internet users globally. This paper discusses how building on the 'Citizen science' approach and convening different biodiversity and non-biodiversity datasets (such as IUCN's Red List of Threatened Species, GBIF Biodiversity data, Wikipedia, Panoramio and Flickr photos and Google Maps) into one single place, it is possible to engage the general public and bring protected areas to a whole new generation of motivated stewards, managers, policy makers and researchers. This paper also demonstrates how by harnessing the power of Web 2.0 social networking platforms we can improve global conservation outcomes.

Session 101 • Borgne (3rd floor) • Sharing Circle

Sustaining the Conservation Field through the Next Generations of Federal Professionals: Developing Lasting University Collaborations

Organizer: Lisa Sanders, Program Coordinator, Agricultural and Environmental Sciences, Internship and Career Center, University of California–Davis, Davis, CA

The momentum of Federal youth outreach initiatives and the emergence of the Federal Call to Serve university grant program allow for synergistic partnerships that could help sustain the conservation field. Increasing university internships with governmental conservation organizations could enhance community education about water conservation and climate change, bolster career development in environmental sciences and address decreased visitation to public natural lands. Continuing the on-going discussion on concrete strategies needed to develop and sustain these partnerships would be fruitful. Through sharing best practices at the University of California, Davis, a 2010 Call to Serve grant campus and a National leader in experiential learning, this 'Sharing Circle' could provide a constructive space to articulate mutual goals, discuss examples of successful partnerships, and explore the potential of creating college ambassadors for local communities. This dialogue will allow land conservation employers and education professionals to rethink the preservation of an invaluable resource: college students.

Session 102 • Borgne (3rd floor) • Sharing Circle

Continuing the Visioning: The National Park Service in Its Second Century

Organizer: Jerry Rogers, Committee Chair, National Parks Second Century Commission, Santa Fe, NM

In 2009 the National Parks Second Century Commission recommended exciting and extensive steps to enable the National Park Service to do the job the nation and the world require of it in its second century of existence. Director Jarvis, Secretary Salazar, and President Obama have incorporated some recommendations in their own agendas, and other leaders of the future will be able to draw upon others for decades to come. But vision must never be a static thing, neither now nor in the future. Put yourself in a long-range visioning frame of mind, review "Advancing the National Park Idea: the National Parks Second Century Commission Report," and the eight committee reports at www.npca.org, and join us in beginning a visionary conversation about all aspects of the National Park Service mission that we hope will carry on into the second century.

Session 103 • Rhythms I/II (2nd floor) • Invited Papers

Forest and Shrub Vegetation Monitoring

Chair: Donna Shorrock, Ecologist, Rocky Mountain Inventory and Monitoring Network, Fort Collins, CO

Session overview: Extensive forests and shrublands cover millions of acres of western networks' parklands. Monitoring expansive, rugged, and remote landscapes is an undertaking that can be demanding on network fiscal and personnel resources. Because of these challenges, many networks have yet to implement forest monitoring protocols. Speakers will introduce methods and approaches that have been successful in sampling forests and shrublands in a diversity of geographic regions. Specifically, we will hear an example of how eastern networks and parks work collaboratively in their forest monitoring efforts; about an Alaska network using historic, tree ring, and plot data to examine forest response to spruce beetle outbreaks; how one network is monitoring old growth forest tree mortality in light of climate change; about use of standardized methods across vegetation types; and how one network overcame the challenges of monitoring desert systems. Each presentation will be 20 minutes followed by a short Q&A session.

Spruce Beetle Outbreaks in Southwest Alaska: Retrospective Studies and Long-term Monitoring Using Tree-ring Data

Amy E. Miller, Ecologist, National Park Service, Southwest Alaska Network, Anchorage, AK

Rosemary L. Sherriff, Humboldt State University, Arcata, CA

Edward E. Berg, U.S. Fish & Wildlife Service, Kenai National Wildlife Refuge, Soldotna, AK

Approximately 1.5 million ha of forest in south-central Alaska have been affected by the spruce beetle (*Dendroctonus rufipennis*) since the late 1980s. Using tree-ring records (AD 1601-2007) from 37 sites on the Alaska and Kenai Peninsulas, we have found evidence for synchronous, regional-scale outbreaks dating from the late 1700s and, in the most recent outbreak, for reduced tree growth during the 10-year period prior to death ($P<0.05$). To leverage the results of the tree-ring study, we established long-term forest monitoring plots at a subset of sites ($n = 10$) that encompass a range of outbreak severities (<10%-100% mortality) along the latitudinal gradient. At each plot (0.09 ha), we have cored all trees and saplings to characterize stand age structure, tree death dates and variations in growth. In addition, we are monitoring soil temperature, fuel loads, and understory species composition to track changes in forest condition in response to beetle disturbance.

Collaborative Monitoring of Forest Health in Eastern National Parks

Brian Mitchell, Northeast Temperate Network
Pat Campbell, National Capital Region Network
Wendy Cass, Shenandoah National Park, Luray, VA
Jim Comiskey, Mid-Atlantic Network
Kate Miller, Northeast Temperate Network
Stephanie Perles, Eastern Rivers and Mountains Network
Suzy Sanders, Great Lakes Network
John Paul Schmit, National Capital Region Network
Geri Tierney, State University of New York

In 2005, several eastern parks and NPS inventory and monitoring networks began collaboratively developing and implementing forest health monitoring. The group included parks with established monitoring, networks that were actively developing protocols, and networks that were considering monitoring in the future. Through annual meetings and regular communication, the networks and parks agreed on standard definitions for most monitoring targets (for example, using the same definitions for "tree" and "coarse woody debris"), as well as standardized methods (such as using compatible break points for cover classes). The collaborative process built support for the methods used by programs that were farther along in protocol development, to the extent that some networks are now using identical procedures implemented by a shared field crew. The collaboration is now actively pursuing data analyses that are simplified by the use of similar methods, and are yielding insights into the health of eastern forests.

Upland Vegetation and Soils Monitoring in the Sonoran and Chihuahuan Desert Networks

J.A. Hubbard, Program Manager, Sonoran Desert Network
S.E. Studd, Intern, Sonoran Desert Network
C.L. McIntyre (no affiliation given)
K. Gallo, Network Coordinator, Chihuahuan Desert Network

In the Sonoran Desert, Apache Highlands, and Chihuahuan Desert ecoregions, vegetation composition, distribution and production are highly influenced by edaphic factors such as soil texture, mineralogy depth, and landform type. Especially as they relate to water, these influences are magnified at patch scales, resulting in diverse and dynamic landscapes – and a challenge to for effective monitoring of vegetation and dynamic soil vital signs. An overview of the objectives, the alternative approaches that we tested, inherent trade-offs, and the results of our past three years of protocol development and monitoring will be presented. We will also discuss the value of historical data and perspectives in pursuit of an efficient, adaptable, and ultimately sustainable protocol for terrestrial ecosystems in the American Southwest.

Monitoring Mature and Old-growth Forests in the North Coast and Cascades Network

Steven Acker, Supervisory Botanist, NCCN I&M Program/Olympic National Park, Port Angeles, WA
John R. Boetsch, Ecologist/Data Manager, NCCN I&M Program/Olympic National Park, Port Angeles, WA
Mignonne Bivin, Plant Ecologist, North Cascades National Park Complex, Marblemount, WA
Lou Whiteaker, Plant Ecologist, Mount Rainier National Park, Ashford, WA

Tree mortality in old-growth forests of the Pacific Northwest is doubling every 17 years, most likely due to a warmer and drier climate. Implications include fewer large trees, less carbon storage, and forests predisposed to abrupt dieback. Some of the most significant remaining old-growth forests are in national parks of the North Coast and Cascades Network. As part of Vital Signs Monitoring, we have begun tracking tree recruitment, growth, and mortality in mature and old-growth forests representing the range of environments in the network. We have established 35, 1-hectare plots in three parks at elevations from sea-level to 1800 m, and plan to establish up to 15 more plots, adding two parks. Our first interval for measuring tree mortality was 2008 to 2009. Roughly half of the plots had no tree mortality while three plots had mortality of greater than 1.5%. The average rate of tree mortality was 0.6% (SE=0.1%).

Vegetation Monitoring in the Klamath Network

Dennis C. Odion, Southern Oregon University, Ashland, OR
Daniel A. Sarr, Klamath Network-National Park Service, Ashland, OR
Sean Smith, Klamath Network-National Park Service, Ashland, OR
Sean Mohren, Klamath Network-National Park Service, Ashland, OR

The Klamath Network includes six parks in northern California and Southern Oregon that encompass a wide diversity of habitats: from wetlands and the tallest forests in the world along the Pacific Coast, to dwarf shrublands in extremely xeric desert conditions. The Network undertook a ranking process that identified vegetation composition, structure and function as a vital sign for long-term monitoring. A key challenge has been developing a monitoring program that can be applied across the full spectrum of vegetation types. We chose to monitor permanent plots every three years using a plot design that has been implemented in the Great Smokies. Although we will sample all vegetation, there is proportionally more sampling in high elevation and riparian environments, which may be more sensitive to anthropogenically driven changes. We limited our sampling universe based on accessibility and safety concerns, which has implications for how broadly the monitoring results can be applied.

Session 104 • Rhythms III (2nd floor) • Invited Papers

Water Resources Monitoring

Chairs: Dean Tucker, Natural Resource Specialist, WASO WRD, Fort Collins, CO

Pete Penoyer, Hydrologist, WASO WRD, Fort Collins, CO

Session overview: Water resources monitoring is conducted by all Vital Signs Networks to assess the physical, chemical, and biological characteristics of park waters. Monitoring produces data which are fundamental to detecting anthropogenic or natural changes in aquatic ecosystems and determining impairment. Analyzing, interpreting, and managing these data are the focus of this session. Presentations will be up to 20 minutes in length followed by up to five minute question and answer periods.

Monitoring Ocean Acidification in the NPS: Perspectives from a Pilot Program in Olympic National Park

Steven C. Fradkin, Coastal Ecologist, Olympic National Park, Port Angeles, WA

One facet of climate change affecting marine ecosystems is the observed decrease in ocean pH over the past 20 years as a consequence of elevated CO2 levels. Atmospheric CO2 reacts with seawater to change pH, reducing the concentration of carbonate ions which are essential building blocks of shell-building marine organisms. The diverse marine NPS resources are particularly susceptible. While national ocean acidification monitoring efforts exist, there is a need to assess acidification trends in NPS units, given regional and local variation in acidification trajectories. Current methods for measuring acidification include chemical analyses targeting the ocean carbon dioxide system, requiring analytical laboratories and specialized instrumentation not currently feasible for routine implementation in NPS units. At Olympic National Park a pilot program was initiated in 2010 to monitor nearshore ocean pH using standard multi-probe datasondes. The trade-offs and feasibility of this approach will be discussed along with a presentation of preliminary data.

Integration of Estuarine Water-Quality Data in Northeast Coastal and Barrier Network Parks at Local and Regional Scales

Hilary A. Neckles, Research Ecologist, Patuxent Wildlife Research Center, Augusta, ME

James M. Caldwell, Water Quality Specialist, USGS Maine Water Science Center, Augusta, ME

Penelope S. Pooler, Quantitative Ecologist, Northeast Coastal and Barrier Network, Kingston, RI

Dennis Skidds, Data Manager, Northeast Coastal and Barrier Network, Univ. of RI Coastal Institute, Kingston, RI

Estuaries throughout the Northeast Coastal and Barrier Network (NCBN) are severely threatened by the adverse impacts of nutrient over-enrichment. Water-quality monitoring data have been collected from NCBN estuaries since 2003, resulting in 17 park-by-year data sets. Evaluation of park-specific data on multiple vital signs (dissolved oxygen, chlorophyll concentration, turbidity, light attenuation) collected at multiple scales (probability surveys, trend surveys, and continuous logging) permits determination of the mean condition of park estuaries, the percent of the estuarine area exceeding threshold values, and the likelihood that nutrient enrichment is a primary stressor on park ecosystems. In addition, NCBN estuarine monitoring was designed deliberately to be compatible with coastal water-quality monitoring programs implemented by the U.S. Environmental Protection Agency throughout the northeastern states, which permits examination of park data in a regional context. Combining park-specific data with regional condition indicators will help park managers identify water-quality problems, causes, and potential management solutions.

Status of DOI's Climate Change Response Monitoring Network

Glenn Patterson, Research Associate, Colorado State University, WASO WRD, Fort Collins, CO

In an effort to assemble an "early warning system" for detecting and forecasting changes in the Nation's environmental resources as a result of climate change, the U.S. Geological Survey is heading up an effort known as the National Climate Effects

Network (CEN). Built mostly around existing monitoring programs in the USGS and other Federal agencies, the CEN is a consortium of observation and research programs that collect, share, and use data, models, and related information to assess climate impacts on ecosystems, resources, and society. The CEN will include some new data-collection efforts, and will provide some enhanced funding for selected existing Federal monitoring programs. A brief description of the status and plans for the Network will be provided, with reference to NPS monitoring programs.

Continuous Water Resources Data Management: Aquarius and the Southwest Alaska Network Approach

Cuyler Smith, Data Manager, Southwest Alaska Network, Anchorage, AK

Russell Frith, IT Specialist, Southwest Alaska Network, Anchorage, AK

The use of multi-parameter sondes for water monitoring with sensors programmed to collect measurements continuously or near continuously is rapidly increasing. Although this technology has the potential to turn water sampling into water censusing, it also presents a number of data management (correction, flagging, analysis, and storage) issues. The tremendous volume of data generated rapidly overwhelms most data management systems. The Southwest Alaska Network (SWAN), in cooperation with the Water Resources and Inventory and Monitoring Divisions, has defined and is in the process of implementing a schema for processing and managing continuous water resource data using either a local copy of Aquarius Workstation or the new shared five-user license of Aquarius Workstation in conjunction with the Aquarius Database. An overview of the schema, the NPS' Aquarius infrastructure, and SWAN's progress to date will be presented.

Exploratory Data Analysis: NPS Experience, Tools, and Techniques

Roy Irwin, Contaminants Specialist, Water Resources Division, WASO WRD, Fort Collins, CO

Brian Gregory, Aquatic Ecologist, Southeast Coastal Network, Atlanta, GA

Joe Meiman, Hydrologist, Cumberland Piedmont and Gulf Coast Networks, Mammoth Cave, KY

Tom Rodhouse, Ecologist, Upper Columbia Basin Network, Bend, OR

Mike Tercek, Data Analysis Consultant, Walking Shadow Ecology, Gardiner, MT

As the quantity of data collected by Vital Signs Networks increases, analyzing those data to find meaning and patterns becomes more difficult. One approach to this problem is Exploratory Data Analysis (EDA). EDA is an attitude governed by open-minded data exploration where a priori data assumptions are either limited, non-existent, and/or examined first to prove or disprove their validity. More than simply statistical graphics, the objectives of EDA include using the data as a window to understand the processes behind the data, uncover basic structure and patterns, identify anomalous values and outliers, develop helpful models, determine optimal scale and category definitions for data analysis, ascertain patterns of autocorrelation in time or space, and discover recurring cycles in time. A brief overview of EDA will be presented followed by short staff presentations from three Networks on the EDA tools and techniques used by their respective Networks to explore data.

Session 105 • Edgewood A/B (4th floor) • Invited Papers

Electronic Field Data Collection to Improve Data Quality

Chairs: Peter Budde, GIS Team Lead, National Park Service, Inventory & Monitoring Program, Fort Collins, CO

Kristen Beaupre, Network Data Manager, NPS Sonoran Desert Network, Tucson, AZ

Session overview: As part of the National Park Service's effort to improve park management through greater reliance on scientific knowledge, our primary goal is to collect, organize, and make available scientifically-credible data. Historically field data collection has always been with paper and pencil, however reliable, this type of data collection allows for errors to occur out in the field and subsequently during data entry. Electronic field data collection solutions are being evaluated to replace analog methods; solutions allowing for real-time data verification and validation, and ensuring data collected are of the highest standards. Electronic field data collection solutions replicated to an enterprise databases further eliminate transcription errors. However beneficial to the quality of data, electronic field data collection solutions have a cost. There are many different hardware and software companies with solutions available; choosing the correct combination of hardware and software can be difficult. Presentations will provide data managers an opportunity to discuss available options and allow for more programs to gain efficiencies in the field while collecting higher quality data.

Two Electronic Data Collection Solutions from Grand Canyon's Vegetation Mapping Project

Michael Kearsley, Vegetation Mapping Coordinator, Grand Canyon National Park, AZ

S. Curran, Northern Arizona University

M. Tukman, Kass Green Associates

R. Pedersen, Kass Green Associates

Two applications which addressed different sets of requirements were developed for electronic field data collection during the Grand Canyon Vegetation Mapping Project. For sampling classification and observation plots, detailed vegetation and edaphic information were of greatest importance. Northern Arizona University / ERI developed programs in PenDragon to run on PDAs for collecting all data required in NVC and FGDC standards. The units were inexpensive and replaceable and the program allowed for division of labor during surveys and error-checking via range and completion checks. A second application was developed by Kass Green Associates for the reconnaissance and accuracy assessment phases. Locality information was of much greater importance than botanical data in this phase. An ArcGIS form was programmed to collect cover data for species in the vegetation field key linked to real-time locality display in ARC on laptops or tablet PCs. Advantages and disadvantages of the systems are presented.

NPS Abandoned Mineral Lands (AML) Database Mobile Inventory Tool

John Burghardt, Geologist, NPS Geologic Resources Division, Denver, CO

N. Irwin, NPS, National Information Systems Center, Denver, CO

The NPS Geologic Resources Division and Resource Information Services Division partnered to develop a spatially-enabled database of all abandoned mines and oil & gas wells in the National Park System. The database is displayed in a web application built using the NPMap framework. This gives parks the ability to remotely add and edit AML data in real time using a secure server. Legacy AML data document 2,600 sites containing 9,100 individual features in 127 parks, but the inventory is incomplete and lacking in detail. A mobile inventory tool has been developed to facilitate field data collection. Field crews can now use GPS devices to fill out electronic inventory forms that can extract and push data from and to the database through NPMap. This technology will be invaluable in completing a comprehensive Inventory & Assessment Initiative by October 2012, aimed at prioritizing AML sites for mitigation and estimating program funding needs.

Project Planning and Data Dictionary Design: Keys to Successful GPS Data Collection

James Stein, Cultural Resources GIS, National Park Service Heritage Documentation Programs, Washington, DC

The first step to successful GPS data collection in the field is project planning and data dictionary design. Completion of these components allows surveyors to conduct a focused survey that returns the needed data and reduces costly field time. This discussion will cover aspects of planning and executing a successful GPS project. Project planning addresses the use of GPS as an additional tool to efficiently collect data in the field in order to populate a GIS. Topics include assessing the purpose and data needs of the project, data scale and accuracy, feature attributes and data dictionary development as well as best survey practices.

Collecting Protocol Data with Silverlight Interface: A Solution to Disconnected Work Place

Kristen Beaupre, Network Data Manager, NPS Sonoran Desert Network, Tucson, AZ

Tom Richie, Network Data Manager, NPS Chihuahuan Desert Network, Las Cruces, NM

Chihuahuan Desert and Sonoran Desert Networks are collaborating on several monitoring protocols. The collaboration has multiple benefits, however inherently creates a disconnected work place with field crews collecting data in three states. Currently protocol data is stored in a Microsoft Access database and Access also is used to create the user interface. Within this new collaboration ensuring version control and dissemination of the protocol database and user interface is a critical step to ensure the continued high quality of data collection. Microsoft Silverlight is easy to develop, can be used on a local machine or even be served over the internet. Version control of the user interface is built into this Microsoft product and also can be distributed and replicated over a network. Using Silverlight would thus ensure all field crews were collecting data with the same user interface and would allow for a successful disconnected work environment.

Session 106 • Evergreen (4th floor) • Affinity Meeting (open to all registrants)

Climate Change Vulnerability Assessments for Natural and Cultural Resources

Chairs: John Gross, Climate Change Ecologist, National I&M Program, Fort Collins, CO

Jay Flaming, Archeology GIS Analyst, NPS Pacific West Region, Seattle, WA

This affinity session is to share information on current or planned vulnerability assessment activities to address climate change, to identify opportunities for collaboration and shared learning, and to articulate "next steps" to improve practices for conducting vulnerability assessments. Resource management agencies have broad and immediate needs for climate change vulnerability assessments (VAs) for natural resources, cultural resources, infrastructure, visitor experiences, and other values. To

address these needs, the NPS Climate Change Response Program funded about $4 million in projects in FY10 that are likely to contribute to vulnerability assessments. USGS allocated a similar level of funding in FY10, and USFWS, BLM, and USFS have similar goals and programs. Most currently funded VA projects use what is essentially a "one-off" approach, with little or no consideration for how an individual project could contribute to a more general approach. The goal of this session is provide an opportunity for project leaders, project collaborators, and other interested parties to share information on current or planned VA activities, to identify opportunities for collaboration and shared learning, and to articulate "next steps" to improve practices for conducting VAs.

Session 107 • Oakley (4th floor) • Invited Papers

Managing Protected Areas in the Face of Increasing Urbanization: Case Studies

Chairs: Seth Riley, Wildlife Ecologist, Santa Monica Mountains National Recreation Area, Thousand Oaks, CA

Christy Brigham, Chief of Planning, Science, and Resource Management; Santa Monica Mountains National Recreation Area, Thousand Oaks, CA

Session overview: Protected areas everywhere are facing threats from increasing development and urbanization along their boundaries or within close proximity. Many parks that were once isolated now have suburban or urban development right next door. In this session we will learn about the challenges and opportunities associated with protected area management on the urban edge from resource managers at parks that have a long history of urban development along their borders. Case studies from such classic urban parks as Gateway National Recreation Area, National Capital Parks East, Golden Gate National Recreation Area, and Santa Monica Mountains National Recreation Area will cover topics ranging from the effects of the urban interface on fire to impacts of urbanization and fragmentation on wildlife. The experience of these managers will be relevant to the majority of protected area managers who are now facing a growing matrix of human developments along their boundaries.

Wildlife Management Challenges for Urban National Parks in the San Francisco Bay Area

Bill Merkle, Supervisory Wildlife Ecologist, Golden Gate National Recreation Area, San Francisco, CA

Tania Pollak, Natural Resource Planner, Presidio Trust, San Francisco, CA

The greater San Francisco Bay Area supports 7–8 million people. The Golden Gate National Recreation Area and the Presidio of San Francisco provide a national park experience for this urban population. There are numerous challenges to managing wildlife in this urban landscape including habitat fragmentation, high visitation and a highly interested populace, wildlife habituation, roads and trail development, historic resources, isolated park areas and the need to work closely with adjacent land managers and jurisdictions. The Presidio provides an island of habitat in highly developed San Francisco with additional challenges from large numbers of buildings and residents within the park. Alcatraz Island and Muir Woods have extremely high visitation and historic resources complicating wildlife management. Coyotes have recently recolonized this area, and encounters with people have been increasing. Managing a harbor seal haul-out with multiple user groups is difficult. Finally, extensive dog use presents a complex management challenge.

Cryptic Effects of Urbanization on Park Wildlife: Toxicant Exposure and Genetic Impacts

Seth P.D. Riley, Wildlife Ecologist, Santa Monica Mountains National Recreation Area, Thousand Oaks, CA

Urbanization threatens animal populations, most obviously through direct habitat destruction. However wildlife in national parks adjacent to development also face less obvious threats, such as exposure to toxicants and the longer-term genetic effects of habitat fragmentation. At Santa Monica Mountains NRA, while carnivore populations, including those of large carnivores such as mountain lions, continue to persist in the park, 85–90% of bobcats, coyotes, and mountain lions have tested positive for exposure to anticoagulant rodenticides. Anticoagulant poisoning was the second leading cause of death for collared coyotes (after vehicles) and caused the death of two mountain lions. Rodenticide exposure has also been associated with a disease epizootic in bobcats, resulting in significant population declines. We have also found evidence of significant reductions in gene flow in multiple animal taxa, from larger carnivores to lizards and a bird, from the barrier effects of freeways and development. These threats to wildlife populations may be relevant for resource managers in many parks with adjacent development.

Canada Goose Herbivory Monitoring along the Anacostia River, Washington, DC

Mikaila Milton, National Capital Parks–East, Washington, DC

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

Stephen Syphax, Chief of Natural Resource Management, National Capital Parks–East, Washington, DC

Browsing by resident Canada geese is threatening a series of wetland restoration projects installed in the Anacostia River in Washington DC. As part of an Environmental Impact Statement (EIS) to determine the best management of the Anacostia wetlands and Canada geese at National Capital Parks–East, the park is working with USGS researcher Cairn Krafft to monitor the effects of Canada geese on the tidal freshwater wetland vegetation and provide quantitative data documenting the effects of Canada goose herbivory on wetland vegetation. In 2009, sixteen modules were established in Kingman Marsh, a 40-acre wetland constructed in 2000 by the US Army Corps of Engineers, District Department of the Environment, NPS (National Capital Parks-East), USGS, volunteers from the Anacostia Watershed Society, and others. As of August, 2010, a second year's worth of data has been collected which also shows a growing difference between exclosure and control plots in the modules that were established in bare marsh soil, indicating that if goose pressure is removed the marsh vegetation is likely to return to this portion of the Anacostia River.

Restoration of Endangered Habitat Including Dunes and Serpentine Grasslands within a Fragmented Urban Environment

Sue Fritzke, Supervisory Vegetation Ecologist, Golden Gate National Recreation Area, San Francisco, CA

Golden Gate National Recreation Area contains one of the highest numbers of Federal listed endangered species in the National Park Service – 36 species at this time. Given the long Euro-American history of use, urbanization, and habitat fragmentation within the San Francisco Bay Area, and our unique geologic and climatic history, this is not surprising. Restoration of the habitats that support our endangered plant species requires a careful dance of meeting the directives of the FWS recovery plans while maintaining public access, adhering to site-specific management plans and objectives, engaging volunteers through stewardship opportunities, and managing invasive non-native plant species. At GGNRA we have been successful at achieving recovery goals for two of our endangered species – San Francisco lessingia and *Presidio clarkia* – through a collaborative effort between the NPS, the natural resource program of the Presidio Trust, and the native plant nursery program of the Golden Gate National Parks Conservancy.

Balancing Park Natural Resources and Fire Safety at the Urban-Wildland Interface

Marti Witter, Fire Ecologist, Santa Monica Mountains National Recreation Area, Thousand Oaks, CA
Kathryn Kirkpatrick, Fire Management Officer, Santa Monica Mountains National Recreation Area, Thousand Oaks, CA
Irina C. Irvine, Restoration Ecologist, Santa Monica Mountains National Recreation Area, Thousand Oaks, CA

As the largest urban park in the National Park Service, the Santa Monica Mountains National Recreation Area manages for invasive species, fires and habitat loss among many partners. The park clears brush to protect its structures and is pressured to provide the same for bordering neighbors when clearance zones extend into the park. While mowing and disking are inexpensive, effective means to reduce hazardous fuels, these treatments promote weed spread, erosion, habitat loss and diminish the visitor experience. Here we report how the park's Fire Management Officer, Fire Ecologist and Restoration Ecologist are coordinating the management of these interfaces by, 1) providing education to neighbors about wildland-safe, fire-safe gardening, 2) adopting management practices that time weed treatments to coincide with plant phenology to reduce weed spread while allowing natives to go to seed and, 3) restoring fuel modification zones with sparse native vegetation and native grasses that tolerate yearly mowing.

Concurrent Sessions • Wednesday, March 16 • 1:30–3:35

Session 108 • Napoleon A1/A2 (3rd floor)
OPEN

Session 109 • Napoleon B1 (3rd floor) • 2-hour Workshop
A National Park System Plan for the Future
Chair: Warren Brown, Program Analyst, US National Park Service, Annapolis, MD
The National Park System Advisory Board is developing guidelines for a new national park system plan considering the parks as cornerstones in a network of protected areas. Participate in a forum about how to shape a national park system that meets the challenges of the next century: What is your vision for a system that will be effective in meeting the needs of a changing environment and human population? What types of natural and cultural features should be managed by NPS? Should current criteria be updated? What new types of partnerships might be encouraged to address large landscapes? How might a broader scope of NPS programs be recognized as part of the system? Dr. J. Michael Scott and other Advisory Board committee members will be on hand to learn about your ideas for their initial report due in April 2011.

Session 110 • Napoleon B2 (3rd floor) • Contributed Papers
Ecosystem-Level Networks
Chair: TBD

Landscape Conservation: Building a Network in the Pacific West Region
Angela Whitney, Research Assistant, Pacific West Region, National Park Service, Oakland, CA
Ray Sauvajot, Chief of Natural Resource Programs, National Park Service, Pacific West Region, Oakland, CA
Craig Dalby, Chief of Information Coordination and Management Program, National Park Service, Pacific West Region, Seattle, WA
Broad-scale conservation has emerged as an important way to conserve natural resources across the landscape and between multiple partners. Efforts often rely on collaboration to realize their specific goals and yet coordination between programs does not always exist. We attempted to identify all landscape conservation efforts in five. Western states and summarized their attributes to create a useable database available to land managers. Programs were included if they had broad geographic scope, included multiple partners, had an ecosystem focus, and developed a specific conservation plan or made specific recommendations. We analyzed efforts collectively to find common themes, overlap in methods and objectives, geographic distribution, and relevance to NPS units. Our analyses suggest that while broad-scale efforts are taking place at many scales and some partnerships exist between programs, communication across networks is limited. Our findings should help engage new partners and ensure complementary activities occur among important efforts now underway.

Applying Systems Thinking to Holistic Park Management
Katherine Hanson, Chief Learning Officer, National Park Service, Washington, DC
The strategies governing National Park Service approaches to park management have evolved over the last century, in response to the shifting priorities of local, state, national, and international leaders in the conservation and preservation arenas. Likewise, philosophies that underpin the foundation of ecosystem management have also evolved as our awareness of ecological changes in our environment has increased exponentially in the last hundred years. This paper briefly revisits the dynamic course of park management over the last century, and presents a case for a more holistic approach that applies systems thinking to the leadership framework of our current park system. Specifically, theories of how nature, science, and social systems interact and are interdependent upon one another for survival and success will be discussed, with examples of these systems in action at various National Park Service units.

The Open Parks Grid: A Catalyst for Stewardship of Protected Areas
Elizabeth Baldwin, Assistant Professor, Clemson University, Clemson, SC
Brett Wright, Chair, Parks, Recreation and Tourism Department, Clemson University, Clemson, SC
Emily Gore, Clemson Libraries, Clemson University, Clemson, SC
David White, Clemson Computing and Information Technology, Clemson University, Clemson, SC

Jeff Skibins, OPG Research Assistant, Parks, Recreation and Tourism Department, Clemson University, Clemson, SC

An interdisciplinary team at Clemson University in partnership with the Southeast Region of the National Park Service has been working on a plan to connect the fragmented community of park researchers, managers and supporters into a cohesive network called the Open Parks Grid (OPG). The vision of the OPG is to bridge the gaps in parks and protected areas by building a portal for the discovery of archived digital content and data, spatial assets, and to facilitate collaboration among park professionals. Simply making the valuable content held in the parks and other research repositories available in one place will have a national impact. Currently the project is being beta tested and the team is seeking feedback from the parks community on this applied project designed to be a catalyst for stewardship of protected areas. "

Islands to Networks: Solution for Nature Conservation?

Stephen Woodley, Chief Ecosystem Scientist, Parks Canada, Gatineau, Quebec, Canada

An analysis of Canada's protected areas shows they do not adequately represent the range of Canadian ecosystems and they are generally too small to make effective conservation cores. 83% of protected areas in Canada are less than 100 km2. A range of approaches to conservation has been proposed to resolve these issues, under the banner of moving from "islands to networks" of protected areas. The "islands to networks" idea appears in the scientific literature, and even in the program of work for protected areas under the Convention on Biological Diversity. Models are expressed as 1) managing parks within a larger matrix of consumptive but complimentary land uses; 2) physical linkages between protected areas that allow movement of individuals and genes and 3) comprehensive conservation planning where conservation priorities are considered first in the planning process. Our analysis concludes that islands to networks approaches are inadequate for large parts of Canada, because the exiting protected areas network is composed of core units that are too small to be effective.

Community Leaders on the Landscape: An Integrated Approach to Aquatic Habitat Conservation along the Trent-Severn Waterway

Joan Chamberlain, Manager, Resource Conservation, Parks Canada, Trent-Severn Waterway, Peterborough, Ontario, Canada

Parks Canada's 386 km long Trent-Severn Waterway is one of the most ecologically diverse corridor systems of lakes and rivers in Ontario and also provides unique and complementary opportunities for heritage appreciation, recreation and tourism. The "Leaders on the Landscape – Integrated Aquatic Habitat Conservation Program", is a strong integrated program for protection, outreach education, and visitor experience along the Waterway to create citizen awareness, engagement opportunities, and an intrinsic respect for protection of aquatic habitats, species at risk and the vast array of natural and cultural resources the region has to offer. This program is building on a solid foundation of existing work and partnerships with more than 60 partners and stakeholders participating along the length of the Waterway to help create a lasting ethic of conservation in the region. The presentation will focus on the challenges of this multi-faceted approach to conservation and sustainable use of the Waterway.

Session 111 • Napoleon B3 (3rd floor) • Invited Papers

Crossing Institutional Boundaries for Better Management of Parks and Protected Areas (Part 1)

Chairs: Robert Bennetts, Program Manager, National Park Service, Southern Plains Network, Des Moines, NM

Andy Hubbard, Program Manager, National Park Service, Sonoran Desert Network, Tucson, AZ

Session overview: The National Park Service, like many organizations has an institutional structure that tends to compartmentalize the organization by such things as disciplines and funding sources. While the purpose of such a compartmentalized structure is based largely on administrative functioning, an indirect consequence is a more limited capacity to work as a unified organization toward common goals. At the very least, communication across disciplines is often far less than what it should be and at the other end of the spectrum we suggest that relationships among different disciplines is sometimes better characterized as a rivalry than a partnership, even though those disciplines may be under the same agency with a common mission. While the ultimate solution to this dilemma may warrant reconsidering the institutional structure of our organization, here we present ideas and efforts within the existing organizational structure to better work as a unified agency.

Crossing Institutional Boundaries for Better Management of Parks and Protected Areas

Robert Bennetts, Network Program Manager, National Park Service, Des Moines, NM

Andy Hubbard, Network Program Manager, National Park Service, Tucson, AZ

Linda Kerr, Fire Ecologist, National Park Service, Denver, CO

Jill Cowley, Historical Landscape Architect, National Park Service, Santa Fe, NM

The National Park Service, like many organizations has an institutional structure that tends to compartmentalize the organization by such things as disciplines and funding sources. While the purpose of such a compartmentalized structure is based largely on administrative functioning, an indirect consequence is a more limited capacity to work as a unified organization toward common goals. At the very least, communication across disciplines is often far less than what it should be and at the other end of the spectrum we suggest that relationships among different disciplines is sometimes better characterized as a rivalry than a partnership, even though those disciplines may be under the same agency with a common mission. While the ultimate solution to this dilemma may warrant reconsidering the institutional structure of our organization, here we present ideas and efforts within the existing organizational structure to better work as a unified agency.

Integrated Grassland Monitoring Collaboration between Southern Plains Fire Group and Southern Plains I&M Network

Richard Gatewood, Fire Ecologist, National Park Service, Alpine, TX
Tomye Folts-Zettner, Biologist, National Park Service, Johnson City, TX

The Southern Plains Fire Group (SPFG) and the Southern Plains I&M Network (SOPN) have integrated the grassland monitoring conducted by each group to address broader issues of vegetation health and to achieve economic efficiencies in both programs. Of the seven parks in the SPFG and 11 parks in the SOPN, 7 are overlapped by both programs. Efficiencies are gained by sending one data collection team to gather information required for both programs. The same data is collected from the mirrored Fire Effect plots and Long-Term monitoring plots. Data is housed within FFI, a SQL database used by the fire program. Collaboration on data analysis and reporting between the programs will provide a more holistic view of grassland health and the effects of fire to both programs and the respective parks.

Collaboration across Agencies and Disciplines to Protect the Sierra Ancha Cliff Dwellings

Duane C. Hubbard, Southern Arizona Office Archeologist, National Park Service, Roosevelt, AZ
Jenny Shrum, Bio Tech, National Park Service, Roosevelt, AZ
Andy Hubbard, Network Program Manager, National Park Service, Tucson, AZ
Evan Gwilliam, Biologist, National Park Service, Tucson, AZ

The Tonto Basin of central Arizona contains hundreds of unique and significant prehistoric cultural sites, yet only a handful of the most accessible sites are protected within Tonto National Monument. The Tonto National Forest contains several renowned and impressive sites as well, including the nearby Cherry Creek complex of cliff dwellings in the rugged Sierra Ancha Mountains. Archaeologically-important and visually stunning, the Cherry Creek sites have recently suffered impacts from unmanaged visitation. In response, USFS and NPS resource experts joined planners to (1) assess the severity and extent of impacts, (2) describe the key site features and threats, and (3) develop a collaborative management strategy to protect the exceptional and finite resources of the Sierra Ancha while also providing for the education and enjoyment of increasing numbers of visitors. The pulse study approach and lessons learned will be discussed in the context of resource protection and stewardship "outside the box."

Collaborations in Data Management—The Best Protection for Parks: Sharing Data

Skip Edel, Spatial Fire Analyst, National Park Service, Denver, CO
Linda Kerr, Fire Ecologist, National Park Service, Denver, CO

Impacts to protected areas from land management agency actions can be magnified if the sharing of information is not effective. Treatments involving manual, mechanical, fire, or chemical impacts and how these treatments overlap require the sharing of information across disciplinary interests. This open sharing of data collected in the field promotes effective communication and adds value to all groups. How the data is developed and shared can impact overall management of National Park Service protected areas as well as cross-boundary interests with private and other landowners. Shared data and regular communication can make treatments successful on a broad scale. Effective data management can influence management decisions, provide economies of effort and expenditures, and increase overall effectiveness in management of protected areas.

Climate Change Monitoring in the Desert Landscape Conservation Cooperative

Kirsten Gallo, Network Program Manager, National Park Service, Las Cruces, NM

The National Park Service to enhance natural resource monitoring and reporting already being done by NPS Inventory and Monitoring Networks to better address the effects of rapid climate change. Scientists and managers from the Chihuahuan, Mojave, and Sonoran Desert I&M Networks (which together align well with the Desert Landscape Conservation Cooperative or LCC) worked together with partners to evaluate existing monitoring being done by the three networks, eval-

uate and engage monitoring being done by other partners within the LCC, and identify how best to leverage the additional funding to inform park management decision-making, planning, and education. Here I describe work being conducted within NPS and across agencies to within the LCC to address this challenge.

Session 112 • Southdown (4th floor) • Business Meeting (by invitation only)
Parks Canada/USNPS/CONANP Protected Areas Workshop I
Chair: Beth Johnson, Deputy Associate Director NRSS, National Park Service, Washington, DC
No abstract available.

Session 113 • Gallier A/B (4th floor) • Panel Discussion
Engaging Youth in Our National Parks: Sharing Lessons Learned to Improve Practice
Chair: Rebecca Stanfield McCown, Graduate Research Assistant, University of Vermont, Burlington, VT
Nora Mitchell, Director, National Park Service, Conservation Study Institute, Woodstock, VT
National Park Service Director Jon Jarvis has identified "relevancy" as one of four priority areas for the agency and has emphasized the importance of helping all Americans, especially young people, discover a personal connection to their national parks. More and more, individual parks are initiating programs designed to reach constituencies not previously engaged in park activities. While there are many approaches to engaging the public, some of the most innovative programs are aimed at engaging youth from surrounding communities in order to build their connections to the park and develop their sense of stewardship. This panel discussion will provide an opportunity for park managers and program staff to reflect on current youth programming efforts, highlight areas of success, and learn from current field research. Panelists (to be determined) will include park and program managers as well as research specialists.

Session 114 • Nottoway (4th floor) • 2-hour Workshop
The Power of Your Power Button: Communicating Science through Digital Media
Chairs: Corbett Nash, Science Communications and Outreach Coordinator, Hawaii-Pacific Islands CESU / Pacific Island Network, Hawaii National Park, HI
Alice Wondrak Biel, Science Writer-Editor, National Park Service, Sonoran Desert Network and Northern Colorado Plateau Network, Devils Tower, WY
Dominic Cardea, Ranger-Interpretation Learning and Development, National Park Service, Northeast Regional Office, Philadelphia, PA
Todd Edgar, Web Manager, Natural Resource Program Center, Office of Education and Outreach, National Park Service, Fort Collins, CO
Open your world of science and fieldwork to the rest of the world by contributing to global digital media. Learn what a podcast is and how to produce one. Perhaps more importantly, learn how to distribute information through an RSS feed, in schools, and in other venues. Discover how a blog can reach new demographics, enhance internal as well as external communications, and allow discourse that traditional media cannot. Experience the nuts and bolts of assembling an audio podcast from conception to recording, editing, posting, and distribution. Plus, learn some tips and tricks for adding images, filming scientific methods, interviewing, lighting, choosing file size and type, and keeping your audience interested. Don't know which software or hardware to use? We will share our experiences together. By the end of the workshop the group will produce a short audio podcast about this year's conference.

Session 115 • Oak Alley (4th floor) • Business Meeting (by invitation only)
Research Learning Center Strategic Planning Meeting
Chair: Ben Becker, Marine Ecologist, Point Reyes National Seashore, Point Reyes Station, CA
Research Learning Center Strategic Planning Meeting. Contact Ben Becker if you would like to attend.

Session 116 • Bayside A (4th floor) • Contributed Papers
Threatened and Endangered Species
Chair: TBD

The Species at Risk Program at Parks Canada Agency: Ten Years of Conservation
Denyse Lajeunesse, Program Manager Species at Risk Program Coordinator, Parks Canada, Gatineau, Québec, Canada

Marie-Josée Laberge, Ecosystem Scientist, Species at Risk Program, Parks Canada, Gatineau, Québec, Canada

This presentation will give a brief history of conservation practices in Canada's heritage protected places as it relates to species at risk, and give an overview of the main features of the collaborative work between the three federal departments responsible for the implementation of the Species at Risk Act in Canada. It will also present and illustrate a conservation tool developed to assist the Agency in species assessment, protection, recovery planning, monitoring and reporting on performance, at both the national and local levels. This tool supports conservation by helping decision-makers in identifying feasible recovery opportunities in each protected heritage place and revealing knowledge gaps that warrant inventory, monitoring or research. The use and effectiveness of this tool in all steps of the species at risk conservation cycle will be illustrated by selected species at risk success stories in Canada's protected heritage place, demonstrating Parks Canada Agency's leadership in species at risk conservation.

Research, Monitoring, and Propagation of the Endangered Shivwits Milk-vetch (*Astragalus ampullarioides*), Washington County, Utah

Rebecca Lieberg, Lead Revegetation Biological Science Technician, Zion National Park, Springdale, UT

The Shivwits milk-vetch is a federally-listed endangered plant found only in Washington County. Of known populations, more than 75% are found within the boundaries of Zion National Park. Since 2006, the U.S. Geological Survey and Zion NP have been studying this species in relation to geology and soils, herbivory, exotic plant competition, and mycorrhizal fungi. In addition, annual plant inventories of all Zion sites have been conducted since 2006. Zion staff is also conducting its own caging and seed collection study, and has begun propagation with the goal of developing propagation SOPs and out planting and increasing populations. In 2010, inter-agency personnel joined park staff in conducting surveys in areas in and adjacent to Zion NP and were successful in mapping several new populations. Current energies are focused on long-term survival in the greenhouse; performing experimental out plantings; and developing a long-term monitoring plan and monitoring SOPs.

Preventing the Extinction of the Federally Endangered Sonoma Spineflower at Point Reyes National Seashore

Amelia Ryan, Ecologist, National Park Service, Point Reyes Station, CA
Lorraine Parsons, Point Reyes National Seashore, Point Reyes Station, CA

Sonoma spineflower is a federally endangered plant species with only one known surviving population, located on a single 3-acre area on Point Reyes National Seashore (Seashore). In 2010, the Seashore received a USFWS grant to prevent the extinction of this extremely rare plant. The Seashore took a four- pronged approach: improvement of conditions in the existing habitat by removing invasive species, relocation of a ranch road through the population, collection of seed for long term storage in a seedbank, and a carefully planned reintroduction project. Prior to the reintroduction, a study was carried out correlating plant survival, size and reproductive output to soil and hydrologic characteristics in the natural population and in failed and moderately successful prior reintroduction attempts. This data was used to implement new reintroduction efforts on sites where soil and hydrologic characteristics most closely resembled the study sites most correlated with measures of plant success.

Keeping Skeletons Out of the Closet: Proactive Approaches to Future Climate Change-Driven Extinctions

Alison Colwell, Interdisciplinary Resources Biologist, Division of Resources Management and Science, Yosemite National Park, El Portal, CA
Judi Weaser, Branch Chief, Vegetation and Ecological Restoration, Division of Resources Management and Science, Yosemite National Park, El Portal, CA

How should we (NPS) confront the reality of species extirpation or extinction within our parks during our lifetime, possibly during our tenure as protectors of the resource? Examples from the Yosemite alpine flora and fauna threatened by local climate change will be used to present some ideas on how this phenomenon could be brought to the public attention. Although more aggressive management practices are discussed as a response to climate change, in some instances we will not be the saviors of species but the witness-bearers to their extinction. Bearing witness should not a passive solution but a proactive one involving the public as narrators of this story. How to join the perspectives of park visitors, park fans, historians, artists, writers and others to the data we collect as land managers to provide as complete a biography as possible of threatened species and communities is the practical issue to be solved.

An Experimental Restoration of Two Threatened and Endangered Annual Plants in the Presidio, Golden Gate National Recreation Area

Lewis Stringer, Restoration Ecologist, Presidio Trust, San Francisco, CA
Stuart B. Weiss, Ecologist, Creekside Center for Earth Observation, Menlo Park, CA
Christal Niederer, Ecologist, Creekside Center for Earth Observation, Menlo Park, CA

Managing for disturbance dependent plant species in the 21 century will require active manipulation of urban parklands where ecological processes have been lost. We present results of experiments to manage two T&E serpentine grassland species: *Presidio clarkia* and Marin dwarf flax. Our first study compared eight treatments plus control in a randomized block design experiment with 243 square-meter plots. The treatments included spring and fall burning and mowing, flaming, scraping, and tarping. One hundred *Presidio clarkia* seeds were hand broadcast over half of each plot in the fall after treatment. Fall treatments of scraping, tarping, and flaming were most effective at establishing clarkia and reducing annual grass and nonnative cover. A follow-up experiment looked at subset of these treatments and their effects on Marin dwarf flax. These results are being used to develop rotational patch treatments for managing native biodiversity at a 15 acre grassland in the Presidio.

Session 117 • Bayside B/C (4th floor) • Invited Papers

Building Partnerships to Meet Resource Management Objectives

Chairs: Linda Drees, Partnership Manager, Natural Resource Program Center – NPS, Fort Collins, CO
Diana Maxwell, Partnership Program Manager, Natural Resource Program Center, NPS, Denver, CO
Marty Sterkel, Assistant Regional Director, Partnerships, NPS- Midwest Region, Omaha, NE

Session overview: Partnerships are one of the most effective ways for the NPS to cultivate a shared sense of resource stewardship and fulfill our mission. Without partners and the resources they offer, many of our critical resource priorities cannot be met. Increasingly park mandates and initiatives that require partners. Many National Park units and certain NPS programs operate almost exclusively through partnerships and the valuable assistance they bring to the table. Heritage areas and corridors, and national trails and rivers are partnership units. NPS is a key player in a Nationwide System of Parks, Historic Places, and Open Spaces Initiatives, which rely heavily on partnerships across political, jurisdictional, stakeholder, and land ownership boundaries. To be successful, today's resource manager must work with an array of managers and stakeholders. With the recognition of the critical need for employees skilled in partnership development, partnership management has become a core competency to carry out our NPS mission. The session will present an overview on the importance of partners to meet resource management objectives, context for partnerships and practical steps and success factors for creating and managing these valuable relationships.

The Value of Partnerships

Marty Sterkel, Assistant Regional Director, Partnerships, NPS, Midwest Region, Omaha, NE

Private sector support for America's national parks is a tradition as old as the parks themselves. George Melendez Wright supported some of the National Parks initial natural and cultural resource work with his personal wealth. Today over 160 partner groups and the National Park Foundation (NPF) carry forward this tradition with national parks. Millions of dollars are provided to parks through private partners. This session will provide an overview of the benefits of partnership within the NPS. Participants will gain an understanding of the range of partnership opportunities available to meet resource objectives.

Connecting Students with Soundscape through Educational Travel

Lelaina Marin, Outdoor Recreation Planner, National Park Service Natural Sounds Program, Fort Collins, CO
David Shurna, Director, Global Explorers, Fort Collins, CO
Shannon Smiley, National Parks Program Coordinator, Global Explorers, Fort Collins, CO
Cecilia Leumas, Acoustic Technician, National Park Service Natural Sounds Program, Fort Collins, CO
Katherine Warner, Acoustic Technician, National Park Service Natural Sounds Program, Fort Collins, CO

Since 2008, the National Park Service Natural Sounds Program (NSP) has cooperated with Global Explorers (GEx), a nonprofit travel organization whose mission is to inspire responsible global citizenship through educational travel programs. NSP collaborates with GEx to develop sound-based activities and curricula that are implemented on expeditions around the world. More in-depth initiatives are conducted in Grand Canyon and Canyon de Chelly. In 2010, NSP staff accompanied a team with various hearing abilities on a Peruvian Amazon expedition that highlighted ways people and the environment use sound. In the coming year, we are working to develop Sound Academies, where students from under-represented populations will compete for the opportunity to visit an NPS Unit and engage in sound-related field research. This cooperation

helps to further the NPS mission by using the excitement of travel to spark dialogue and increase awareness about resource preservation in our Parks.

Critical Ingredients of Successful Partnerships

Ray Murray, Partnerships Program Chief, NPS, Pacific West Region, Oakland, CA

Based on his four decades negotiating and managing public and private partnerships and in-depth survey and analysis of partnerships and success and failure factors throughout the National Park Service, Ray Murray will highlight the core essential ingredients for establishing and maintaining productive partnerships from both the perspective of the NPS and our partners. Beginning with a compelling mutual advantage for undertaking the partnership and strong personal commitments from the principals to do whatever it takes to ensure success, critical ingredients include: realistic goals and work plans, accomplishment milestones, staff liaisons, mutual investment, protocols for working together and solving problems, sharing credit and celebrating accomplishments, and workforce engagement. The presentation will feature use real life examples.

New Horizons for Cooperative Management and Collaborative Partnerships

Joe Seney, Branch Chief of Geologic and Hydrologic Services, Redwood National & State Parks, Orick, CA

The need for partnerships between National Parks, state parks, other public lands agencies and tribal governments is becoming increasingly important as federal and state agencies see reductions in funding and increased complexity of preserving ecological integrity of parks resources. Frequently, local residents and businesses, tribal members, environmentalists, and federal and state agencies are key stakeholders within these partnerships. In 1994 Federal and State Redwood Parks initiated a cooperative management strategy to identify, develop and implement operational efficiencies that would result in improved visitor services and enhanced resource protection. The move toward cooperative management at Redwood National Park was necessary due to its unique setting: carved out of private property fitted around three majestic state parks, and vulnerable to upstream land uses. Redwood National Park, in the early years, often operated in an antagonistic local setting and was highly dependent on relationships with external parties. This presentation identifies three essential elements associated with successful collaborative partnerships, namely, vision, leadership, and networking. Since 1994, RNSP has become an important showcase model of agency to agency partnerships that provided a greater capacity to manage park resources and serve park visitors. I would like to share examples of various collaborative efforts in which Redwood National Park, Prairie Creek, Del Norte Coast and Jedediah Smith Redwoods State Parks have engaged.

Partnerships: Policy Implications to Use in the NPS

Karyn Ferro, Partnership Program Coordinator, NPS National Office on Partnership, Washington, DC

Did you know the National Park Service has a brand that we are charged to protect? This session will present case examples of the proper and improper use of the NPS and other policy implications of using partnerships. The participants will gain an understanding of the policy do's and don'ts of partnerships such as use of agreements, NPS identity, or accepting donations.

Session 118 • Maurepas (3rd floor) • Panel Discussion

Going Global: The IUCN Global Protected Areas Programme

Chairs: Trevor Sandwith, Head, Global Protected Area Programme, IUCN, Gland, Switzerland

Brent Mitchell, Vice President, QLF Atlantic Center for the Environment, Ipswich, MA

The World Commission on Protected Areas (WCPA) is the world's premier network of protected area expertise. It is administered by IUCN's Global Protected Areas Programme and has over 1,400 members, spanning 140 countries. WCPA's mission is to promote the establishment and effective management of a world-wide representative network of terrestrial and marine protected areas. This session will set out the priorities of the new head of the PPA; describe IUCN's role in the Programme of Work of the Convention on Biological Diversity; focus on WCPA North America; introduce the work of WCPA Specialist Groups; and discuss plans for the 2014 World Parks Congress.

Panelists: Nikita Lopoukhine, Chair, World Commission on Protected Areas, Ottawa, ON, Canada

Cyril Kormos, WCPA Vice Chair for North America & the Caribbean and WILD Foundation, Ojai, CA

Julia Miranda, WCPA Vice Chair for South America and CEO, National Parks, Bogotá, Colombia

Ernesto Enkerlin, WCPA Deputy Chair and Technical University of Monterrey, Monterrey, Mexico

Session 119 • Borgne (3rd floor) • Sharing Circle

Social Science and the National Parks

Chair: Robert Pahre, Professor, Department of Political Science, University of Illinois, Champaign, IL

The target community for this Sharing Circle is academics, social scientists working in the NPS and other agencies, and other NPS professionals who don't have a good sense of what social scientists try to do In the last GWS meeting (my first), and in the George Wright Forum, I've been struck by the fairly narrow representation of social sciences. Park histories, studies of visitors and recreational users, and some kinds of anthropology (prehistory) are fairly common. Economics and other kinds of anthropology are less common. Political science, sociology and geography seem almost entirely absent. Yet politics, society, and human geography clearly shape the national parks. The field of policy studies could also benefit from greater attention to the national parks, and vice versa. Ideally, this sharing circle could serve as the catalyst to a community interested in broadening these connections.

Session 120 • Borgne (3rd floor) • Sharing Circle

Wilderness Management along Today's US/Mexico Border

Chairs: Mark Sturm, Chief of Resource Management, Organ Pipe Cactus National Monument, Ajo, AZ

Peter Holm, National Park Service

Tim Tibbetts, National Park Service

Organ Pipe Cactus National Monument (ORPI) is situated on the international border with Mexico. Nearly 94% of ORPI is designated wilderness. For more than a decade the park has experienced prolonged exposure to high levels of border related activities. Managing wilderness in the face of such ubiquitous impacts resulting from border related activities is challenging. Nonetheless the park has met with many important successes. During this sharing circle session we will present some of the complex issues the park currently faces and discuss with participants options that we could pursue towards their resolution. We will also share the actual outcomes regarding some of the issues that are discussed.

Session 121 • Rhythms I (2nd floor) • Panel Discussion

Applications of Vegetation Monitoring Data for Management and Planning

Chairs: Stephanie Perles, Plant Ecologist, National Park Service Eastern Rivers and Mountains I&M Network, University Park, PA

James Comiskey, Program Manager, National Park Service, Mid-Atlantic I&M Network, Fredericksburg, VA

This panel discussion will describe the multi-region collaboration on forest monitoring among I&M Networks and parks in the eastern U.S. By 2010, more than 2,000 permanent forest monitoring plots across 61 parks in the Northeast and Midwest will have been established using compatible procedures. Data from these monitoring plots are already influencing management decisions in individual parks. We will highlight several examples of the application and utility of monitoring data to park management. One of the main advantages to multi-regional collaboration is that data are collected in comparable ways, allowing analysis at regional scales. We will present the results of several multi-network/multi-region data analyses, focusing on exotic plant species, forest regeneration, and the distribution of tree species. The format of the panel discussion will be several short presentations following the aforementioned themes, interspersed with questions from audience members.

Panelists: Stephen M. Smith, Plant Ecologist, National Park Service, Cape Cod National Seashore, Wellfleet, MA

Kate Miller, Plant Ecologist, National Park Service, Northeast Temperate I&M Network, Bar Harbor, ME

John Paul Schmit, Quantitative Ecologist, National Park Service, National Capital Region I&M Network, Washington, DC

Wendy Cass, Botanist, National Park Service, Shenandoah National Park, Luray, VA

Suzanne Sanders, Ecologist, National Park Service, Great Lakes I&M Network, Ashland, WI

Session 122 • Rhythms II (2nd floor) • 2-hour Workshop

Bayesian Approaches to the Analysis of Data

Chair: Joshua Schmidt, Data Manager/Quantitative Ecologist, Central Alaska Network, National Park Service, Fairbanks, AK

This workshop will provide an introduction to Bayesian methods with a series of examples describing the use of these methods for NPS monitoring projects. Examples will include: a harbor seal trend analysis (Noble Hendrix/Scott Gende), double-observer methods for bald eagle surveys (Bill Thompson), repeated counts for passerine bird monitoring (Josh Schmidt), spatial modeling of trends in a wetland plant species (Tom Rodhouse), and identification of trends in salt marsh nekton communities (Penelope Pooler). Speakers will be available during a subsequent workshop on Thursday 1:30–3:35 to answer detailed questions and discuss further applications.

Presenters: Noble Hendrix, Statistician, R2 Resource Consultants, Redmond, WA
Scott Gende, Ecologist, Coastal Cluster Program, Juneau, AK
Bill Thompson, Ecologist (Biometrics), Southwest Alaska Network, Anchorage, AK
Joshua Schmidt, Data Manager, Central Alaska Network, Fairbanks, AK
Tom Rodhouse, Ecologist, Upper Columbia Basin Network, Bend, OR
Penelope S. Pooler, Quantitative Ecologist, Northeast Coastal and Barrier Network, Kingston, RI

Session 123 • Rhythms III (2nd floor) • Invited Papers
SQL Server: Who's Using It, How, and Why

Chair: Margaret Beer, Data Manager, National Park Service, Inventory & Monitoring Program, Fort Collins, CO

Session overview: As the volume and complexity natural resource data increases, data managers are faced with the decision of if, when, or why to upgrade information systems from the widely-used Microsoft Access software, to the more robust yet more complex SQL Server software. This session will present five instances of using SQL Server, including complete transitions away from Microsoft Access, to various "hybrid" solutions, and will examine some of the trade-offs and benefits of each. The capabilities and options of SQL instances hosted at the NPS Natural Resource Program Center in Fort Collins will also be presented.

Natural Resource Monitoring Databases Development Using SQL Server: A Comparison Between Visual Basic/ADO .Net and Microsoft Access Data Projects

Scott Miller, Data Manager, NPS Inventory & Monitoring Program, Arctic Network, Fairbanks, AK

Microsoft SQL Server provides a robust relational back-end database for natural resource monitoring data management applications, but it opens up many platform choices for the front-end. Developers accustomed to the Microsoft Access environment may not be aware of such possibilities. This session will describe experiences building front-end applications using Microsoft Access 2007 Data Project and Visual Basic/ADO .Net, and will compare overall development time and effort, usability, software quality and versatility.

Leveraging the Power of the NRPC Information Platform to Benefit an Individual I&M Network

Bill Johnson, Data Manager, NPS Inventory & Monitoring Program, Southeast Alaska Network, Juneau, AK

The NPS Natural Resource Program Center (NRPC) in Fort Collins, Colorado, currently makes available to I&M networks the potent combination of MS SQL Server data repositories and public-facing web servers. A benefit one may realize from this platform is the simplification inherent in using a single facility for distributing data and information to internal staff, external cooperators, and the rest of the world. Also, the professionally-managed database infrastructure assures the availability, scalability, and permanence of repository data—regardless of local staffing issues. This platform, which also hosts the NRInfo system, is a solid base for supporting modern technologies such as smart phones, web services, and web 2.0 applications. This session presents how the Southeast Alaska I&M Network is currently using this platform.

A Case Study of Implementing SQL Server

John Boetsch, Data Manager/Ecologist, NPS Inventory & Monitoring Program, North Coast and Cascades Network, Olympic National Park, Port Angeles, WA

Bret Christoe, Data Manager, NPS Inventory & Monitoring Program, North Coast and Cascades Network, Mount Rainier National Park, Ashford, WA

NCCN has implemented three project databases and three administrative databases in SQL Server. For another 10 projects, Access is the current platform. A common scenario is to use Access for initial development and then migrate to SQL Server as the database design matures and/or the data volume or size of the user group makes migration necessary. NCCN primarily uses ODBC connections between Access front-ends and SQL Server back-ends, as this is the most simple and flexible connection approach. Because the network's user group includes people at small parks or remote stations with relatively poor connectivity, remote users frequently access the database via remote desktop (terminal services) as a means of maximizing performance. This presentation will cover these and other implementation details relevant to those considering/beginning to implement SQL Server, including discussion of problems we've experienced and solutions we've discovered.

Cold Fusion 9 and MS Access: Problems and Possible Solutions

Simon Kingston, Data Manager/Biologist, NPS Inventory & Monitoring Program, Fort Collins, CO

Russ DenBleyker, Database Assistant, Northern Colorado Plateau Network, Colorado National Monument, Fruita, CO

In 2011, Web servers hosting Inventory & Monitoring program and network websites will be upgraded to Windows 2008 Release 2 (64-bit) and Cold Fusion 9. This configuration will not support MS Access data sources. Networks using Access data sources on their websites will need to upsize these databases to SQL Server in order to maintain functionality. This presentation will go through the basics of upsizing, important steps to take, and support that will be provided by WASO staff to complete the conversions. Several examples of the conversion process will be presented by a network that has recently completed the changeover.

Managing Data and Information with the Southeast Coast Network Decision Support System

Christina Wright, Biologist / Data Manage, Inventory & Monitoring Program, Southeast Coast Network, NPS Southeast Regional Office, Atlanta, GA

Ultimately, a successful inventory and monitoring program is challenged with preserving the data of the past while accommodating the dynamic demands for data and information in the present and future. In order to meet these challenges, the Southeast Coast Network (SECN) has developed an integrated, decision support system for natural resources monitoring rather than multiple stand-alone databases for each monitoring objective. Although database development began in MS Access, concerns related to database size, reporting capabilities, backup and user access encouraged a rapid transition to a client-server approach using SQL Server. Taking an integrated, client-server approach to data management has allowed for integration among the biological and geophysical data components, the comparison of data across parks and the sharing of data with partnering agencies. In addition, this system supports the ability to explore the sensitivity of park ecosystems to management decisions or changes to the ecosystem over time.

Session 124 • Edgewood A/B (4th floor)

OPEN

Session 125 • Evergreen (4th floor)

OPEN

Session 126 • Oakley (4th floor) • 4-hour Workshop; continues in Session 144)

Data Management and GIS "Open House" I

Chairs: Margaret Beer, Data Manager, National Park Service, Inventory & Monitoring Program, Fort Collins, CO

This "open house" session provides participants an opportunity to meet with WASO GIS, data management, and NRInfo Portal staff, and work one-on-one or in small groups on specific technical questions or problems. The session also provides a venue for attendees to meet and collaborate with their peers on technical issues, follow up on presentations or posters, and exchange ideas, tools, and solutions. Not all WASO staff will be present throughout the entire session; specific meeting times should be arranged ahead of time, if needed. Computers with Web access and NPS intranet connections will be available or attendees may bring their own.

NPS resource persons and area of expertise: Miftah Ahmad (SQL Server Development and Administration)
Kathy Dratch (NRInfo Portal, NRInfo Reference Application, SharePoint)
Kirk Sherrill (GIS Technician)
Michelle Flenner (NPSpecies)
Brent Frakes (NRInfo Portal, NRInfo Reference Application)
Dave Hollema (GIS Developer)
Fagan Johnson (I&M Websites, Natural Resource Technical Report Series)
Simon Kingston (Natural Resource Database Template, Microsoft Access, SQL Server)
Dan Kocol (NRinfo Portal—User Feedback)
Alison Loar (NPSpecies)
Lisa Nelson (GIS Applications and Administration, SQL Server)

Session 127 • Napoleon A1/A2 (3rd floor) • Workshop

Listening Session on a National Park Service Cultural Resources Challenge

Chair: Stephanie Toothman, Associate Director, Cultural Resources, National Park Service, Washington, DC

The National Park Service's Cultural Resources Program is exploring the possibility of launching a Cultural Resources Challenge to rejuvenate and refocus the program's activities in the coming years. All GWS2011 participants are invited to join key NPS Cultural Resources personnel for an open discussion / listening session on what directions a Cultural Resources Challenge might take. A listening session with an introduction by ST and an opportunity for participants to contribute to a discussion focused on key questions. I am thinking depending on how many people show up that we would divide the group up into smaller groups as we do in public sessions for plans the groups could be led by attending CRAG members and report back out as in the AGO sessions.

Session 128 • Napoleon B1 (3rd floor) • Contributed Papers

Partnerships

Chair: Barbara Goodman, Superintendent, Timucuan Ecological and Historic Preserve, National Park Service, Jacksonville, FL

International Partnerships: Sister Parks Agreement between Samlaut Protected Area, Cambodia, and Sequoia and Kings Canyon National Parks

Karen Taylor-Goodrich, Superintendent, Sequoia and Kings Canyon National Parks, Three Rivers, CA

Sequoia-Kings Canyon National Parks is into year four of a five-year "Sister Park" agreement with the Royal Government of Cambodia to provide professional development expertise at Samlaut Protected Area; the Agreement will be re-negotiated in January 2011. The Maddox-Jolie-Pitt Foundation (MJP) provides on-site coordination and financial support for the agreement. Samlaut shares a border with Thailand on Cambodia's northwest territory; MJP is facilitating negotiations on the potential establishment of a Thai-Cambodian "peace park"; and, Thai national park staff will be participating in NPS-sponsored training at Samlaut for the first time this year. This proposed paper/case study will focus on the use and promotion of innovative international partnerships to support new and existing protected areas, and achieve local and global ecological and social benefits.

The CESU Network: Vital Statistics and Future Directions

Thomas Fish, National Coordinator, CESU Network, Washington, DC

Neil Moisey, Professor of Wildland Recreation Management, Department of Society and Conservation, College of Forestry and Conservation, University of Montana, Missoula, MT

The U.S. government has responsibility for protection and management of approximately one third of the lands and waters in the United States. Innovative approaches that transcend disciplinary and institutional boundaries are essential for solving persistent and emerging complex problems facing the sustainability of our natural and cultural landscapes. Established by Congress in 1998, the Cooperative Ecosystem Studies Units (CESU) Network is a national consortium of federal agencies; academic institutions; state and tribal governments; conservation organizations; and other partners working together to support agency mission-based science and informed public trust resource stewardship. Thousands of collaborative projects have been conducted through this program, on myriad management units with engagement from partners from coast to coast. This presentation will highlight results from a comprehensive program evaluation and project inventory, capturing vital statistics for the program over the past twelve years; and offering a look at strategic directions for the next ten years.

Everglades Cooperative Invasive Species Management Area (ECISMA)

Antonio Pernas, Coordinator, Florida/Caribbean EPMT, NPS, Palmetto Bay, FL

A Cooperative Invasive Species Management Area is a formal partnership of federal, state, and local government agencies, tribes, individuals and various interested groups that manage invasive species and is defined by a geographic boundary. Florida has a long history of invasive species organization cooperation such as the Florida Exotic Pest Plant Council, Noxious Exotic Weed Task Team, Florida Invasive Animal Task Team and Invasive Species Working Group. Everglades restoration poses new challenges for invasive species management and has created a need for a more defined commitment to cooperation among agencies and organizations at higher levels of policy and management.

Challenges of Multi-jurisdictional Management of Bovine Tuberculosis in the Riding Mountain National Park Region, Canada

Ken Kingdon, Coordinator, Wildlife Health Program, Resource Conservation Section, Wasagaming, Manitoba, Canada
Doug Bergeson, Resource Conservation Section, Riding Mountain National Park, Manitoba, Canada
Ryan Brook, University of Saskatchewan, Saskatoon, Saskatchewan, Canada

Disease management across a multi-jurisdictional landscape is always a challenge. In 1991, bovine tuberculosis (TB) (*Mycobacterium bovis*) was found in a domestic cattle herd near Riding Mountain National Park, Manitoba, Canada. Subsequent testing of wildlife indicated that Wapiti (*Cervus elaphus*) and White-tailed Deer (*Odecoileus virginianus*) also carried the disease. As the disease was found in both domestic livestock and in wildlife, early management actions required the cooperation of two federal and two provincial government departments. At the same time, First Nations communities and local stakeholders around the National Park demanded greater input into the decision making process. A flexible, adaptive approach integrating Parks Canada's management objectives with input from First Nations, local residents and stakeholder groups, and other Government partners has led to the formation of an integrated multi-stakeholder management process. The presentation reviews the process and management structures developed to manage this complex disease in a challenging management environment.

Parknership: A 21st Century Model at Keweenaw National Historical Park

Tom Baker, Park Ranger (Management Assistant), Keweenaw National Historical Park, Calumet, MI

Stephen Mather, in the formative years of the National Park Service, relied on key partners to promote the national park idea. In 1992, Congress established Keweenaw NHP, based on a partnership premise, to provide a way to preserve the hundreds of structures and associated landscapes that document the nation's first major mineral rush, without overburdening taxpayers. The NPS at Keweenaw NHP are the facilitators in this grand partnership preservation strategy. The Federal government no longer has perennially deep pockets to save the nation's natural treasures, nor its cultural heritage. America needs a new, collaborative stewardship model to care for its great places and intangible heritage resources: the "parknership" model employed at Keweenaw NHP demonstrates just such a successful collaboration. Challenges abound, but the prize lies in the preservation of irreplaceable resources. Similar parknership strategies can be employed to achieve the mission of the NPS as well as other preservation/conservation organizations.

Session 129 • Napoleon B2 (3rd floor) • Contributed Papers

Transportation

Chair: David Louter, History Program Lead, Pacific West Region, National Park Service, Seattle, WA

No Ordinary Highway: Trans Canada Highway Twinning, Banff National Park—A 30 Year Retrospective

Terry McGuire, Special Project Director, Parks Canada Agency, Calgary, Alberta, Canada

Eighty three kilometers of the Trans Canada Highway bisect Banff National Park. This anomaly has offered a unique and important opportunity for Parks Canada to manage this transportation corridor as much to connect ecosystems as to connect people to their travel destinations. Each phase of conversion from two to four lanes has sparked national public interest, with early phases becoming flash points for the many divergent views about development and conservation in protected areas and if in keeping with Parks Canada's mandate of protecting and presenting these lands for present and future generations. This paper offers a 30 year retrospective on how Parks Canada has advanced the science of road ecology with leading-edge, context-sensitive highway design, mitigation and monitoring while improving stakeholder relationships and satisfaction and how the nature and substance of public participation has changed and evolved into an opportunity to now expand awareness about these successful mitigation measures.

Transit in the Parks: The Role of Foundations and the Private Sector

Katherine Turnbull, Executive Associate Director, Texas Transportation Institute, College Station, TX

Addressing transportation issues continues to be a major concern at many National Parks. Congested roads, overcrowded parking lots, exhaust fumes, and vehicles blocking scenic vistas all detract from the park experience. Working with local and state partners, the National Park Service (NPS) has implemented new shuttle bus services and other improvements to address these issues and to enhance visitor experiences. Foundations and the private sector are playing key roles in planning, funding, and promoting these new transit services. This paper will discuss the roles foundations and the private sector play in the bus services at Acadia National Park, Zion National Park, Colonial National Historical Park, and other National Parks. Common themes will be highlighted and benefits to other parks will be described.

Alternative Transportation Partnership Case Studies

Patricia Steinholtz, Senior NEPA Planner, David Evans and Associates, Inc., Denver, CO

Land managers tasked with protecting our country's natural and cultural resources are turning to alternative transportation systems (ATS) to address traffic, pollution, and crowding challenges, and can benefit by implementing partnerships with other entities. Two case studies – Santa Ana National Wildlife Refuge ATS and North Moab Recreation Areas ATS – investigate the effectiveness of such partnerships and offer land managers examples of successes and impediments experienced on existing ATS projects. Each case study demonstrates different types of partnerships, such as between private or public service providers, between federal lands agencies, with other entities (e.g., transit agencies), or with private companies such as ski resorts, bike rental companies, or other transportation concessioners. Other considerations include multimodal access, system complexity, regional diversity, and geographic setting. The results of these case studies provide land managers valuable lessons learned and successful partnership strategies to apply to their own ATS initiatives.

An Effort to Protect the Endangered Florida Panther from Highways and Vehicles in Big Cypress National Preserve

Krista Sherwood, Community Planner, National Park Service, San Antonio, TX

In 2006, Defenders of Wildlife, a non-profit wildlife advocacy organization, with sponsorship from the National Park Service (NPS) through an agreement with the U.S. Fish and Wildlife Service (USFWS), applied for a Transportation Enhancement grant from the Florida Department of Transportation (FDOT) to fund construction of a wildlife crossing in a location with chronic vehicle-related Florida panther mortality within Big Cypress National Preserve. Along with adjoining State and Federal preservation lands, Big Cypress ensures the protection of this unique ecosystem and provides the largest contiguous natural habitat for one of the most endangered mammals in the world, the Florida panther (*Puma concolor coryi*). The project was awarded funding to develop a Project Development and Environmental (PD&E) study which would determine feasibility and design of a wildlife crossing at this location. This paper details the challenges and considerations that guided project development and details the subsequent modifications in the outcome.

Visitor Perceptions of Alternative Transportation in Yosemite and Rocky Mountain National Parks

David Pettebone, Social Scientist, Yosemite National Park, El Portal, CA

Derrick Taff, PhD Candidate, Colorado State University, Fort Collins, CO

Peter Newman, Associate Dean of Academic Affairs, Colorado State University, Fort Collins, CO

David White, Associate Professor, Arizona State University, School of Community Resources and Development, Phoenix, AZ

Jessica F. Aquino, Graduate Research Assistant, Arizona State University, School of Community Resources and Development, Phoenix, AZ

Increasingly the National Park Service (NPS) is using alternative transportation to accommodate escalating visitation. Understanding factors that influence visitors' transportation-related decision making is essential to developing effective management strategies and messaging that will encourage visitors to use park shuttle buses and other modes of alternative transportation. Survey research, conducted in Rocky Mountain (2008) and Yosemite (2009 & 2010) National Parks examined visitors' perceptions of their transportation experience. Three important factors: accessibility, park experience, and conflict were identified by analyzing visitor data from each park using confirmatory factor analysis (CFA). The similarity in CFA results between studies suggests that strategies and messaging to promote and expand alternative transportation in parks can be formulated at larger, regional levels, rather than at the level of the individual park unit.

Session 130 • Napoleon B3 (3rd floor) • Invited Papers

Crossing Institutional Boundaries for Better Management of Parks and Protected Areas (Part 2)

Chairs: Robert Bennetts, Program Manager, National Park Service, Southern Plains Network, Des Moines, NM

Andy Hubbard, Network Program Manager, National Park Service, Sonoran Desert Network, Tucson, AZ

Session overview: The National Park Service, like many organizations has an institutional structure that tends to compartmentalize the organization by such things as disciplines and funding sources. While the purpose of such a compartmentalized structure is based largely on administrative functioning, an indirect consequence is a more limited capacity to work as a unified organization toward common goals. At the very least, communication across disciplines is often far less than what it should be and at the other end of the spectrum we suggest that relationships among different disciplines is sometimes better characterized as a rivalry than a partnership, even though those disciplines may be under the same agency with a common mission. While the ultimate solution to this dilemma may warrant reconsidering the institutional structure of our organization, here we present ideas and efforts within the existing organizational structure to better work as a unified agency.

Environmental History: Laying the Foundation for an Interdisciplinary Approach to Resource Management

Maren Bzdek, Program Manager – Public Lands History Center, Colorado State University, Ft. Collins, CO
Cori Knudten, Researcher – Public Lands History Center, Colorado State University, Ft. Collins, CO

A theoretical approach to understanding the past, environmental history explores the many intersections between humans and their environment—how the environment influences human actions and beliefs as well as how humans have altered and coexisted with their environment. Because environmental history brings insights from the humanities and the sciences together in a single explanation for change over time, it can be understood as a methodology for interdisciplinary investigation. Environmental history combines a range of evidence, including historical documents, field investigations, and scientific literature to create a well-rounded picture of the landscape under study. This presentation will focus on several projects undertaken by the Public Lands History Center at national park sites to demonstrate how environmental history can provide managers with some of the tools they need to make resource management decisions and how environmental history can lay the foundation for considering "natural" and "cultural" resources as a holistic entity.

Moving Towards Integrated Resources Management Planning

Jill Cowley, Historical Landscape Architect, National Park Service, Santa Fe, NM
Kathy Billings, Superintendent, National Park Service, Honaunau, HI
Daniel Jacobs, Chief, Natural Resource Management, Pecos, NM

Integrated resources management, which addresses "resources" rather than "cultural resources" and "natural resources," can help managers work through apparent management conflicts. "Natural/cultural" can be a divisive dichotomy, just as "feminine/masculine" and "public/private" can be within the social sciences. Integrated resources management starts with studies like environmental histories that document landscape change in a holistic way, interrelating human and non-human influences and conceptualizing park resources as cultural and natural at the same time. This holistic approach can continue through the development of statements of significance, desired future conditions, resource management targets, and action strategies within planning processes such as the Resource Stewardship Strategy (RSS). This presentation will use the ongoing pilot RSS at Pecos National Historical Park as a case study of how a holistic resources understanding can be developed into holistic management strategies. Issues addressed will include how the terminology we use influences the degree of integration we achieve.

Integrated Resources Reporting: A Step toward Integrated Thinking

Robert Bennetts, Network Program Manager, National Park Service, Des Moines, NM
Andy Hubbard, Network Program Manager, National Park Service, Tucson, AZ
Linda Kerr, Fire Ecologist, National Park Service, Denver, CO

The focus of this session is crossing institutional barriers that result from a compartmentalized institutional structure. The National Park Service, like many organizations, is administratively structured in such a way that different disciplines have a tendency to act independently, rather than as a unified organization working toward a common mission. A key first step in working toward unifying our efforts is to start thinking more holistically. One way to facilitate this is for our resource reporting to be more interdisciplinary. There have been some notable advancements toward achieving such a goal, but even these tend to be limited to types of resources (e.g., natural vs. cultural) or functionality (e.g., monitoring vs. management treatments). Here we present ideas for taking interdisciplinary reporting a step further by crossing both disciplinary and functional boundaries with the hope that a more unified presentation of resource information will broaden the conceptualization of our resource stewardship.

Practical Linkages Between Management and Monitoring: Management Assessment Points in Action

Robert Bennetts, Network Program Manager, National Park Service, Des Moines, NM
Andy Hubbard, Network Program Manager, National Park Service, Tucson, AZ

To achieve our core NPS mission of resource protection, resource management and monitoring must be explicitly linked. At GWS 2009, we advocated the use of management assessment points as a bridge between science and management. Management assessment points are: "…pre-selected points along a continuum of resource-indicator values where scientists and managers have agreed to stop and assess the status or trend of a resource relative to program goals, natural variation, or potential concerns" (Bennetts et al. 2007). We applied the management assessment point approach to vegetation and soils monitoring efforts in the Sonoran Desert network parks. An evaluation of the approach, benefits, and "lessons learned" from their use with monitoring data will be discussed in the context of collaboration across disciplines to better meet the NPS resource protection mandate.

Session 131 • Southdown (4th floor) • Day-Capper

The Fifth Element: Beyond Earth, Air, Fire and Water

Chair: Emma Lynch, Acoustical Resource Specialist, National Park Service, Fort Collins, CO

Ancient science categorized the world into four elements, with the fifth element— aether— being intangible, mysterious, and heavenly. Modern resource management has developed mature tools and methods for managing the traditional elements, while the ability to quantify resources such as soundscapes and night skies have emerged only recently. The National Park Service is hosting this open house to provide an opportunity for attendees to chat about acoustical and light pollution threats in their local area, examine field equipment, see the power of modeling, test their skills in a listening session, classify night sky quality, discuss outreach strategies one on one with specialists, and learn more about these "aetherial" resources. Drop in for free educational handouts, youth activities, interpretive handbooks, and CDs containing natural sounds and night sky images.

Session 132 • Gallier A/B (4th floor) • Day-Capper

A New Generation Honors George Wright's Legacy: Climate Change Fellows and Interns in the National Parks

Chairs: Lisa Norby, Acting George Melendez Wright Climate Change Youth Initiative Coordinator, National Park Service, Natural Resources Program Center, Geologic Resources Division, Lakewood, CO

Gregg Garfin, Principal Investigator for the George Melendez Wright Climate Change Fellowship Program and Assistant Professor and Extension Specialist in Climate, Policy and Natural Resources, School of Natural Resources and the Environment, University of Arizona, Tucson, AZ

Paul Dion, Principal Investigator for the George Melendez Wright Climate Change Internship Program and Director of Internship Programs, National Council for Science and the Environment, Washington, DC

This day capper session will showcase the work done by National Park Service George Wright Climate Change Youth Initiative participants. In this year's pilot program, 35 fellows and interns have contributed to the climate change knowledge base in the NPS. The session will be structured to maintain a lively flow and encourage audience participation. During the session, up to 20 students will present a brief vignette highlighting their project, significant findings, and something fun, unique or compelling gained from their experience. The students will be grouped according to themes (e.g., wildlife, vegetation, glaciers, and hydrology) to provide structure and help focus the discussion. After each group's presentations there will be group participation, utilizing a "game show" format of audience questions and rapid panel responses to maintain a lively discussion.

Session 133 • Nottoway (4th floor) • Invited Papers

Collaborative Efforts of the Colorado River Parks

Chairs: Jane Rodgers, Deputy Chief, Science & Resource Management (Socio-Cultural Resources), Grand Canyon National Park, Flagstaff, AZ

Sandee Dingman, Lake Mead National Recreation Area, Boulder City, NV

Session overview: Working together has long been a National Park Service goal and necessity, but are parks truly able to collaborate on the ground? This session explores the possibilities presented when parks are co-located along a geographic theme. This session will introduce the Colorado River parks of Nevada, Arizona and Utah and share examples of partnership opportunities that are in process. We will reflect on how working together has and continues to be a challenge and explore some recent ways in which these challenges are being overcome.

A River Runs through Us

Jane Rodgers, Deputy Chief Science and Resource Management (Socio-Cultural Resources), Grand Canyon National Park, Flagstaff ,AZ

The Colorado River remains a source of adventure, history, water, wilderness, habitat and political intrigue. Along its course, the river is drawn into eight individual park units, crossing five U.S. states before gasping a final breath into the Gulf of California. At the headwaters is Rocky Mountain National Park, and from there the waterway winds through Arches National Park, Canyonlands National Park, Glen Canyon National Recreation Area, Rainbow Bridge National Monument, Grand Canyon National Park, Grand Canyon-Parashant National Monument, and Lake Mead National Recreation Area. Resource managers in these parks collectively steward over 5.7 million acres. How could we better serve these parks by working together? What are our common themes? How can we turn the good idea of collaboration into practical reality? A recent workshop with four of the eight parks began answering these questions with action.

The Colorado River: A Narrow Ribbon of Green—Some are Weeds and the Beetles are Coming!

Curtis E. Deuser, Supervisory Restoration Ecologist, National Park Service, Lake Mead Exotic Plant Management Team, Boulder City, NV

The Colorado River Watershed drains much of the western United States including millions of acres of National Park and Public Lands. This river system forms a unique juxtaposition of biological communities and recreational opportunities within an arid region. It is also an active byway and transportation corridor for exotic invasive plants. Systematic exotic plant control efforts, including both site-led and species-led management strategies, have been ongoing for decades. Recent expansion of the tamarisk leaf beetle (biological control agent) into the watershed creates an adaptive management opportunity for new species prioritization and restoration possibilities. Further development and enhancement of cooperative partnerships on a watershed scale will be essential to accomplish objectives resulting from this adaptive management process.

Trespass Ungulates and Other Managed Grazing Issues in Colorado River Parks

Alice Newton, Biologist, Lake Mead National Recreation Area, Boulder City, NV

Four park service units, Grand Canyon NP (GRCA), Glen Canyon NRA (GLCA), Lake Mead NRA (LAKE), and Parashant NM (PARA), manage areas along the Colorado River and share common resource concerns and issues. Among these are the administration of permitted grazing allotments, and the management of trespass and feral cattle, burros, buffalo hybrids, and other ungulates. GRCA has recently has reported burro sightings in areas previously believed burro free, and it appears that ingress from PARA and LAKE or from surrounding BLM lands has increased. GRCA also now has an established herd of hybrid beefalo along the north rim which originated from the House Rock Valley, AZ in the late 1990s. GLCA has authorized grazing administered by BLM, but experiences trespass grazing in addition to feral horses and burros in several areas. LAKE does not have active authorized use allotments, but suffers significant impacts from trespass cattle in several locations. Additionally, while the 1995 Burro Management Plan has been successful in removing over 2300 burros and making most areas of the park virtually burro free, burros still exist within the park and within adjacent BLM Herd Management Areas. PARA still has authorized grazing within the Monument, as well as issues related to trespass cows and feral burros. This discussion examines these issues, their impacts and implications for management, and potential solutions.

Bright Lights, Big City & Dark Skies, Deep Canyons: A Colorado Plateau Dark Sky Reserve

Dan Duriscoe, NPS Night Sky Team, Death Valley National Park, Death Valley, CA

The area known as the Colorado Plateaus, centered roughly on the Arizona/Utah Border near the east-west center of the states, possesses some of the best conditions for visual observing of the night sky found anywhere on earth. The combination of clean air, a high percentage of cloudless nights throughout the year, and an absence of large cities producing a naturally dark night environment lead to an excellent opportunity for preserving this valuable resource. The concept of a dark sky reserve has been implemented successfully in Quebec, Canada, at Mont Megantic International Dark Sky Reserve. A cooperative effort of civic, private, and commercial groups produces a sense of community pride in the preservation and restoration of natural night skies. Data on night sky quality, air quality, and climate are presented along with an overview of the region's geography with regard to suitability for International Dark Sky Reserve Status. The threats and opportunities posed by the growth of large metropolitan areas and transportation corridors in and near the region to the sustainability of a dark sky reserve are discussed. The processes of obtaining Dark Sky Reserve Certification from the International Dark Sky Association is outlined.

Session 134 • Oak Alley (4th floor) • 2-hour Workshop
Rethinking Protected Area Zoning in a Changing World

Chairs: Catherine Dumouchel, Manager, Policy, National Parks Directorate, Parks Canada Agency, Gatineau, Quebec, Canada

Denyse Lajeunesse, Species at Risk Program Coordinator, Parks Canada Agency, Gatineau, Quebec, Canada

Zoning is a key tool for protected area managers, providing a framework to define, implement and communicate management intent with regards to protection, conservation and visitor experience. Zoning systems are a reflection of policy decisions, trends and priorities. Within the context of evolving external and internal environments, including new trends in recreational opportunities, zoning systems need to be reviewed and potentially revised to ensure they continue to play a key role in supporting the long term vision and management objectives of protected areas. Parks Canada's Legislation and Policy Branch would like to host a 4-hour workshop where representatives of other jurisdictions and organizations will be invited to present and discuss current reviews, development, best practices and success factors related to zoning in terrestrial and marine protected areas. The expected outcomes of the workshop are a shared understanding of best practices with regards to zon-

ing in protected areas and the development of parameters to help support decision-making when developing and revisiting zoning systems.

Session 135 • Bayside A (4th floor) • Day-Capper

Where are the S'mores and Who are All These People at the Campfire?

Laurie Heupel, Outdoor Recreation Planner, National Park Service, Fairfax, VA

Barbara Kubik, Past President, Lewis and Clark Trail Heritage Foundation

The Lewis and Clark Bicentennial (2003-2006) gave rise to a series of innovative new partnerships that spanned several major watersheds. Staff from a variety of land management agencies, including the National Park Service, the Bureau of Land Management, and the USDA Forest Service, explored a variety of partnering techniques in an effort to diversify the number and types of participants in the bicentennial commemoration. These new partnership efforts led to three important developments: new thinking about recreation and river management; bringing many diverse groups to the table; and reaching out to groups/partners that had been ignored for many decades. When these groups joined the discussions, many of the traditional partners gained new perspectives on river and watershed management. In this session, former Bicentennial participants share their experiences and lessons learned from the commemoration. This format involve in the building of S'mores to represent partnerships.

Session 136 • Bayside B/C (4th floor) • Day-Capper

The Next Wave: Training & Capacity Building for Coastal and Marine Protected Area Managers

Lauren Wenzel, National MPA System Coordinator, National Marine Protected Areas Center, Silver Spring, MD

Mary Sue Brancato, Capacity Building Program, Office of National Marine Sanctuaries, NOAA

Do you have all the skills and information you need to manage your coastal or marine protected area (MPA)? Do you feel prepared for the challenges of adapting to climate change? Participating in coastal and marine spatial planning? Do you have the skills you need to advance your career as an MPA manager? NOAA's National MPA Center and the Office of National Marine Sanctuaries are partnering with the National Park Service, USFWS and states to build the capacity of MPA programs to address these challenges. We're developing a training and capacity building plan for coastal and marine protected areas, and need to hear from about your needs and priorities. Stop by add your priority needs to the scale and see if that tips the balance. See how your needs match up with staff from other MPAs around the US. Can you guess the three highest priorities?

Session 137 • Maurepas (3rd floor) • Business Meeting (open to all registrants)

Planning the Future of National Park Service International Programs

Chair: Jonathan Putnam, International Cooperation Specialist, National Park Service, Office of International Affairs, Washington, DC

Stephen Morris, Chief, National Park Service, Office of International Affairs, Washington, DC

The year 2011 marks the 50th anniversary of the National Park Service's Office of International Affairs (OIA). This is an appropriate time to reflect on the NPS's international mission and discuss where the international program should be heading over the next decade. What should NPS's international priorities be? How can OIA better communicate the importance of international work to NPS staff, decision makers and the general public? What could OIA and others be doing to instill the international perspective into the NPS "culture?" Where are there opportunities to partner with other organizations to develop symbiotic relationships? All GWS attendees are welcome.

Session 138 • Borgne (3rd floor) • Affinity Meeting (open to all registrants)

Meeting for Parks and Partners on Biodiversity Discovery Activities (All-Taxa Biodiversity Inventories, BioBlitzes, etc.)

Chairs: Kirsten Leong, Human Dimensions Program Manager, Biological Resource Management Division, National Park Service, Fort Collins, CO

Sally Plumb, Biodiversity Coordinator, Biological Resource Management Division, National Park Service, Fort Collins, CO

Biodiversity Discovery activities in NPS range from All-Taxa Biodiversity Inventories (ATBIs), to large-scale BioBlitzes in partnership with National Geographic Society, and individual park efforts at varying scales. A subset of parks engaged in these activities have been meeting periodically since 2008 to cultivate a support network that allows parks to learn from each other's experiences and expertise, develop best practices for the range of approaches to biodiversity discovery, and coordinate data management and sharing. These efforts have resulted in internal and external websites, a brochure and white paper summarizing activities across the system and resource needs, and a draft handbook to assist parks in conducting Biodiversity

Discovery activities. In 2010, a national Biodiversity Coordinator was hired. This meeting will review materials developed to date, especially the Biodiversity Discovery Handbook, introduce the national coordinator, and identify other coordination needs and opportunities, especially for parks that have not been engaged to date."

Session 139 • Borgne (3rd floor) • Business Meeting (by invitation only)
Parks Canada/USNPS/CONANP Protected Areas Workshop II

Chair: Beth Johnson, Deputy Associate Director NRSS, National Park Service, Washington, DC

No abstract available.

Session 140 • Rhythms I (2nd floor) • Rapid-Fire Session
Invasive Plant Early Detection Protocols

Chair: Craig Young, Biologist, National Park Service, Heartland I&M Network, Republic, MO

In order to manage invasive exotic plants, national parks require methods for the early detection of such plants. Early detection increases the logistical and financial feasibility of controlling invasive exotic plants. In this session, inventory and monitoring staff involved in developing early detection protocols will review available protocols to highlight some of the major decisions encountered in developing these protocols. These decisions include prioritization of species, sampling design, data management, data analysis, and reporting. The session format will be rapid fire with eight presenters providing five minute overviews of their protocol and then spending an additional five minutes on unique elements of that protocol. These unique elements include use of opportunistic observations, monitoring in cultural landscapes, modeling based on field observations, partnerships, and interactions with exotic plant management teams.

Early Detection of Invasive Species in the Eastern Rivers and Mountains Network (Opportunistic Observations and EDDMapS)

Jennifer Stingelin Keefer, Botanist/Research Associate, Eastern Rivers and Mountains Network, University Park, PA

Invasive Plant Detection in Midwestern Cultural Landscapes

Craig Young, Botanist, Heartland I&M Network, Republic, MO

Integrated Analyses and Syntheses

Dennis Odion and Daniel Sarr, Klamath I&M Network, Ashland, OR

Monitoring Corridors and Hot Spots Using Sampling and Incidental Observations

Dusty Perkins, Network Program Manager, Northern Colorado Plateau Network, Grand Junction, CO or Rebecca Weissinger, Ecologist, Northern Colorado Plateau Network, Moab, UT

Partnerships and Communication

Alison Ainsworth, Quantitative Ecologist, Pacific Island Network, Hawaii NP, HI

Use of Volunteers

Robert Steers, San Francisco Bay Area I&M Network, Point Reyes, CA

Corridors of Invasiveness: NPS Exotic Plant Early Detection Monitoring Protocol for South Florida

Kevin Whelan, Community Ecologist, South Florida/Caribbean Network, Palmetto Bay, FL

Edge Effects

Robert Bennetts, Network Program Manager, Southern Plains Network, Capulin, NM

Early Detection Smartphone Software

Bobbi Simpson, California Exotic Plant Management Team, Point Reyes, CA

Session 141 • Rhythms II–III (2nd floor) • 2-hour Workshop

Structured Decision-making: Linking Science and Management

Chair: Maggie McCluskie, Program Manager, Central Alaska Network, National Park Service, Fairbanks, AK

Management actions required by land managers are becoming increasingly complex. Structured Decision-making (SDM) is a means by which mangers can explicitly incorporate policy, laws and data to reach optimal decisions given the management objectives. In this workshop the SDM process will be described and case studies using the approach will be presented. Case studies include amphibian biodiversity management in National Capital Region parks, sea otter management in southwest Alaska, golden eagle management in Denali National Park and Preserve and wolf population management in Yukon-Charley Rivers National Park and Preserve.

Application of Structured Decision Making to Sea Otter Management

Jim Pederson, Oregon Cooperative Fish and Wildlife Research Unit, USFWS, Corvallis, OR

Management of Amphibian Populations in the National Capital Region Network of National Parks

Evan Grant, Patuxent Research Center, USGS, Laurel, MD

Wolf Population Management in Yukon-Charley Rivers National Preserve and the Utility of Structured Decision Making

Joshua Schmidt, Data Manager, Central Alaska Network, Fairbanks, AK

Golden Eagle Management in Denali National Park and Preserve: A Case Study for Structured Decision Making

Maggie McCluskie, Network Program Manager, Central Alaska Network, Fairbanks, AK

Session 142 • Edgewood A/B (4th floor) • 2-hour Workshop

Connecting with Hearts, Minds and Muscles: Social Marketing for Invasive Plants

Chairs: Emily Gonzales, Bioregional Monitoring Ecologist, Parks Canada, Ottawa, Ontario, Canada

Stephane Bruneau, Outreach Education Specialist, Parks Canada, Cornwall, Ontario, Canada

Human activities spread invasive species, so public engagement is a critical component of ecological restoration. Fear tactics, however, are typically used to gain public attention and may be ineffective when the public does not fear the effects of invasive plants. Parks are already faced with a disengaged public and negative messages may also alienate new visitors. Community-based social marketing (CBSM) has been used to improve our understanding of stakeholder perceptions so we can better target messages and alter behavior. This workshop identifies barriers to public engagement in the control of invasive plants and invites you to help devise solutions. Following an overview of CBSM principles and a landscape visualization exercise, participants will develop strategies to engage the public in ecological restoration. We will use a case study targeting residents neighboring a Canadian National Park to produce an invasive plant CBSM program with applications to other protected areas.

Session 143 • Evergreen (4th floor) • Affinity Meeting (open to all registrants)

NPS Network for Innovation

Chairs: Nora Mitchell, Director, Conservation Study Institute, National Park Service, Woodstock, VT

Brent Mitchell, Vice President, QLF Atlantic Center for the Environment, Ipswich, MA

At the request of the NPS National Leadership Council, a working group of National Park Service staff in cooperation with the National Park System Advisory Board is currently exploring ways to more deliberately advance innovation, creativity and change and to contribute to leadership and organizational development through more effective sharing of experience and lessons learned across the system. An emerging concept of a "network of innovation" will be outlined as a framework for discussion. This informal meeting will briefly describe discussions to date, and invite ideas and comments. The session is open and not limited to NPS staff.

Session 144 • Oakley (4th floor) • 4-hour Workshop (continued from Session 126)

Data Management and GIS "Open House" II

Chairs: Margaret Beer, Data Manager, National Park Service, Inventory & Monitoring Program, Fort Collins, CO

See under Session 126 for abstract and list of participants.

Session 145 • Napoleon A1 (3rd floor) • Invited Papers

International Parks and Protected Area Research: Social Issues and Cultural Differences

Chairs: Robert Burns, Associate Professor, West Virginia University, Morgantown, WV

Eick von Ruschkowski, Gottfried Wilhelm Leibniz Universität, Hannover, Germany

Session overview: Parks and protected areas share similar issues, problems, and potentially similar solutions. This session examines various methods of inventorying and finding resolution to social issues in parks and protected areas in the US, Europe and Asia. Different frameworks and management values are examined, along with a comparison of the social carrying capacity variables used to measure the impacts related to potential social impacts. Several case studies will be presented, along with a synthesis of the various methods used in each case study. Case studies will focus on social carrying capacity studies conducted in the US, Germany, Austria and Romania, and is Asia. Variables to be examined include identifying theoretical models of predicting behavior, cultural differences, crowding/conflict, and satisfaction with the recreation experience.

Differences in Values between US and Austrian Park and Protected Area Managers: A Qualitative Study

Robert C. Burns, Associate Professor, West Virginia University, Morgantown, WV, USA

Arne Arnberger, Associate Professor, BOKU, Vienna, Austria

There is a continuing increase in recreational visitor use of public land on a global scale. This rise in visitation can be a good thing if there is a pro-active management plan utilizing strong cumulative methodology to anticipate potential impacts to their area and sustain its natural and social resources. Although vast spectrums of issues present themselves to each management, few of the issues are new to researchers and managers. A Delphi study was conducted in 2010 to identify possible levels on which managers could effectively communicate about management techniques on an international level. Managers from protected areas in Austria and the Pacific Northwest region of the US Forest Service were asked a series of questions on techniques and objectives, to determine this common level and also gauge the height of enthusiasm they have toward more collaborations with other managers.

Harz National Park, Germany: Inventorying and Identifying Social Issues

Eick von Ruschkowski, Gottfried Wilhelm Leibniz Universität, Hannover, Germany

Robert C. Burns, Associate Professor, West Virginia University, Morgantown, WV

Harz National Park can be considered a representative example in regards to visitor use management efforts in Germany efforts. Previously, the Park had adapted "socio-economic management" into its existing national park plan. Since 2006, little effort has been put into this field, mainly due to the lack of resources. Between 2002 and 2004, a total of 15 counters (seven vehicle counters and eight infrared devices) were installed to generate visitor data in the National Park. The study came to the conclusion that annual visitation for the Brocken peak exceeds 1.17 million. A baseline of use was established, and the need to conduct further research focusing on sensitive management decisions was determined. Managers clearly determined that stakeholders deserve empiric evidence that justifies the decisions. Because of multiple access opportunities, the methodological challenge to provide reliable data in an efficient manner still awaits solution. Further funding will allow for additional research.

Residents' Interactions with Retezat National Park, Romania: Implications for Perceived Environmental Responsibility

Natalia Buta, Lecturer, Frostburg University, Frostburg, MD, USA

Stephen Holland, Associate Professor, University of Florida, Gainesville, FL, USA

This study examined the visitation patterns of residents living adjacent to Retezat National Park (RNP) and a model positing relationships between protected area visitation, social interaction, community attachment and perceived environmental responsibility were tested. Data were collected from 260 residents in nine communities adjacent to RNP in 2009. The majority of respondents indicated they have been inside the park at least a few times during the last 12 months. Using Mplus 5.21, a structural model which included the proposed variables was tested. The model fit the data adequately ($2/df=154.39/72=2.14$; CFI=0.98; RMSEA=0.066; WRMR=0.963). Significant path coefficients were found between park visitation and social interaction, social interaction and attachment, and between attachment and perceived environmental responsibility. This study supports efforts to encourage residents' visitation to adjacent protected areas, and that the managerial openness to such behavior will shape social interactions, attachments to the social and natural environment and perceived environmental responsibility.

Exploring Cultural Differences in Landscape Preferences: Differences between Austrian and United States Visitors

Franziska Rom, BOKU, Vienna, Austria
Arne Arnberger, Associate Professor, BOKU, Vienna, Austria
Robert C. Burns, Associate Professor, West Virginia University, Morgantown, WV

Based on the assumption that history and cultural backgrounds form human perception, this study investigates differences of landscape preferences of protected area visitors in Austria and the United States. To scrutinize these variations on – site visitors to the Hell's Canyon National Recreation Area in Oregon (n= 100) and the Gesäuse National Park in Austria (n= 100) were questioned on their landscape preferences by means of the information-processing theory using the predictors variables (coherence, complexity, legibility, and mystery) by Kaplan and Kaplan (1989). The respondents rated the same set of eight images depicting Austrian landscapes with different human impact. A main objective of this study was to ascertain the relation between the predictors and preference. The results demonstrate a very strong explanatory power of the predictor variables, in particular for the Austrian sample (setting #3: R (AUT) .60; R (USA) .09). Significant differences will be discussed in detail.

Addressing International Management Capacity Building Needs for Marine Protected Areas

Thomas E. Fish, Cooperative Ecosystem Studies Units Network, USA
Anne H. Walton, NOAA National Marine Sanctuary Program, USA

Numerous challenges facing coastal and marine protected areas (MPAs) are exacerbated by limitations in local and regional capacity for planning and management. Effects of rapid economic development, consumptive resource use, water scarcity, and climate change require new approaches to maintain and safeguard ecosystem processes and ecosystem services, vital for ecological integrity and livelihoods in coupled human and natural systems. Targeting coastal and marine resource management professionals from protected areas, provincial agencies, and nongovernmental conservation organizations, the International MPA Management Capacity Building Training Program works with partners in several multinational regions (e.g., Mediterranean, South China Sea) to develop local and regional capacity in designation, implementation, and management of MPAs. While the program covers a range of protected area planning and management subjects, this presentation will focus on two topical areas – sustainable tourism and climate change adaptation – with example results drawn from needs assessments, group projects, and trainings implemented in several countries.

Session 146 • Napoleon A2 (3rd floor) • Contributed Papers

In Search of Relevance

Chair: Shawn Cardiff, Manager, Land Use Policy and Planning, Parks Canada, Jasper National Park, Jasper, Alberta, Canada

NPS Comprehensive Survey of the American Public: Broad Trends between 2000 and 2008

Patricia Taylor, Professor of Sociology, University of Wyoming, Laramie, WY
Burke Grandjean, Professor of Sociology and Statistics, and Executive Director, Wyoming Survey & Analysis Center, University of Wyoming, Laramie, WY
James Gramann, Visiting Social Scientist, National Park Service, and Professor, Texas A&M University, College Station, TX

In 2008 and 2009, the National Park Service conducted its second Comprehensive Survey of the American Public, a nationwide telephone interview with 4,000 respondents. Several questions from the first NPS comprehensive survey in 2000 were repeated in the second survey. Within limitations imposed by methodological refinements, several comparisons are possible. This presentation discusses broad trends in visitation rates, visitor satisfaction, barriers to more frequent visitation, and attitudes toward management of non-native plants and animals in parks. Despite refinements in methods and question content, the two data sets yield similar results. Differences that did occur could indicate a growing gap between visitors and non-visitors in willingness to participate in surveys about national parks. This may be a function of growing public resistance to telephone surveys or less interest in parks by non-visitors.

Inequalities in US National Park System Visitation: An Application of the Multiple Hierarchy Stratification Perspective

Timia Thompson, Research Assistant, Doctoral Student, North Carolina State University, Raleigh, NC
Myron F. Floyd, Professor & Director of Graduate Programs, North Carolina State University, Raleigh, NC

Demographic projections suggest that travel to federal lands, particularly National Park system units will be impacted by significant shifts in the population's racial and ethnic, gender, age, and socioeconomic status (SES) composition. There remains, however, a paucity of social science research on visitation to national parks along these axes. As visitor and potential visitor

populations to parks become more diverse, managers will need more evidence-based information to create more inclusive environments for visitors. Using the multiple hierarchy stratification perspective, this study examined the individual and cumulative effects of race and ethnicity, gender, age, and socioeconomic status on U.S. national park system visitation. We will present the results of this research and discuss potential policy and management implications associated with efforts to attract diverse populations to US national parks.

Public Attitudes toward Selected Natural Resource and Recreation Management Issues in U.S. National Parks

Gerard Kyle, Associate Professor, Texas A&M University, College Station, TX
Jinhee Jun, Post-Doctoral Research Associate, Texas A&M University, College Station, TX
James Gramann, Professor, Texas A&M University, College Station, TX
Patricia Taylor, Professor, University of Wyoming, Laramie, WY
Burke Grandjean, Professor, University of Wyoming, Laramie, WY

The National Park Service's Comprehensive Survey of the American Public conducted by telephone in over 4,000 households in 2008 and 2009 explored public attitudes toward a number of NPS management issues. Among these were attitudes toward protection of selected natural resources in parks, including air, water, night skies, and natural soundscapes, as well as attitudes toward visitor facility development and motorized recreation. The findings displayed considerable homogeneity across the public on many issues, but polarization on others. In general, the public supported protection of natural resource quality in parks and providing visitor facilities, but was less supportive of removing non-native plants and animals and permitting jet-skiing or snowmobiling. In addition to the overall findings, we discuss attitudinal variations between sub-segments of the U.S. population, including geographic variation and differences between visitors and non-visitors to the National Park System."

Setting the Stage for Visitor Experiences in Canada's National Heritage Places

Ed Jager, A/Director, Visitor Experience, Parks Canada, Gatineau, Québec, Canada

With increased urbanization, immigration and an aging population, Canada is undergoing significant demographic changes. The Parks Canada Agency is faced with the challenge of remaining relevant to Canadians in this dynamic context. To continue to be relevant to Canadians, Parks Canada strives to continuously take into consideration their needs and expectations. High quality visitor experiences are a key means by which Parks Canada can become relevant to Canadians and nurture their appreciation and support. This work must be done in a continually evolving fashion integrating the protection, education and visitor experience elements of Parks Canada's mandate. Success will be achieved when Canadians see their National Parks, National Historic Sites and National Marine Conservation Areas as special places they want to protect, learn about and experience, and when these treasured places are a living legacy connecting visitors to a stronger, deeper understanding of the very essence of Canada.

Protection and Visitor Experience: Synergies in Support of Relevance

Kathie Adare, Senior Advisor to the Director General National Parks, Parks Canada Agency, Gatineau, Québec, Canada
Catherine Dumouchel, Senior Policy Analyst, Parks Canada Agency, Gatineau, Québec, Canada

The year 2011 will mark the 100th anniversary of the establishment of Parks Canada. To ensure continued relevance of national parks, Parks Canada facilitates meaningful visitor experience linked to the unique opportunities provided by protection and restoration initiatives in national parks. Through a series of examples from across Canada's national park system, this presentation will explore key elements that help define and shape meaningful experiences (e.g., authenticity, connectedness, self-actualization etc.). We will describe how the Agency's program elements within both the protection and visitor experience areas of our mandate are complementary and synergistic to ensure the relevance of these special places in the hearts and minds of all Canadians. In addition, we will demonstrate how such experiences can result in fostering a sense of personal connection to the unique biodiversity and special landscapes within parks, enhance understanding and appreciation of these places and enhance support and engagement with regards to their long-term protection and presentation.

Session 147 • Napoleon A3 (3rd floor) • Panel Discussion

NPS Safety Leadership Council Panel Discussion: Risk, Culture, and Safety in Natural Resource Management

Chairs: Cicely Muldoon, Superintendent, Point Reyes National Seashore, National Park Service; and Chair, National Park Service Safety Leadership Council, Point Reyes Station, CA
Samantha Richardson, Public Affairs Specialist and Communications Editor for NPS Safety Leadership Committee, Lakewood, CO

The National Park Service (NPS) has the highest accident and fatality rate of the agencies within the Department of Interior, and within the past few years, the Park Service has suffered two on-the-job fatalities in the natural resource management profession. NPS recognizes the often-hazardous activities associated with natural resource work, and is working to integrate safety into the mission, work ethic, and behavior within this field. This session will highlight the importance of employee health and safety in natural resource activities, and will engage natural resource managers in how to best incorporate operational leadership into the culture of natural resource management. The panel will also highlight suggested strategies for encouraging safer individual behavior within the natural resources field, and welcome discussions with the audience to better understand the concerns about the day-to-day realities of field work, and how to be safe in these varied environments.

Jon Jarvis, Director, National Park Service, Washington, DC

Cicely Muldoon, Superintendent, Point Reyes National Seashore, National Park Service; and Chair, National Park Service Safety Leadership Council, Point Reyes Station, CA

Margaret Wild, Wildlife Health Program Chief, NPS, Fort Collins, CO

Jerry Mitchell, Chief, Biological Resource Management Division, NPS, Fort Collins, CO

Mark Herberger, Operational Leadership Program Manager, NPS, Washington, DC

Session 148 • Napoleon B1 (3rd floor) • Panel Discussion

Indigenous Women Exploring Biocultural Conservation and Cultural Alliances

Chair: Melia Lane-Kamahele, Management Assistant, NPS, Pacific West Regional Office, Honolulu, HI

This interactive session is proposed as an informal, moderated discussion based on a series of questions from the moderator to the panelists to explore indigenous women in conservation and their career experiences, challenges, successes and perspectives – and how their indigeneity has influenced and continues to influence their careers. Audience interaction and questions will round out the exchange of perspectives, observations and recommendations. This session follows a model and panel that was proposed and successfully executed at the 18th Annual Hawaii Conservation Conference in Honolulu, Hawaii in August 2010. The panel was composed of 6 Pacific Islander women actively engaged at international, national, federal, state, regional and local levels through their agencies and organizations.

Panelists: Nathalie Gagnon, Policy Analyst, Aboriginal Secretariat, Parks Canada, Gatineau, Quebec, Canada

Jeanette Pomerenke, National Park Service, Superintendent, Bering Land Bridge National Preserve, AK

Elizabeth F. Nanticoke, Acting Director, Department of Environment, Mohawk Council of Akwesasne, Kawehnoke, Ontario, Canada

Deanna Beacham, Virginia Council on Indians and Program Specialist, Office of the Secretary of Natural Resources, Commonwealth of Virginia

Fawn YoungBear-Tibbetts, Student intern/researcher, University of Wisconsin-Madison Arboretum, Madison, WI

Session 149 • Napoleon B2 (3rd floor) • Invited/Contributed Papers

Integrating Wilderness Character into NPS Planning, Monitoring, and Management

Chair: Wade Vagias, Natural Resource Specialist, Wilderness Stewardship Division, Washington Office, NPS, Washington, DC

Session overview: The Wilderness Act of 1964, and all subsequent wilderness legislation, instructs the agencies responsible for managing wilderness to preserve wilderness character. The recently published "Keeping it Wild, An Interagency Strategy to Monitor Trends in Wilderness Character Across the National Wilderness Preservation System," is a promising new tool to understand, articulate, and protect wilderness character and several new initiatives are making substantial inroads on integrating the concept of wilderness character into NPS planning, monitoring, and management.

Overview of Wilderness Character as a Foundation for NPS Wilderness Planning, Monitoring, and Management

Peter Landres, Aldo Leopold Wilderness Research Institute

Introduction to the concept and utility of the wilderness character concept for NPS planning, monitoring, and management.

Introduction of the Wilderness Character Integration Team

Suzy Stutzman, Wilderness Coordinator, Intermountain Region

The Wilderness Character Integration Team (WCIT) has been assembled to integrate wilderness character into National Park Service planning, management, and monitoring. The intended outcome from the work of this team will be for all NPS wilderness parks to understand how the idea of wilderness character applies to their park and how wilderness character informs and guides their day-to-day and on-the-ground activities that occur within a wilderness park.

Wilderness Fellows Program

Wade Vagias, Natural Resource Specialist, Wilderness Stewardship Division, Washington Office, NPS, Washington, DC

The Wilderness Fellows Program was initiated by the Wilderness Stewardship Division in partnership with the SCA, to meet two specific outcomes; 1) provide capacity to NPS wilderness parks to assist with addressing wilderness stewardship planning and associated tasks and 2) provide recent graduates of conservation-oriented programs the opportunity to work in a NPS unit. Seven wilderness fellows were placed in six NPS units. Fellows met at Everglades National Park for a 3-day wilderness planning workshop with park staff before reporting to their respective units. Weekly conference calls ensued throughout the duration of the 6-month program to address topics and issues of mutual interest. Outcomes of this effort included the development of baseline wilderness character assessments, wilderness character narratives, and inroads on operational-level details including wilderness education for both staff and visitors and forming of wilderness committees. This proposed presentation will focus reviewing outcomes of the program as well as advice and guidance for others considering developing similar program.

Mapping Wilderness Character in Death Valley National Park: New Tools for New Concepts

James Tricker, Research Scholar, Aldo Leopold Wilderness Research Institute / University of Leeds, Missoula, MT
Peter Landres, Ecologist, Aldo Leopold Wilderness Research Institute, Missoula, MT
Sandee Dingman, Natural Resource Specialist, Lake Mead National Recreation Area, Boulder City, NV

With the emergence in recent years of an interagency strategy to monitor trends in wilderness character, there is now a need to develop standardized toolsets to make the concept of wilderness character spatially explicit. A new GIS-based approach for mapping wilderness character was developed for Death Valley Wilderness. Using data layers that are already available and several modeling techniques, a spatially explicit assessment for the natural, untrammeled, undeveloped, solitude or primitive and unconfined recreation, cultural, and tribal qualities of wilderness character is presented. A multi-criteria evaluation, with user-defined weights for each quality, provides an overall index of wilderness character. This GIS-based approach to mapping wilderness character allows managers to understand which locations within the wilderness are most vulnerable to impairment, which locations are most important to preserving wilderness character, and how different planning alternatives will affect wilderness character. The approach presented here is robust and adaptable to any wilderness.

Keeping the "Wild" in Wilderness: Establishing a Wilderness Character Monitoring Framework at Black Canyon of the Gunnison NP and Curecanti NRA

Julie Sharp, Environmental Protection Assistant, National Park Service, Denver, CO
Kerri Cahill, Visitor Use Technical Lead, National Park Service, Denver, CO
Suzy Stutzman, Regional Wilderness Coordinator, National Park Service, Denver, CO

The Wilderness Act of 1964 and the National Park Service management policies require that conditions and long term trends of wilderness character are monitored. This monitoring is based on the four key wilderness qualities: untrammeled, natural, undeveloped, and opportunities for solitude or primitive and unconfined recreation. A new interagency "Keeping It Wild" framework was developed for monitoring wilderness character, but there has been limited application within the NPS to date. This presentation will demonstrate lessons learned on applying the current framework to Black Canyon of the Gunnison NP and Curecanti NRA as part of their Wilderness and Backcountry Management Plan. Specifically, the presentation will focus on the process used for developing appropriate indicators and measures that will ensure that the conditions essential to preserving the parks' wilderness areas are maintained. In addition, the presentation will identify important questions that remain for future applications of the "Keeping it Wild" framework.

Session 150 • Napoleon B3 (3rd floor) • Contributed Papers

Fire Management, Modeling, and Monitoring

Chair: Jan van Wagtendonk, U.S. Geological Survey (retired), El Portal, CA

Modeling the Santa Ana "Devil Winds," Extreme Wildfire Behavior, and the Geography of Disaster

Robert Taylor, Biogeographer/ Fire GIS Specialist, Mediterranean Coast Network, NPS, Thousand Oaks, CA

Every fall, Santa Ana Winds blowing through southern California's shrubland canyons predictably create some of the world's most dangerous wildfire weather and terrain. Native plant communities are well adapted to surviving the infrequent but inexorable firestorms that have periodically swept this landscape for millennia. But the exurban human communities now sprawled across that same landscape are quite vulnerable to disastrous loss of property and life when extreme fire behavior

comes to town, and they are also an ongoing source of fire starts. Frequent large wildfires pose threats to ecological sustainability and public safety. Modeling Santa Ana wind patterns across this landscape at a fine spatial scale allows NPS to make much more realistic predictions of wildfire behavior, and to perform spatially explicit, fine scale characterizations of fire hazardous terrain. We are also using it to create some visually striking fire spread simulations for use in fire education programs.

Perspectives of Potential Science Users in the Context of Fire Management

Vita Wright, Science Application Specialist, RMRS / NPS, Kalispell, MT

The use of science is mandated by the National Parks Omnibus Management Act of 1998 and federal wildland fire policy, yet challenges remain to fulfilling this mandate. Use of research can be strategically improved by understanding potential research user perspectives. I review the impact of agency, position title, pay grade, administrative level, education level, and level of suppression responsibilities on perspectives about fire / fuels research. An interagency survey of 495 federal fire managers showed that National Park Service managers, Fire Ecologists, those with graduate education, and those who spent less time on fire suppression had more positive beliefs and attitudes toward research, used research more, and had more frequent interactions with scientists than fire and fuels managers with different positions or backgrounds. When asked about sixteen potential barriers to using research, 70% respondents cited lack of time. In contrast, only 27% cited lack of relevant research as a barrier.

Monitoring Forest Succession the First 14 Years After a Wildfire in the Western Oregon Cascades

Mark Huff, Monitoring Program Manager, NPS, North Coast & Cascades Network Inventory & Monitoring, Ashford, WA
Jane Kertis, Siuslaw National Forest, Corvallis, OR
Martin J. Brown, Brown & Brown Consultants, Portland, OR

We observed changes in vegetation, standing dead trees, and logs following a 1991 wildfire in the Oregon Cascade Range. To document natural variation of fire effects, we selected monitoring sites from different elevations, aspects, and fire severities. Tree mortality in the fire followed strong patterns associated with species and diameter class. After the fire, tree mortality continued at annualized rate of 8.6% from year 1 to 7, and 4% from year 8 to 14. Snags created by the fire fell at rapid rates that differed by diameter class and species. After the fire, coarse woody debris volume increased eight-fold from the pre-burned forest. Copious seedling establishment was detected after the fire, but varied vastly across landscape from near zero to ~250,000/ha at 14 years after the fire. The variability in fire severity and postfire regeneration patterns should produce a future landscape of considerable structural diversity.

Earth, Wind & Fire: An Analysis of Historical Chaparral Fire Regimes in Southern California

Keith Lombardo, Biologist, Cabrillo National Monument, San Diego, CA
Thomas Swetnam, Director, Laboratory of Tree-Ring Research, University or Arizona, Tucson, AZ
Christopher Baisan, Research Specialist, Laboratory of Tree-Ring Research, University or Arizona, Tucson, AZ
Donald Falk, Associate Professor, School of Natural Resources, University or Arizona, Tucson, AZ
Mark I. Borchert, Province Ecologist, U.S. Forest Service, San Bernardino, CA

There is vigorous debate regarding the spatial and temporal attributes of chaparral fire regimes in southern California. We reconstructed a multi-century record of chaparral fire history, and evaluated the effects of climate on these fire regimes, by sampling and dendrochronologically dating fire-scarred bigcone Douglas-fir (*Pseudotsuga macrocarpa*) that exist as scattered islands of forest in a chaparral matrix across three National Forests. Our results indicate that the contemporary mega-fires that plague the region have been occurring for centuries and that these blazes are linked to antecedent drought conditions. The results of this research provide wildland fire managers and policy makers with significant knowledge regarding the long-term natural range of fire regime variability for two communities, chaparral and bigcone Douglas-fir, of which little is currently known. Contemporary and future fire management plans require a full understanding of fire regime variability and the ability to assess current departures from "natural" conditions.

Session 151 • Maurepas (3rd floor) • Contributed Papers
Monitoring Marine Natural & Cultural Resources

Chair: Brad Barr, Senior Policy Advisor, NOAA Office of National Marine Sanctuaries, Woods Hole, MA

Pinnipeds: Sentinels of the Sea

Sarah, Allen, Ocean Stewardship, National Park Service, Point Reyes, CA

David Press, Point Reyes National Seashore, Point Reyes, CA
Sarah Codde, Point Reyes National Seashore, Point Reyes, CA
Ben Becker, Point Reyes National Seashore, Point Reyes, CA

Pinnipeds, as apex predators, are integral to functioning marine ecosystems. They also fill a unique niche straddling the land-sea boundary where they give birth on land but spend their lives in the ocean. Consequently, long-term monitoring of these species' distribution, abundance and health are important to detect changes in marine ecosystem condition, particularly when understanding the effects of and planning for climate change. Monitoring mostly includes surveys at colonies, relying on trained volunteers. The abundance of species at colonies has changed over the past twenty years with increases in populations of some species and declines in others. Spatial distribution has also changed, with expansion of elephant seals into new sub-colonies and decline of harbor seals at others. Anthropogenic interactions mostly revolve around habitat utilization at terrestrial sites, and marine protected areas are one tool for reducing interactions and allowing for resilience to changing ecosystems.

Driving the Marine Ecosystem: Monitoring the Oceanography of Glacier Bay, Alaska

Lewis Sharman, Ecologist, Glacier Bay National Park and Preserve, Gustavus, AK
Seth Danielson, University of Alaska–Fairbanks, School of Fisheries and Ocean Sciences, Institute of Marine Science, Fairbanks, AK
Bill Johnson, Data Manager, Southeast Alaska Network, National Park Service, Juneau, AK
Brendan Moynahan, Program Manager, Southeast Alaska Network, National Park Service, Juneau, AK

Glacier Bay National Park and Preserve is one of the most fundamentally "marine" units in the national park system. Virtually everything about the park, even those terrestrial and freshwater ecosystem components centered well inland, has some critical connection to the sea. The Southeast Alaska Network has identified oceanography as a key vital sign and is sustaining an 18-y dataset with a detailed comprehensive sampling and data management protocol. We document seasonal and interannual variations by sampling a system of 22 stations nine times per year. Vertical depth profiles of temperature, salinity, light, fluorescence, turbidity, and dissolved oxygen describe a marine production cycle of high spring/summer productivity sustained by intermediate stratification. This is followed by fall/winter biological quiescence resulting from physical breakdown of water column stability. Remarkably high marine primary production fuels a tremendous seasonal influx of secondary consumers and apex predators such as fishes, seabirds, and whales.

Assessing Marine Protected Area Vital Signs: A Pilot Project on North America's West Coast

Gary Davis, President, GEDavis & Associates, Westlake Village, CA
Hans Hermann, Senior Program Manager, Conservation and Biodiversity Program, Commission for Environmental Cooperation, Montreal, Quebec, Canada
Douglas Hyde, President, e-cocreate Solutions, Gatineau, Quebec, Canada
Luis Fueyo MacDonald, Consultor, Mexico D.F., Mexico

Protecting special places in the sea is a way many cultures use to ensure healthy oceans and sustain ocean-based benefits for human communities. Collectively these special places are called Marine Protected Areas (MPAs). Assessing the health of MPAs and sharing that knowledge with local communities is a key element of sustainable stewardship. We conducted a pilot project to develop an easy yet powerful tool for MPA managers to share evidence-based ecological information through scorecards that refine monitoring information into concise, easily understood, health assessments. We evaluated ten MPAs along the west coast of North America in diverse biogeographical settings from British Columbia, Canada to Baja California, Mexico, We developed scorecards in public workshops with invited experts seeking consensus on 12 standard questions about water, habitat, and living resources. The process helped bridge gaps between technical/scientific and public communities, and identified gaps in knowledge, understanding, and monitoring information in each MPA.

Proposed Submerged Cultural Resources Monitoring Plan: Dry Tortugas National Park

Andres Diaz, Archeologist, National Park Service, Submerged Resources Center, Lakewood, CO

The recent assessment of the condition of submerged cultural resources of Dry Tortugas National Park by park staff with the guidance of the National Park Service's Submerged Resources Center (SRC) resulted in the proposal of a monitoring plan that will enable the resource manager and the park dive team to conduct their own condition assessments. The monitoring plan includes the study of shipwrecks that are interpreted and encouraged to dive on as well as other submerged archeological sites which will each represent a distinct threat to the cultural resources of the park. Those threats include visitation,

theft/looting, and natural forces such as hurricanes, and coral die-off. This monitoring plan will serve as a model for the other National Parks that the SRC supports and could be applied by other resource managers responsible for the monitoring and protection of submerged archeological sites.

Battle of the Atlantic: Heritage Resource Management and Protection Initiatives off the Coast of North Carolina

Joseph Hoyt, Maritime Archaeologist, Monitor National Marine Sanctuary, NOAA, Newport News, VA
David Alberg, Superintendent, Monitor National Marine Sanctuary, NOAA, Newport News, VA

Since 2008 NOAA's Monitor National Marine Sanctuary (MNMS) has been conducting site evaluations of maritime heritage resources off the coast of North Carolina. To date, this research has focused on vessels lost during World War II during an engagement know as the Battle of the Atlantic. As a result of this conflict, the seabed off the coast of North Carolina contains a unique collection of heritage resources, in the form of shipwrecks, which is believed to be of national significance in its range and quality. MNMS has been applying archaeological site survey and assessment standards to determine the geographical boundaries, integrity and significance of this collection. This data and research is being collected to inform potential future management and determine the need for potential new or expanded protected areas. This paper will discuss current work and management directions for the MNMS.

Session 152 • Borgne (3rd floor) • Invited Papers

Transportation and Recreation Research in Yosemite National Park: Integrating Disciplines to Inform Managerial Issues

Chair: David Pettebone, Social Scientist, Yosemite National Park, El Portal, CA

Session overview: Congestion issues have long affected the ease of movement and quality of experiences for visitors during the summer season in Yosemite. Building from two notable projects, focused primarily in Yosemite Valley (Manning et al, 2000; Lawson et al., 2009), a comprehensive park wide study was conducted in 2010. Study objectives were to describe visitor use conditions on roadways and at attraction sites, investigate use level relationships across descriptive components, and identify visitor experience/quality thresholds for congestion at numerous pedestrian and vehicle-based sites. Session presentations will outline the diverse research components of the study and how the transportation and recreation disciplines have converged to inform visitor management issues at broader landscape scales. Results from this work will inform communication tools intended to be used by both visitors and park operations. These results directly inform the development and implementation of an intelligent transportation system to improve visitor use management within the park.

Thinking Beyond Traditional Recreation Research for Visitor Capacity Decisions

Bret Meldrum, Branch Chief, Visitor Use and Social Science Branch, Yosemite National Park, El Portal, CA
David Pettebone, Social Scientist, Visitor Use and Social Science Branch, Yosemite National Park, El Portal, CA
Todd Newburger, Monitoring Program Coordinator, Visitor Use and Social Science Branch, Yosemite National Park, El Portal, CA
Jim Bacon, Planner, Planning Division, National Park Service Denver Service Center, El Portal, CA

Yosemite National Park has been at the forefront of the debate on visitor capacity within protected area management. The park has struggled to pass the Merced River Plan as a result of numerous legal challenges on capacity issues. Recognizing that prescriptive capacity determinations are largely driven by transportation, the park and research collaborators have established a framework to collectively investigate and understand the park's transportation and recreation landscapes. This integrated transportation and recreation research signifies the majority of the visitor research being applied to address capacity in planning efforts on roadways and at front country destinations park wide. Conceptual linkages in these complimentary research components will be highlighted and discussed. Identifying visitor use level relationships, coupled with visitor-based evaluative components, allow managers to make informed decisions regarding the kinds and amounts of use a park can facilitate without allowing inappropriate impacts to resources and visitor experience.

Pedestrian Modeling to Simulate Transportation: Visitor Experience Relationships for Capacity Management at Attraction Sites

Brett Kiser, Project Researcher, Resources Systems Group, White River Junction, VT
Steve Lawson, Director–Public Lands, Resources Systems Group, White River Junction, VT
Nathan Reigner, PhD Candidate, University of Vermont-Rubenstein School of Environment and Natural, Burlington, VT
Robert Manning, Professor, University of Vermont-Rubenstein School of Environment and Natural Resources, Burlington, VT
Bret Meldrum, Branch Chief, Visitor Use and Social Science Branch, Yosemite National Park, El Portal, CA

David Pettebone, Social Scientist, Visitor Use and Social Science Branch, Yosemite National Park, El Portal, CA

The quality of experiences for visitors to attraction sites in Yosemite, in terms of crowding and congestion, can be understood as a function of the park's transportation system. Because the transportation system constrains and patterns visitor movement within the park, its operation influences the social conditions, and consequent experiential quality, at attraction sites. It is important for park managers to understand these influences for visitor capacity management and transportation planning. This research develops a set of integrated regression and simulation models to estimate indicators of experiential quality at attraction sites. Regression models link park entrances and vehicle traffic with recreation site use. Simulation models then estimate social conditions experienced by visitors given site use parameters. The models provide park managers a tool for both monitoring experiential quality at recreation sites and examining and adaptively managing the park's transportation system to conform with visitor experience and resource protection objectives.

Visitor Evaluation of Indicators of Quality for Integrated Transportation and Capacity Management, Yosemite National Park

Nathan Reigner, PhD Candidate, University of Vermont-Rubenstein School of Environment and Natural, Burlington, VT
Robert Manning, Professor, University of Vermont-Rubenstein School of Environment and Natural Resources, Burlington, VT
William Valliere, Research Staff, University of Vermont-Rubenstein School of Environment and Natural Resources, Burlington, VT
Peter Pettengill, PhD Candidate, University of Vermont-Rubenstein School of Environment and Natural Resources, Burlington, VT
Steve Lawson, Director-Public Lands, Resources Systems Group, White River Junction, VT
Brett Kiser, Project Researcher, Resources Systems Group, White River Junction, VT
Bret Meldrum, Branch Chief, Visitor Use and Social Science Branch, Yosemite National Park, El Portal, CA
David Pettebone, Social Scientist, Visitor Use and Social Science Branch, Yosemite National Park, El Portal, CA

Efforts to manage visitor capacity begin with formulation of desired park conditions. Contemporary park management frameworks employ the concept of indicators and standards of quality to empirically define and manage these conditions. This study was designed to measure crowding-related standards of quality. Using a survey approach, visitors to seven attractions sites in Yosemite National Park evaluated the acceptability of a range of visitor use levels. Use level ranges were presented via visual simulations of visitor density at high use sites and numerical descriptions of hiking encounters at low use sites. Aggregate acceptability ratings derived from the survey data suggest thresholds for the maximum number of visitors that can be accommodated at attraction sites without violating crowding-related standards of quality. These findings provide a basis for managers to determine appropriate use levels, supporting park transportation planning and visitor capacity management.

Understanding Functional and Experiential Dimensions of Visitor Travel to Inform Transportation Management in Yosemite National Park

Dave D. White, Associate Professor, Arizona State University, School of Community Resources and Development, Phoenix, AZ
Jessica F. Aquino, Graduate Research Assistant, Arizona State University-School of Community Resources and DevelopmentPhoenix, AZ
Katelyn Johnston, Undergraduate Research Assistant, Arizona State University-School of Community Resources and Development, Phoenix, AZ

As part of an integrated transportation capacity assessment for Yosemite National Park, this research examines visitors' experiences of the park transportation system. Prior research conducted in the park used both qualitative and quantitative approaches to explore functional and experiential dimensions of visitor travel, which suggested potential indicators of the quality for the transportation experience. The current research extends prior work by documenting visitors' evaluations for selected indicators, including travel time for park road segments and vehicles per viewshed. The research also assesses the relations between visitor travel and subjective perceptions of freedom, connection to the natural environment, and conflict as well as visitors' attitudes toward transportation management options. The study employed a cross-sectional survey design with stratified sampling strategy to collect data from adult park visitors (N=1040; response rate 63%). The findings will inform standards for visitors' transportation experience as well as landscape-level management and a proposed intelligent transportation system.

Transportation Model Development and Simulation in Yosemite National Park

Bill Byrne, David Evans and Associates, Denver, CO

A network-based travel demand model implemented in TransCAD and a micro-simulation model implemented in VISSIM were developed for the roadway system within Yosemite National Park to 1) explore relationships between visitor standards for crowding/congestion and transportation conditions, 2) simulate traffic flow under various roadway conditions and management actions, and 3) provide information on likely travel patterns and conditions under potential management strategies. These models will utilize comprehensive origin-destination data collected in 2010, as well traffic, transit, and parking data collected during previous summer seasons. The origin-destination data collection used video cameras and visitor surveys to capture a broad sample of visitor travel patterns to update and calibrate the origin to destination travel patterns for the TransCAD model. The results of the transportation models will provide the framework for a real-time monitoring system for the park transportation network that can inform decision-making to improve visitor use management within the park.

Session 153 • Salon 828 (8th floor) • Invited Papers

National Park Service World War II Network: Preserving America's World War II Heritage

Chair: Vincent Santucci, Chief Ranger, National Park Service — George Washington Memorial Parkway, McLean, VA

Session overview: The National Park Service World War II Network was established to enhance the preservation, interpretation and public recognition of the value of our World War II heritage. The WWII Network recognizes over two dozen individual park units which preserve resources and stories which collectively contribute to greater understanding of the American home front during the war. The Network has begun to outreach and explore partnership opportunities to further promote the preservation of WWII resources throughout the United States.

America in World War II, 1941–1945

Harry Butowsky, Historian, National Park Service, Washington, DC

World War II was the greatest cataclysm in history. Tens of millions of people died in battle. Millions more were murdered simply because of ethnic or religious reasons. Millions of innocent civilians were caught up in a conflict about which they knew little and understood less. World War II changed the face of America, Europe, Asia and the world. This presentation will look at the sites and locations and events associated with World War II in the United States that can help Americans understand the history and meaning of the war. These sites will comprise National Parks, National Historic Landmarks, National Register sites and other property. This presentation will provide a special focus on World War II Japanese American Internment Camps and will identify the NPS resources and literature available for research and study.

Remembering and Revisiting the Lost Villages of the Aleutians

Rachel Mason, Cultural Anthropologist, Alaska Regional Office, Anchorage, AK

During World War II the Unangan (Aleut) residents of the Aleutian Islands were taken to Southeast Alaska and held in evacuation camps there, ostensibly for their own protection. At the end of the war the residents of the smallest villages, their numbers diminished by death and attrition, were not permitted to return but instead were settled in other Unangan communities. The residents of Attu had an especially tragic experience during World War II. They were taken by the Japanese in 1942 and held prisoner on Hokkaido for the duration of the war. Almost half of them died. This paper describes the Lost Villages of the Aleutians project conducted by the Aleutian-World War II National Historical Area. The project documents the history of the lost villages through oral and written history and has sponsored boat trips to revisit each village with elderly former residents and their descendants.

World War II on the Home Front: The Challenge of Preserving Social Change

Isabel Jenkins Ziegler, Supervisory Curator/Curator of Record, Rosie the Riveter/WWII Home Front National Historical Park, Eugene O'Neill National Historic Site, John Muir National Historic Site, Port Chicago Naval Magazine National Memorial

The mobilization to support the United States involvement in World War II constitutes an event of monumental scale. The transport of essential supplies, the retooling of factories, and the mass migration of civilians to create a war-time work force was on a scale of biblical proportions. The mixing of peoples from varied ethnic backgrounds became a vehicle for social change that later fueled the civil rights movement. Women's roles and opportunities changed dramatically as a result working in the war industry. The changes in our country's culture are still felt today. Rosie the Riveter/World War II Home Front National Historical Park was established to commemorate this event. Without owning a single property, the National Park Service at Rosie is tasked with helping local government and citizens preserve and interpret not only the physical remnants of the War industry but to capture the stories of those who worked in that Industry.

WWII Valor in the Pacific National Monument: A New Interpretation and Meaning

Daniel A. Martinez, Chief Historian, WWII Valor in the Pacific National Monument, Pearl Harbor, HI

On December 7th, 2010, the new $58 million Pearl Harbor Visitor Center and museum was dedicated after five years of planning and design. Interactive museum exhibits will challenge the visitor in their understanding through multiple perspectives on Pearl Harbor and World War II in the Pacific. The new presidential proclamation for the site will give the visitor a new opportunity to broaden their historical perspectives. Placed along the waterfront of Pearl Harbor it opens up the historic landscape with a new dimension and vision. To support the mission of the monument, the Education and Research Center provide staff and the visiting public opportunities to learn more. The bookstore is dedicated to the interpretive history of the Pacific War providing books, audio-visual media and other educational products. New partnerships with three other non-profit historic sites allow for central ticketing for visitors who wish to explore beyond the NPS facility.

Preserving World War II Resources at Golden Gate National Recreation Area

Stephen Haller, Senior Historian, Golden Gate National Recreation Area, San Francisco, CA

Golden Gate National Recreation Area is famous for Muir Woods, Alcatraz Island and a range of scenic natural and historic sites along the coastline of the San Francisco Bay Area. It is less well remembered that the area was a major military base during World War II and that the protection of these war-winning assets was the role of the Army posts that ringed the headlands with gun batteries. Recent survey work has begun to hint at the even wider network of anti-invasion defenses set up during the dark early days of the war, while partnerships with community groups have helped define the extraordinary role played by Nisei soldiers in the Pacific War. Preserving and interpreting these little known resources presents a range of challenges and opportunities that will be highlighted in this PowerPoint presentation.

Session 154 • Grand Chenier (5th floor) • Contributed Papers

Soundscapes

Chair: Theresa Ely, Physical Scientist, National Park Service Intermountain Region, Natural Resources, Lakewood, CO

Motorcycle Noise and Quieter Pavement Research at National Parks

Judith Rochat, Physical Scientist, U.S. Dept. of Transportation / RITA / Volpe Center, Cambridge, MA

The National Park Service Natural Sounds Program identified road noise research and related products that would help parks better assess, predict, and reduce road noise in park environments. The two main topics are: 1) motorcycle noise; and 2) quieter pavements. For motorcycles, pass-by noise measurements were conducted at a National Park, where motorcycles were placed into five categories and analyzed for inclusion in the Federal Highway Administration Traffic Noise Model (TNM), for the purpose of more accurately predicting highway noise in park environments. Data were also collected at noise-sensitive locations to assess the noise environment. For quieter pavements, two documents were written to provide guidance on use of various quieter pavement types in the U.S. and on use of quieter rumble strips. At another National Park, tire/pavement and sensitive-receiver-location noise measurements were conducted; results were used in TNM to demonstrate the effectiveness of quieter pavement in a park environment.

Denali National Park Soundscape Inventory: A First Look at Park-wide Acoustics

Davyd Betchkal, Physical Science Technician, National Park Service, Denali Park, AK

Denali National Park staff have recently completed year five of a 10-year systematic acoustic inventory covering the park's 6.5 million acres. This publication comprises a first look at park-wide acoustical conditions based on the data collected at 41 sites so far.

Aviation Noise in National Parks: Analysis of Noise-Exposure-Visitor Response Data—What Do the Numbers Tell Us?

Grant Anderson, Principal, Grant Anderson Consulting, Concord, MA

Amanda S. Rapoza, Acoustics Engineer, U.S. Department of Transportation, Research and Innovative Technology Administration, Volpe National Transportation Systems Center, Cambridge, MA

Beginning in 1992, the National Park Service and Federal Aviation Administration both funded a number of studies to collect data and examine the relationship between aircraft over-flight noise and park visitor response. These studies shared the same data collection protocol, basic questionnaire format, and core response questions. As a result, there exists a database of some 2,600 visitor questionnaires with associated direct measurements of aircraft noise exposure. This paper reports on a recent analysis of the database, the goals of which were to 1) illuminate the salient aspects of the noise exposure (sound level, length

of exposure, time between exposures, and/or source of the noise), 2) identify additional site-specific or visitor-specific factors which may significantly influence the visitor response, 3) combine these two into exposure-response relations, and 4) estimate the additional number of visitor responses and study sites needed to ensure adequate statistical confidence for future data collection efforts.

Physiological Impacts of Noise in National Parks: Study Design Considerations

Christopher Zevitas, Senior Environmental Engineer, U.S. Department of Transportation, Volpe Center, Cambridge, MA

Excessive anthropogenic noise pollution detracts from visitor experiences in National Parks and has been associated with annoyance, disruption of sleep and cognitive processes, hearing impairment, as well as adverse impacts on cardiovascular and endocrine systems. However, few studies have examined the health effects of lower levels of intermittent noise exposures encountered in parks. Conversely, natural environments have been recognized as having rejuvenative qualities. Initial research has demonstrated improvements in emotional state and cognitive ability and it is suspected that exposure to natural sounds may have measurable effects on neurological, cardiovascular or other physiological endpoints. However, research is lacking owing to the difficulty of isolating effects of the acoustical environment from the overall park experience, representing the integrated exposure of acoustical, visual, olfactory, air quality, and other inputs. This paper identifies factors that must be considered in study design, and will present a methodological framework for advancing this line of research.

Session 155 • Grand Coteau (5th floor) • Invited Papers

Taking Stock: Assessing Cultural and Natural Resource Conditions in National Parks

Chairs: Jeff Albright, Coordinator, Natural Resource Condition Assessment Program, NPS WASO-Natural Resources Program Center, Fort Collins, CO

Bob Page, Director, Olmsted Center for Landscape Preservation, National Park Service, Boston, MA

Session overview: Successful resource stewardship is built, in part, on a foundation of data and knowledge about park resource conditions and the factors that influence those conditions. The reality is that our knowledge bases in this arena are never complete and always evolving. In the spirit of adaptive management and learning, we need to redouble our efforts to deliver best available science into today's park planning and decision making even as we work to strengthen the scientific foundation that will inform future planning and decision making in parks. This session will highlight a few ongoing (and developing) efforts, from both cultural and natural resource perspectives, to improve delivery of 'resource condition' science into park planning and management activities. Comments and ideas will be solicited from session attendees as well, in recognition of the fact that there is a broader community of programs and individuals engaged in work efforts related to this topic.

Introduction

Laura Schuster, Chief of Cultural Resources, Hawaii Volcanoes National Park , HI

Cultural Resource Condition Assessments: Developing a Framework that Combines Several Assessment Techniques

Bob Page, Director, Olmsted Center for Landscape Preservation, National Park Service, Boston, MA

Presentation will focus on the proposed park cultural resource assessment process developed to support NPS Resource Stewardship Strategies. This talk will highlight the draft "Cultural Resource Summary Table" that is intended to serve as a template for each park to facilitate coordination and integration between science, planning, and park management. The role of historic context, scope of resources, and performance indicators will be described. An overview of existing cultural resource inventories (i.e., LCS, ASMIS, CLI, FMSS) and condition assessment techniques and their relationship will be provided. The importance of cultural/natural resources coordination and integration and understanding cultural resources (and integrated resources) condition as a process or cycle rather than one specific state will be touched on, but not discussed in detail. The objective of this talk is to build awareness of the proposed park cultural resource assessment process prior to its distribution to the field for review and comment.

Natural Resource Condition Assessments: Highlights and Examples from an Ongoing Series of Park-Based Studies

Jeff Albright, Coordinator, Natural Resource Condition Assessment Program, National Park Service, Fort Collins, CO

A series of Natural Resource Condition Assessment (NRCA) projects is underway in NPS units. These projects evaluate and report current conditions (trend as possible) for a subset of important park natural resources and indicators. Project guidelines and reporting products emphasize delivery of science-based information that is credible and has practical uses for a variety of park decision making, planning, and partnership activities. Among other uses, parks receiving a NRCA report will be

in an improved position to work on a Resource Stewardship Strategy and to report on 'resource condition status' for the resources and indicators evaluated for that park. This presentation will briefly summarize project purpose and national guidelines, discuss park-level flexibility in determining important study details, and showcase example products from a number of completed NRCA projects. Notable challenges and opportunities encountered in completing these projects will be touched on, but not discussed in detail.

Directed Panel and Open-Session Discussion on Resource Condition Assessment and Related Topics

Panel Discussion Members:

Robert Bennetts, Coordinator, Southern Plains Inventory and Monitoring Network, National Park Service, Des Moines, NM

Tim Carruthers, Program Manager, Integration and Application Network, University of Maryland, Cambridge, MD

Jill Cowley, Historical Landscape Architect, Intermountain Region, National Park Service, Santa Fe, NM

David Louter, History Program Lead, Pacific West Region, National Park Service, Seattle, WA

Many programs and individuals are involved in aspects of evaluating and reporting on cultural and natural resource conditions in parks. Panel participants will open this portion of the session by highlighting a few specific challenges, opportunities, or lessons learned based on their experience in working in the broader arena of resource condition assessment. This introduction by panelists will be followed by general Q&A as well as an open-session discussion by all session attendees.

Session 156 • Waterbury (2nd floor) • Panel Discussion

Climate Change Policy Challenges in the National Park Service

Chair: Susan Johnson, Policy Analyst, Air Resources Division, National Park Service, Lakewood, CO

Climate change threatens not only the integrity and existence of natural and cultural resources the NPS is responsible for conserving, but the very mission and culture of the Service itself. Managers are facing unprecedented challenges in resource protection, and they need sufficient authority and guidance to take steps to adapt to climate change. This includes identifying what management goals are, since we can no longer logically manage for "no impairment," and working across jurisdictions. Parks across the system are already faced with addressing resource protection dilemmas on the ground, whether or not sufficient policy or guidance exists. In this panel discussion, (5 minute introduction) we will frame some of these pressing issues and then hear how some parks have or have not resolved imminent resource protection challenges (15 minutes each panelist). We hope to generate audience debate (40 minutes questions/discussion) to inform a path forward for NPS climate change policy.

Panelists: Jeff Mow, Superintendent, Kenai Fjords NP, Seward, AK

Russell Galipeau, Superintendent, Channel Islands NP, Ventura, CA

Richard Bahr, Fire Science and Ecology Lead, Fire Management Program Center, NPS, Boise, ID

David Graber, Chief Scientist, Pacific West Region, NPS, Three Rivers, CA

Trish Kicklighter, Superintendent, Assateague Island NS, Berlin, MD

Session 157 • Rhythms I/II (2nd floor) • 2-hour Workshop

NPScape Landscape Dynamics Monitoring in US National Parks

Chair: Bill Monahan, Landscape Ecologist, National Park Service, Inventory and Monitoring Division, Fort Collins, CO

NPScape is a landscape dynamics monitoring project that produces and delivers to US National Parks a suite of landscape-scale datasets, maps, reports, and other products to inform natural resource management and planning at local, regional, and national scales. The target audience for NPScape spans the range from GIS specialists who can use the geospatial data and tools, to ecologists and resource managers who can use the landscape metrics to evaluate resource dynamics, to park superintendents who can readily incorporate the maps and graphics into reports or briefings. This 2-hour workshop will provide an overview of NPScape, summarize the availability of existing products, and showcase several examples of how NPScape is being applied in parks. Example applications will include education and outreach at Saguaro National Park, Natural Resource Condition Assessments, and research aimed at evaluating landscape drivers of species occurrence.

Session 158 • Rhythms III (2nd floor) • Rapid-Fire Session

Data Management Rapid-Fire Session

Chair: Whitney Granger, Data Manager, NPS Gulf Coast Network, Lafayette, LA

Data Managers across the National Park Service are developing innovative and practical solutions to managing a variety of natural resource-related data. The fact that parks and I&M networks are widely dispersed and geographically isolated can be an

obstacle to sharing these solutions and often prevents staff from fully benefiting from the work of others. This is a "rapid fire" session that will comprise eight to ten brief presentations of data management-related applications and tools that have utility and applicability across NPS. While only overviews are presented during the session, attendees can contact presenters at a later time for more specific details or guidance. These types of rapid-fire sessions have proved to be very effective in quickly sharing many ideas with a broad audience.

Galax Poaching on the Blue Ridge Parkway: Monitoring for Illegally Harvested Species and the Feedback Loop for Resource Protection

Patrick Flaherty, Data Manager, NPS Appalachian Highlands Network, Asheville, NC

The APHN is conducting long-term monitoring for several poached species known to be significant poaching targets, including galax (*Galax urceolata*). The galax populations being targeted by poachers belong to a genetically distinct form that produces large colorful leaves that are in demand for floral displays in the US and abroad. Long-term monitoring by APHN of this resource has led directly to law enforcement arrests and convictions and has increased public awareness of this problem. The feedback loop essential to the success of long term monitoring has given BLRI park managers the necessary information for continuing the mission of the park service.

A Cost-effective Solution for Digitizing and Creating Metadata for Analog Audio Data

Dennis Skidds, Data Manager, Northeast Coastal and Barrier Inventory & Monitoring Network, Kingston, RI

The NCBN's inventories of reptiles and amphibians at Fire Island National Seashore and Sagamore Hill National Historical Site employed a wide variety of sampling techniques, including amphibian calling surveys. These surveys yielded nearly twenty hours of audio data, initially stored on standard analog tapes. Desiring to archive these data in a more secure and permanent format, NCBN data management staff developed a simple, cost effective procedure for converting and documenting the data using two software packages: digitizing was facilitated using the Audacity 1.2.6 digital audio editor, while metadata was created using the shareware BWAV Writer 1.0b. Metadata standards were developed using specifications for Broadcast Wave Format (BWF) outlined by the International Association of Sound and Audiovisual Archives (IASA).

An Integrated AARWP Database

Bob Truitt, Data Manager, Mojave Desert Inventory & Monitoring Network, Boulder City, NV

This presentation will demonstrate how the MOJN I&M, working with the University of Nevada Las Vegas, has customized the WASO I&M Annual Administrative Report and Workplan (AARWP) databases to integrate NPS Administrative Finance System (AFS3) outputs, payroll, track travel costs, and annual expenditures in one standalone MS Access database. This eliminates the need to maintain a variety of tools to bridge the gap between fiscal work plans, annual administrative reporting and AFS3. Consolidating several databases (building from the efforts of other networks) has increased the manageability and efficiency of the MOJN financial tracking. It is our intent that the integrated database will be adaptable to other NPS programs that need to track their annual funding internally.

Digital Photo Metadata and File Properties

Tom Richie, Data Manager, NPS Chihuahuan Desert Network, Las Cruces, NM

This presentation will present the concept of metadata and file properties with respect to digital images. It will briefly cover industry Image Metadata Standards, standard elements and the storage of data within the file header. This presentation will also cover methods of embedding metadata in the file header to facilitate access and discovery: extraction of image metadata for inclusion in image databases, SharePoint libraries, and Indexing Services.

Mojave Desert I&M Network Photo Wizard

Bob Truitt, Data Manager, Mojave Desert Inventory & Monitoring Network, Boulder City, NV

"The camera is an indispensable instrument for the ecologist" — Fredric Clements. Images of ecological systems have long been recognized as useful to document locations of sampling sites, long-term changes, identify vegetation types and structure, and visually assess the condition of an area. However without proper management images can be rendered useless because they are not cataloged or identified. We will demonstrate the Mojave Desert I & M Network (MOJN) Photo Wizard; a stand alone, easy-to-use, application that captures the seven NPS required digital photo metadata elements. The Photo Wizard provides a non-licensed option to create the minimum required metadata as well as provide additional elements (e.g. keywords) to facilitate cataloging and sorting of large number of images. It creates a copy of the original image, embeds the metadata into the image header, names the copied image file, and creates a sidecar metadata file.

I&M Data Management Reviews: Progress Report

Margaret Beer, Data Manager, I&M Program Data Manager, Fort Collins, CO

In 2010, a group 0f 11 I&M network data managers established a process for a structured, periodic review of network data management practices, to ensure that, on a network and national level, monitoring data are well-managed, high-quality, secure, documented, and available to end users. Reviews are underway in 2011. This presentation will present an brief overview of the main review components and summarize results to date.

Communication Planning: Know Thine Audience

Sara Melena, Education Specialist, NPS Office of Education and Outreach, Fort Collins, CO

Knowledge of your audience is the foundation for good communication and good communication efforts benefit parks by enhancing awareness of park resources and issues among park staff, partners, and the public. Communication planning carefully considers the goals, objectives, audiences, and methods of delivery. It harnesses the knowledge and expertise of resource managers, scientists, and communicators to develop strategies that deliver relevant information to target audiences. Beyond enhancing communication efforts, communication planning develops a partnership between communicators, scientists, and managers that is critical to resource stewardship.

The New NPS Focus Digital Asset Management System and a New NPS Search Portal, NPSearch

Christie McDonald, Digital Data Manager, NPS National Information Systems Center, Denver, CO

The current NPS Focus Digital Library and Research Station (http://focus.inside.nps.gov) is a NPS-wide repository for digital assets, and a federated search portal. NPS Focus is used by parks and programs to manage, share, and discover information related to the protection and management of all types of park resources. The system is being decoupled into two systems: the NPSFocus Digital Library and the NPSearch portal. The re-designed NPS Focus Digital Library will improve digital asset management and discovery using current technologies. NPSearch (http://npsearch.nps.gov) is a new search portal for the NPS. and will be a single access point for searching across multiple systems. The NPSearch portal is planned to initially search across ten systems, including NPS Focus, NRInfo, NPS Voyager, InsideNPS, nps.gov, doi.gov, Landsnet and e-TIC. The re-designed NPS Focus and new NPSearch sites are planned to be launched in 2011.

Natural Resource Web Update

Todd M. Edgar, NRPC Web Manager, Fort Collins, CO

The Natural Resource Stewardship and Science (NRSS) public website is a valuable and rapidly evolving tool for communicating natural resource information. For web content authors working in this environment, it is essential to know how specific content fits into the larger design of the NRSS website, the proposed future of the NPS content management system, and what tools and templates are currently available.

Session 159 • Salon 816–820 (8th floor) • Affinity Meeting (open to all registrants)

Climate Change Ambassadors: Citizen Science Projects

Chair: Susan Teel, Director, Southern California Research Learning Center, Thousand Oaks, CA

Beginning in 2009 a diverse group of 22 inter-city students from the Elementary Institute of Science in the San Diego area embarked upon a journey that would forever change their understanding of climate change and conservation efforts, as well as shape their futures. With the help of the Southern California Research Learning Center (SCRLC), the Crown of the Continent Research Learning Center (CCRLC) and many other partners this group of students became Climate Change Ambassadors and traveled to Glacier National Park in Montana to conduct field research at ground zero for climate change research in the United States. Take this opportunity to participate in a conversation with representatives from the Climate Change Ambassadors.

Session 160 • Salon 824 (8th floor) • Panel Discussion

Utility-Scale Renewable Energy and Marcellus Shale Gas Development: Challenges and Opportunities for Protecting Parks and Other Special Places

Chair: Carol McCoy, National External Energy Coordinator, NPS Natural Resources Stewardship and Science Directorate, Denver, CO

The NPS has been proactive in its efforts to influence decisions governing the permitting of utility-scale renewable energy facilities on federal lands and waters, and unconventional gas development in states containing the Marcellus shale gas deposit.

Both types of development are a means for lowering the generation of greenhouse gases and creating jobs. Both types of development also present significant park protection challenges and opportunities for interagency and intergovernmental collaboration. During this session, panelists and participants will examine the steps the NPS has taken to date to advance park protection, the tremendous work load that lies ahead, and why it is so important for the NPS to be engaged in the process at the earliest stages when the "rules of the game" are being crafted. The session will also explore options for getting to "yes" in having other agencies and project developers factor park protection in siting and permitting decisions.

Panelists: Holly Salazer, Air Resources Coordinator and Marcellus Shale Coordinator, NPS-Northeast Region, University Park, PA

David A. Reynolds, Right-of Way-Program Coordinator and External Renewable Energy Coordinator, NPS-Pacific West Region, Oakland, CA

Dan McGlothlin, Supervisory Hydrologist and NPS Lead for the BLM-DOE Solar Programmatic EIS, NPS-Water Resources Division, Fort Collins, CO

Andrea Compton, Chief of Resources, Joshua Tree National Park, Twentynine Palms, CA

John McCarty, Chief Landscape Architect, Bureau of Land Management, Washington, DC

Session 161 • Napoleon A1 (3rd floor) • Contributed Papers

Amphibians

Chair: Ross Haley, Wildlife Branch Chief, Lake Mead NRA, Boulder City, NV

Modeling the Past to Predict the Future: A Case Study of a Montane Endemic Salamander

Amy Luxbacher, Graduate Student, University of Minnesota, St. Paul, MN

Mountains harbor large numbers of species with restricted geographic distributions making them of high value for the conservation of biodiversity. Because many localized montane endemics may face rapid changes in their distributions in the near future due to climate change, conservation of these species requires an understanding of how they may respond. I will use Great Smoky Mountains National Park's Red-cheeked Salamander (*Plethodon jordani*) as case study for exploring the impact of rapid climate change on montane endemic species. I will present GIS-based models that predict how the distribution of climatically suitable habitats for this species has changed from the last glacial cycle to the present. I will then cross-validate these model predictions with genetic data. Understanding the effects of past climate changes on species distributions and genetic diversity will help resource managers make informed predictions about species' responses to anthropogenic climate change and take appropriate conservation action.

Responding to Emerging Pathogens by Reintroducing Boreal Toads into Rocky Mountain National Park

Mary Kay Watry, Biologist, Rocky Mountain National Park, Estes Park, CO
Erin Muths, Research Zoologist, US Geological Survey, Fort Collins, CO

The boreal toad is currently listed as an endangered species in the state of Colorado and is one of five amphibians native to Rocky Mountain National Park (RMNP). Boreal toad populations have declined over the last 30 years. *Batrachochytrium dendrobatidis* (Bd) is a pathogenic fungus which causes chytridiomycosis in amphibians and has been identified as a prominent factor in the decline of amphibians around the world. It has been identified in RMNP and is credited as the most likely cause of the recent and rapid declines of boreal toads in RMNP. Due to concerns over the declines, RMNP, in collaboration with USGS, began taking reintroduction actions in 2000. Over the past 10 years such actions have included contributing to the captive breeding program, evaluating sites for reintroduction and reintroducing tadpoles and toads. We will discuss our reintroduction efforts and preliminary observations.

Restoration of the Relict Leopard Frog: NPS Leads Program in and around Lake Mead National Recreation Area

Ross Haley, Wildlife Branch Chief, Lake Mead NRA, Boulder City, NV

The relict leopard frog (*Rana onca*) was first described in 1875, and was believed to have gone extinct in about 1950 until it's rediscovery 41 years later (1991) at three small springs within Lake Mead NRA. Subsequent searches found them in three additional springs inside the park and one outside. By 1994 however, the population outside the park was gone as well as the population at the site of the original discovery within the park. Numbers of frogs at the remaining sites were critically low, and the habitats were small. The Park initiated actions to save this species including initiating taxonomic research to prove they really were relict leopard frogs, studies of habitat needs, species distribution, population sizes, temperature tolerance, disease exposure, and husbandry techniques. The park also initiated a headstarting program and a multi-agency planning effort to develop a Conservation Agreement and Strategy (CAS) to save this species. A petition to list the species as endangered was filed on May 8, 2002, but this petition was denied due to the existing CAS and the active program to restore the species outlined in that agreement. To date over 2600 young frogs and approximately 7500 tadpoles have been reared from eggs in our headstarting program and these have been transplanted to nine additional springs with varying degrees of success. A status report on this program and the status of the species will be presented.

Amphibian Population Dynamics: Counting Toads for Twelve Years in Horseshoe Canyon, Canyonlands National Park, Utah

Tim Graham, Ecologist, USGS (retired), Moab, UT
Gary Cox, Park Ranger, Canyonlands National Park, Moab, UT

Horseshoe Canyon is a detached unit of Canyonlands NP, set aside primarily for archeological resources; it also contains significant sections of relatively pristine riparian and aquatic habitat. Regular ranger patrols provided the opportunity to establish

a monitoring program for the amphibians found in the canyon. Amphibian surveys were initiated in 1999 on eleven 100 m transects with relatively long-lasting aquatic habitat in Horseshoe Canyon, eventually expanding to 16 transects. Transects are surveyed weekly from late March through early October, using the visual encounter survey method, counting numbers of adults, juveniles and tadpoles of each resident species (*Bufo woodhousei, B. punctatus, and Spea intermontana*). Available habitat fluctuated from week to week within and between years resulting in considerable spatial and temporal variation in amphibian abundance in time and space. Flash flood timing and intensity added a significant stochastic element to the system.

Monitoring Aquatic Amphibians in Santa Monica Mountains National Recreation Area, the Largest Urban National Park

Kathleen Delaney, Ecologist, National Park Service, Thousand Oaks, CA
Seth P.D. Riley, Wildlife Ecologist, National Park Service, Thousand Oaks, CA
Stacey Ostermann-Kelm, Inventory & Monitoring Coordinator, National Park Service, Thousand Oaks, CA
Stephen Hayes, Statistician, University of Idaho, Moscow, ID

Santa Monica Mountains National Recreation Area is part of the Mediterranean Coast Network (MEDN), and is the country's largest urban national park. Because of the proximity to the Los Angeles Metropolitan area, which hosts a population of over 17 million people, the Santa Monica Mountains and surrounding areas are subjected to stressors and impacts associated with urban areas. Ecosystem changes that result from urbanization include the destruction and fragmentation of habitat for aquatic amphibians, degradation of air and water quality, altered stream structure, and the spread of non-native invasive species. Our monitoring efforts track the trends in occupancy and abundance of native aquatic amphibians: California newts, California and Pacific tree frogs, western toads, and threatened California red-legged frogs. In addition, non-native invasive species like crayfish and New Zealand mud snails are monitored. Our monitoring efforts have correlated negative effects of urbanization pressures and invasive species with diversity and abundance of native amphibians.

Session 162 • Napoleon A2 (3rd floor) • Contributed Papers

Planning for Effective Management

Chair: Warren Brown, Program Analyst, US National Park Service, Annapolis, MD

Choosing Appropriate Socioeconomic Analyses for NPS Planning: Development of a Decision Support Tool

Lynne, Koontz, Economist, US Geological Survey, Policy Analysis & Science Assistance Branch, Fort Collins, CO
Jessica Montag, Social Scientist, Policy Analysis & Science Assistance Branch, USGS, Fort Collins, CO
Bruce Peacock, Chief, Social Science Division, Natural Resource Program Center, National Park Service, Fort Collins, CO
Natalie Sexton, Social Scientist, Policy Analysis & Science Assistance Branch, USGS, Fort Collins, CO

USGS social scientists are working with the NPS, BLM, and the USFS to develop a Web-based decision tool which will enable planners and managers to develop a custom socioeconomic assessment plan tailored to their individual land units and specific planning issues. Using the tool, planners and managers will be able to: establish the broad resource themes they may want to address in their plans; identify sub-issues to assess under those broader themes; and determine the scale of the issue and potential controversy. The tool suggests appropriate analysis methods for addressing the identified issues using various inputs, including time and budget constraints. The objectives of this presentation are: (1) to demonstrate the tool's development objectives, theoretical framework, and specific capabilities for individual projects and strategic planning use; and (2) to solicit additional input into the software's final user interface, program logic, and report products.

Visitor Use Data Collection Strategies in Denali National Park and Preserve

Andrew Ackerman, Social Scientist, Denali National Park and Preserve, Denali Park, AK

Denali NPP has been collecting a variety of visitor use data over the last two decades. The data collection effort has become more comprehensive over the last five years where now the data sets are of sufficient complexity and generated from such disparate sources within the park that it requires a single staff member to compile and analyze the data. Over the last year Denali has worked on developing a consistent way of collecting and presenting the existing data sets as well as filling in gaps where data was previously lacking. This paper will show both methods for how data is compiled and presented as well as some tools and techniques for collecting visitor use data in the field. This includes showing results from data collection in the field from winter and summer 2010 and how these efforts can be used as a longer term monitoring tool.

Park Planning and Social Science Informing General Management Plans: An Ozark National Scenic Riverways Case Study

Logan Park, Assistant Professor of Forest Recreation and Park Management, Southern Illinois University–Carbondale, Carbondale, IL

Ken Chilman, Associate Professor Emeritus, Southern Illinois University–Carbondale, Carbondale, IL

Ryan Sharp, Visitor Use Specialist, National Park Service, Denver, CO

National parks are required by law to develop general management plans (GMP) to guide managers through decisions at various scales. Often GMP development requires data to defend the plan's proposed actions. Many park managers have a wealth of anecdotal visitor experience evidence. However, in contentious situations as at Ozark National Scenic Riverways (OZAR), anecdotal information may not be enough to build consensus among stakeholders for management decisions. OZAR management proposed several actions that could change how river visitors experienced the park. The need for defensible data required two visitor surveys during the summer season of 2010 to gain a better understanding of visitor use patterns and experiences. We will focus on how the results of the survey will be incorporated into the GMP guiding the park's decisions for the next 15-20 years. We will also discuss the broader importance of having statistically reliable social science data for making stronger planning decisions.

A New, Better Way to Manage Florida Bay's Tricky Shallow Waters (Everglades National Park)

Fred Herling, Park Planner, Everglades and Dry Tortugas National Parks, Homestead, FL

Dave Hallac, Chief, Biological Resources, Everglades and Dry Tortugas National Parks, Homestead, FL

Florida Bay, a 376,000-acre area in Everglades National Park, is known for its vast seagrass meadows, outstanding wildlife, and world-class fishery. The Bay is extremely difficult to navigate – water depth averages 3 feet in a complex bank/basin system. For decades, improper boating has impacted resources and visitor experiences. The park's General Management Plan defines Bay goals, resource and visitor use issues, and management strategies. Effective public involvement led to understanding the challenges and recognition that the park and public working together could find needed solutions. Impatient stakeholders asked park managers to act on this issue before GMP completion in 2012. In January, the 8,700-acre Snake Bight Pole/Troll Zone, an area known for its outstanding natural resources and recreation opportunities, was established with 95% public support. Zone access is by boats using push poles, paddles or electric-trolling motors (no internal-combustion engines). Monitoring will assess zone efficacy and support GMP implementation.

Examination of Qualitative Methodology Usefulness in Assessing Management Effectiveness of Protected Areas: A Case Study of Mexico

Carla Mora, Research Assistant, Clemson University, Clemson, SC

Elizabeth Baldwin, Parks, Recreation and Tourism Department, Clemson University, Clemson, SC

Measuring management effectiveness can be complex and challenging and has been done in a variety of ways. The purpose of this research was to develop and test a purely qualitative methodology designed to explore management effectiveness using all six elements from the World Commission on Protected Areas framework, by interviewing experts from a region of interest. Our setting for this research was the Federal Protected areas of Mexico due to the stated combined goals of managing for conservation of biodiversity and sustainable development. We interviewed a total of eight conservation and protected areas experts from Mexico, while in Mexico, and in Spanish. With a combination of detailed interviews and the use of visual research methods we were able to gain insight at multiple scales spatially, temporally, and ethically; all essential for understanding and possibly predicting management effectiveness. We provide suggestions for further development and use of this tool.

Session 163 • Napoleon A3 (3rd floor) • Invited Papers

Quantifying Beauty

Chair: Chad Moore, Night Sky Program Manager, National Park Service, Fort Collins, CO

Session overview: Aesthetic quality remains an important facet of wildland management, but despite overall advances in science and resource management, land stewards still grapple with quantifying beauty. Such lack of measurement or objective treatment inhibits restoration, obstructs resource communication and education, and confounds deeper scientific investigation. A better understanding of aesthetics may bolster its protection by stewards uncomfortable with the possibility of being disparaged as biased, emotional, or unscientific. Furthermore, beauty can forge important pathways to both intellectual understanding and protection by citizenry and should not be dismissed as an important value. Using examples from the topics of night skies and natural soundscapes, we attempt to advance the understanding of aesthetic quality.

The Value of Beauty

Terrel Gallaway, Professor of Economics, Missouri State University, Springfield, MO

Society's ability to articulate the value of beauty is critical to its efforts to preserve scenic assets. This presentation examines key biases in economic theory that have crippled the ability of both economists and the general public to adequately express the importance of beauty. It is noted that the under-appreciation of beauty is an important factor that accommodates and accelerates the loss of scenic nightscapes. To correct this shortcoming, we explore how the night's beauty, or at least the importance of that beauty, might be quantified in order to more readily inform both discussion and policy.

The Economics of Natural Sounds

Frank Turina, Soundscapes Planner, Natural Sounds and Night Sky Division, National Park Service, Fort Collins, CO

The Oxford English Dictionary defines "beauty" as the combination of qualities such as shape, color, or form that pleases the aesthetic senses. Visitors to National Parks often rate natural sounds such water, wind, and bird songs as "very pleasing". That is, visitors recognize a beauty in the natural sounds that they experience in parks. Understanding and quantifying the value of aesthetics inherent in the natural soundscape is important for protecting the acoustic environment. Although economic valuation alone is not sufficient to support management decisions, assessing the value of the soundscape to park visitors helps to provide information that park managers can use to justify the expenditure of funds and resources to protect the acoustic environment. This presentation discusses ongoing research to quantify the value of natural sounds using conjoint analysis. It establishes direct values as well as passive or non-use values of the resource by surveying park visitors and the American public.

Understanding Incremental Loss of Scenery

Tyler Nordgren, Professor of Astronomy, Redlands University, CA

Is a sky with half as many stars, still half as beautiful? Intuitively we see this is false when we consider a natural landscape. If half the view is obscured by billboards, the natural beauty we expect is more than half reduced. The effect of light pollution on a natural starscape is even greater. Replace the starry sky with the glow of reflected light, and the stars that disappear first are the faint ones including the Milky Way itself, the sight that inspires awe for the first-time viewer and is no longer visible for most individuals. Where beauty is often associated with rarity, the Milky Way that once was visible everywhere takes on added beauty as it is now increasingly unlikely to be seen outside wilderness areas. With its loss, we lose not just beauty, but all direct connection we have with our place in the Universe beyond our atmosphere.

An Index of Night Sky Quality

Chad Moore, Night Sky Program Manager, Natural Sounds and Night Sky Division, National Park Service, Fort Collins, CO
Dan Duriscoe, GIS Specialist, Natural Sounds and Night Sky Division, National Park Service, Bishop, CA

The protection of starry night skies has been hampered by the lack of a repeatable objective index of their quality. Astronomical measurement approaches currently employed are complex and obscure to the general public and do not adequately capture the aesthetic character of the night sky. In response, the NPS has developed a Sky Quality Index that rates each site's night sky on a 1–100 scale. Derived from precise and repeatable photometric measures, the index is designed to numerate units of equal aesthetic change and capture the visual impression one gets from stargazing. If validated, such a system can serve as a common platform for resource condition assessment, planning, environmental impact analysis, and public communication.

National Park Service Unit Managers' Perceptions, Priorities, and Strategies of Night as a Unit Resource

Brandi Smith, Doctoral Student, Clemson University, Department of Parks, Recreation & Tourism, Clemson, SC

Recreation opportunities in parks and protected areas (PPA), including the U.S. National Park Service (NPS), are a product of recreationists' desires, natural features, and management decisions. Misdirected anthropogenic outdoor night lighting (light pollution) is brightening the night, altering natural PPA features through nocturnal habitat destruction and reduction of viable night recreation opportunities. Empirical studies recently began investigating visitor perceptions of night, and despite actions such as establishing the NPS Night-Sky Team, it is still largely unknown how and to what extent PPA management recognizes night as a resource. An unrealized resource cannot be enjoyed or protected. The present study begins to fill this dearth of information through a system-wide NPS survey of management perceptions, priorities, and strategies regarding status of night as a resource in each NPS unit. Relationships between management perception and night recreation opportunities offered are discussed, along with variables affecting perception and strategies to protect night quality.

Session 164 • Napoleon B1 (3rd floor) • Invited Papers

Parchi Italiani: State and the "Best Practices" of National Parks and Protected Areas in Italy

Maurilio Cipparone, Spokesperson of UNION for Italian Parks and Nature, Rome, Italy

Session overview: Connections in nature conservation between Italy and the United States date back 150 years, when George Perkins Marsh served as the first US Ambassador to Italy. He based his seminal environmental book, Man and Nature, on his long experience in Italy. Though a very different system, Italian national parks have already contributed to innovation in US park management through professional exchange over the past decade. A sister park arrangement with the Conservation Study Institute at Marsh-Billings-Rockefeller National Historical Park and with Acadia National Park will soon help continue that exchange. This session will draw on four projects that contribute to understanding of the strengths and challenges of the Italian approach to national park management.

State of Italian National Parks

Maurilio Cipparone, Spokesperson of UNION for Italian Parks and Nature, Rome, Italy

This paper will report on 23 concurrent studies of Italian national parks now underway to document the management effectiveness of national parks and protected areas across the country. Conducted as theses for a Master's degree program at Molis University in park management and governance by a group of graduate students, the reports will be released at the sesquicentennial of the modern Italian nation as a "Blueprint of Italian National Parks."

Rete DNA: A New Network and an Alliance of Academies and Parks, for Park Management in Italy

Maurilio Cipparone, Spokesperson of UNION for Italian Parks and Nature, Rome, Italy

A new network of parks and universities, Rete DNA, will further professionalize protected area management in Italy through education and training. This paper will describe its purposes and development, and invite discussion and comparison to North American counterparts.

Parks for the One and Only Earth: Lessons Learned from Italy's National Park Experience

Nino Martino, Superintendent, Dolomiti Bellunesi National Park, Feltre, Italy

Italy has designated 11% of its national territory in a complex system of protected areas, as documented in a landmark publication on Italy's park experience by Dr. Martino, superintendent of one of Italy's signature parks. The book is an in-depth review of the natural and cultural values of 23 Italian national parks and describes a series of selected "best practices," implemented for sound management of biodiversity, preservation of cultural heritage and sustainable development in the national protected areas system. This paper will describe key findings of the book, and focus on lessons learned.

"API": The Italian Protected Areas Data Bank

Davide Marino, Associate Professor, Faculty of Science, University of Molise, Rome, Italy

The API (Italian Protected Areas) Database Project was created to evaluate of management effectiveness of protected areas in Italy. In particular, the research methodologies have been developed by the Department of Science and Technology for the Environment of the University of Molise as MEVAP (Monitoring and Evaluation of Protected Areas) for the evaluation of effectiveness of Italian National Parks. Today, API consists of a set of 250 indicators divided in 4 sectors: Environment, Economy, Governance and Society. The detail of the indicators recorded down to municipal level. The online API database (www.bancadatiapi.it) is designed as a scientific portal, for the exchange of experience and information about the world of protected areas in Italy: the institutions, working groups, students may increase the website's content by publishing their researches.

Session 165 • Napoleon B2 (3rd floor) • Invited Papers

Fire and Resource Management: Fire in the Wilderness

Chairs: Richard Schwab, National Burned Area Rehabilitation Coordinator, National Park Service, National Fire Management Program Center, Boise, ID

Jeff Manley, Deputy Fire Program Planning, National Park Service, National Fire Management Program Center, Boise, ID

Session overview: We feel the timing is right to discuss many fire and wilderness management issues. These include increasing scientific knowledge of fire and its management in wilderness in order to improve the application of fire.

Fires in Previously Burned Wilderness Areas: Fire Severity and Vegetation Interactions in a Changing World

Kent Van Wagtendonk, Geographer, Yosemite National Park, El Portal, CA

In 2009, Yosemite National Park was in the unique position to manage four Wilderness fires in large areas that burned in the 1990s. In some high severity areas resulting from the 1990s fires a vegetation type conversion from upper montane pine and fir forests to montane chaparral communities occurred. Questions arose from resource managers and the public regarding whether the park should reintroduce fire into those areas. This analysis builds on a previous 2007 re-burn project by evaluating the affect that the 1990s fires had on vegetation and the severity of the 2009 fires. In particular, areas that resulted in high severity in the first fires shaped vegetation and, therefore, severity distribution of the subsequent fires. With external factors such as climate change, increasing populations, and air quality concerns affecting how Yosemite does business, the park can assess and manage Wilderness fires in a more effective manner.

Assessing Fire Management Trade-offs: A Monday-morning Quarterback Approach

Carol Miller, Wilderness Fire Research Ecologist, Aldo Leopold Wilderness Research Institute, Missoula, MT

Managers of parks and wilderness areas struggle with restoring natural fire regimes and the majority of lightning-caused ignitions are suppressed for myriad biophysical and social reasons. These land managers need a thorough understanding of the consequences of fire management decisions, including the risks, benefits, and costs of actions not taken. Current research is combining fire behavior modeling technology, underutilized information in archived fire records, and local staff experience to quantitatively compare what actually happened with what might have happened had alternative response strategies been taken on fires in the northern Rockies and Southwest during 2007 and 2008. The ability to retrospectively assess tradeoffs is a valuable learning opportunity for managers and should produce knowledge that will inform future decisions. Furthermore, this research will identify factors that influence a suite of economic, social, and environmental outcomes of response strategies and broaden our understanding of the monetary and nonmonetary costs of suppression.

Prescribed Fire in Wilderness: Nature or Nurture?

Jason Lawhon, Master of Forestry Candidate, Yale School of Forestry, New Haven, CT

Wilderness areas are the closest approximation we have to ecosystems that exist unimpeded by management decisions. Minimizing our impact on wilderness has protected species, habitats, ecological functions, and ecosystem services recognized as crucially important. Manipulation to protect these values offers an intriguing contradiction to our longstanding notion of wilderness as a hands-off institution, and may threaten the very reason these areas exist in their current condition. Using prescribed fire in wilderness is one such example. This paper will investigate the complexities of stewarding fire in wilderness and highlight opportunities to learn from this type of management action. Beyond preserving wilderness values, these considerations will aid in clarifying the role of wilderness in climate change mitigation and adaptation strategies both as a refuge and as a comparison for more actively managed landscapes.

New Approaches to Fire and Wilderness Management in Grand Canyon National Park

Christopher Marks, Deputy Fire Management Officer, Grand Canyon National Park, Flagstaff, AZ

Balancing fire and forest restoration needs with wilderness values is an important part of the fire management program in the proposed wilderness areas on the North Rim of Grand Canyon National Park (GCNP). Recent landscape scale prescribed fire projects in these areas were developed to restore fire adapted ecosystems with the safest and most modern technology, while minimizing the use or impacts of that technology to preserve wilderness character during and long after the project completion. As one example, the SW Roost project treated 2130 acres of ponderosa pine and mixed conifer using previous fire perimeters and existing roads as boundaries, thus eliminating the need for nearly 6 miles of fireline. The project also used a minimal aerial ignition that only involved igniting fuels on the ridge tops, thus allowing the fire to move on its own down slope and across the rest of the unit.

A Proactive Approach to Managing So Many Archeological Sites within a Fire-ready Landscape

Jamie A. Civitello, Archeological Technician, Bandelier National Monument, Los Alamos, NM

Over 2,200 archeological sites exist within the 23,267-acre designated wilderness of Bandelier National Monument (Jemez Mountains, New Mexico). Historic era grazing and fire suppression have led to unnaturally heavy fuel loading that can cause significant damage to archeological features when a wildfire occurs. Given that unplanned fire on the landscape is inevitable, Bandelier managers take a proactive approach to protecting archeological sites, starting with intensive field inventory followed by fuel reduction and experimentation to evaluate fire effects during specific burn prescriptions.

Session 166 • Napoleon B3 (3rd floor) • Invited Papers

Preserving America's Paleontological Heritage through Inventory and Monitoring

Chair: Vincent Santucci, Chief Ranger, National Park Service — George Washington Memorial Parkway, McLean, VA

Session overview: During the past decade a servicewide baseline inventory of paleontological resources has been completed throughout the National Park Service. Through this work over 230 parks were identified with fossils, representing thousands of fossil localities and over 45,000 fossil specimens in museum collections. The completion of the baseline paleontological resource inventories has shifted the focus to the development of strategies for the long term monitoring of National Park Service fossils. Paleontological resource monitoring has been initiated in several National Park Service units to determine the most useful methodologies for assessing the stability and condition of fossil localities. This session will provide an overview of paleontological resource inventory and monitoring activities undertaken by the National Park Service.

Paleontological Inventory of Big Bend National Park

Steven Wick, Seasonal Paleontologist, Big Bend National Park, Big Bend, TX

Donald Corrick, Geologist, Big Bend National Park, Big Bend, TX

Big Bend National Park contains a very diverse, largely uninterrupted, Late Mesozoic/Tertiary geologic interval (spanning 135 million years) containing a variety of fossil plants, invertebrates, and vertebrates. Big Bend is arguably the most paleontologically biodiverse park in the National Park System, with over 1100 fossil taxa reported. Numerous sites in the park have important scientific value, including type localities for specimens. Some park fossils have become famous world-wide (giant pterosaur Quetzalcoatlus and giant crocodile Deinosuchus). The park harbors deposits from a southern paleobiogeographic province. The park also preserves deposits from the Late Cretaceous extinction event, making it one of very few public lands where K-P boundary strata can be studied. Big Bend has attracted world-renowned paleontologists for decades, including researchers Barnum Brown, Walter Alvarez, Wann Langston, and Paul Sereno. Only a small portion of the park has been formally surveyed, leaving open the likelihood for many new important discoveries.

Glacier Bay National Park and Preserve Paleontological Resource Inventory

Robert B. Blodgett, Geological Consultant, Anchorage, AK

Vincent L. Santucci, Chief Ranger, George Washington Memorial Parkway, McLean, VA

Lewis Sharman, Ecologist, Glacier Bay National Park and Preserve, Gustavus, AK

The national parks and monuments in the state of Alaska contain rich and diverse paleontological resources. Comprehensive paleontological resource inventories have been initiated for several National Park Service units in Alaska. A comprehensive paleontological resource inventory has been initiated for Glacier Bay National Park and Preserve. Initial work focuses on compiling complete bibliographies on the paleontologic and stratigraphic literature for Glacier Bay, including formal publications and theses. This work will be followed by compilation of all known fossil localities within Glacier Bay. This phase involves careful scanning of the assembled literature and all available unpublished USGS fossil reports (known informally as E&R reports). This effort is intended to provide baseline information for the management and protections of the non-renewable fossils at Glacier Bay, as well as to support future geologic mapping and research.

Monitoring Paleontological Resources in Glen Canyon National Recreation Area

Erica Clites, Physical Science Technician, Glen Canyon National Recreation Area, Page, AZ

Matthew Miller, GeoCorps Intern, Geological Society of America, Rapid City, SD

Vincent L. Santucci, Chief Ranger, George Washington Memorial Parkway, McLean, VA

John Spence, Terrestrial Ecologist, Glen Canyon National Recreation Area, Page, AZ

Laurie Axelsen, Dangling Rope Subdistrict Ranger, Glen Canyon National Recreation Area, Page, AZ

Glen Canyon National Recreation Area has recently begun a program to relocate and document paleontological localities. Mesozoic-age rocks (250 – 65 million years old) are especially well-exposed in the park and contain paleontological resources such as dinosaur trackways, plesiosaur skeletons and dung from Quaternary mammals such as ground sloths. Park-specific forms were designed for the documentation and monitoring of fossil sites. Site visits are conducted with law enforcement rangers or cultural resource staff. Paleontological technicians do the initial site documentation, then law enforcement rangers revisit sites to monitor their condition. At some sites, photo points have been established and crack monitors are in use. The sites visited include those identified by researchers over the past 20 years, those identified in a 2009 survey by NPS and Utah Geological Survey staff, as well as new sites discovered during fieldwork. Thirty sites have been fully documented since May 2010, including four previously undescribed sites.

Monitoring, Stabilization, and Curation of Paleontological Sites from Claystone Deposits at Wind Cave National Park

Rodney D. Horrocks, Physical Science Specialist, Wind Cave National Park, Hot Springs, SD
Rachel A. Brown, South Dakota School of Mines & Technology, Rapid City, SD

Wind Cave National Park has instituted a cyclic fossil prospecting program for eight known Oligocene paleontological sites in the Park. These sites have fossils that are similar to those found at Badlands National Park and are exposed by erosion of the soft silty claystone of the Brule Formation. Cyclic prospecting of these sites is conducted because the fossiliferous deposits are located close to backcountry roads which make them visible, accessible and vulnerable to poaching. Evidence suggests that poaching has already occurred at seven of the eight sites in the park. All significant fossil excavations are stabilized by refilling with backfill and applying protective coconut straw mats. Preparation, cataloging, and curation of specimens are accomplished through an ongoing partnership with the Mammoth Site in Hot Springs. Cataloged specimens are housed at the new Paleontological Research Laboratory at the South Dakota School of Mines and Technology, the official repository for WICA paleontological specimens.

Utilizing Parks' Fossil Ecosystems to Interpret Past, Present, and Future Climate Change

Jason P. Kenworthy, Geologist, Geologic Resources Division, Denver, CO

Fossils record the evolution of life on a dynamic planet. As prehistoric ecosystem conditions changed outside of an organism's "comfort zone," animals and plants migrated to more favorable conditions, adapted to the changes, or they did not survive. As modern climate continues to change, all living things—including humans—will face those same options. Fossil parks are excellent places to interpret these changes. At a fossil park, visitors are surrounded by a modern ecosystem often very different from the one experienced by its prehistoric inhabitants. A training manual is being developed to help interpreters connect visitors to stories of past changes and what those stories mean for modern climate change. The manual focuses on the dramatic shift in Earth's climate from a greenhouse to an icehouse over the past 65 million years. It utilizes the fossil record from six National Park Service units, but is applicable to other fossil parks.

Session 167 • Maurepas (3rd floor) • Contributed Papers

Air Quality

Chair: Alan Ellsworth, Northeast Region Hydrologist, National Park Service, Troy, NY

Thresholds for Ecosystem Changes (Critical Loads) from Deposition of Air Pollutants in the Western U.S.

Tamara Blett, Ecologist, Air Resources Division, National Park Service, Denver, CO
Leela Rao, Ecologist, California Air Resources Board, El Monte, CA
Linda Geiser, Lichenologist, US Forest Service, Corvallis, OR
Jill Baron, Ecosystem Ecologist, US Geological Survey, Fort Collins, CO

Air pollutants deposited in sensitive national park ecosystems can alter soils, surface waters, and biota in both subtle and dramatic ways. A "critical load" of air pollution defines a deposition level below which sensitive parts of an ecosystem are protected. This talk presents an overview of ongoing and future efforts by the NPS and scientific partners to develop critical loads of atmospheric pollutants for western ecosystems. The presentation will highlight pollution thresholds for arid land plants and soils in Joshua Tree NP; for lichen communities in the Pacific northwest; and for lake biota in the Rocky Mountains. This type of information is policy-relevant science because it is increasingly being used to link ecosystem change thresholds to air quality emissions reduction policies and land management strategies.

Partnership to Reduce the Ecological Effects of Atmospheric Nitrogen Deposition in Rocky Mountain National Park

Jim Cheatham, Biologist, Rocky Mountain National Park, Estes Park, CO

Research has documented significant effects from nitrogen deposition to Rocky Mountain National Park sensitive aquatic and terrestrial ecosystems. The high elevation ecosystem in the Park is more vulnerable to atmospheric nitrogen deposition than many other ecosystems due to lower buffering capacity, shorter growing season, and plant adaptation to nitrogen impoverishment rather than nitrogen enrichment. Nitrogen deposition monitoring and research on its effects has been ongoing in the Park for over 20 years. The National Park Service (NPS) has established a critical load for wet nitrogen deposition of 1.5 kilograms per hectare per year for protecting high elevation aquatic ecosystems in the park. The NPS, Colorado Department of Public Health and Environment, and the Environmental Protection Agency have entered into a Memorandum of Understanding to reverse the trend of increasing nitrogen deposition and address harmful impacts to air quality and other natural resources occurring in Rocky Mountain National Park.

The Composition and Origin of Nitrogen Deposited in Rocky Mountain National Park during the ROMANS Study

Bret Schichtel, Physical Scientist, National Park Service, Air Resource Division, Fort Collins, CO
William C. Malm, Cooperative Institute for Research in the Atmosphere (CIRA), Colorado State University, Fort Collins, CO
Jeffrey L. Collett, Department of Atmospheric Science, Colorado State University, Fort Collins, CO
Michael G. Barna, National Park Service, ARD, Fort Collins, CO
Kristi A. Gebhart, National Park Service ARD, Fort Collins, CO
Marco Rodriguez, Cooperative Institute for Research in the Atmosphere (CIRA), Colorado State University, Fort Collins, CO

Changes in Rocky Mountain National Park (RMNP) ecosystems are occurring because of emissions of nitrogen species along the Front Range of the Colorado Rocky Mountains as well as sources farther east and west. The Rocky Mountain Atmospheric Nitrogen and Sulfur (RoMANS) study was conducted to improve our understanding of the origins of nitrogen species as well as the complex chemistry occurring during transport from source to receptor. Specific goals included characterizing the atmospheric concentrations of nitrogen species in gaseous, particulate, and aqueous phases in and outside of the park and identify the relative contributions from urban, agricultural and other sources within and outside of Colorado to nitrogen deposition in RMNP. As part of this study, intensive five week monitoring campaigns were conducted in the spring and summer followed by detailed modeling and data assessments. In this presentation we will discuss the final study results and their implications.

Planning Tools for Healthy and Resilient Ecosystems: Critical Loads for Air Pollution in Eastern Parks

Ellen Porter, Biologist, NPS Air Resources Division, Denver, CO
Timothy J. Sullivan, Biological Scientist/Environmental Chemist, E&S Environmental Chemistry, Inc., Corvallis, OR
Bernard J. Cosby, Dept. of Environmental Science, University of Virginia, Charlottesville, VA
Eric K. Miller, President and Senior Scientist, Ecosystems Research Group, Norwich, VT
Richard Haeuber, Chief, Assessment and Communications Branch, USEPA Clean Air Markets Division, Washington, DC
Jason Lynch, USEPA Clean Air Markets Division, Washington, DC
Tamara Blett, Ecologist, NPS Air Resources Division, Lakewood, CO
Cindy Huber, Air Quality Specialist, USDA Forest Service, Roanoke, VA
Linda H. Pardo, Environmental Engineer, USDA Forest Service, Burlington, VT

Park management requires addressing immediate threats to resources as well as preparing for an uncertain future to ensure that park ecosystems retain health and resilience to allow adaptation to change. Information on resource response to stressors allows managers to evaluate current conditions and strategize for the future. Quantitative estimates of responses of lakes, streams, and forests to air pollution are increasingly available from ecosystem models. "Critical loads" of pollution have been mapped across large regions in the East, and identify the amount of pollution that ecosystems can sustain while remaining healthy over the long-term. NPS managers have recently used critical loads in collaborative efforts with States, EPA, and other federal agencies to ensure that energy and other development will not harm air quality or resources sensitive to air quality in parks, and to ensure that air quality management strategies achieve maximum benefit for ecosystem protection and resilience in the future.

Quality Air and Water at Acadia National Park: An Historical Analysis

Alan Ellsworth, Northeast Region Hydrologist, National Park Service, Troy, NY
Penelope S. Pooler, Quantitative Ecologist, National Park Service
Bill Gawley, Biologist, Acadia NP, Bar Harbor, ME

Acadia was established as the first National Park east of the Mississippi River in order to protect outstanding scenic, natural, and cultural resources including air quality, lake and pond water quality, and their dependent ecosystems. Air quality has been monitored at Acadia NP since 1981 and water quality data dates back as far as the 1940's. A review of these data indicates concurrent reductions in acid rain and lake water have occurred over time coincident with Clean Air Act legislation. Results of a repeated measures analysis also show an improvement in prized lake clarity until the mid-1990's whereupon it began declining possibly due to changes in climate. Interpretation of dedicated long term monitoring provides a picture of how park resources change over time, the ability to relate changes to management policies or other perturbations, and a mechanism to express how these changes fit into regional trends.

Session 168 • Borgne (3rd floor) • Panel Discussion

Open Space: Cathedrals or Conduits (Assessing Societal Needs for both Infrastructure and Inspiration)

Chairs: Leslie Morlock, GIS Coordinator, Delaware Water Gap National Recreation Area, Milford, PA

John J. Donahue, Superintendent, Delaware Water Gap National Recreation Area, Bushkill, PA

The concomitant demand for ever increasing infrastructure and national desire to become energy independent continues to threaten the integrity of parks and other preserves, challenging efforts for preservation. Infrastructure, from gas and electric development, wind and solar farms, and cell towers, among others, poses significant threats to open spaces. As society seeks to deal with a dynamic changing landscape in the field of communication development and energy generation and delivery, and balance competing needs, what is the appropriate role for the NPS? This session will address significant threats to visual and scenic resources, habitat fragmentation, and other critical impacts that infrastructure and development poses to NPS units. Through a series of presentations (10–15 minutes each) and discussion (45–70 minutes) we hope to assess some current threats both inside and outside our boundaries, address the needs and current efforts for NPS guidance, assess some technology and research methods, and discuss conservation strategies and solutions.

Panelists: John J. Donahue, Superintendent, Delaware Water Gap National Recreation Area, Bushkill, PA

Casey Reese, Natural Resource Program Manager, Appalachian National Scenic Trail, Harpers Ferry, WV

L. Suzanne Gucciardo, Natural Resource Specialist, Lewis and Clark National Historic Trail, Omaha, NE

J. David Anderson, Resident Landscape Architect/GIS & GPS Coordinator, Blue Ridge Parkway, Asheville, NC

Leslie Morlock, GIS Specialist, Delaware Water Gap National Recreation Area, Milford, PA

Session 169 • Salon 828 (8th floor) • Panel Discussion / Contributed Paper

Voices of the Next Generation: Perspectives on the Park Break Program

Chairs: Matthew Heard, Ph.D. Candidate, Brown University, Providence, RI

Meghan Lindsey, University of South Florida

The political and ecological issues facing our national parks, protected areas, and cultural sites are likely to be multi-faceted and challenging. Therefore, it is critical that the agencies responsible for management of these areas provide training to the next generation of leaders interested in protecting these resources. One forum that provides this on-the-ground training to graduate students interested in addressing these issues is the George Wright Society Park Break Program. Park Break is a unique fellowship program that brings together graduate students from a variety of academic disciplines and provides them with the opportunity to work collaboratively with members of governmental agencies, non-profits, and the local community. In this panel discussion, 2010 Park Break Fellows will provide perspectives on participation in the program and evaluate Park Break's overall value as a tool for recruitment and training of the next generation of natural and cultural resource managers.

Panelists: Archi Rastogi, Ph.D. Student, McGill University, Montreal, Canada

Jonathan (Rodney) White, Ph.D. Student, University of Louisville, Louisville, KY

Annamarie Leon Guerrero, M.A. Student, Sonoma State University, CA

Evaluating Park Break: A GWS, NPS & USGS Sponsored Park-Based Field Seminar for Graduate Students

Susan Vezeau, Graduate Student, Clemson University, Clemson, SC

Instituted in 2008, Park Break, sponsored by the George Wright Society, U.S. Geological Survey, National Park Service, and other cooperating partners, is an all-expenses-paid, park-based, field seminar for graduate students thinking about a career in park management or park-related research and education. Individuals who attended the 2008, 2009 and 2010 sessions of Park Break were asked to complete an evaluation soliciting their opinions on items pertaining to issues such as their session's relevancy to park and protected area management, the skills or social capital they obtained by their participation, and practical aspects such as communications, travel, accommodations, and session speakers, among other subjects. The purpose of this study was to determine the impact Park Break had, or could have, on former participants, leading to a greater understanding of the benefits provided by participation in Park Break as well as an assessment on how the program could be improved.

Session 170 • Grand Chenier (5th floor) • Invited Papers

Cultural Resource Response to an Oil Spill

Chairs: Mary Striegel, Chief, Materials Conservation, National Center for Preservation Technology and Training, Natchitoches, LA

Kirk Cordell, Executive Director, National Center for Preservation Technology and Training, Natchitoches, LA

Session overview: How does crude oil impact historic structures and archeological resources? What safeguards are needed to

keep crude oil from potentially damaging a cultural resource? What information is needed and how does one gather this information? What measures are needed to remediate the harmful effects? Five 20 minute papers will be presented in this session that will provide an introduction into the topic of oil spills and the protection of cultural resources.

Mixing Oil and Historic Structures: Hazards and Response

Mary F. Striegel, Chief, Materials Conservation, National Center for Preservation Technology and Training, National Park Service, Natchitoches, LA

In this presentation, Mary Striegel will present an overview of hazards associated with the impact of oil on historic structures. She will discuss the chemical nature of crude oil and provide insights into the interaction of oil and historic building materials. The discussion will progress to the pros and cons of possible methods to protect structures. She will end the presentation with guidelines for documenting oil impacts.

Implementing Section 106 Compliance in an Oil Response: Lessons Learned

Meredith Hardy, Regionwide Archeological Survey Program, Southeast Archeological Center, National Park Service, Tallahassee, FL

David Morgan, Director, Southeast Archeological Center, National Park Service, Tallahassee, FL

Meredith Hardy and David Morgan will present the story of the cultural resource response effort during the Deepwater Horizon (MS Canyon 252) oil spill. They will discuss the creation, implementation, and evolution of the inventory, protection, and survey programs that were developed. They will also discuss lessons learned – successes and pitfalls of cultural resource stewardship during an unprecedented emergency.

Rapid Documentation for Cultural Resource Conservation Using a Spatial Video

Andrew Ferrell, Chief, Architecture and Engineering, National Center for Preservation Technology and Training, National Park Service, Natchitoches, LA

Andy Ferrell will present highlights NCPTT's collaborative work with Louisiana State University to develop techniques for rapid documentation of heritage resources using Spatial Video Documentation (SVD) to capture geospatial data and video imagery of cultural landscapes and historic communities in Louisiana's high-risk coastal zone. The presentation will include an explanation of the SVD approach and examples of current fieldwork in Louisiana.

Case Study: Fort Livingston, Grand Terre Island, Louisiana

Carol Chin, Joint Faculty, National Center for Preservation Technology and Training and Northwestern State University of Louisiana, National Park Service, Natchitoches, LA

Fort Livingston, on the western tip of Grand Terre Island, Jefferson Parish, Louisiana, was contaminated with oil around the first week of June, 2010. Staff from NCPTT made two site visits to Fort Livingston, on June 16, 2010 and again on September 9-10, 2010. During these visits they evaluated the extent of contamination, performed cleaning tests, and collected oil samples for further studies in the laboratory. The presentation will include results of the site visits.

Evaluation of Cleaners for Removal of Crude Oil from Historic Structures

Payal Vora, University of Texas at Austin, Austin, TX

In light of the recent Gulf Coast oil spill, there was little information on cleaners that could safely be used to remove oil from historic masonry. NCPTT and UT researchers evaluated selected cleaners for removal of crude oil from brick. Payal Vora will present results of laboratory studies, including effectiveness and adverse effects of cleaners.

Session 171 • Grand Coteau (5th floor) • Contributed Papers

Case Studies in Administrative History: NBS and NPS

Chair: TBD

The Ill-fated NBS: A Historical Analysis of Bruce Babbitt's Vision to Overhaul Interior Science

Diane Krahe, Assistant Research Professor, University of Montana, Missoula, MT

Nearly two decades have passed since Secretary Bruce Babbitt created the National Biological Survey, into which most research scientists from Interior's land management agencies were forced to transfer. Wildly unpopular from the start – with both the agencies that supplied the NBS its scientists and a conservative Congress unwilling to fund the new bureau – the NBS was

short lived, but reverberations from this upheaval in Interior science are still felt today. As part of an administrative history of the multi-agency Cooperative Ecosystem Studies Unit (CESU) Network, which was established in 1999 in the wake of the failed NBS, I have examined the origins and quick demise of the National Biological Survey/Service. To my knowledge, no historian has yet analyzed the NBS. I believe members of the George Wright Society may be interested in my perspective on this extremely turbulent chapter of Interior's history, which many GWS members experienced firsthand.

"Pristine Nature" Between Steel Mills and Suburbs: The Creation of Indiana Dunes National Lakeshore

Jackie Mirandola Mullen, Graduate Student in History, SUNY at Albany, Albany, NY

This paper examines the establishment of the Indiana Dunes National Lakeshore in 1966. It places the work of the Save the Dunes Council (SDC), an organization that has worked to protect Indiana's duneland for over fifty years, into the context of a fledgling national environmental movement and Chicago's suburban and industrial development. Local histories of the Save the Dunes movement rely on a false dichotomy between righteous conservationists and nature-destroying industrialists. I argue that such a rigid characterization fails to acknowledge how the suburban SDC benefited from casting industrialists as the villain of their cause. By focusing on an industrial region—"despoiled" land—rather than a wilderness landscape, this paper offers a counter-intuitive conservation lesson: Industrial development often helps conservationists by providing them with a clear sense of focus and a tangible enemy against whom to fight.

The Ghost of Christmas Past: Historic Preservation and the 1916 NPS Act

Richard Sellars, NPS Historian (retired), Santa Fe, NM

The legislative history of the National Park Service Act has been examined many times in its relationship to the large natural parks, but rarely with regard to the cultural areas. This presentation will show the ways in which historic preservation did play a role in the legislative history, one that could have changed the early stature of historic preservation, but also could have wrecked the whole effort to get the Act passed. By the time of passage, departments other than Interior had gotten involved; and Mather's top assistant, Horace Albright, had begun to stalk the War Department for its historical largesse.

Reinterpreting Our Heritage: Toward a New History of the National Park Service

David Glassberg, Professor of History, University of Massachusetts–Amherst, Amherst, MA

As the Centennial of NPS approaches, it becomes more important than ever for conservation professionals and the general public to gain a sense of the agency's history. There has been an outpouring of excellent Park Service histories in recent years, but not a new one-volume interpretive synthesis, especially one that addresses the past 50 years since Mission 66. Reinterpreting Our Heritage will be a social and cultural history of NPS, with an emphasis on how its changing interpretations of nature and culture since the early 20th century reflected changes in American society. Among the proposed chapters are "Race and Recreation: Desegregating NPS"; "Thinking Outside Park Boundaries: the Heritage Conservation and Recreation Service"; "Putting Native Americans into History"; "Interpreting Environmental Change"; and "The Politics of Civic Engagement." The presentation at GWS in March will offer an overview of the project and solicit audience comment.

Was Redwood National Park Expansion Related to Woodstock, Earth Day and the Kent State Massacre?

Dan Sealy, Acting, Natural Resources & Science, National Capital Region, National Park Service, Washington, DC
Suzanne Guerra, Guerra & McBane, Public Historians
John Amodio, Environmental Program Manager, Department of Resources Recycling and Recovery (CalRecycle), California Department of Natural Resources

The history of Redwood National Park is linked to a societal shift in the 1960's when Americans questioned their government, their institutions and themselves. Woodstock, 1969, the "Kent State Massacre," and the first Earth Day in 1970 illustrated the changing mood of a generation. Humboldt California is home to both Humboldt State University and Redwood National Park. It is my premise that this place, this time and the people who experienced this social upheaval created a positive atmosphere for park expansion and produced a generation with a new environmental conscience. Forty years later there are lessons about the interrelated dynamics of social change and environmental conservation. I will survey a group of those activists and will conduct subsequent targeted interviews to document their involvement in the RNP expansion movement, involvement in other concurrent social movements, immediate effects on their lives and long-term influence on their involvement in conservation.

Session 172 • Waterbury (2nd floor) • Invited Papers

Climate Change Scenario Planning: Different Perspectives on Preparing for an Uncertain Future

Chair: Patrick Malone, Project Manager / Natural Resource Specialist, National Park Service, Denver Service Center-Planning Division, Lakewood, CO

Session overview: Resource management decisions must be based on future expectations. Climate change is generally expected to bring highly consequential and unprecedented changes, but specific future conditions are very difficult to accurately predict. Scenario planning offers a tool for developing a structured, science-based decision-making framework in the face of an uncertain future. Scenario planning has been widely used within the private sector to assist corporations with navigating uncertainties about future commodity supply. In recent years, scenario planning has been used to help evaluate water supply management and other environmental issues. Scenario planning for climate change is an emerging arena that has attracted government agencies, academic institutions, and non-profit conservation organizations to it for the purposes of planning for the uncertainties of climate change impacts. This session will begin with a 5-minute overview; followed by five 20-minute presentations of different perspectives and applications of scenario planning; and closing with 15 minutes of Q&A/open discussion.

The National Park Service's Use of Scenario Planning

Don Weeks, Hydrologist and Scenario Planning Detailee, NPS–NRPC Water Resources Division, Denver, CO

Scenario planning is a proven process used in both the private and public sector to manage for uncertain futures. Over the past four years, the National Park Service Climate Change Response Program (NPS CCRP) has explored the use of scenario planning with climate change. In this investigation phase, five case studies were completed, evaluating potential futures influenced by a changing climate, along with the associated park management challenges. Building from the lessons learned during these case studies, the NPS CCRP has started the next phase with climate change scenario planning, which is centered around training land managers on the process. Four training workshops have been scheduled into FY11 to accomplish this. The training workshops are facilitated by the Global Business Network, the worlds' largest consultancy integrating scenarios and strategy over the past two decades. The presentation will provide an overview of this effort and current applications from the process.

Scenario Planning: A Tool for Place-based Natural Resource Management and Conservation Planning in Light of Climate Change

Erika Rowland, Senior Research Associate, Wildlife Conservation Society, Bozeman, MT

As natural resource management agencies and conservation organizations seek guidance on preparing for rapid climate change, a growing number of general recommendations are emerging on how to ensure the long-term viability of species and ecological systems. Practitioners have expressed a need for tools to transform these broad recommendations into feasible site- and target-specific actions. The presentation will describe the participatory and iterative climate change adaptation framework designed to identify climate-smart management strategies for particular landscapes, species, or ecosystems. The framework addresses the uncertainty and complexity of understanding climate change impacts, while also considering the specific ecological, social, and political contexts that motivate management decisions. The application of the framework to conservation and management targets will be demonstrated by presenting results from one of several recently completed climate change workshops involving multiple stakeholders. The framework provides an efficient and structured approach for proactively responding to the challenges posed by climate change.

How Do Models and Downscaled Climate Data Fit into Climate Change Scenario Planning Activities?

Steve Gray, Wyoming State Climatologist, University of Wyoming, Laramie, WY

When combined with information from historical observations and paleoclimatic reconstructions, output from global climate models and related downscaling products can provide the basic foundation for many types of scenario planning exercises. As illustrated from a suite of efforts in the Rocky Mountain region, climate models are useful for placing bounds on the range of "scientifically plausible" futures, while accompanying climate-impacts literature offers a means to enhance resulting storylines. At the same time, scenario planning offers a proven means to help stakeholders overcome resistance to using model output in their decision-making processes. Based on examples presented here, scenario planning can be especially useful when dealing with situations where model uncertainties remain high (e.g., changes in seasonal precipitation). Moreover, experience from the Rocky Mountain region shows how climate models and scenario planning can provide a framework for stakeholders to consider actions and outcomes that would otherwise be socially or politically unpalatable.

Scenario Planning in Water Management: Evaluation of Alternatives and the Public Process

Holly Hartmann, Director, Arid Lands Information Center, University of Arizona, Tucson, AZ

Scenario planning has proved useful in fostering strategic thinking about potential responses to the future prospects of increased volatility, uncertainty, complexity, and ambiguity that are confronting resource managers. But decisions to implement specific actions generated by scenario thinking will generally require more traditional planning analyses and public engagement processes as well. Case studies from the experience of water utilities and other water management applications offer direction for use of scenario planning in the management of parks, protected areas, and cultural sites. These case studies provide insight about (1) introducing new scenarios in ways that build on, rather than replace, prior work, (2) connecting alternatives generated within the scenario planning process to traditional project evaluation techniques, (3) using scenarios to determine key decision points and their indicators, and (4) engaging the public during scenario development, evaluation of alternatives, and implementation of plans within the scenario planning framework.

The Use of Scenario Planning to Prepare for Climate Change at Assateague Island National Seashore

Courtney Schupp, Coastal Geomorphologist and Acting Chief of Science and Resource Management, Assateague Island National Seashore, NPS, Berlin, MD

The natural environment of Assateague Island National Seashore (ASIS) is expected to become much less stable under most climate change projections. To help identify and prepare for the anticipated consequences of climate change, the Seashore engaged in a scenario planning effort involving park staff, resource experts, and planners. Scenario planning is a widely utilized method of planning for and addressing future uncertainty. The results of this effort are being used to support both short and long-term planning processes, and have provided value in identifying vulnerable resources and infrastructure, prioritizing information needs, and in engaging park staff and the general public. More broadly, the results of this scenario planning effort have provided a framework for the development of alternatives in the ongoing revision of the Seashore's general management plan.

Session 173 • Rhythms I/II (2nd floor) • Invited Papers

Landscape Dynamics Monitoring Applied to Natural Resource Management in Canada and US National Parks

Chair: Bill Monahan, Landscape Ecologist, National Park Service, Inventory and Monitoring Division, Fort Collins, CO

Session overview: Information about changes and trends in landscape-scale indicators in and around parks can help park managers anticipate, plan for, and manage associated effects to park resources. This 2-hour session of invited papers (about 24 min. per presentation with Q&A) will showcase three major landscape dynamics projects in the US and Canada that are aimed at quantifying landscape-level patterns and processes and applying the results to park resource management. The projects collectively highlight a series of novel data and techniques with broad applications to other parks and protected areas.

Modeling Disturbance Agents with LandTrendr and GIS Data in North Coast and Cascades Parks

Catharine Copass Thompson, Ecologist, NPS North Coast and Cascades Network, Port Angeles, WA
Natalya (Natasha) Antonova, GIS Specialist, NPS North Coast and Cascades Network, Sedro-Woolley, WA
Robert E. Kennedy, Research Associate, Oregon State University, Corvallis, OR
Zhiqiang Yang, Research Associate, Oregon State University, Corvallis, OR

In order to meet North Coast and Cascades Network (NCCN) landscape dynamics monitoring goals, we must determine not only the location of landscape change, but also its cause. Of particular interest to the NCCN are natural disturbances such as landslides, fires, windthrow, flooding events, and insect infestations. We used the algorithm called LandTrendr (Landsat-based Trends in Detection of Disturbance and Recovery) to identify disturbance location, magnitude, intensity and duration. We used Random Forest classification techniques to attribute the change polygons with the disturbance agents. Important variables for predicting disturbance agent included magnitude and duration of disturbance; vegetation condition; elevation, slope, polygon geometry and distance to the nearest stream. Initial results had an overall error rate of less than 30%. These preliminary results suggest that this is a promising method for long term monitoring of landscape dynamics in NCCN parks.

A Retrospective Analysis of Landscape Change in North Coast and Cascades Network (NCCN) Parks: 1985–2008

Natalya (Natasha) Antonova, GIS Specialist, NPS North Coast and Cascades Network, Sedro-Woolley, WA
Catharine Copass Thompson, Ecologist, NPS North Coast and Cascades Network, Port Angeles, WA
Robert E. Kennedy, Research Associate, Oregon State University, Corvallis, OR
Zhiqiang Yang, Research Associate, Oregon State University, Corvallis, OR

National parks are affected by frequent natural and anthropogenic disturbances. Increased temperatures and shifts in precipitation regimes due to climate change are likely to affect frequency, size and severity of these disturbances. The North Coast and Cascades Network Program is working with collaborators from Oregon State University to develop a model that labels change polygons generated by the LandTrendr (Landsat-based Trends in Detection of Disturbance and Recovery) algorithm with their disturbance types. The model combines GIS data and LandTrendr outputs to generate disturbance agent labels for areas both inside and outside park boundaries. We applied the model the LandTrendr dataset from 1985 to 2008 for parks in the NCCN. We present a preliminary accuracy assessment of the model. We evaluate disturbance trends by park and discuss changes in frequency, severity and size of specific disturbance types in the context of climate data from that period.

A Cost Effective Predictive Modeling Approach for Developing Process-based Ecological Inventories for Arctic National Parks

Donald McLennan, National EI Monitoring Ecologist, Parks Canada Agency, Hull, QC, Canada
Sergei Ponomarenko, Terrestrial Mapping Ecologist, Parks Canada Agency, Hull, QC, Canada
Rajeev Sharma, NSERC Post-Doctoral Fellow, Parks Canada Agency, Hull, QC, Canada
Rob Fraser, Research Scientist, Canadian Centre for Remote Sensing, Ottawa, ON, Canada
Ian Olthof, Environmental Scientist, Canadian Centre for Remote Sensing, Ottawa, ON, Canada

Canada's ten Arctic national parks average 16,000 km2 in area and have been located to represent the range of environmental variability across the Canadian Arctic. Their large size and remote locations make intensive ground-based sampling to support map interpretations both expensive and difficult. Through the IPY-funded CiCAT program, and in partnership with the Canadian Centre for Remote Sensing (CCRS), we have developed Integrated Predictive Ecosystem Mapping (IPEM) – an approach that marries the cost effectiveness and broad coverage of 'top-down' satellite data, with the 'bottom up' detail of process-based air photo interpretations, to produce accurate representations of park ecotypes and bioclimatic zones. Variables such as slope, aspect, elevation and soil moisture derived from the digital elevation models were the strongest predictors of park ecotypes, while data from optical sensors were less important. Models, accuracy assessments, map products, and potential applications are shown for 3 contrasting national parks—Wapusk, Ivvavik, and Torngat Mountains.

PALMS: Monitoring, Evaluating, and Forecasting the Condition of Park Landscapes

John E. Gross, Ecologist, National Park Service, Ft Collins, CO
Andrew J. Hansen, Professor, Montana State University, Bozeman, MT
Scott J. Goetz, Senior Scientist, Woods Hole Research Center, Falmouth, MA
David M. Theobald, Research Scientist, Colorado State University, Ft Collins, CO
Forrest Melton, Research Scientist, California State University Monterey Bay, Seaside, CA & NASA Ames Research Center, Moffett Field, CA
Nathan Piekielek, Graduate Student, Montana State University, Bozeman, MT
Rama R. Nemani, Senior Research Scientist, NASA Ames Research Center, Moffett Field, CA

Implementing practical, cost-effective, and useful landscape monitoring is an on-going challenge for NPS and other agencies. To address this challenge, we worked with five parks (YOSE, SEKI, ROMO, DEWA, YELL) and I&M Networks to identify a set of informative and practical landscape-scale indicators. We developed these indicators and provided data, methods, and results in formats that could be readily adopted. Results include a credible method to define landscape-scale areas of analysis, indicators that address climate, ecosystem productivity and phenology, disturbance, land cover, landscape pattern, and key drivers of change. We emphasized development and application of existing NASA technologies, including use of a sophisticated ecosystem modeling environment that provided hindcasts, near-real-time results, and forecasts into the future. Project deliverables include resource briefs, reports, publications, Standard Operating Procedures consistent with I&M standards, data, and web sites. Project results and lessons learned can benefit parks, Networks, and others that undertake similar efforts.

Use of NASA Technologies for Monitoring Park Condition: Integration of Four Case Studies

Andrew J. Hansen, Professor, Montana State University, Bozeman, MT
John E. Gross, Ecologist, National Park Service, Ft Collins, CO
Scott J. Goetz, Senior Scientist, Woods Hole Research Center, Falmouth, MA
David M. Theobald, Research Scientist, Colorado State University, Ft Collins, CO
Forrest Melton, Research Scientist, California State University Monterey Bay, Seaside, CA & NASA Ames Research Center, Moffett Field, CA

Nathan Piekielek, Graduate Student, Montana State University, Bozeman, MT

Rama R. Nemani, Senior Research Scientist, NASA Ames Research Center, Moffett Field, CA

New technologies have emerged that greatly enhance capabilities to monitor the condition of protected areas. NASA has collaborated with the NPS I&M Program to integrate NASA data and products into park monitoring. We summarize the use of NASA products to assess the condition and trend in four sets of US National Park units. Land allocation and change in land use was used as a basis for placing these parks into one of five typologies. YELL/GRTE, YOSE/SEKI, and ROMO represent the wildland protected typology where key issues are: loss of ecological function under climate change (especially hydrologic and disturbance processes), maintenance and/or restoration of wildland species, and human-wildlife conflicts. DEWA/UDSR represents the exurban typology where habitat fragmentation and connectivity, mesocarnivore release, water flow and quality, and invasive species are key issues. We summarize change in these factors from past to present and under future scenarios and draw implications for management.

Session 174 • Rhythms III (2nd floor) • Rapid-Fire Session

GIS Rapid-Fire Session

Chair: Kirk Sherrill, Geospatial Technician, NPS Inventory and Monitory Program, Fort Collins, CO

Session overview: GIS specialists across the National Park Service are developing innovative and practical solutions to managing geospatial data. The fact that parks are widely dispersed and geographically isolated can be an obstacle to sharing these solutions and often prevents staff benefiting from the work of others. This is a "rapid fire" session that will comprise (10–15 minute) presentations of GIS-related applications and tools that have utility and applicability across NPS. While only overviews are presented during the session, attendees can contact presenters at a later time for more specific details or guidance. These types of rapid-fire sessions have proved to be very effective in quickly sharing many ideas with a broad audience.

Historic Aerials in Park Planning and Resource Management Grand Teton National Park (1:30–1:45)

Kathryn Mellander, GIS Coordinator, Grand Teton National Park, Moose, WY

The park has recently acquired an orthorectified mosaic of 1945 aerial photos of almost all of Teton County, Wyoming. The photo contact prints reside at GRTE, and the park, through cooperative work with state and local agencies, as well as the NPS Western Archeological and Conservation Center, scanned over 1200 aerials and had them ortho-rectified to a NAIP base. This presentation will briefly describe and illustrate examples of how the historic aerials are already being used, and how we plan to use them in the park. Some of these applications include use of the aerials as reference for present and future land use planning, identifying land cover/habitat change, particularly in forest incursions into sage and changes in the alpine/subalpine interface. The aerials are also an invaluable visual and spatial reference for the homestead and dude ranch era in Jackson Hole, and are in immediate use in documenting cultural landscapes and historic structures.

Assessing Regional Climatological Trends with the Climate Grid Analysis Toolset (1:45–2:00)

Kirk Sherrill, Geospatial Technician, NPS Inventory and Monitory Program, Fort Collins, CO

Brent Frakes, Functional Analyst, National Park Service, Inventory & Monitoring Program, Fort Collins, CO

Increasingly, land managers recognize the need for using historical climatic data to inform management decisions. Additionally, given anticipated climatic change, having baseline knowledge of historical climatic conditions is essential for understating potential implications of future climatic change. While most managers rely on point-based observations, stations are often few in number and not representative of the entire park. Gridded datasets, including PRISM and SNODAS, are derived from observations, spatially continuous (4km and 1km resolutions), and spatially and temporally extensive. The Climate Grid Analysis Toolset (CGAT) is a suite of GIS Python scripts developed to facilitate efficient analysis of PRISM and SNODAS geospatial climatic datasets. Respectively CGAT performs three main analyses for user-defined spatial and temporal ranges: cell-based average or sum, percentile calculation, and user-defined zonal statistics. Overall, CGAT facilitates use of these two highly relevant and information rich datasets.

Use of ArcGIS and Mobile GIS (ArcPad) for Viewshed Protection (2:00–2:15)

David Anderson, Landscape Architect, Blue Ridge Parkway, Asheville, NC

This presentation introduces the use of ArcGIS and Mobile GIS(ArcPad) for viewshed protection for cellular towers, wind energy development and USFS Timber management, at the Blue Ridge Parkway.

National Park Service Theme Manager (2:15–2:30)

Angie Southwould, GIS Database Management Specialist, Alaska Regional Office, National Park Service, Anchorage, AK

NPS Theme Manager, developed by the Alaska Region GIS Team, is a desktop tool for delivering spatial data to GIS users. This product allows data managers to present data in an organized and intuitive structure without exposing the underlying complexities of physical data storage. NPS Theme Manager is a simple tool for organizing and discovering GIS layers.

Managing and Analyzing Spatial Data from GPS-Collared Caribou Using the SQL Server 2008 Geography Data Type (2:30–2:45)

Scott Miller, Data Manager, Arctic Network, National Park Service, Fairbanks, AK

Kyle C. Joly, Arctic Network, National Park Service, Fairbanks, AK

Microsoft SQL Server 2008 ships with two new features: geography and geometry data types. These new data types allow developers for the first time to store, retrieve and analyze spatial data using Structured Query Language. We began using these spatial capabilities in our Arctic Network caribou monitoring program to track and analyze the seasonal movement patterns of GPS-collared caribou. We present our reasons for choosing SQL Server over a GIS and discuss our experiences with this new technology.

Travel Time Cost Surface Model: A Planning and Logistical Resource Tool (2:45–3:00)

Kirk Sherrill, Geospatial Technician, NPS Inventory and Monitory Program, Fort Collins, CO

Brent Frakes, Functional Analyst, National Park Service, Inventory & Monitoring Program, Fort Collins, CO

Stephani Schupbach, NPS Inventory and Monitory Program, Fort Collins, CO

The travel time cost surface model (TTCSM) calculates travel time from defined locations to other locations within a user-defined area of interest. Modeling is done using GIS and readily available geospatial products such as road, trail, and stream networks, digital elevation models and land cover data to name a few. The model is designed to be dynamic in nature in order to accommodate user (e.g., hiker / skier / ATVer / etc.), temporal (e.g., winter / summer data collection) and park specific needs. Outputs from the TTCSM are point -to-point specific travel time least cost paths (i.e. the modeled fastest path(s)) and raster maps in which each cell value is the modeled time required to reach the given cell from the specified starting location(s). Overall the TTCSM is intended to be used as a tool to facilitate more efficient field data sampling design and planning.

GIS Support at Katmai Branch Search and Rescue (3:00–3:15)

Angie Southwould, GIS Database Management Specialist, Alaska Regional Office, National Park Service, Anchorage, AK

On August 21, 2010, a floatplane carrying three Park Service employees and pilot went missing in Katmai National Park and Preserve. The AK Region GIS community provided valuable support during the Branch Search and Rescue effort in Katmai this fall. Geospatial data and technologies were integrated into the daily operations as new search data was collected, analysis was performed, and updated maps were generated. The SAR GIS team processed a daily workflow and worked with the planning and operations groups of the Incident Management Team to develop re-usable tools for use during and beyond this incident.

New Process for Updating Vegetation After Fires (3:15–3:30)

Janice Vogel, GIS VIP, Grand Teton National Park, Moose, WY

In the wake of a large fire disturbance, thousands of acres of GIS-based vegetation and fuels data become no longer valid. NPS fire and resource management programs need to rapidly update these maps in order to carry on accurate assessments and emergency responses. Vegetation maps are infrequently updated, due to cost and project scope. Yet habitat and fuels status change drastically after fires, making vegetation data for these areas obsolete. Using the joint NPS-USGS National Burn Severity Mapping Project imagery in conjunction with vegetation vector layers now provides a means to update vegetation and fuel data after a fire in a timely and cost-effective manner.

Session 175 • Salon 816–820 (8th floor) • 2-hour Workshop

Natural Resource Information Portal: Reference Application Workshop

Chair: Brent Frakes, Functional Analyst, National Park Service, Inventory & Monitoring Program, Fort Collins, CO

The Reference Application is a key component of the Natural Resource Information Portal (NRInfo), accessible at http://nrinfo.nps.gov, and it merges the data and functions of two legacy NPS information systems: NatureBib and the NPS

Data Store. This web-based tool allows NPS staff to find natural resource-related documents, data sets, GIS layers, publications, reports, and more, and in many instances, download them to their local computer. The Reference Application also allows NPS staff to upload their data to the system, which ensures that information becomes and remains accessible to others. This session will provide an overview of the application, then will address specific functions such as creating and editing records, uploading documents, determining data sensitivity and record visibility, and tips for managing records. Ample time will be provided for questions, answers, and live demonstrations.

Session 176 • Salon 824 (8th floor) • 2-hour Workshop

Bayesian Methods/Structured Decision Making: General Discussion of Methods and Approaches, Additional Applications

Chairs: Joshua Schmidt, Data Manager, Central Alaska Network, Fairbanks, AK

Maggie McCluskie, Network Program Manager, Central Alaska Network, Fairbanks, AK

This informal workshop setting will provide an opportunity for more detailed questions and discussion about the applications of Bayesian modeling and Structured Decision Making approaches. Presenters from the two previous workshops on these topics will be available to answer questions regarding current and future applications of these methods as part of the NPS Inventory and Monitoring Program. An example application, "Quantifying Conceptual Models of Ecosystem Functionality Using a Bayesian Network Approach" will be presented by Roxolana Kashuba and Penelope Pooler.

Session 177 • Napoleon A1 (3rd floor) • Day-Capper

"Who Wants to be a Millionaire?" Live on NPS Network

Chairs: Ann Hitchcock, Senior Advisor, Scientific Collections and Environmental Safeguards, National Park Service, Washington, DC

Julia Brunner, Policy/Regulatory Specialist, National Park Service, Denver, CO

John G. Dennis, Deputy Chief Scientist, National Park Service, Washington, DC

Ann Deutch, Environmental Protection Assistant, National Park Service, Yellowstone, WY

Dale Pate, Supervisory Physical Scientist, National Park Service, Carlsbad, NM

Researchers who want to become millionaires, or at least have a commercial application for research results from park-permitted research, are required to negotiate benefits-sharing with NPS. Enjoy gaming as you learn about the new NPS benefits-sharing program. Benefits-sharing core team members will explain key aspects of benefits sharing and coach the audience in answering challenging contest questions about benefits sharing when results from park-permitted research go commercial. Get a copy of the draft benefits-sharing handbook; hear how derivatives from park specimens can make money; and learn how your park can negotiate benefits to further protect park natural resources. Try your skills! Prizes for smart and witty answers! Format: Audience seated theater style; brief 10 minute overview of benefits-sharing with handouts; then move into gaming format where one leader poses a challenge question and other leaders offer hints moving around the room and passing wireless microphones to contestants with answers.

Session 178 • Napoleon A2 (3rd floor) • Day-Capper

Sea Change: The New Ocean Policy—What it Means for You and Protected Areas

Chairs: Lauren Wenzel, Coordinator, National System of MPAs, National Marine Protected Areas Center, Silver Spring, MD

Cliff McCreedy, Marine Resource Management Specialist, National Park Service, Washington, DC

Andrew Gude, Fish and Wildlife Service Liaison to the Assistant Secretary for Fish, Wildlife and Parks, Washington, DC

Last July, President Obama signed a policy directive to ensure that "the ocean, our coasts, and the Great Lakes are healthy and resilient, safe and productive, and understood and treasured." This session asks: how can we help make this vision a reality? New regional coastal and marine spatial plans (CMSPs) will be developed with states and tribes and stakeholder input, and protected areas should play starring roles in these plans. The White House Council on Environmental Quality is the casting director. The auditions are in Washington, DC and in your region. Ocean experts from NOAA and DOI will host a lively conversation about what this new ocean policy means for your coastal or marine protected area. Contribute your ideas about how protected areas can play support ocean policy goals, including ecosystem-based management; resilience to climate change; improved scientific observations and mapping; greater public awareness; and enhanced regional collaborations. See http://www.whitehouse.gov/oceans.

Session 179 • Napoleon A3 (3rd floor) • Invited Papers

Transportation in Parks: Understanding Choices and Experiences

Chair: Jeffrey Hallo, Assistant Professor, Clemson University, Department of Parks, Recreation and Tourism Management, Clemson, SC

Session overview: Transportation is a vital component of parks. However, transportation systems raise many potential issues for managers and visitors of parks. This session is the second in a three-session track of papers, whose purpose is to provide a forum for communicating results and 'best practices' from a variety of park transportation research and implementation projects. In this session, papers will focus on projects related to travel mode choices, visitor transportation experiences, and visitor perceptions of transit systems. Papers will be presented by invited authors and follow the same style and format as regular oral paper presentations at the GWS conference.

NPS Transportation Planning and Implementation: Enabling Relevant Visitor Experiences

Patricia Sacks, National Park Service –Denver Service Center Transportation Division, Lakewood, CO

Patrick Shea, National Park Service –Denver Service Center Transportation Division, Lakewood, CO

NPS transportation planning and implementation projects are broad reaching and multi-faceted. With each access challenge comes an opportunity to promote relevant visitor experiences, improve resource health, and realize recreational opportuni-

ties in and around national park environs. Recent case studies will illustrate successful park transportation planning outcomes that demonstrate customized approaches to solving access problems within areas that express a rich cultural and natural heritage. Case studies will include discussion of transportation planning/implementation at Valley Forge National Historical Park, Grand Canyon National Park, and Golden Gate National Recreation Area. Future transportation planning activities will need to address changing visitor needs and expectations, demographics and travel patterns, and re-interpret or re-script the park experiences at local, regional and interstate levels. This emphasis will adjust strategic focus to facilitate problem solving and engage additional participants to create shared visions for recreational, economic, preservation, and interpretive opportunities and to preserve and experience park's values on a grander scale.

Indicators and Standards of Quality for Transportation in National Parks: Does Trip Purpose Matter?

Laura Anderson, Post-doctoral Research Associate, University of Vermont, Rubenstein School of Environment and Natural Resources, Burlington, VT

Robert Manning, Professor, University of Vermont, Rubenstein School of Environment and Natural Resources, Burlington, VT

Peter Pettengill, Graduate Research Assistant, University of Vermont, Rubenstein School of Environment and Natural Resources, Burlington, VT

Nathan Reigner, Graduate Research Assistant, University of Vermont, Rubenstein School of Environment and Natural Resources, Burlington, VT

William Valliere, Research Associate, University of Vermont, Rubenstein School of Environment and Natural Resources, Burlington, VT

In park settings, transportation may be both a means of getting from one place to another and a form of recreation. This study examined the degree to which trip purpose (i.e., "transportation" and/or "recreation") is related to indicators and standards of quality of the transportation system. In 2009, visitor surveys were conducted at Acadia National Park, Muir Woods National Monument, and Golden Gate National Recreation Area to address this issue. In general, Muir Woods Shuttle, Alcatraz Ferry, and Acadia Island Explorer users were transportation oriented, while travelers along the Acadia Park Loop Road and Acadia Carriage Roads were recreation oriented. The desirability of several potential indicators of quality (e.g., scenic views, opportunities to take photographs) differed based on trip purpose. However, trip purpose was not related to standards of quality for crowding, service frequency, and landscape character. Study findings have implications for managing the quality of transportation experiences in parks.

Visitors' Potential Use and Perceptions of a Proposed Transit System at Cumberland Island National Seashore

Jeffrey C. Hallo, Assistant Professor, Clemson University, Clemson, SC

Robert E. Manning, Professor, University of Vermont, Rubenstein School of Environment and Natural Resources, Burlington, VT

Visitation to Cumberland Island National Seashore in recent years has been at an all-time high of more than 70,000 visits annually. Island visitors have limited mobility because they are removed from their personal vehicles and the park unit's natural and cultural resources are dispersed over the island's 17.5 mile length. A proposed transit system (a recent statutory requirement) is being planned to increase visitor access to the north end of the island, most of which is designated wilderness. A visitor survey was conducted to gather perceptions about the ease of traveling on the island, the potential use of the transit system, and attitudes toward transit system implementation alternatives. Results of this survey will be presented and discussed, and comparisons will be drawn between general visitors and visitors to the wilderness portion of the island. Implications related to public transit at Cumberland Island and other NPS units will be considered.

Travel Mode Choice at Yosemite National Park: A Stated-Preference Study

Peter R. Pettengill, Graduate Research Assistant, University of Vermont, Rubenstein School of Environment and Natural Resources, Burlington, VT

Robert E. Manning, Professor, University of Vermont, Rubenstein School of Environment and Natural Resources, Burlington, VT

William A. Valliere, Research Associate, University of Vermont, Rubenstein School of Environment and Natural Resources, Burlington, VT

Visitors may choose to travel in Yosemite Valley by three modes of transportation: car, bus, or bicycle. All three modes have common attributes, including crowding, convenience, corridor design, and cost, and the condition of these attributes helps determine which mode of travel visitors choose. This study uses a stated-preference approach to evaluate the relative importance

of attributes in visitors' choice of travel mode. A series of travel scenarios with varying conditions of attributes were presented to a representative sample of visitors who were asked to rank their preference for each of the three modes. Resulting data reveal the importance of the attributes that define each of the three travel modes and suggest how park managers might influence visitors' choice of travel mode.

Alternative Transportation Planning and Experiential Quality in Muir Woods: An Application of Simulation Modeling

Steve Lawson, Director, Resource Systems Group, Inc., White River Junction, VT
Janet Choi, Resource Systems Group, Inc., White River Junction, VT
Nathan Reigner, Graduate Research Assistant, University of Vermont, Rubenstein School of Environment and Natural Resources, Burlington, VT
Robert Manning, Professor, University of Vermont, Rubenstein School of Environment and Natural Resources, Burlington, VT
Michael Savidge, Strategic Planning, Golden Gate National Recreation Area, CA
Mia Monroe, Golden Gate National Recreation Area, CA

As part of Golden Gate National Recreation Area's general management planning efforts, Muir Woods National Monument is evaluating the effects alternative transportation systems may have on visitors' experiences in the woods. Because of its isolated and spatially confined location, the number of individuals visiting the woods and the distribution of their arrivals throughout the day is largely constrained by the monument's parking capacity and shuttle bus schedules. Subsequently, social conditions of crowding and experiential quality can be understood as a function transportation access. This research develops a simulation model of Muir Woods to estimate indicators of crowding at key interpretive sites based upon the arrival of visitors via the transportation system. The model is a tool to both monitor indicators of experiential quality under current management regimes and evaluate alternative transportation scenarios for impacts to the visitor experience. Results suggest that most alternatives considered within the GMP will not adversely affect visitor crowding at interpretive sites within the woods.

Session 180 • Napoleon B1 (3rd floor) • Contributed Papers

Invasive Species

Chair: TBD

Ten Year Review of the Exotic Plant Management Team

Rita Beard, Invasive Species, WASO, NPS, Biological Resources Management Division, Fort Collins, CO
Abby Miller, NPS (retired), Shelburne, VT

It is the goal of invasive plant programs within the National Park Service to manage the sources of new infestations, reduce the effects of existing infestation, and to restore native plant communities and ecosystem function. The Exotic Plant Management Teams were formed to assist parks, and have become an integral part of the NPS response to a growing invasive species threat. The program is now ten years old and has changed and evolved in repose to changing and evolving invasive plants and invasive plant programs within the National Park system. A review of the program was initiated with four goals and objectives to: assess the effectiveness and efficiencies of the current EPMT organization and program; assess the degree to which EPMT efforts are contributing to invasive plant programs locally, regionally, and nationally; to identify the need for changes or modifications to the current program, and; to help determine the future of the program. The review involved a combination of surveys and on site visits. The results of the review are currently being evaluated and be reported on. The final report will be available by the time of the conference.

Winning Battles, Losing the War: Hemlock Forest Decline at Delaware Water Gap National Recreation Area

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

Hemlock woolly adelgid (HWA) is a non-native insect parasite of hemlock trees, and was first discovered in the park in 1989. Since 1993 we have conducted a program of research, monitoring, and management to address the threats that HWA and hemlock decline poses to park resources and visitor experiences. Hemlock mortality was 35% in 2010, and is predicted to be 50% by 2015 and 80% by 2027. Hemlock mortality along stream banks is resulting in mass stream bank failure, channel destabilization and stream habitat degradation. Research conducted by the University of California at Berkeley has revealed that hemlock decline greatly exacerbates the impact of deer herbivory on native plants and greatly accelerates the invasion of non-native plants. Existing management tools such as insecticide treatments for individual trees and herbicide treatments for invasive plants only mitigate specific local impacts. We are unable to prevent the transformation of hemlock ecosystems already underway.

Extent and Impact of the Balsam Woolly Adelgid in Subalpine Fir Forests, Olympic Peninsula, WA

Karen Hutten, Graduate Research Assistant, University of Washington, Seattle, WA
Christian Torgersen, Research Landscape Ecologist, U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center, Cascadia Field Station, Seattle, WA
Andrea Woodward, Ecologist, U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center, Olympic Field Station, Port Angeles, WA
Robert Kennedy, Department of Forest Ecosystems and Society, Oregon State University, Corvallis, OR
Justin Braaten, Department of Forest Ecosystems and Society, Oregon State University, Corvallis, OR

We are investigating spatial and temporal patterns of tree mortality and severity and extent of balsam woolly adelgid (*Adelges picea*) in relation to physical geography and associated disturbance agents on the Olympic Peninsula, WA. The balsam woolly adelgid (BWA) is an exotic herbivorous insect first documented on the Peninsula in 1969. Aerial surveys and satellite imagery were used to identify areas of tree mortality within the range of the subalpine fir host. We hypothesized that mortality would be correlated with annual weather, aspect, elevation, and interactions among BWA, western balsam bark beetle (*Dryocoetes confusus*), and an associated fungus. Preliminary data indicate that BWA has affected subalpine fir trees of all ages across the peninsula, but distribution is patchy and severity is variable. The most severe gouting and defoliation occur on trees on south-facing slopes and adjacent to meadows at low elevations.

Bee Biodiversity in Marin County, California

Benjamin Colteaux, Louisiana Board of Regents Fellow, PhD Student, University of Louisiana at Lafayette, Lafayette, LA (research presented completed while attending Dominican University of California, San Rafael, CA)
Mietek Kolipinski, Senior Scientist, National Park Service, Pacific West Regional Office, Oakland, CA
Circe McDonald, Department of Natural Sciences and Mathematics, Dominican University of California, San Rafael, CA
James Cunningham, Project advisor, Department of Natural Sciences and Mathematics, Dominican University of California, San Rafael, CA
Sibdas Ghosh, Department Chair, Department of Natural Sciences and Mathematics, Dominican University of California, San Rafael, CA

Bees and other pollinators play an essential role in maintaining the ecological integrity of our planet's landscape. Few baseline studies or monitoring programs have addressed concerns over worldwide declines in bee populations. We established 22 specimen collection sites in Marin County, California to survey the biodiversity of bee species and the plant species they may be pollinating in this area. In collaboration with the National Park Service, we emphasized study of bee diversity in natural areas and wildlands, including Golden Gate National Recreation Area and Point Reyes National Seashore. We collected 109 specimens representing 7 bee species and 84 specimens representing 44 plant species of which only 11 are native. One species, the European honey bee (*Apis mellifera*), was found on 37 species of plants, 28 of which were non-native. These data suggest that bees may be assisting in the propagation of non-native plants, which may limit native biodiversity.

Session 181 • Napoleon B2 (3rd floor) • Contributed Papers

Managing Bird Species: Case Studies of Inventory, Monitoring, Proactive Management, and Public Involvement

Chair: Kristen Dybala, Graduate Student, University of California–Davis, Davis, CA

The Status and Distribution of Barred Owls (*Strix varia*) in Marin County, California

Bill Merkle, Supervisory Wildlife Ecologist, Golden Gate National Recreation Area, San Francisco, CA
Scott Jennings, PRBO Conservation Science, Petaluma, CA
Renée Cormier, PRBO Conservation Science, Petaluma, CA
Thomas Gardali, PRBO Conservation Science, Petaluma, CA
David Press, National Park Service, San Francisco Bay Area I&M Network, Point Reyes National Seashore, Point Reyes Station, CA

Barred owls (*Strix varia*) are recognized as one of the major threats to the recovery of the federally threatened Northern Spotted Owl (*Strix occidentalis caurina*). Barred Owls began expanding their range from eastern North America into western provinces and states in the late 1800's and have spread throughout the range of the Northern Spotted Owl, colonizing the southern extent of the range in Muir Woods National Monument in 2002. We describe patterns of the early colonization of Barred Owls in Marin County, California, estimate the current population size, report known breeding attempts by Barred Owls, and describe competitive interactions between Barred and Spotted Owls. We discuss the Barred Owl invasion in the

context of other threats to Spotted Owls in Marin County. We briefly discuss some potential control options. This paper will help inform future study of Barred Owl invasion into Spotted Owl habitat in Marin County and beyond.

Monitoring Landbirds within the National Parks of the Gulf Coast Network

Daniel Twedt, Research Wildlife Biologist, USGS Patuxent Wildlife Research Center, Vicksburg, MS
Martha Segura, National Park Service, Gulf Coast Network, Lafayette, LA

Avian monitoring within the 8 national parks of the Gulf Coast Network is challenged to provide valid quantitative data on bird populations within park boundaries with limited financial input. As such, compromises are required between that which can be expected from volunteer bird monitors and that which is required to achieve reliable estimates of bird population and demographic parameters. We have proposed avian monitoring implemented via a few (3–12) volunteer-days annual effort, yet yielding useful information with a reasonable expectation of long-term implementation. Propose monitoring of breeding birds will use roadside surveys (i.e., Breeding Bird Surveys) and off-road point location surveys. Both methods incorporate time- and distance-at-first-detection methods so as to assess species-specific detection probabilities and effective detection distances. As a harbinger of results from monitoring efforts, we present avian density estimates for select species from Breeding Bird Surveys conducted during 2009 and 2010 along Natchez Trace National Parkway.

Prairie Falcons at Pinnacles National Monument: More than 20 Years of Stability

Marcus Koenen, Program Manager, National Park Service, San Francisco Bay Area I&M Network, Sausalito, CA
Dave Press, National Park Service, San Francisco Bay Area I&M Network, Point Reyes National Seashore, Point Reyes Station, CA

Pinnacles National Monument has one of the highest densities of the nesting Prairie Falcons (*Falco mexicanus*) in the country. The falcons have been monitored at the monument since 1987. The monitoring program was initially developed to locate and track nesting prairie falcon pairs annually to establish climbing advisories and minimize disturbance to the nests. The monitoring methodology also lends itself to detecting long-term population trends. Slight modifications have been made to the sample design after conducting a power analysis that included estimates of detection probabilities. As a result of, at least 30 territories will be monitored annually to determine occupancy of territorial falcons. Fecundity will be determined by examining trends in the number of hatchlings and fledglings. The thirty year analysis shows a stable population of territorial falcons. Reproductive success has also remained stable. Years with low reproductive success has been linked to extreme weather conditions.

Proactive Management of North America's Lone Insular Bird Species in the Face of Global Change

Scott Morrison, Director of Science, The Nature Conservancy, San Francisco, CA
T. Scott Sillett, Smithsonian Institution, Washington, DC
Kathryn R. Faulkner, Channel Islands National Park, Ventura, CA
Walter M. Boyce, Wildlife Health Center, University of California, Davis, CA

The island scrub-jay (*Aphelocoma insularis*), North America's sole island-endemic bird species, is restricted to Santa Cruz Island, one of five islands within Channel Islands National Park. Although the jay population appears to be stable at present, its viability is nonetheless threatened on multiple fronts. West Nile virus, which causes high mortality rates in other corvids, is prevalent on the mainland of southern California but has not established on the island, perhaps due to the island's cooler ambient temperatures. We discuss management options for reducing extinction risk of this species, including vaccination, captive research, biosecurity measures, and creation of a second population of jays on a neighboring island. Evaluating the benefits, risks, and impacts of the various proactive conservation management options requires consideration of both ecological and philosophical factors. We discuss those, and their broader implications for protected area management in the face of global change.

Solutions for Dreamers: Citizen Science as a Tool for Defensible Results

Kevin Schallert, Research Associate, National Park Service, Thousand Oaks, CA
Susan Teel, National Park Service
Nick de Roulhac, National Park Service

Critics argue the benefits associated with the use of citizen science are shadowed by concerns associated with the quality of data collected by people not professional trained in the sciences. This issue has National Park Service (NPS) managers hesitant to include data collected by citizen scientists when defensible results are necessary. Concerns about the population abun-

dance of the northern island loggerhead shrike on Santa Cruz and Santa Rosa Islands provoked a multi-agency research team to struggle with concerns and questions regarding the value of citizen science. Lessons learned from this study reveal that contributions of citizen scientists are both scientifically valuable and the data collected can be as accurate as conventional methods. This paper discusses a replicable model to mitigate traditional concerns with citizen science while maximizing the benefit of citizen science in research studies. The authors will provide annotated materials for use in implement citizen science based research studies.

Session 182 • Napoleon B3 (3rd floor) • Panel Discussion

Preparing 21st Century Park Leaders

Chair: Kristen McConnell, Director, Center for Park Management, NPCA, Washington DC

Protected areas cannot be preserved or protected without strong, innovative leadership. The National Park Service has designed several initiatives to tackle the current and future challenges facing park leaders. These initiatives include (but are not limited to) the Superintendent's Leadership Roundtable, the National Parks Institute, and the Leadership for Public Lands and Cultural Heritage Program. This panel will describe how these and other programs address specific leadership needs, the process of developing successful initiatives (and mistakes we won't make again!), and the broader context of protected area leadership. After presentations on key initiatives by each panelist, the moderator will facilitate an extended discussion with the panelists and audience. Contribute your suggestions about key curriculum topics, ask questions about strengths and weaknesses of various approaches, and find out how to participate in these or develop your own leadership programs.

Panelists: Kathy Hanson, Chief, Learning & Development, National Park Service, Washington, DC

Brett Wright, Professor & Chair, Department of Parks, Recreation & Tourism Management, Clemson University, Clemson, SC

Virginia Farley, Director for Leadership Programs, Conservation Study Institute, National Park Service, Woodstock, VT

Steve Shackelton, Associate Director for Visitor and Resource Protection, National Park Service, Washington, DC

Session 183 • Maurepas (3rd floor) • Panel Discussion

Cultural Heritage Resources in the National MPA System: Benefits in Partnership

Chair: Valerie Grussing, Cultural Resources Coordinator, NOAA MPA Center, Silver Spring, MD

The National System of Marine Protected Areas is designed to improve coordination, stewardship, and effectiveness of existing MPAs at multiple management levels. The system has three primary conservation goals: to advance the conservation and management of the nation's natural heritage, cultural heritage, and renewable living resources and their habitats. Achieving and maintaining healthy ecosystems requires understanding the relationships between people and resources. Maritime cultural heritage provides a tangible link between the contemporary environment and historical processes. The system encourages and facilitates the study, use, and preservation of heritage resources in ways that recognize multiple cultural voices and knowledge systems, and has the capability to enhance our understanding of the interactions between human cultures and natural resources. The system benefits participating MPAs, the nation, and stakeholders, through improved visibility, capacity building, and enhanced partnerships. Members of the cultural working group of the MPA Federal Advisory Committee will discuss these issues and strategies for implementation.

Panelists: Valerie Grussing, Cultural Resources Coordinator, NOAA MPA Center, Silver Spring, MD

Dave Conlin, NPS Submerged Resources Center

John Jensen, Professor, Sea Education Association, Woods Hole, MA

Bonnie Newsom, Penobscot Indian Nation THPO

Session 184 • Borgne (3rd floor) • Contributed Papers

The Role of Science in Making (and Justifying) Decisions: Perspectives from Management, the Law, Social Science, and Museology

Chair: TBD

Effective Strategies to Promote Science-based Management Decisions

Lisa Acree, Botany Program Manager, Resources Management and Science Yosemite National Park, El Portal, CA

Today's land management agencies face an array of complicated resource issues ranging from large eco-regional challenges such as found in the Everglades, to park-centric concerns such as rising levels of development in giant sequoia groves. A solid foundation between science teams and management teams is critical to making robust management decisions to address resource issues. Using a synthesis of interviews and reports, this presentation examines an array of common elements that led

to the most high-value relationships between science and management teams as they resolved complex resource issues. While each resource issue demands a site-specific approach, this presentation uncovers common threads that led to broad support from scientific and management communities.

Potato Chips or Pornography: Defining Impairment for the National Parks

Jacob J. Hoogland, NPS Market Leader, Vanasse Hangen Brustlin, Inc (VHB), Williamsburg, VA

While the "no impairment" mandate of the National Park Service Organic Act has been in effect since its enactment in 1916, it is only recently that Federal Courts have turned their attention to the interpretation of what that phrase means. Recent cases dealing with both snowmobile operation and personal watercraft use within units of the National Park System have added to the case law on this topic. This paper examines the relationship between the roles of law, policy and science in determining when impairment occurs. The roles of science and regulation in interpretation and applying the standard are compared and evaluated.

Still Fighting the Last War? Preservation and the Search for Legitimation

Diane Barthel-Bouchier, Professor of Sociology, State University of New York at Stony Brook, Stony Brook, NY

As historic preservation developed into a global phenomenon, it relied heavily on claims to scientific status and inclusion within the constellation of human rights. But as Horkheimer and Adorno demonstrated, arguments that work in one period often fail to gain adherents in a later period. This paper follows a dialectical approach by analyzing how science and human rights helped historic preservation gain support and win respect as it expanded during the second half of the twentieth century. Over-reliance on these two perspectives, however, caused preservationists to largely ignore the limitations and contradictions inherent in such claims. This led to skepticism in certain professional quarters as well as a relatively low level of public support. Finally, drawing upon social science theory, I propose a synthesis based on an appreciation of the different sources of professional status and the necessity of engaging in more direct forms of public outreach.

Interdisciplinary Research: Navigating the Pitfalls, Processes, and Potential of Integrating Social and Natural Science

Rudy Schuster, Social Scientist, Branch Chief, United States Geological Survey, Fort Collins, CO

Craig E. Colten, Department of Geography and Anthropology, Louisiana State University, Baton Rouge, LA

The National Academy of Science (NAS) and National Science Foundation define Interdisciplinary research (IDR) as a mode of research by teams or individuals that integrates information, data, techniques, tools, perspectives, concepts, and/or theories from two or more disciplines or bodies of specialized knowledge to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline. The NAS further states that social-science research has not yet fully elucidated the complex social and intellectual processes that make for successful IDR. This presentation addresses the double meaning of the former statement. First, issues with process of IDR along with characteristics of successful teams will be presented. Second will be a discussion of specific issues faced by social scientists that inhibit successful participation and solutions. Examples of successful IDR teams will be used to illustrate the concepts.

Relations between People and their Environment: New Kinds of Engagement

Annegien Canoy, Heritage consultant, Dutch Society for the Promotion of Nature Reserves (Natuurmonumenten), Berg en Dal, Gelderland, Netherlands

How can a museological perspective contribute to realize engagement between people and their environment, between people and (natural) heritage organizations. In this paper presentation I investigate if an integrative museological approach can be used for different kinds of engagement to connect people to their environment and to Natuurmonumenten (the Dutch Society for the Promotion of Nature Reserves).The paper describes a framework that should give an answer to how to design new kinds of engagements. The framework consists of the elements 'people, place, passion' which links the people, to their place and their passions. The process of delivering new kinds of engagement can be perceived as the re-invention of stewardship with respect for the different processes of valuing and attributing meaning by human beings. The key elements to implement the framework and the (new) way of working are presented as well and could be useful for different organizations in the of (natural) heritage.

Session 185 • Salon 828 (8th floor) • Day-Capper

New Orleans: Where the Real Saints Go Marching In

Chair: Chair: Patricia Corral, Park Ranger, Jean Lafitte National Historical Park & Preserve, New Orleans, LA

New Orleans is a city of deep religious roots and traditions tied to its diverse immigrant-driven ethnic heritage. Celebrating saints and feast days in somewhat unusual and public displays is one of the ways this is manifested. On this St. Patrick's Day, join us for a lively, interactive discussion—New Orleans style—of the various ethnic and religious commemorations of saints honored throughout the city. Prizes will be given (or thrown) and participants will leave with a deeper understanding of this vibrant and festive city.

Session 186 • Grand Chenier (5th floor) • Contributed Papers
Rights, Policy, and Knowledge: Engaging with Native Communities

Chair: Erik Val, Director, Yukon Parks Branch, Yukon Environment, Whitehorse, Yukon, Canada

Aboriginal Community Engagement for Reconciliation and Reconnection in a Canadian Rocky Mountain National Park

Shawn Cardiff, Manager, Land Use Policy and Planning, Parks Canada, Jasper National Park, Jasper, Alberta, Canada

Creation of Canada's Rocky Mountain national parks more than a century ago excluded and displaced indigenous people, with social and ecological consequences that resonate to this day. This paper discusses Parks Canada's approach to overcoming that legacy, with potential applications for other protected areas. Jasper National Park's establishment in 1907 alienated Aboriginal people that historically used the area: Cree, Stoney, Shuswap, Iroquois, Ojibwa and Métis. In 2004, Parks Canada and 20 Aboriginal groups began a process of interest-based reconciliation and partnering. New doors have opened that enable privileged access for ceremonial practices, to influence park management, to participate in economic opportunities, and connect park visitors with authentic and inspiring cultural experiences. The park is gaining relevance with the engaged communities. While significant relationship-building challenges exist: the healing process, capacity to achieve aspirations, and assertions of rights and title, mutually-beneficial initiatives are furthering reconciliation and delivery of Parks Canada's mandate.

Policy, Laws, and Preservation and the Effects on Indigenous Rights for Cultural and Spiritual Practices

Freddie Romero, Cultural Preservation Consultant, Santa Ynez Band of Chumash Indians Elders Council, Santa Ynez, CA

Today around the globe, laws and policies are being instituted for the preservation of the environment and regeneration of sustainable ecosystems. Policies created to restore our environment, or preserve an endangered species, are having significant impacts on indigenous rights. This presentation will show how such laws effect cultures that have sustained ecosystems for millennia and ways of responding to such issues, such as infringement upon religious rights or denial of access to traditional places. What is the process and who to address? The hope is, that the information presented will challenge indigenous people to stay informed and to strike a balance between the laws and policies and the values given us by creator to care for this earth, while maintaining their cultural traditions and practices.

Beyond Consultation: Aboriginal Engagement for Effective Management of Legacy Contamination in an Arctic National Park

Edward McLean, Consultation Advisor, Parks Canada Agency. Winnipeg, Manitoba, Canada

John Snell, Contaminated Sites Specialist, Parks Canada Agency, Western & Northern Service Centre, Calgary, Alberta, Canada

Nelson Perry, Ecosystem Scientist, Parks Canada Agency, Western Arctic Field Unit, Inuvik, Northwest Territories, Canada

Ken Reimer, Director, Environmental Sciences Group, Royal Military College of Canada, Kingston, Ontario, Canada

Nick Battye, Project Leader, Environmental Sciences Group, Royal Military College of Canada, Kingston, Ontario, Canada

Stokes Point, on Canada's Yukon North Slope in what is now Ivvavik National Park, is the site of a former Cold War era DEW Line radar station and offshore oil exploration base (circa 1980's). Ivvavik is the first Canadian national park created from an Aboriginal land claim agreement (Inuvialuit Final Agreement, 1984) and is co-operatively managed by the Inuvialuit and Parks Canada Agency (PCA). Within this framework, PCA has just completed a comprehensive five-year, $6-million assessment and clean-up of Stokes Point for contaminants and debris left behind from these past uses. This case study describes the collaborative approach and positive outcomes underlying the successful clean-up, with emphasis on relationship building and meaningful engagement of Inuvialuit in project decision making that goes beyond our legal duty to consult. This project exemplifies a corporate shift as PCA moves from doing things for Canadians, to doing things with and as defined by Canadians.

Protecting Traditional Resources Rights in Conservation: Native Knowledge in National Parks

Fernando Villalba, Biologist, National Park Service, Point Reyes Station, CA

During its early development, the National Park Service played an active role in the removal of Native Americans from their ancestral lands. In doing so, they were also in effect dislodging intimate knowledge systems that encompass a long-standing dialogue with the landscape. Although international instruments exist to protect traditional resource rights, dominant international and national frameworks are insufficient to adequately protect traditional knowledge. In analyzing this issue, two case studies were observed at Pinnacles National Monument and Redwood National Park, who are developing relationships with affiliated Tribes—the Amah Mustun Tribal Band and the Yurok Tribe, respectively. Particularly, I analyze the mutual interest to conserve biological diversity and restore disturbed lands as opportunities to collaborate. By working with local National Park Service staff and Native community leaders, trust relationships can be developed in a culturally-appropriate and productive manner if a concerted effort is exerted by both the park and Tribe. Park managers are displaying a sense of not only moral responsibility to reinstate, at least in part, Native land stewardship systems, but also of urgency to work cooperatively with local Native communities and address their concerns and needs regarding cultural revitalization. Native partners especially express the necessity to maintain and restore integrity of traditional practices and knowledge.

Are Aboriginal Title and Treaty Rights Compatible with National Parks?

Heidi Cook, Project Manager, Misipawistik Cree Nation, Grand Rapids, Manitoba, Canada

Ovide Mercredi, Chief, Misipawistik Cree Nation, Grand Rapids, Manitoba, Canada

Edwin Ballantyne, Project Coordinator, Misipawistik Cree Nation, Grand Rapids, Manitoba, Canada

The traditional territory of the Misipawistik Cree Nation (MCN) has been actively studied for a National Park since 1992. In the absence of adequate consultation with the MCN, the proposed park was met with strong resistance that has prevented its creation. In 2007 the MCN, federal, and provincial governments made a fresh start in discussions on the protection of traditional Cree lands and waters. With the support of Parks Canada, MCN representatives visited other communities in Canada to investigate the impact of National Parks on Aboriginal Title, Treaty Rights, and land use. The exchange provided insight on the impacts and benefits of the parks system, and the compromises that are necessary when it is used to protect traditional lands and waters. The community process currently underway asks whether protection through the National Park system can benefit Cree culture, language, and lifestyle, and how Misipawistik title and rights may be compromised.

Session 187 • Grand Coteau (5th floor) • Invited Papers

Sound Sessions: Recent Social Science Studies in National Park Units

Chairs: Peter Newman, Associate Dean, Warner College of Natural Resources, Fort Collins, CO

Paul Bell, Department of Psychology, Colorado State University, Fort Collins, CO

Karen Trevino, Natural Sounds and Night Skies, NPS Natural Resource Program Center, Fort Collins, CO

Session overview: A growing body of research has documented the potential environmental impacts of visitor use in national parks and related areas. These impacts apply to multiple components of the landscape, including soil, vegetation, water, and wildlife. Research and management attention is now being extended from conventional landscapes to "soundscapes," and includes consideration of aural impacts of visitor use as well as other sources of noise. Soundscapes have been defined by the NPS as the composite of all sounds at a specific locale, as perceived by park visitors. This session addresses recent work on the impacts of a variety of sound sources on visitor experiences in National Parks.

The Role of Messaging on the Acceptability of Commercial Aircraft Sounds and Sights

Derrick Taff, Graduate Research Assistant, PhD Student, Colorado State University, Fort Collins, CO

Peter Newman, Associate Dean of Academic Affair and Associate Professor of Warner College of Natural Resources, Colorado State University, Fort Collins, CO

Gretchen Nurse, Post-Doctoral Research Associate, Department of Psychology, Colorado State University, Fort Collins, CO

Research suggests that visitors frequently visit parks in part to experience the sounds of nature. While anthropogenic sounds (e.g., people talking, vehicles and aircraft) can detract from the visitor experience, indirect management techniques such as messaging have the potential to influence visitor perceptions of resource conditions. This study explored the role of messaging on visitor perceptions of commercial aircraft overflight sounds and sights. In a lab, respondents were shown a series of photos representing a hiking trip to Rocky Mountain National Park while experiencing both natural and commercial aircraft sounds. Half of respondents received a messaging treatment concerning commercial aircraft before evaluating the sounds and sights. If visitors are more acceptable of commercial aircraft once they are informed, then messaging strategies may be appro-

priate management techniques in the park. Alternatively, messaging may increase awareness of commercial aircraft and negatively affect the acceptability of the associated sounds.

Motivation and Acceptability Norms of Human-caused Sound in Muir Woods National Monument

Lelaina Marin, Outdoor Recreation Planner, National Park Service Natural Sounds Program, Fort Collins, CO
Peter Newman, Associate Dean of Academic Affairs and Associate Professor Warner College of Natural Resources, Colorado State University, Fort Collins, CO
Robert Manning, Professor of Natural Resources/Director Park Studies Lab, University of Vermont, Burlington, VT
Jerry Vaske, Professor of Human Dimensions of Natural Resources, Colorado State University, Fort Collins, CO
David Stack, Park Ranger, National Park Service – Statue of Liberty National Monument, Liberty Island, NY

Acceptability of sound, natural or human-caused, was predicted to vary by an individual's motivation for quiet at Muir Woods National Monument. This study used a dose-response methodology where visitors (n = 157; response rate = 54%) listened to five audio recordings varying in the percentage of time that human-caused sound was louder than natural sound (percent time above). Visitors then rated the acceptability (pleasant to annoying) of each recording. Cluster analysis was used to segment individuals into three homogenous groups based on their motivations (i.e., low, moderate and highly motivated for quiet) for visiting the park. Results indicated that as percent time above natural sound increased, visitor ratings of human-caused sound decreased. Reactions to human-caused sound also decreased as motivation for quiet increased. Consensus regarding the acceptability of sound was greatest when the percent time above natural sound was lowest (i.e., quietest sounds). Recommendations are offered for setting standards to meet soundscape objectives.

Sources and Prevalence of Anthropogenic Noise in Cultural Parks: Independence Hall and Valley Forge

Jacob A. Benfield, Assistant Professor, Pennsylvania State University–Abington, Abington, PA

Laboratory and field research has shown that human-caused, or anthropogenic, noise can have negative effects on the visitor experience such as reducing scenic evaluations and memory for interpretive material. Additionally, deleterious levels of anthropogenic noise have been shown in a number of wilderness parks including the Grand Canyon and Muir Woods. However, less is known about these noise levels in cultural parks and the effect the noises could have on visitor experiences. The current study describes the results of auditory logging taking place at two very different cultural parks—the urban setting of Independence Hall and the wooded historical site of Valley Forge National Park. Noise sources and levels will be discussed relative to their prevalence and the existing literature from wilderness parks.

Is Personal Reflection Affected by Ambient Soundscapes?

Jacob A. Benfield, Assistant Professor, Pennsylvania State University–Abington, Abington, PA
Gretchen A. Nurse, Postdoctoral Research Associate, Colorado State University, Fort Collins, CO
Lucy Troup, Professor on Special Appointment, Colorado State University, Fort Collins, CO
Paul Bell, Professor, Colorado State University, Fort Collins, CO

Laboratory research has shown that anthropogenic noise can affect a wide range of human dimensions. For example, research has shown that scenic evaluations of national park scenes are lower in the presence of automobile, aircraft, and human vocal noises when compared to natural sound controls. Research has also shown that memory for park interpretative information is lower when presented alongside different types of anthropogenic noise. In a similar line of laboratory research, the current study explored how different soundscapes could impact personal reflection and private thought. Participants were exposed to various natural and anthropogenic noise conditions while asked to reflect upon their lives and their current ability to balance the multiple demands placed upon them. Participants then responded to a series of open-ended prompts regarding their thoughts and feelings. Results compare the different conditions based on length, emotional content, depth, and other qualities of the written response.

The Influence of Anthropogenic Sound on Cultural Park Tours

Gretchen Nurse, Postdoctoral Research Associate, Colorado State University, Fort Collins, CO
Jacob A. Benfield, Assistant Professor, Pennsylvania State University–Abington, Abington, PA
Lucy Troup, Professor on Special Appointment, Colorado State University, Fort Collins, CO
Paul Bell, Professor, Colorado State University, Fort Collins, CO

Understanding the effects of anthropogenic sound on visitor experience in cultural parks is an emerging issue for the National Park Service (NPS). Although the relationship between noise and scenic evaluation is more established, little is known about

how noise influences certain cognitive processes such as level of involvement with informational material. The goal of this paper is to clarify these dynamics through the exploration of visitors' experiences at cultural parks. Specifically, this project exposed participants to two simulated cultural park tours that included pod casts with auditory information typical of the location or 'tour stop' presented in a photo on the screen. Visitor satisfaction, involvement, and affective state regarding the 'tour stop' as well as the information in the pod cast were evaluated to determine the effects of both overflight sounds and voices on visitor experience. Visitor outcomes decreased as percent time audible of all anthropogenic sounds increased in the ambient environment.

Session 188 • Waterbury (2nd floor) • Contributed Papers
Climate Change Forecasting and Planning
Chair: Jan van Wagtendonk, U.S. Geological Survey (retired), El Portal, CA

Testing the Limits: Effects of Climate on Conifer Distributions in Mount Rainier National Park
Ailene Ettinger, PhD Candidate, Biology Department, University of Washington, Seattle, WA
Kevin R. Ford, PhD Candidate, Biology Department, University of Washington, Seattle, WA
Janneke Hille Ris Lambers, Assistant Professor, Biology Department, University of Washington, Seattle, WA
Global climate change is expected to cause warming and reduced snowpack in the Pacific Northwest; these changes are likely to impact the species' distributions and therefore affect natural resource management in national parks. We ask how important climate is in determining range limits of Pacific Northwestern conifers by quantifying relationships between climatic variables (e.g. snow, temperature) and growth across altitudinal ranges of six conifers on Mt. Rainier. We investigate growth-climate relationships at multiple life history stages (seeds, seedlings, adult trees) and find that growth-climate relationships vary by species, elevation, and life history stage. Our results suggest that, as temperature increases over the next century, conifers will likely show increased growth at treeline, but responses in low-elevation forests will be more idiosyncratic.

Plant Responses to Climate in National Parks of the Southwestern US: Forecasts for Land Management
Seth Munson, Research Ecologist, U.S. Geological Survey, Southwest Biological Science Center, Moab, UT
Jayne Belnap, U.S. Geological Survey, Southwest Biological Science Center, Moab, UT
Andy Hubbard, National Park Service, Sonoran Desert I&M Network, Tucson, AZ
Kirsten L. Gallo, National Park Service, Chihuahuan Desert I&M Network, Las Cruces, NM
Sue Rutman, Organ Pipe Cactus National Monument, Ajo, AZ
Mary Moran, National Park Service, Southeast Utah Group, Moab, UT
Charles D. Schelz, National Park Service, North Central Arizona Monuments, Flagstaff, AZ
Robert H. Webb, U.S. Geological Survey, Tucson, AZ
Don E. Swann, Saguaro National Park, Tucson, AZ
The National Park Service (NPS) is likely to face many challenges in the future as climate change alters the abundance, distribution, and interactions of plant species. These challenges will be especially daunting in the southwestern US, which is expected to warm faster than the rest of the country and experience decreased precipitation, resulting in reduced soil moisture in an already water-limited environment. These changes will likely have a negative effect on plant growth and may also result in shifts of plant community composition. Integration of climate and vegetation data is essential in providing resource managers with tools to forecast the effects of climate change on ecosystems—a major goal in NPS inventory and monitoring protocols. The broad-scale effects of climate change and the complex spatial heterogeneity of abiotic and biotic conditions across the southwest region make it difficult to use individual park data to assess climate-vegetation relationships. Here, we highlight preliminary research results from cross-park analyses in the Sonoran Desert and Colorado Plateau that relate past regional patterns in climate to changes in plant species and functional types.

How Climate Change Threatens Communities: A Management Question at Point Reyes National Seashore
Sarah Hameed, Graduate Student, University of California–Davis, Bodega Bay, CA
Jill Baty, Graduate Student, University of California–Davis, Davis, CA
Angela Doerr, Graduate Student, University of California–Davis, Davis, CA
Katie Holzer, Graduate Student, University of California–Davis, Davis, CA
Climate change and its consequences for natural communities pose major challenges to conservation management. Working with managers at Point Reyes National Seashore, we addressed this challenge with a site-specific climate change vulnerability

assessment. We took a multi-faceted approach: 1) we surveyed scientific experts regarding how climate change threatens 14 communities in the park, 2) we quantitatively compared vegetation community distribution predictions of community niche models and dynamic vegetation models, 3) we mapped predicted sea level rise onto vegetation communities at the park and analyzed the potential impacts to the park's communities, and 4) we assessed the vulnerabilities of some individual species to climate change using NatureServe's Climate Change Vulnerability Index. With this four-pronged approach we have developed an important management tool for the park and simultaneously created a road map for other conservation managers to incorporate the implications of climate change in management decisions.

Climate Change Scenario Planning in Alaska

Robert Winfree, Alaska Regional Science Advisor, National Park Service, Alaska Regional Office, Anchorage, AK

Nancy Fresco, Network Coordinator, Scenarios Network for Alaska Planning (SNAP), University of Alaska–Fairbanks, Fairbanks, AK

Bud Rice, Environmental Protection Specialist, NPS Alaska Regional Office, Anchorage, AK

NPS has implemented climate change scenario planning (CCSP) workshops across all NPS areas in Alaska, grouped by four Inventory and Monitoring (I&M) networks. Scenario planning, adaptive management and hedging are alternative approaches for decision making when the levels of uncertainty, risk, and controllability are not optimal. Scenario planning is designed for situations with a high uncertainty, and low controllability. NPS partnered with the Global Business Network (GBN) for process and the University of Alaska's Scenarios Network for Alaska Planning (UAF-SNAP) for leading-edge science on status, trends, and projections relative to climate change and effects. CCSP helps park managers and employees, cooperators, and others understand climate trends; anticipate future changes that may affect resources, assets, and operations in parks and surrounding areas; and identify a range of possible climate change response strategies. This presentation will focus on the CCSP process and scenarios developed for arctic coastal and southwest Alaska parks.

Session 189 • Rhythms I (2nd floor) • Panel Discussion

Future Monitoring with Remote Sensing

Chair: Michael Story, Physical Scientist, National Park Service NRPC IMD, Morrison, CO

Remote Sensing Technologies represent a diverse and dynamic array of sensor systems and analysis tools. This session seeks to inform potential users of important trends in the development of these technologies. Mid and long range monitoring plans need to rely upon consistency in data and methods. Remote sensing data that have been extensively used in the past (traditional aerial photography and Landsat Thematic Mapper) may not be available in the future. What are the data types and sources for the future and how will they impact our ability to effectively monitor National Parks? This session will bring a variety of experts together to discuss the future of remote sensing options with a focus on monitoring.

Panelists: Tom Loveland, Senior Scientist, USGS, Sioux Falls, SD

Jason Stoker, Project Manager for the Lidar Science Project, USGS, Sioux Falls, SD

Jim Irons, Deputy Landsat Project Scientist, NASA, Greenbelt, MD

Mike Hutt, Unmanned Aerial Systems Project Manager, USGS, Lakewood, CO

Session 190 • Rhythms II (2nd floor) • Panel Discussion

Enhanced Monitoring to Better Address Climate Change: Results from Scoping and Prioritization in 2010

Chair: Sara Wesser, Alaska Regional Inventory and Monitoring Program Manager, National Park Service, Anchorage, AK

In response to climate change and the need to better understand the effects it may have, the National Park Service (NPS) has developed a Climate Change Response Strategy (NPS 2010). This strategy includes specific goals to apply climate science through collaboration with scientific agencies and institutions, and conduct scientific studies and resource monitoring activities. In 2010 a select number of I&M Networks received funding to plan for enhancing vital signs monitoring in relation to climate change. This panel discussion will describe the multi-network approach and collaboration within five "highly vulnerable" areas: North Atlantic Coast, Southeast Coast, Alaskan High Latitudes, High Elevation Northern Rockies and the Desert Southwest. Fifteen minute presentations from each panelist will describe strategies taken by these Networks to enhance or initiate new monitoring focused on the effects of climate change. There will be a ten minute introduction and the session will close with 40 minutes of discussion.

Panelists: Joe DeVivo, Program Manager, Southeast Coast I&M Network, Athens, GA

Lisa Garrett, Program Manager, Upper Columbia Basin I&M Network, Moscow, ID

Andy Hubbard, Program Manager, Sonoran Desert I&M Network, Tucson, AZ

Michael Shephard, Program Manager, Southwest Alaska I&M Network, Anchorage, AK
Sara Stevens, Program Manager, Northeast Coastal and Barrier Network, Kingston, RI

Session 191 • Rhythms III (2nd floor) • Presentations and Panel Discussion

The NPS Natural Resource Information Portal: Current Status, Innovative Uses, Future Directions

Chair: Margaret Beer, Data Manager, National Park Service, Inventory & Monitoring Program, Fort Collins, CO

NPS is transforming the way natural resource information is managed and delivered to parks, partners, and the public. The NPS Natural Resource Information Portal (http://nrinfo.nps.gov) is the beginning of a Web-based "one-stop" for data and information on park-related natural resources such as documents, reports, publications, data sets, and park species lists. NRInfo has eliminated cumbersome logins and passwords, and offers a common user interface for multiple natural resource data applications. The underlying architecture of the portal is based on service-oriented architecture, which allows efficient use and sharing of data both within NPS and with essential partners such as the US Fish and Wildlife Service, USGS, and the Data.Gov. This panel discussion will include an overview session that provides background and current status of the portal; a presentation by an NPS division that is using portal data in innovative ways; a park perspective of how the portal is helping with park-based data management; a presentation by a representative of the U.S. Fish and Wildlife Service that highlights inter-agency cooperation efforts; and will finish with an overview of additional information systems that are on deck for incorporation into the portal.

The NRInfo Portal: Introduction and Progress Report

Margaret Beer, Data Manager, National Park Service, Inventory & Monitoring Program, Fort Collins, CO

Over the past year the Natural Resource Information Portal (http://nrinfo.nps.gov) has been steadily increasing in use, number of records, and functionality. This presentation will provide a general overview of the portal, highlight its key capabilities and benefits, and summarize major features that are upcoming in 2011.

The NRInfo Portal as the Springboard for DOI-wide Collaboration

Brent Frakes, Functional Analyst, National Park Service, Inventory & Monitoring Program, Fort Collins, CO

Sharing of data and expertise among DOI bureaus has been clearly identified as a priority by the current administration and NPS is a key player in efforts to leverage existing IT resources. This presentation gives an overview of a workgroup that has been established to move forward with sharing tools and technologies within DOI, and the role played by the Natural Resource Information Portal as a collaborative model.

Using NRInfo Web Services to Create Dynamic Web Applications

Melanie Ransmeier, NPS Air Resources Division, Lakewood, CO
Michael Cox, NPS Air Resources Division, Lakewood, CO

One of the advantages of the NRInfo Portal's service-oriented architecture is the ability to directly query data using web applications. This allows divisions, parks, regions, and other entities to present information on their websites that meets specific information delivery requirements. Implications of using this tool may be significant for both publication and web data management. Accessing NRInfo eliminates the need to maintain duplicate copies of publications on web servers and static web pages containing reference data. In this session we describe using Cold Fusion code to retrieve and parse information from NRInfo's Reference Service and provide dynamic reference data on the Air Resources Division website. Implementation, methods of identifying relevant records, and challenges encountered along the way are discussed.

Extending the NRInfo Reference Application: Programmatic Generation of Map Services

Peter Budde, Inventory & Monitoring Program, National Park Service

Services within the Natural Resource Information Portal (http://nrinfo.nps.gov)are consumable by a variety of clients. The Natural Resource Inventory & Monitoring Program uses the Reference application in the portal to distribute inventory data products, including GIS datasets. Currently, inventory datasets are managed as holdings linked to inventory references. These holdings are usually zip files of GIS datasets, plus supporting help documents, source data, and reports. We are developing tools that auto-generate ArcGIS Server map services to allow streamlined visualization of inventory datasets. Through the developed workflow reference owners (i.e., Inventory Coordinators) control when a map service is generated as well as how the service looks and feels to the end-user. The presentation will highlight the programmatic efforts involved in transforming reference holdings into web map services.

Dissolving Data Boundaries: Data Discovery among Many Systems

Dan Kocol, Managed Business Solutions, Fort Collins, CO

Good search solutions increase efficiency by connecting a broad set of people to a broad set of information. Effective search applications drive value to the organization by helping a specific set of people make the most of specific sets of information regardless of where the data may reside. This session will explore how the NPS IRMA team is using common data standards and federated search in conjunction with search relevancy and ranking to provide meaningful search results to the Natural resource user base. The IRMA program is creating a single search portal that will provide a central access point to various NPS and bureau data sources (TIC, FWS, DOI) with the results tailored to the needs of the Natural Resource programs.

Session 192 • Salon 816–820 (8th floor) • Panel Discussion

Developing a Culture of Evaluation for Interpretation and Education in Great Smoky Mountains National Park: Implications for National Policy

Chairs: Robert B. Powell, Assistant Professor, Department of Parks, Recreation, and Tourism Management-Clemson University, Clemson, SC

Marc J. Stern, Assistant Professor, Department of Forest Resources and Environmental Conservation, College of Natural Resources and Environment, Virginia Tech, Blacksburg, VA

Systematically employing evaluation of interpretation and education allows managers to gauge the influence of program's on visitors' enjoyment, attitudes toward park resources, and stewardship behaviors, and investigate the relative effectiveness of different aspects of educational programs. This information is useful not only to monitor the effectiveness of a particular program but also begins the process of developing a culture of evaluation and adaptive management. This session will provide a description of 5 integrated studies that were part of a broader effort to evaluate interpretation and education programs occurring in Great Smoky Mountains National Park. Key components of the studies for developing a culture of evaluation include their complementary and integrated design, high level of NPS staff involvement, and focus on results with high utility for future programmatic improvement. The results of this study have implications for a national effort to develop a culture of evaluation within the Interpretation and Education servicewide.

Panelists: Susan Sachs, Great Smoky Mountains National Park, Gatlinburg, TN

Beth Wright, Education Technician, Great Smoky Mountains National Park, Gatlinburg, TN

Sue Vezeau, Social Scientist, Yosemite National Park, El Portal, CA

Marc J. Stern, Assistant Professor, Department of Forest Resources and Environmental Conservation, College of Natural Resources and Environment, Virginia Tech, Blacksburg, VA

Robert B. Powell, Assistant Professor, Department of Parks, Recreation, and Tourism Management-Clemson University, Clemson, SC

Session 193 • Salon 824 (8th floor) • Panel Discussion

Putting User Capacity in Perspective: Integration of User Capacity into the Visitor Use Management Framework

Chair: Ryan Sharp, Visitor Use Specialist, National Park Service, Lakewood, CO

Addressing user capacity on public lands is mandated by law. As a result of lawsuits and much debate about the best way to implement applicable laws, there is a strong need to understand how user capacity works towards achieving broader visitor use management goals on public lands. This panel discussion will focus on four main themes: 1) The challenges and issues associated with user capacity, 2) The need to shift emphasis toward visitor use management more broadly, while putting user capacity into its proper context, 3) The strategies being developed among the major land management agencies, 4) Identification of major gaps and needs to further institutionalize visitor use management within the agencies. There will be ample opportunity for questions and comments on the current and future role of user capacity as a part of visitor use management.

Panelists: Kerri Cahill, Visitor Use Technical Specialist, National Park Service, Denver, CO

Jim Bacon, Visitor Use Technical Specialist, National Park Service, El Portal, CA

David Cole, Research Geographer, Aldo Leopold Wilderness Research Institute, Missoula, MT

Ryan Sharp, Visitor Use Specialist, National Park Service, Denver, CO

Ericka Pilcher, Visitor Use Specialist, National Park Service, Denver, CO

Concurrent Sessions • Friday, March 18 • 8:00–10:00

Session 194 • Maurepas (3rd floor) • Affinity Meeting (open to all registrants)
Parks and Protected Areas Where Farms and Food Matter
Chair: Rolf Diamant, Superintendent, USNPS, Marsh-Billings-Rockefeller National Historical Park, Woodstock, VT
Lucy Lawliss, Superintendent, George Washington Birthplace National Monument, VA
Paula Vlamings, Golden Gate National Parks Conservancy, CA
Christina Marts, Assistant Superintendent, USNPS, Marsh-Billings-Rockefeller National Historical Park, Woodstock, VT
Angie Richman, Communication Specialist, Climate Change Response, National Park Service
There is a growing network of national parks and protected areas around the world that are partnering with their communities preserving historically important agricultural landscapes and encouraging sustainable farming practices. In an era of climate de-stabilization and epidemic obesity, these initiatives are strengthening local food security, food education, public health and cultural heritage. They also support agrobiodiversity, which is increasingly recognized as a critical component of a sustainable food supply. In many instances, parks and protected areas are becoming centers of experimentation and innovation. This network will gather to discuss challenges and opportunities confronting national parks and protected areas where food and farming are important. Topics may include new approaches to education such as farm to school programs, exploring experiences with community gardens/ community supported agriculture/farmers markets, use of conservation strategies such easements on agricultural lands, and a variety of new institutional relationships and partnership models. Participants are encouraged to bring their own issues and share their experiences.

Session 195 • Borgne (3rd floor) • Affinity Meeting (by invitation only)
Regional Wilderness Coordinators Affinity Meeting
Chairs: Wade Vagias, Natural Resource Specialist, Wilderness Stewardship Division, WASO, Washington, DC
Garry Oye, Wilderness Stewardship Division, WASO, Washington, DC
Affinity meeting of NPS Regional Wilderness Coordinators to discuss topics of mutual interest.

Session 196 • Poydras (3rd floor) • Business Meeting (open to all registrants)
The Spreadsheets Across the Curriculum Geology of National Parks Project: Update, Discussion, and Prospects
Chairs: H.L. Vacher, Professor, Department of Geology, University of South Florida, Tampa, FL
Judy McIlrath, Instructor, Department of Geology, University of South Florida, Tampa, FL
Tom Juster, Instructor, Department of Geology, University of South Florida, Tampa, FL
Mark Rains, Associate Professor, Department of Geology, University of South Florida, Tampa, FL
Meghan Lindsey, PhD student, Department of Geology, University of South Florida, Tampa
Laura Wetzel, Associate Professor of Marine Science, Eckerd College, St. Petersburg, FL
David W. Hastings, Associate Professor of Marine Science and Chemistry, Eckerd College, St. Petersburg, FL
Ben Becker, Director, Pacific Coast Science and Learning Center, Point Reyes National Seashore, Point Reyes Station, CA
Geology of National Parks: Spreadsheets, Quantitative Literacy and Natural Resources is an NSF-funded project (DUE 0836566) in which University of South Florida geologists visited eight regionally diverse Research Learning Centers to create teaching modules for the Spreadsheets Across the Curriculum library (NSF DUE 0442629). The purpose of the project was to build a collection of modules to bring quantitative literacy and environmental geology (Natural Resource Challenge) materials into the undergraduate, general education course, Geology of National Parks. In this workshop, we will discuss lessons learned in the process of making and implementing the modules, invite feedback on how to continue the collaboration of SSAC and RLCs, and, in particular, look for direction on focusing future projects on major environmental issues affecting the parks (e.g., climate change). We seek ideas not only from RLCs but also anyone interested in the intersection of environmental data and science/mathematics education, particularly quantitative literacy.

Session 197 • Salon 828 (8th floor) • Business Meeting (by invitation only; continues in Session 203)
National Park Service CESU Coordinators Annual Meeting I
Chair: Kathy Tonnessen, Research Coordinator, National Park Service, RM-CESU, Missoula, MT
The NPS CESU Research Coordinators will meet to consider new initiatives, to get acquainted with the new CESU/RLC/Climate Change coordinator, and will take up business items of interest to the group.

Session 198 • Grand Chenier (5th floor) • Business Meeting (open to all registrants)
World Heritage and the United States

Chairs: Stephen Morris, Chief, Office of International Affairs, National Park Service, Washington, DC
Phyllis Ellin, Historian, National Park Service, Chicago, IL
Jonathan Putnam, International Cooperation Specialist, National Park Service, Washington, DC

This meeting, hosted by the NPS Office of International Affairs, will provide an update on recent developments in the World Heritage program globally and in the U.S. Topics will include: results from recent sessions of the World Heritage Committee; the U.S. World Heritage Tentative List and the process and prospects for future nominations; periodic reporting on U.S. World Heritage sites; NPS's World Heritage Fellowships; IUCN's "World Heritage Agenda for Nature"; and prospects for future activities and opportunities for information sharing and involvement by NPS and other interested parties, including improved communication between OIA and NHL regional staff. There will be wide opportunity for general discussion and questions.

Session 199 • Grand Coteau (5th floor) • Business Meeting (by invitation only; continues in Sessions 205, 211, 217)
Putting the USA's National Parks and Protected Areas on the Global Map Workshop I

Chairs: Charles Besancon, Head of Protected Areas Programme, UNEP-WCMC, Cambridge, United Kingdom
Cyril Kormos, IUCN WCPA Regional Vice Chair for North America and the Caribbean
Lisa Duarte, Stewardship Coordinator USGS Gap Analysis Program
Arianna Granziera, WDPA Content Officer, UNEP-WCMC

High-quality and standardized Protected Areas (PAs) data is fundamental for assessing progress towards global biodiversity protection targets. The complexity and magnitude of the USA's PA system makes the collection and conformity to international standards of all non federal PA data a challenging task. Information on IUCN category and governance is often missing and not rigorously articulated, while the process to apply these standards is critical for effective decision making. The Workshop aims at addressing this challenge through the collaboration of all relevant stakeholders and the guidance of Protected Areas experts at national and international level. It will bring together relevant stakeholders in the USA from federal and state government, conservation organizations, Native Americans, IUCN and UNEP to review progress made in standardizing information about PAs in the USA stored in the World Database on Protected Areas. This workshop will review progress and chart a forward path toward sustainability.

Concurrent Sessions • Friday, March 18 • 10:00–12:00

Session 200 • Maurepas (3rd floor) • Affinity Meeting (open to all registrants)
World Commission on Protected Areas / Species Survival Commission Joint Task Force on Biodiversity
Chair: Stephen Woodley, Chief Ecosystem Scientist, Parks Canada, Gatineau, Quebec, Canada
Thomas Brooks, NatureServe–A Network Connecting Science With Conservation, Arlington, VA
Two IUCN Commissions, the World Commission on Protected Areas and the Species Survival Commission have joined forces in a global study of the effectiveness of protected areas in conserving biodiversity. Which protected areas are conserving biodiversity and why? Is it size, regional context, investment in management, visitation or something else? Come hear about this evolving study and how you can help. All are welcome.

Session 201 • Borgne (3rd floor) • Business Meeting (open to all registrants; continues in Session 207)
National Park Service Cultural Resources Programs Business Meeting I
Chair: Stephanie Toothman, Associate Director, Cultural Resources, National Park Service, Washington, DC
A business meeting to discuss the National Park Service cultural resources programs.

Session 202 • Poydras (3rd floor) • Business Meeting (open to all registrants)
Wild and Scenic Rivers Program Updates and Discussion
Chairs: Joan Harn, Wild and Scenic Rivers Program Co-lead, National Park Service, Washington, DC
Bill Hansen, Wild and Scenic Rivers Program Co-lead, National Park Service, Fort Collins, CO
Join the program leads in an open discussion of wild and scenic rivers issues. The NPS Servicewide Wild and Scenic Rivers Program and Steering Committee was created in 2007 to develop and implement a comprehensive Service-wide program that meets the legislative requirements of the Wild and Scenic Rivers Act, improves internal and external communication and coordination, educates NPS staff, stakeholders and the public about the importance of wild and scenic rivers, and protects the river resources under our care.

Session 203 • Salon 828 (8th floor) • Business Meeting (by invitation only; continued from Session 197)
National Park Service CESU Coordinators Annual Meeting II
Chair: Kathy Tonnessen, Research Coordinator, National Park Service, RM-CESU, Missoula, MT
See under Session 197 for abstract.

Session 204 • Grand Chenier (5th floor) • Business Meeting (open to all registrants)
Intermountain Region / Resource Stewardship Advisory Team (RSAT)
Chair: Dave Roemer, Chief of Resources Management, Big Thicket National Preserve, Kountze, TX
The Intermountain Region's (IMR) Resource Stewardship Advisory Team (RSAT) comprises both cultural and natural resource specialists from parks and central offices throughout the region. Its goal is to strengthen the leadership capabilities of IMR in comprehensive resource stewardship. RSAT advises the regional directorate on resource issues, and facilitates communication related to resource stewardship among the regional office, parks, and partners. RSAT is hosting this meeting to provide an opportunity for resource professionals and managers in the Intermountain Region to meet face to face and discuss ways in which the region and RSAT can best serve the needs of parks.

Session 205 • Grand Coteau (5th floor) • Business Meeting (by invitation only; continued from Session 199; continues in Sessions 211, 217)
Putting the USA's National Parks and Protected Areas on the Global Map Workshop II
Chairs: Charles Besancon, Head of Protected Areas Programme, UNEP-WCMC, Cambridge, United Kingdom
Cyril Kormos, IUCN WCPA Regional Vice Chair for North America and the Caribbean
Lisa Duarte, Stewardship Coordinator USGS Gap Analysis Program
Arianna Granziera, WDPA Content Officer, UNEP-WCMC
See under Session 199 for abstract.

Session 206 • Maurepas (3rd floor) • Business Meeting (open to all registrants)
NPS Climate Change Response Strategy
Chair: Leigh Welling, Climate Change Response Program Manager, National Park Service, Fort Collins, CO
In 2010, the National Park Service launched a new program and released a Climate Change Response Strategy for understanding and responding to the challenge of climate change. Learn about the program, meet new staff, and discuss strategies for meeting the goals and objectives put forward by the strategy.

Session 207 • Borgne (3rd floor)) • Business Meeting (open to all registrants; continued from Session 201)
National Park Service Cultural Resources Programs Business Meeting II
Chair: Stephanie Toothman, Associate Director, Cultural Resources, National Park Service, Washington, DC
See under Session 201 for abstract.

Session 208 • Poydras (3rd floor) • Affinity Meeting (open to all registrants)
Who's on First? Clarifying NPS Marine Jurisdiction and Policies to Protect Ocean and Coastal Parks
Chairs: Julia Brunner, Policy & Regulatory Specialist, Geologic Resources Division, National Park Service, Lakewood, CO
Jeffrey Cross, Ocean and Coastal Resources Branch Chief, Water Resources Division, National Park Service
A multitude of problems confront National Parks in conserving ocean and Great Lakes resources, not the least of which is uncertainty about who's in charge. The complex picture of marine jurisdiction can muddy the waters, and uncertainty can discourage parks from addressing activities that they are in fact empowered to regulate. This meeting will discuss clear, fundamental concepts of NPS jurisdiction in ocean and coastal park units, and preview changes in a draft Director's Order on Ocean and Great Lakes Stewardship. Come prepared to ask questions: the answers may surprise you. Cross- cutting topics include federal and state agencies' jurisdiction; the interaction and perceived conflict between NPS regulations and nonfederal ownership of most submerged lands in parks; commercial and recreational fishing, aquaculture, dredging, and water quality. Participants will come away with a toolbox of jurisdictional authorities and policies to manage and protect ocean and coastal resources.

Session 209 • Salon 828 (8th floor)
OPEN

Session 210 • Grand Chenier (5th floor) • Affinity Meeting (open to all registrants)
Building the Next 50 Years of Research at Aldo Leopold Wilderness Research Institute (ALWRI): A Discussion
Chair: Cindy Swanson, Human Dimensions Program Manager, USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Missoula, MT
The Director of ALWRI retired January 2, 2010. His retirement provided an opportunity to take a fresh look at the direction of ALWRI and reach out to managers and other researchers to incorporate the many new challenges that face wilderness areas, such as climate change, urban development on the wilderness fringe, changing recreation patterns, and more intense natural disturbances (wildfire, drought and insects/disease). A series of 6 detailers from multiple federal agencies and a representative from the Wilderness Society came to ALWRI for an average of a month each to be the acting Director. The objectives of these detailers included; 1. Outreach to federal land managers, researchers and employees, non-government organizations and the public to identify wilderness management challenges across the United States, 2. Develop a strategic vision and identifiable landmarks for the next generation of wilderness research, 3. Develop a pathway to expand partnerships and build internal research and science delivery capacity, and 4. Identify the strategic roles, responsibilities, skills, abilities and duties for the position of Director. This session will share a synthesis of the recommendations provided by the detailers and facilitate a discussion of these recommendations.

Session 211 • Grand Coteau (5th floor) • Business Meeting (by invitation only; continued from Sessions 199, 205; continues in Session 217)
Putting the USA's National Parks and Protected Areas on the Global Map Workshop III
Chairs: Charles Besancon, Head of Protected Areas Programme, UNEP-WCMC, Cambridge, United Kingdom
Cyril Kormos, IUCN WCPA Regional Vice Chair for North America and the Caribbean

Lisa Duarte, Stewardship Coordinator USGS Gap Analysis Program
Arianna Granziera, WDPA Content Officer, UNEP-WCMC
See under Session 204 for abstract.

Concurrent Sessions • Friday, March 18 • 3:00–5:00

Session 212 • Maurepas (3rd floor)
OPEN

Session 213 • Borgne (3rd floor)
OPEN

Session 214 • Poydras (3rd floor)
OPEN

Session 215 • Salon 828 (8th floor)
OPEN

Session 216 Grand Chenier (5th floor) • Affinity Meeting (open to all registrants)
Wilderness Stewardship: Mitigating Conflict Through Confronting the Human-Nature Relationship
Chairs: Matthew Carroll, Smokejumper, U.S. Forest Service, McCall, ID
Jason Lawhon, Master of Forestry Candidate, Yale School of Forestry & Environmental Studies, New Haven, CT
Jesse Burkhart, Master of Forest Science, Yale School of Forestry & Environmental Studies, New Haven, CT
Understanding the influence of the perceived human-nature relationship on Wilderness policy direction is imperative as agencies question Wilderness' role in climate change strategies involving landscape scale ecosystem manipulation. It is becoming increasingly clear that humans will always affect ecosystems at all levels. However, the historical interpretation of the human-nature relationship has been one of separation. That is, the processes of the biophysical and the social world are distinct where the former is natural and the latter is unnatural. We argue that this understanding is the impetus for much of the tension between Wilderness policy and practice and through conceptualizing a combined biophysical and social "natural," a theory posited by many before us, tensions between Wilderness policy and practice are mitigated. This new understanding of the human-nature relationship acknowledges interaction, where success is the measurable observation of ecosystem change rather than attempted erasure of human impacts.

Session 217 Grand Coteau (5th floor) • Business Meeting (by invitation only; continued from Sessions 199, 205, 211)
Putting the USA's National Parks and Protected Areas on the Global Map Workshop IV
Chairs: Charles Besancon, Head of Protected Areas Programme, UNEP-WCMC, Cambridge, United Kingdom
Cyril Kormos, IUCN WCPA Regional Vice Chair for North America and the Caribbean
Lisa Duarte, Stewardship Coordinator USGS Gap Analysis Program
Arianna Granziera, WDPA Content Officer, UNEP-WCMC
See under Session 204 for abstract.

Posters

Frozen Landscapes: Understanding Trends in the Permafrost Environments of Central Alaska Parks (CAKN)

Guy Adema, Physical Scientist, Denali National Park and Preserve, Denali Park, AK
Edward (Ted) Schuur, University of Florida

Permafrost landscapes dominate much of the area which comprises the parks of central Alaska. Additionally, much of the permafrost is considered to be vulnerable, with ground temperatures very close to the freezing point. Clear signs of a changing soil regime are evident in CAKN parks, including large thaw slumps, thermokarsts, changes in surface drainage and vegetation, and sag ponds. Continued change to this dominant landscape driver imply potentially drastic changes to the character and habitat regimes of CAKN parks. We have developed and begun testing a permafrost monitoring plan which aims to quantify the rate and extent of change. Indicators such as borehole temperatures, active layer depths, ecosystem carbon balance, and thermokarst distribution provide a variety of data streams which allow for a holistic analysis of the state of permafrost. We will present monitoring methods and examples of the data and trends observed in and around CAKN parks.

Restoration of Abandoned Mine Lands in Kantishna

Guy Adema, Physical Scientist, Denali National Park and Preserve, Denali Park, AK
Ken Karle (no affiliation given)
Phil Brease, National Park Service (recognized posthumously)

A long history of placer and lode mining in the Kantishna mining district in Denali National Park and Preserve ended in the 1980s and was followed by many years of claim validity exams and land acquisition. The park acquired numerous claims, many of which were severely disturbed, and two of which are classified as impaired waterways under the Clean Water Act. During the past three years we have implemented large-scale restoration processes in three watersheds: Glen Creek, Slate Creek, and Caribou Creek. Designs are in progress for a fourth mined area on Moose Creek. The restoration activities included removal of abandoned materials, removal of contaminated soils, stream channel and floodplain reconstruction, and extensive revegetation. Restoration techniques focused on restoring channel and floodplain riparian functions using a variety of techniques, including rock weirs, bio-armored banks, and large-scale revegetation.

Pacific Island Vegetation Mapping Challenges Conquered through Cooperation

Alison Ainsworth, Botanist, Pacific Island Network Inventory and Monitoring Program, Hawaii National Park, HI
Greg Kudray, Program Manager Pacific Island Network Inventory and Monitoring Program, Hawaii National Park, HI

Pacific Island parks present unique mapping challenges due to their isolation, high endemism, sensitive cultural landscapes, and lack of community classifications and legacy vegetation data. In 2007, the Pacific Island Inventory and Monitoring Network (I&M) in collaboration with the NPS National Vegetation Mapping Program developed an innovative strategy relying on park cooperation, regional vegetation experts, vegetation classification specialists, and two mapping contractors. For five smaller parks manual image interpretation and intensive field work were more efficient, but for the four larger parks mapping combined field work guided by GIS biophysical modeling, automated object oriented image segmentation, classification and regression tree analysis, and photo interpretation. Field work was completed by park and I&M staff together. Draft maps are brought to the parks for the widest review possible, which includes an explanation about the process and vegetation types. Involving park staff throughout the process increases the park buy-in and usefulness of these mapping products.

Rapid Response to Insect, Disease and Abiotic Factors

James Akerson, Supervisory Ecologist, NPS Mid-Atlantic Exotic Plant Management Team, Luray, VA

National Park Service regions East of the Mississippi River released a document to help their park units respond to forest pest epidemics. The strength of the document titled, "Rapid Response to Insect, Disease and Abiotic Factors," is in its electronic format. Accessed via MS-SharePoint or external internet links, it provides needed information to quickly mount a treatment response plan. The opening chapters describe the process for monitoring, diagnosing, prescribing treatments, obtaining funding, and satisfying federal policies to respond to invasive forest pest problems. The appendices provide all forms, law/policy, and the pest advisories for preparing wise project proposals. A dichotomous key was created to help staffs quickly determine the identity of an unknown impact. Smaller park units, without robust resource staffs, may be the greatest beneficiary from this product. The authors plan to update the appendices as new information becomes available or as NPS staff make recommendations for improvements.

Monitoring Colonial Nesting Birds in Biscayne National Park

Joaquin Alonso, Biologist Technician, National Park Service, Miami, FL
Raul Urgelles, Wildlife Biologist, National Park Service, Miami, FL
Kevin R. Whelan, Community Ecologist, National Park Service, Miami, FL

Colonial nesting birds are an important component of many ecosystems. Their high trophic position suggests they are a good indicator of local and regional ecosystem health. Consistent successful nesting by colonial birds suggests that the ecosystem adequately supports reproduction effort (ability to acquire food for establishment of reproductive condition, egg production, food for fledging chicks, etc). The South Florida/Caribbean Inventory and Monitoring Network is developing a long-term monitoring program designed to detect changes in nesting efforts of colonial birds in Biscayne National Park. Currently, colonies are monitored monthly. Photographs of the colonies are taken from a helicopter and the numbers of active nests are determined from the pictures taken. We have found that Double-Crested Cormorants have the greatest amount of nests and a year-round nesting period. It is assumed that significant variation in counts could reflect changing environmental conditions encountered by the birds; this provides important information for park management.

Using Coral Video Monitoring and Water Temperature Data to Demonstrate a Variety of Analytical Methods

Andrea Atkinson, Quantitative Ecologist, National Park Service , South Florida / Caribbean Network, Palmetto Bay, FL
Jeff Miller, Fisheries Biologist, National Park Service, South Florida / Caribbean Network, St. John, VI
Rob Waara, Biological Technician, National Park Service, South Florida / Caribbean Network, Palmetto Bay, FL
Judd Patterson, GIS Specialist, National Park Service, South Florida / Caribbean Network, Palmetto Bay, FL
Brian Witcher, Data Manager, National Park Service, South Florida / Caribbean Network, Palmetto Bay, FL
Kevin R.T. Whelan, Community Ecologist, National Park Service, South Florida / Caribbean Network, Palmetto Bay, FL

Anticipating the most likely ways monitoring data will be analyzed in the future can help refine sampling design and protocols. The NPS South Florida / Caribbean Network has been monitoring coral communities for up to 10 years and water temperatures up to 20 years in four National Parks. At selected sites 20 randomly chosen coral video monitoring transects are monitored annually and water temperature is collected with data loggers. We share the analyses used to test for long-term trends and sudden precipitous events for coral cover, coral community metrics, and water temperatures, and explain our use of baseline data and thresholds to use water temperature data as an early warning indicator for management. Difficulties, lessons learned and ways the protocol has been adjusted are presented.

Vevé of Afa: Case Study For Development Options and Progress

Maria Ayub, Landscape Designer, American Society of Landscape Architects, Plantation, FL

The Vevé of Afa is an eco-cultural community development project in Palma Soriano, Cuba, that was featured in 2007 at the GWS conference in St. Paul, Minnesota. The project deals with the integration of ecological sustainability combined with religious symbolic gestures on the landscape. The presentation for the 2010 conference will comprise of the updates and development of this designated cultural protected area. The project has been slow in getting the funds but nonetheless, some features of the project are being constructed and by March of 2011, they will be completed.

Year-Round Hydrologic Monitoring of Subalpine Lakes in Great Basin National Park

Gretchen Baker, Ecologist, Great Basin National Park, Baker, NV
Geoff Moret, Hydrologist, Boulder City, NV
Christopher C. Caudill, Aquatic Ecologist, Moscow, ID
Nita Tallent-Halsell, I & M Coordinator, Boulder City, NV

Lake hydrology has strong effects on chemical and biological processes and is sensitive to climate, but remote high-elevation lakes can be difficult to access during the winter. The Mojave Desert I&M Network and Great Basin National Park have installed pressure and temperature loggers in four subalpine lakes (elevation 2915–3292 m) in Great Basin National Park to monitor lake levels, the length of the ice-free period, and water temperatures. The collected data show that both water levels and water temperature vary significantly over the course of the year, with the snowmelt pulse driving variations in both parameters. The dates of ice-over and ice-out could be inferred from the temperature record. Current predictions of climate change are for earlier snow pack disappearance, which should greatly affect the hydrology of these lakes. Long-term, year-round monitoring will help detect these changes and determine how they affect water chemistry and biological communities.

Passing the Torch: A Conversation between Generations about Resource Stewardship

Ben Baldwin, Research Learning Specialist, Rocky Mountain National Park, Estes Park, CO
Chelsea Frost, Student, University of Nevada–Reno, Reno, NV
Ben Bobowski, Chief of Resource Stewardship, Rocky Mountain National Park, Estes Park, CO

Passing the Torch is a project to capture and share experiences of seasoned NPS employees with the next generation. Many long term employees have great stories and lessons (often hard earned) that can benefit new employees. Often these experiences are not shared due to limited time or contact and unfortunately many are lost when the employee retires. Passing the Torch is an attempt to collect an informal knowledge repository that persists over time; but if not tapped, will be lost forever. The experiences are captured through interviews and questionnaires. The interviewees are asked to give advice, provide lessons learned, tell how they benefited from experiences and share their hopes for the future. The information is then synthesized and formatted to be available in a variety of formats. This provides the next generation of employees a chance to learn from those that came before them and hopefully carry on the mission.

Rocky Mountain Green Team—Providing Urban Youth a Connection to National Parks

Ben Baldwin, Research Learning Specialist, Rocky Mountain National Park, Estes Park, CO
Shane Wright, Youth Program Director, Groundwork Denver, Denver, CO
Ben Bobowski, Chief of Resource Stewardship, Rocky Mountain National Park, Estes Park, CO

The Rocky Mountain Green Team (RMGT) is a NPS Youth Internship Program (YIP) partnership between Rocky Mountain National Park (RMNP) and Groundwork Denver (GWD). GWD is a community and environmentally focused nonprofit that works in Denver's low income communities. The mission of GWD is to bring about the sustained improvement of the physical environment and promote health and well-being through community-based partnerships and action. The RMGT is a internship program that hires lower income urban youth to work in the park. The summer of 2010, RMGT interns camped and worked in RMNP for five weeks. In addition to habitat restoration, special projects and trail construction, interns interacted with NPS staff and had opportunities to develop leadership and professional skills, learn about the NPS and career opportunities. In the words of one RMGT member, "Working and living at RMNP was an experience that will last a lifetime. I am very grateful."

Rocky Mountain National Park Eagle Rock Internship Program: A Productive Partnership for Youth Engagement

Ben Baldwin, Research Learning Specialist, Rocky Mountain National Park, Estes Park, CO
Jon Anderson, Instructor, Eagle Rock School, Estes Park, CO
Judy Visty, CDRLC Director, Rocky Mountain National Park, Estes Park, CO
Ben Bobowski, Chief of Resource Stewardship, Rocky Mountain National Park, Estes Park, CO

The Eagle Rock (ER) Internship Program is a collaborative partnership between Rocky Mountain National Park and Eagle Rock School and Professional Development Center, a purposefully diverse residential high school located in Estes Park, Colorado. This internship program focuses on bridging the critical years between high school and college when students are making decisions that will influence their career choices. Students receive hands-on experience, connections to the existing workforce, and active mentoring as they begin their working relationship. The ER Internship Program begins with a volunteer (service learning) experience, followed by a full-time, paid, temporary position at the park, complemented by professional development training. Its innovative educational and development program emphasizes active, interdisciplinary, experiential learning. The ER Internships develop opportunities for students to connect with national parks, fosters student interest in science and public lands, and ultimately provides a path for students to pursue careers in the National Park Service.

Visions of You—Picture Your NPS: Helping Youth Personally Connect to Parks through Photography

Ben Baldwin, Research Learning Specialist, Rocky Mountain National Park, Estes Park, CO
Amanda Christman, Fellow, Eagle Rock School, Estes Park, CO
Jon Anderson, Instructor, Eagle Rock School, Estes Park, CO

Visions of You—Picture Your NPS is a way for students to visually explore, reflect, and interact with the National Park Service. Visions of You is part of the professional development curriculum for the Rocky Mountain National Park Eagle Rock Internship Program. This internship program provides high school students with structured internships at the park. Visions of You project takes advantage of students' comfort levels by using familiar technology (digital cameras and computers) to personally connect them with the unfamiliar— national parks. This project provides a way for students to meaningfully explore, visually document and learn about their transition from an academic environment to a professional experience with

the NPS. For most Eagle Rock interns, this is the students' first substantial interaction with the NPS. The Visions of You interns' photos provided snapshots of the NPS through new eyes and provide unique insight into their experience.

Nature or Nintendo: The Millennial Generation's Perceptions and Uses of Public Lands

Karen Barton, Assistant Professor of Geography, University of Northern Colorado, Greeley, CO

The Nature or Nintendo project attempts to better understand the "Millennial" generation's views and attitudes toward U.S. public lands. Research focuses upon perceptions of Rocky Mountain National Park by students at the University of Northern Colorado. The purpose is to compare research to date on millennials with actual experiences of UNC students. Initial results suggest that millennials possess a strong interest in visiting public lands, yet their ability to visit is challenged by competing responsibilities, scheduled activities, and the allure of passive entertainment. Perceived cost and time of park visitation also factor heavily into focus group discussions and interviews with students. Park-based Citizen Science programs appear to show some promise for millennials. Students profess a desire to participate in such programs held on public lands, either independently or as part of the university curriculum. This solution may better involve and engage students more directly in outdoor activities on public lands.

Vegetation Mapping Provides a Baseline for Managing Invasive Species

Rita Beard, Acting Invasive Species Coordinator/Biologist, National Park Service, Biological Resource Management Division, Fort Collins, CO

Carol DiSalvo, IPM Coordinator, National Park Service

Chris Lea, Botanist, National Park Service

Karl Brown, Vegetation Inventory Manager, National Park Service

Invasive pest species continue to threaten park resources and native ecosystems. To efficiently and scientifically address these threats the NPS Invasive Species and Integrated Pest Management Programs coordinate with the NPS National Vegetation Mapping Program, which classifies and maps vegetation communities Servicewide. Baseline data from vegetation maps is used to help identify vulnerable parks and ecosystems. More than 60% of NPS lands are forested ecosystems, including hemlock forests in the east, ash dominated forests in the Midwest, and ponderosa and lodge pole pine forests in the west; these forests are at high risk from the invasive hemlock wooly adelgid (*Adelges tsugae*), emerald ash borer (*Agrilus plannipenis*), and mountain pine beetle (*Dendroctonus ponderosae*) respectively. Park vegetation maps, in conjunction with known and predicted forest pest occurrence information from the USFS, are being used to develop management strategies and to address invasive forest pests capable of devastating ecological communities. This effort is critical in order to protect park resources and reduce risk to human and ecological health. In recent years vegetation maps were used to determining high risk areas for emerald ash borer and have been used to locate vulnerable Opuntia species for invasive cactus moth (*Cactoblastus cactorum*).

Application of NPScape Landscape Dynamics Products to Support Resource Management at Saguaro National Park

Kristen Beaupre, Data Manager, National Park Service, Tucson, AZ

K.A. Beaupre (no affiliation given)

D. Swann (no affiliation given)

B. Monahan (no affiliation given)

J.A Hubbard (no affiliation given)

National parks that occur near rapidly-developing urban areas are faced with a host of challenges for effective resource protection and management. Urban development is often dynamic and can be difficult to accurately predict in nature and extent. Composed of two districts that bracket the sprawling metropolitan area of Tucson, Arizona, Saguaro National Park is an excellent example of a park/urban interface, and the issues such a boundary present to park managers. To understand urban interface dynamics and other landscape-scale monitoring needs, the NPScape landscape dynamics monitoring project provides a suite of standardized, national-scale products (e.g., land cover, housing type, population density, and other socioeconomic data) as well as programming tools to permit customization at park and network scales. Early results from a pilot application of NPScape will be presented, with lessons learned and recommendations for application at other parks and protected lands.

Using GPS to Understand Use Patterns and Impacts of Water-based Recreations

Adam Beeco, Graduate Student, Clemson University, Clemson, SC

Jeffrey Hallo, Clemson University, Clemson, SC

Robert Manning, University of Vermont, Rubenstein School of Environment & Natural Resources, Burlington, VT

The locations people visit, their travel routes, and the amount of time spent at these locations are some the most basic, but relevant data on recreation. Specifically, spatial and temporal distributions of use influence the extent of recreation-related resource impacts, including wildlife disturbances. Recently, Global Positioning System (GPS) technology has shown promise in alleviating many of the problems with traditional tracking methods. Additionally, GPS is less burdensome to respondents than traditional methods. This presentation conveys methods and results from a GPS survey of visitors boating on Lake Umbagog National Wildlife Refuge, NH. Areas of concentrated use are mapped, including primary travel routes and shoreline camping locations. Also, areas of use are related to sensitive breeding habitat for the Common Loon, which is listed as a threatened species by the state of New Hampshire. Limitation and implications of using GPS as a method for tracking water-based recreationists are discussed.

A New Hypothesis on the Geologic Origin of Devils Tower

Mark Biel, Natural Resources Program Manager, Glacier National Park, West Glacier, MT
Prokop Zavada, Post-Doctoral Scientist, Institute of Geophysics Department of Tectonics and Geodynamics, Prague, Czech Republic

The scientific debate on the origin of Devils Tower, WY (DT) existed for more than a century. All hypotheses so far suggested only intrusive scenarios. Identification of phreatomagmatic breccia in the vicinity of Missouri Buttes (MB; group of phonolite bodies 6km NE of DT) and DT, analogue modeling, and thermal mathematical modeling results and gravimetric survey results from the area of interest support a new – extrusive hypothesis for both these spectacular landmarks. Devils Tower represents a remnant of a lava lake emplaced into a phreatomagmatic crater, the Missouri Buttes likely resulted from intrusion branching.

Using GIS to Analyze Snowmobile and Snowcoach Emissions in Yellowstone National Park

Drew Bingham, Geographer, NPS, Denver, CO

During the late 1990s the volume of snowmobile traffic in Yellowstone NP had increased to a point that the air quality was being affected. The park put into effect a temporary Winter Use Plan that set a Best Available Technology (BAT) limit on snowmobile emissions and limited their numbers. During the winter of 2006, using a portable emissions monitoring system, tailpipe data were collected from 10 snowcoaches and 2 four-stroke snowmobiles. Data for CO, CO2, HC and NOx were assembled and brought into a GIS for analysis and visualization. Emissions along routes were plotted along with DEM data to help understand how terrain and vehicle type affect emissions. The plots also help determine areas on the route where there were greater concentration of pollutants. By providing guidance on the types and number of snow vehicles permitted in the park this study has helped the park improve its winter air quality.

Wetland Monitoring Design in an Urban National Park: Cuyahoga Valley National Park, Ohio

Sonia Bingham, Wetland Biologist, National Park Service, Brecksville, OH

Cuyahoga Valley National Park (CUVA) contains nearly 1500 documented wetlands (approximately 1900 acres) between the cities of Akron and Cleveland in northeast Ohio. CUVA protects a complex of fluvial landforms within the Erie Gorges ecoregion, including a 22 mile corridor of the Cuyahoga River, its floodplain, and adjacent lands. A tiered approach is proposed to accomplish program objectives with 3 levels of monitoring intensity (USEPA 2006), including a GIS analysis of human land-use (Landscape Development Index, Brown and Vivas 2005), a rapid field method to examine wetland quality (Ohio Rapid Assessment Method, Mack 2001) and an intensive vegetation survey (Vegetation Index of Biotic Integrity, Mack 2007) across a gradient of landscape disturbance. Detecting trends at these scales will allow managers to evaluate the effectiveness of watershed management actions and identify areas in need of additional management attention, using a cost-effective approach designed for a 2-3 person field team.

Next Generation GIS for Park Planning: The Park Atlas

Nell Blodgett, GIS Specialist, National Park Service Denver Service Center Planning Division, Lakewood, CO
Nancy Shock, GIS Chief, National Park Service Denver Service Center Planning Division, Lakewood, CO

The park atlas concept covers a range of data collection, data management, cartography, and web-mapping activities that serve as a cohesive GIS-based planning support system. The concept involves the design of a paper map atlas and complimentary web-based mapping system for an individual national park undergoing a specific planning project such as a General Management Plan or Foundation Statement. The atlas integrates various types of spatial data including existing conditions,

visitor use, facilities and concessions, natural and cultural resources, and property ownership for display and analysis. Depending on a project's needs the web-based mapping system can be viewed by internal staff or by the public during scoping activities. Final park atlas products including maps and GIS data files are made available to NPS parks, regions, and programs at the end of a project.

National Historic Landmarks and the National Register of Historic Places within the Park System

Paloma Bolasny, Historian, National Park Service, Park History Office, Washington DC

The poster will summarize the 5 year National Register/National Historic Landmark update initiative, a project undertaken between the WASO Park History office and the regional history offices. Some of the current documentation updates will be highlighted along with some of the special NPS owned sites that are National Historic Landmarks on the National Register of Historic Places.

Ten Years of Search and Rescue in Yosemite: Examining Past Trends for Future Prevention

Stacy Boore, Medical Student and Search and Rescue Volunteer, Yosemite National Park, Columbus, OH

The Search and Rescue program in Yosemite National Park is one of the busiest in the country, responding to an average of 360 medical calls each year. As part of an effort to prevent medical incidents, I am conducting a project that first seeks to identify trends in the demographics of ten years of medical incidents in the park. Categories include: location, activity, chief complaint, age, gender, and time of year. The second aspect of the project is a survey of patients from the last three years of backcountry medical incidents to determine whether they may have been prevented, and if so, how. I aim to provide data that Yosemite National Park can use in a variety of ways to improve visitor safety, to contribute to the field of wilderness medicine, and to establish a model for future research projects.

Engineering the Land: The Effect of Policy and Industry on Gulf Coast Indigenous Peoples

Cynthia Boshell, Student, Humboldt State University, Arcata, CA

Land loss in coastal Louisiana impacts Indigenous peoples disproportionately through loss of cultural sites, burial grounds and real property. The purpose of this research-in-progress is to inquire whether Indigenous relationships with ancestral lands are still relevant and if so, whether it is appropriate for private corporations, federal agencies and state governments to take responsibility for Indigenous land restoration and sustainable management. This interdisciplinary project combines science, culture and policy in its analysis of how Gulf Coast land loss impacts tribal property, culture and resources. The contribution of policy and industry to coastal degradation is examined, and environmental concerns of coastal Indigenous communities are used as a yardstick for measuring the acceptability of proposed state and federal restoration plans. Finally, Mississippi River diversions through ancestral sites and research into land-mass engineering is analyzed with respect to its impact on Indigenous tribes.

A Minimally Invasive Approach to Monitor Nest-Site Behavior for a Threatened Species

Timothy Bowden, Wildlife Biologist, Grand Canyon National Park, Grand Canyon, AZ
Jeremy White, Wildlife Biologist, Grand Canyon National Park, AZ
R.V. Ward, Wildlife Biologist and Program Director, Grand Canyon National Park, Grand Canyon, AZ

In Grand Canyon National Park, spotted owls (*Strix occidentalis lucida*) nest in limestone cliffs in areas that are remote and difficult to access. Monitoring nest-site behavior requires large amounts of effort and is cost prohibitive for large samples. In this study we investigate the efficiency and reliability of using audio recordings as an alternative approach to monitoring aspects of nest-site behavior. Over a 180-day season, 337 days (20,220 hours) of audio data were recorded at four nest sites. Continuous recordings allowed us to monitor the onset of juvenile vocalizations, the number of vocalizing juveniles, frequency of vocalizations and feeding bouts, and date of dispersal from the nest area. As well, natural history events such as interactions with predatory species were captured. The use of spectrograms and recognition software increased efficiency of analysis and clearly distinguished among male, female, and juvenile vocalizations.

Aquatic Vegetation Monitoring at Ozark National Scenic Riverways, Missouri, 2007-2009

David Bowles, Aquatic Program Leader, Heartland Inventory & Monitoring Network, Republic, MO
Hope R. Dodd, National Park Service
Janice A. Hinsey, National Park Service
Tyler Cribbs, National Park Service

We have monitored aquatic vegetation communities annually in six of the largest springs at Ozark National Scenic Riverways, 2007-2009. Vegetation sampling is conducted on six equally-spaced, fixed transects with each having three equally-spaced 1 m2 plots (n=18). Daubenmire cover classes (% composition) are used to evaluate plant density. Several diversity measures are calculated for each transect and averaged across the sample reach using three measures. We found 46 species of hydrophytes, mosses and algae from among the six springs, and community composition and structure varied widely. No single species is dominant in more than one spring, and most springs share several co-dominants. Several hydrophyte species previously reported from the springs are now absent, but conversely we have documented several new distributional records for other species, including several non-native species. The data aid resource managers in making informed, science-based decisions about these fragile systems.

Is Restoration Improving Water Quality? Monitoring Streams in Kantishna Hills, Denali National Park and Preserve

Tim Brabets, Hydrologist, U.S. Geological Survey, Alaska Science Center, Anchorage, AK
Bob Ourso, USGS, Alaska Science Center, Anchorage, AK
Guy Adema, Denali National Park and Preserve, AK

Streams draining the Kantishna Hills, located in the northwest part of Denali National Park and Preserve, support several species of fish and other aquatic habitat. However, the water quality of many of these streams has been degraded by mining. Recovery through natural processes is limited due to a short growing season, and thus Denali has implemented reclamation projects on a number of streams in the Kantishna Hills area. Because reclamation is expensive and limited funds are available, it is essential that restoration efforts work. With funding provided by the NPS-USGS water quality partnership program, streams in the Kantishna Hills have been monitored since 2008 to determine the effects of reclamation on water quality. Data being collected include trace elements in streambed sediments, water samples for major ions, trace elements, suspended sediment and turbidity, macroinvertebrates and algae, and instrumenting several sites to continuously collect water temperature, specific conductance, and turbidity.

Reporting on Land-Use Change for Gulf Coast Inventory and Monitoring Network Parks

Jeff Bracewell, GIS Specialist, National Park Service, Lafayette, LA
Martha Segura, National Park Service, Lafayette, LA

Land use changes adjacent to park boundaries can impact park resources in a variety of ways. Consequently, many approaches have been taken to record and measure land-use change on a variety of scales. The Gulf Coast Network has developed a GIS-based system to predict land-use change based on publicly available GIS data. Largely centered on municipal parcel, zoning, and permitting information, the system highlights changes in attribution or geometry of parcels near park units. The system has variable outcomes for each park unit due to variations in data quality and data availability. This poster will outline a process for collecting and storing municipal GIS data, discuss the utility of these base data as stand-alone products, and explore the use of municipal GIS data in measuring habitat fragmentation and human population density.

Texas Tortoise Habitat Modeling

Jeff Bracewell, GIS Specialist, National Park Service, Lafayette, LA
Robert Woodman, National Park Service

The GULN is engaged in mark/recapture monitoring of the Texas Tortoise (TT) at Palo Alto Battlefield NHP. TT surveys are concentrated on-the-ground efforts, requiring intensive planning and coordination. Accordingly, the GULN wants to ensure survey crews don't spend a lot of time searching in areas where animals aren't likely found. In the interest of building sample size and maximizing yield/event, the GULN has constructed a draft model that defines likely TT habitat. GPS tracklog information indicates where we've looked for TTs. GPS point records of TT encounters indicate where we've found TTs. This information, paired with LiDAR data models of canopy complexity and bare-earth 'departure from trend' gives a good indication of where TTs are, and aren't likely to be found. This poster will present the modeling process, preliminary results, potential for application at other sites, and extension of analytical utilities, e.g., assessing population density.

Shallow Water Benthic Habitat Maps for Resource Managers: The Technology and the Science

Taylor Brown, Graduate Student, Environment, Earth and Ocean Sciences, University of Massachusetts–Boston, Boston, MA
Ashley R. Norton, Graduate Student, Geological Sciences, University of Delaware, Newark, DE
Mark Borrelli, Coastal Geologist, Provincetown Center for Coastal Studies, Provincetown, MA
Allen Gontz, Assistant Professor, Environmental, Earth and Ocean Sciences, University of Massachusetts–Boston, Boston, MA

The Provincetown Center for Coastal Studies is conducting a 3-year study to develop benthic habitat maps in Massachusetts coastal waters. Using high-resolution interferometric sidescan sonar with coincident swath bathymetry, the Center is mapping shallow water areas (1-10m) in Cape Cod Bay. In addition to high-precision bathymetric data, early fieldwork yields sidescan imagery packed with information on benthic habitats and seafloor features that are of particular interest to coastal managers. For example, sidescan imagery delineates extents of submerged aquatic vegetation and is useful for aquaculture and eelgrass restoration projects. Also, numerous submerged cultural resources, such as shipwrecks and sunken historic lighthouse platforms are seen in great detail, as are uncharted navigational hazards. Finally, integrating LIDAR and the project's multibeam bathymetric data creates seamless offshore/onshore maps. This project provides coastal managers with data important to better understand and manage these shallow water resources.

Urban BioBlitz: Finding Diversity in Adversity

Jessica Browning, Biologist, National Park Service, Brooklyn, NY
Anne Yen, National Park Service

Gateway National Recreation Area (GNRA), a National Park abutting the most populated city in the United States, contains a variety of cultural and natural landscapes that provide a welcome escape for 9 million + visitors annually. An area within Gateway, Floyd Bennett Field, a historic airfield that was New York City's first municipal airport, became the site of the latest BioBlitz on June 11th and 12th 2010. Over a period of 24 hours, scientists, staff and park visitors descended upon a variety of habitats throughout Floyd Bennett Field to discover that the historic airport supports at least 450 species despite suffering heavy impacts from the surrounding urban areas. These findings were particularly surprising as Floyd Bennett Field is composed of a significant portion of impervious surfaces and severely fragmented ecosystems. Results indicate that Gateway NRA is a stronghold for a number of valuable plants, animals, invertebrates and aquatic life.

Long-term Glacier Monitoring in Denali National Park and Preserve

Robert Burrows, Physical Scientist, Denali National Park and Preserve, Denali Park, AK
Guy Adema, Denali National Park and Preserve, Denali Park, AK

Glaciers are a significant resource of mountain ranges in Alaska. The glacial resources of Denali National Park and Preserve (DENA) are vast, covering about 4,000 km2, approximately one sixth of the park's area. They are integral components of the region's hydrologic, ecologic, and geologic systems – with changes to the glacier systems driving the dependent ecosystems. Glacier monitoring in Denali began in 1991 and has continuously tracked mass balance trends on two large valley glaciers. Long-term trends were neutral to positive from 1991-2003, and negative since 2003, including the 2009-2010 balance year. Longitudinal surface elevation profiling shows dramatic long-term mass loss on a small valley glacier representative of the population of smaller glaciers in the eastern Alaska Range, consistent with other monitoring and research results on glaciers in Alaska. High-resolution panoramic photography and repeat historical photography also provide a valuable tool for understanding and communicating the scale and extent of change.

Eecotonal Movement of Mangrove into Freshwater Marshes Due to Sea Level Rise

Carolina Cabal, Intern, George Melendez Wright Climate Change Internship Program, Miami, FL

As overall global temperature increases, coastal overflow with saltwater in the coasts of South Florida is greatly expanded. We seek to monitor the shifting reaction of mangrove ecosystems as prime indicators of the overall health of Florida's unique upland and freshwater wetlands' ecosystems. Selection of the ecotonal areas is accomplished via aerial imagery from NAPE 2007 of Everglades National Park, and identifying locations using ArcGIS software. Transition points are chosen by observation and marked on a Trimble GPS attached to Zephyr external antenna. Collection of vegetation data was done by creating a 10x100 transect belt including two adjacent ecotonal habitats. The belt transect is divided into plots, and quantifying data is acquired in count and percentage for all herbaceous plants in each plot. The ecotone pilot program study provides a baseline study and methodology for ecotone identification, and monitoring of changes in ecotone shifts due to climate change conditions.

A Bathymetrical View of Water Resources in our National Parks

Jeremy Cantor, GIS Technician, National Park Service, Fort Collins, CO

Over 20% of the park units managed by the National Park Service are considered ocean and coastal parks. These parks serve to protect over 12,000 miles of ocean and Great Lakes coastline, nearly 2.5 million acres of water, and the wide variety of resources found within them. Creating bathymetric surfaces provides park managers with a clear, visual understanding of water depth within their parks and affords valuable information to help guide management decisions. New park maps have

been created for all ocean and coastal parks increasing emphasis on the water resources found within these parks' boundaries. A wide variety of publicly available sources were used to create these bathymetric surfaces including depth soundings and vector shorelines.

Climate Change in Yellowstone Accentuates the Folly in Promoting Snowmobiling in Our First National Park

Jon Catton, Consultant, Bozeman, MT

In adopting a long-term winter use plan in 2011, Yellowstone can select the mode of transportation that provides the greatest reliability of access given climate change and visitor needs while minimizing adverse impacts to park resources and values. The point of Yellowstone isn't the ride, it's the destination—getting into the Park's interior to walk the geyser basins, view wildlife, etc. Snowcoach tours make this possible for visitors of all ages and abilities. Snowcoaches have also enhanced interpretive opportunities and the visitor's ability to participate in protecting what makes Yellowstone special (by reducing traffic burden on wildlife, and air pollution and noise that accumulate with a greater number of individualized vehicles). Rubber-tracked snowcoaches can operate in highly variable snow conditions now typical across the winter season while snowmobiling has become chronically uncertain at both ends of the season due to increasingly unreliable accumulation and retention of snow on park roads.

Climate Change and Species Interactions in an Estuarine Community

Brian Cheng, PhD Candidate, University of California–Davis, Bodega Marine Lab, Bodega Bay, CA
Edwin D. Grosholz, Professor, University of California–Davis, Davis, CA

Climate change is predicted to have significant impacts on ecosystems by intensifying the physical stress experienced by organisms. Most studies in this field have examined the influence of climate change on the physiology of single model organisms. However, organismal responses to climate change occur within a community of interacting species. It is therefore critical to understand how individual species as well as their predators and prey respond as well. I evaluated the effect of temperature and salinity on the physiology of interacting species within Tomales Bay, CA (Point Reyes National Seashore). In this estuary, native Olympia oysters are an important foundation species that are preyed upon by invasive snails that exhibit temperature dependent foraging activity. Native crabs can limit the distribution of invasive snails but are limited by low salinity. Understanding how this community interacts under varying environmental conditions provides a framework for predicting the complexity of community responses to climate change.

Place-based Meanings and the Economy of Recreation in Elwha River Restoration: Evaluating Planning and Management

Zachary Cole, Graduate Assistant, University of Florida, Micanopy, FL

Protected area management is characterized by a complex web of biophysical elements and functions with accompanying social interests and trade-offs. Research suggests that social considerations are critical to long-term conservation success; environmental policy additionally instructs such factors to be given adequate weight within resource decision-making processes. The proposed study will rely on social, economic, and ecological methods of data collection to 1) capture place-based meanings and 2) assess the economic impact of visitor-use. Study context will be the Elwha restoration project in Olympic National Park. The Elwha project, which includes the largest dam removal ever conducted, affords an ideal circumstance for research into social costs and benefits over time, as one ecosystem is explicitly transformed back to what it once was. Understanding social impacts at the stakeholder-level is becoming increasingly vital in restoration contexts for policy-makers and managers as investment into such projects is increasing within protected areas and beyond.

Evaluation of the Southwest Alaska Network Nearshore Monitoring Program: Synthesis, Analysis, and Insight from the First Five Years

Heather Coletti, Marine Ecologist, NPS – SWAN, Anchorage, AK
Kimberly A. Kloecker, Biologist, USGS Alaska Science Center, Anchorage, AK
James L. Bodkin, Research Wildlife Biologist, USGS Alaska Science Center, Anchorage, AK
Thomas A. Dean, Marine Ecologist, Coastal Resources Associates, Inc., Carlsbad, CA

The SWAN Nearshore Monitoring Program measures over 50 biological, chemical, and physical metrics encompassed within six SWAN I&M designated vital signs. The sampling design incorporates well known ecological interactions and processes primarily within the nearshore food web, at spatially balanced, randomly selected sites within the coastal network of southwestern parks in Alaska. To date, we have complete 5-year data sets for approximately half of the metrics. Because of the holistic nature of the design, we can now utilize existing data sets to evaluate several aspects of the program. While we are interested

in what the data are telling us about ecosystem processes, we will also evaluate the functionality of the program. For each metric we will determine whether current sampling intensity and frequency are sufficient to detect change and whether sampling frequency can be reduced, thus allowing us to minimize costs. We will incorporate results in sampling protocols to optimize our ability to detect trends for the nearshore vital signs.

Using the NPS Geologic Resource Inventory Tracking Database to Obtain Status for Park Geologic Information

Tim Connors, Geologist, National Park Service, Natural Resource Program Center, Geologic Resources Division, Lakewood, CO
Michael J. Cox, Research Assistant II, National Park Service, Geologic Resources Division, Denver, CO
Jason Kenworthy, Geologic Resources Inventory Report Coordinator, National Park Service, Geologic Resources Division, Denver, CO

The National Park Service Geologic Resource Inventory (GRI) is one of the 12 Inventory and Monitoring program inventories designed to supply useful geologic information for the natural area parks. To date (September 30, 2010) since 1998, GRI staff have scoped 255 parks, completed 181 digital geologic GIS datasets, and completed 85 reports detailing geologic features, issues, and processes relevant to the parks. The data management aspect of this project has grown significantly with the need to supply data to 270 parks, maintain accurate GPRA and programmatic status information for year-end reporting, and determine workflow and project status among approximately 20 GRI staff (in multiple locations). The need for a web-based tracking system became necessary and has been developed at www.nature.nps.gov/geology/GRI_DB/. The site provides daily up-to-date information for the GRI programmatic goals of scoping, digital map and report status completion, as well as links to GRI products.

New Approaches to Vegetation Mapping in North Coast and Cascades Network Parks

Catharine Copass Thompson, Ecologist, North Coast and Cascades Network, Port Angeles, WA
Eric Nielsen, Remote Sensing Specialist, Institute for Natural Resources–Portland, Portland State University, Portland, OR
Jimmy Kagan, Director, Institute for Natural Resources–Portland, Portland State University, Portland, OR

The North Coast and Cascades Network (NCCN), in cooperation with the Institute for Natural Resources–Portland is developing vegetation maps, targeted to NPS National Inventory Program standards for scale, classification system and accuracy. Multi-temporal Landsat imagery, supplemented by color-infrared aerial photography, forms the basis of the mapping. NPS field crews collect training data in both targeted and opportunistic field sampling sites. Mapping methods leverage LiDAR (Light Detection and Ranging) data available for Mount Rainier and Lewis and Clark National Parks. LiDAR canopy metrics such as cover, height and rugosity are used as inputs for polygon delineation. The classification algorithm Random Forests is used at multiple scales. Because quantitative metrics define classes, these maps will be useful for future change detection applications. New maps for the NCCN will provide a baseline against which to compare future vegetation change and provide useful inputs for climate change assessments including carbon dynamics and disturbance.

Mapping Submerged Resources in Ocean, Coastal, and Great Lakes Parks

Jeffrey Cross, Chief, Ocean & Coastal Resources Branch, National Park Service, Fort Collins, CO
Thom Curdts, GIS & Remote Sensing Specialist, National Park Service, Fort Collins, CO

Managers of ocean, coastal and Great Lakes parks need comprehensive knowledge about the type, geographic extent and condition of submerged resources within parks in order to effectively manage these areas. Unlike managers of terrestrial units, managers of ocean and coastal parks cannot readily observe their resources. Submerged resource inventory and mapping can only be accomplished by systematic surveys that are logistically difficult, technologically challenging and expensive, which explains why submerged resources remain unmapped for the majority of these units. The NRPC has partnered with the U.S. Geological Survey (USGS), the National Oceanic and Atmospheric Administration (NOAA) and others on pilot benthic mapping projects in nine coastal parks from diverse areas including Alaska, California, the Great Lakes, the Gulf of Mexico and the Caribbean. This poster highlights some of these benthic mapping partnership projects and some of the technologies involved.

Traditional and Modern Perceptions of Fire

Ben Cunningham-Summerfield, Indian Cultural Demonstrator/Park Ranger, Yosemite National Park, Yosemite, CA

Aboriginal perceptions are captured in the oral tradition as myths about how aboriginal people obtained fire. Fire was and still is used as a tool to manipulate traditional landscapes. As Europeans and others began to colonize traditional homelands many of those stories and practices were lost. In today's traditions, fire is still one of the most important aspects of the Indian com-

munity. It is a gathering place for meals, discussion and stories about our people. At ceremonies fire is a revered part of the community. It is appointed a tender or caregiver much like an elder of the community. The art of starting fire in the traditional manner is rusty in many people. Fire managers are beginning to understand the importance of those lost practices and have sought council with aboriginal people from around the world to once again learn to use fire as a tool.

Thom Curdts, GIS & Remote Sensing Specialist, National Park Service, Fort Collins, CO

Managers of ocean, coastal and Great Lakes parks need comprehensive knowledge about the type, geographic extent and condition of submerged resources within parks in order to effectively manage these areas. Unlike managers of terrestrial units, managers of ocean and coastal parks cannot readily observe their resources. Submerged resource inventory and mapping can only be accomplished by systematic surveys that are logistically difficult, technologically challenging and expensive, which explains why submerged resources remain unmapped for the majority of these units. The NRPC has partnered with the U.S. Geological Survey (USGS), the National Oceanic and Atmospheric Administration (NOAA) and others on pilot benthic mapping projects in nine coastal parks from diverse areas including Alaska, California, the Great Lakes, the Gulf of Mexico and the Caribbean. This poster highlights some of these benthic mapping partnership projects and some of the technologies involved."

Cumulative Shoreline Length and Water Area in the Ocean, Coastal and Great Lakes Parks

Thom Curdts, GIS & Remote Sensing Specialist, NPS, Ocean and Coastal Resources Branch, Fort Collins, CO

The National Park Service has published widely varying statistics on shoreline miles and marine acres that it manages. This project was undertaken to address the inconsistency in the numbers reported and to more accurately report the cumulative shoreline miles and marine/estuarine acres managed by the NPS using a geographic information systems (GIS) framework. Several national shoreline datasets were examined and it was determined that there was no single dataset that met the needs of this project. Therefore, many shoreline datasets were examined and utilized on a park-by-park basis. These "best" shoreline segments were aggregated into a single shoreline dataset for ocean, coastal and Great Lakes NPS units. The shoreline data were also used in conjunction with NPS boundary data to create a new dataset depicting marine and estuarine areas for the ocean, coastal and Great Lakes NPS units.

Mapping Submerged Resources at Golden Gate National Recreation Area

Thom Curdts, GIS & Remote Sensing Specialist, NPS, Ocean and Coastal Resources Branch, Fort Collins, CO
H. Gary Greene, Moss Landing Marine Labs, Moss Landing, CA
Tamara Williams, National Parks Service, San Francisco, CA
Brian Edwards, U.S. Geological Survey, Menlo Park, CA
Bryan Dieter, Moss Landing Marine Labs, Moss Landing, CA
Charlie Endris, Moss Landing Marine Labs, Moss Landing, CA
Holly Ryan, U.S. Geological Survey, Menlo Park, CA
Eric Niven, Moss Landing Marine Labs, Moss Landing, CA
Eleyne Phillips, U.S. Geological Survey, Menlo Park, CA
Patrick Barnard, U.S. Geological Survey, Menlo Park, CA
Fraka Harmsen, California University, Fresno, Fresno, CA

A map series of seabed classifications in the Golden Gate National Recreation Area was published in 2009. The five maps in the series depict potential marine benthic habitats, color-coded bathymetry with contours, sun-illuminated bathymetry, onshore–offshore geology and acoustic backscatter imagery. The project involved the compilation of all available seafloor mapping data in and around the Golden Gate National Recreational Area that include marine acoustical data, such as multibeam echosounder (MBES) bathymetry and backscatter data, side-scan sonar mosaics, sediment sample information, and the interpretation of recently collected data. The map series was edited by H. Gary Greene and resulted from a collaborative pilot project between the National Park Service, Moss Landing Marine Labs, the U.S. Geologic Survey and the University of California, Fresno. This poster shows samples from the map series and is presented as an example of NPS partnerships in submerged resource mapping.

Shallow-Water Benthic Habitats of St. John, U.S. Virgin Islands

Thom Curdts, GIS & Remote Sensing Specialist, NPS, Ocean and Coastal Resources Branch, Fort Collins, CO
Adam G. Zitello, NOAA CCMA Biogeography Branch, Silver Spring, MD

Laurie J. Bauer, NOAA CCMA Biogeography Branch, Silver Spring, MD
Timothy A. Battista, NOAA CCMA Biogeography Branch, Silver Spring, MD
Peter W. Mueller, NOAA CCMA Biogeography Branch, Silver Spring, MD
Mathew S. Kendall, NOAA CCMA Biogeography Branch, Silver Spring, MD
Mark E. Monaco, NOAA CCMA Biogeography Branch, Silver Spring, MD

Benthic habitat maps for the nearshore waters of St. John, U.S. Virgin Islands were published in 2009, the results of a partnership between the National Park Service (NPS) and the National Oceanic and Atmospheric Administration (NOAA). The classification scheme utilized in these maps defined benthic communities on the basis of four primary coral reef ecosystem attributes: 1) broad geographic zone, 2) geomorphological structure type, 3) dominant biological cover, and 4) degree of live coral cover. The maps were generated by visual interpretation of satellite and airborne imagery and represent a significant improvement from NOAA's 2001 digital maps (Kendall et al.) of the U.S. Caribbean, due to an expanded habitat classification scheme, smaller minimum mapping unit and more recent imagery. This poster shows samples of the St. John Shallow-Water Benthic Habitat maps and is presented as an example of NPS partnerships in submerged resource mapping.

Will Hawaii's Sustainable Yield Protect Traditional Native Hawaiian Practices in Kaloko-Honokohau National Historical Park?

Paula Cutillo, Hydrologist, NPS Water Resources Division, Fort Collins, CO

Kaloko-Honokohau NHP was established in 1978 to provide a center for the preservation, interpretation, and perpetuation of traditional Native Hawaiian activities and culture. Important cultural resources such as anchialine pools, fishponds, and coral reef habitat depend upon groundwater. In 1978, the State Water Code was also enacted to protect Hawaii's water resources for the benefit of its people. It requires that a "sustainable yield" or maximum pumping rate be determined for each aquifer. Since 1978, pumping rates doubled and wells now operate within one mile of the Park. Planned withdrawals will increase pumping to 82% of sustainable yield. A review of the sustainable yield determination reveals the State did not consider the quality or quantity of groundwater needed to protect traditional and customary Native Hawaiian fishing and shoreline gathering activities in Kaloko-Honokohau NHP. If a new methodology is not adopted, sustainable yield will increase based upon a new water budget.

Big Dams and Park Resources: Water Management in the Colorado River Basin

Guy DiDonato, Natural Resources Program Manager, National Parks Conservation Association, Fort Collins, CO
Catherine Moore, Cultural Resources Program Manager, National Parks Conservation Association, Fort Collins, CO

The water of the Colorado River system is a precious commodity. Diverting and storing that water to support human activities (agriculture, hydropower, urban growth) is central to life in the seven-state region served by the river. In the 20th century, immense dams were built on the Colorado and its tributaries to store water and promote a reliable supply. The operation of these dams has profoundly affected natural and cultural resources in some of America's most revered national parks, a factor generally overlooked in water management decision-making. The National Parks Conservation Association's Center for State of the Parks® summarized the impacts of dam operations on select park resources in five basin parks (Dinosaur NM, Black Canyon of the Gunnison NP, Canyonlands NP, Glen Canyon NRA, and Grand Canyon NP). Our research considered impacts to natural and cultural resources, finding a complex web of effects that cannot easily be resolved.

Catoctin Mountain Park's Climate Change Initiative

Lindsey Donaldson, Biologist, National Park Service, Catoctin Mountain Park, Thurmont, MD

Over the last several centuries, anthropogenic alterations to Maryland's environment such as clear cutting forests, establishing large agricultural areas, and urbanization have resulted in the extirpation of brook trout (*Salvelinus fontinalis*) from 62% of their historic range in Maryland. At Catoctin Mountain Park, brook trout can be found within the Big Hunting Creek and Owens Creek watersheds. The increase of atmospheric carbon dioxide could result in the increase in stream temperatures and the reduce brook trout habitat. By assessing the impacts of climate change on brook trout, CATO will be able to understand the effects of stream temperature changes. The Park will then be able to implement and prioritize best management practices to ensure the protection of its native brook trout populations. Also, Catoctin was applied for the Climate Friendly Park program. Currently the park is working on creating an action plan to reduce our carbon foot print.

Effects of Weather on Survival Rates in Song Sparrows

Kristen Dybala, Graduate Student, University of California–Davis, Davis, CA

Resource management decisions require reliable projections of species' responses to climate change. Current research predicts that many species ranges will contract or dramatically shift in the next century, so that populations may decline or be extirpated from the parks and refuges designed to protect them. However, this species-distribution approach to studying climate change cannot describe how or why a local population may decline, such as through a decline in survival or reproductive success rates. I examined the effects of weather on survival rates in a declining population of Song Sparrows in the Point Reyes National Seashore in California. Adults and juveniles will respond differently to climate change, and both direct and indirect effects of weather on survival are important to consider. Recognizing the demographic links between climate change and population dynamics is critical to identifying management actions that could minimize the effects of climate change.

Estimating Population Size of Island Loggerhead Shrikes on Santa Rosa and Santa Cruz Islands, USA

Linda Dye, Ecologist & Data Manager, Channel Islands National Park, Ventura, CA
Susan Teel, Director, Southern California Research Learning Center, National Park Service, Thousand Oaks, CA
Linnea S. Hall, Executive Director, Western Foundation of Vertebrate Zoology, Camarillo, CA
Lyndal Laughrin, Director, Santa Cruz Island Reserve, UC Natural Reserve System, Santa Barbara, CA

Island loggerhead shrikes (*Lanius ludovicianus anthonyi*) are an endemic, genetically distinct subspecies on California's northern Channel Islands, are a state listed Species of Special Concern and have been petitioned for listing under the Endangered Species Act. Due to suspected low numbers and the possibility of federal listing, in 2009 and 2010 we surveyed stratified randomly selected sample units on Santa Rosa and Santa Cruz Islands using a double observer method with independent observers. Estimated shrike abundance for Santa Rosa Island was 169 in 2009 and 240 in 2010, and for Santa Cruz Island 35 in 2009 and 42 in 2010. Since these estimated abundance numbers are low and rapid vegetation change on both islands due to recent removal of non-native herbivores may threaten their habitat and status, we suggest that that demographic and habitat use projects be initiated immediately to obtain needed information for the successful perpetuation of this subspecies.

Integrating Tribal Marine Resource Use and Cultural Heritage into the Marine Life Protection Act Process

Micah Effron, Master's Student, Donald Bren School of Environmental Science/Management, University of California–Santa Barbara, Santa Barbara, CA
Jeannine Manna, Master's Student, University of California–Santa Barbara, Santa Barbara, CA
Andrea Robertson, Master's Student, University of California–Santa Barbara, Santa Barbara, CA
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Miho Umezawa, Master's Student, University of California–Santa Barbara, Santa Barbara, CA
Holly Wyer, Master's Student, University of California–Santa Barbara, Santa Barbara, CA

California's 1999 Marine Life Protection Act (MLPA) requires the establishment of a statewide network of marine protected areas (MPAs) to protect California's natural marine resources. Despite efforts to represent all stakeholder groups, Native American tribes represent an important yet underrepresented interest group in the MLPA process. We worked with MLPA staff in California's North Coast gathering data on tribal marine resource use to incorporate tribal input into the final MPA network. Tribal marine resource use in northern California had not been systematically documented, so this effort marked the first time that such data was incorporated into California marine policy. Through this project, we discovered that tribes and tribal communities require an approach outside of the regular stakeholder process that is incompatible with current regulations. We analyzed the process' ability to accommodate tribal needs while producing an effective MPA network, and provided recommendations to guide future spatial planning processes.

Changes in Water Levels of Inland Lakes at National Park Units, Great Lakes I&M Network

Joan Elias, Aquatic Ecologist, National Park Service, Great Lakes I&M Network, Ashland, WI
Richard Damstra, National Park Service

As part of our routine long-term water quality monitoring of inland lakes, we measure water level relative to permanent benchmarks. Changes in lake water levels can have profound impacts on recreational opportunities, within lake chemical processes, and the quality and quantity of habitat available for various biota. Important drivers of water level change include weather and climate, land cover, and beaver activity. Water level responses of a given lake will depend on factors such as lake morphometry, watershed size, and lake connectivity. We show examples of seasonal and annual patterns across 33 inland lakes at six national parks in the Western Great Lakes since 2006, and explore potential uses of long-term water level data related to

dominant drivers. Monitoring and analysis of lake water levels, when used in concert with other data, may help managers identify emerging aquatic habitat limitation issues and explain ecosystem responses such as increased algal blooms.

Climate Change and Salt Marsh Dynamics: A Case Study of Cape Romain National Wildlife Refuge

Chris Ellis, Social Scientist, NOAA Coastal Services Center, Charleston, SC
Raye Nilius, Project Leader, South Carolina Lowcountry Refuges Complex, Awendaw, SC |

Climate change is arguably the most significant conservation challenge we face today. Significant change in climate patterns threatens marine and terrestrial biota, habitat types, and geomorphic processes. Rising sea levels caused by climate change have been implicated in the loss of salt marsh at Cape Romain National Wildlife Refuge. The refuge is about 20 miles north of Charleston, SC. It encompasses 66,287 acres, including 29,000 acres of Class I Wilderness that is primarily salt marsh. A 2009 study revealed rapidly eroding tidal creeks in the Wilderness Area marsh. The creeks are extending into the marsh platform at the rate of 6.2 feet each year, on average. Scientists have suggested that the rapid headward erosion of these tidal creeks is evidence that the salt marsh is unable to keep pace with a relatively high rate of sea level rise.

Argentine Ants on Santa Cruz Island, California: Options for Containment and Control

Kate Roney Faulkner, Chief, Natural Resources Management, Channel Islands National Park, Ventura, CA
John M. Randall, Associate Science Director South Coast and Desert, The Nature Conservancy, San Diego, CA
Christina Boser, Santa Cruz Island Restoration Manager, The Nature Conservancy, Ventura, CA
Coleen Cory, Santa Cruz Island Ecologist, The Nature Conservancy, Ventura, CA
Paula Power, Restoration Ecologist, Channel Islands National Park, Ventura, CA
Lotus A. Vermeer, Santa Cruz Island Project Director, The Nature Conservancy, Ventura, CA
Lynn Lozier, Conservation Track Program Director, The Nature Conservancy, San Francisco, CA
Scott A. Morrison, Director of Conservation Science, The Nature Conservancy, San Francisco, CA

Non-native Argentine ants (*Linepithema humile*) have established in four discrete locations on California's Santa Cruz Island but are not yet widespread. Santa Cruz Island, a highly valued conservation area within Channel Islands National Park, harbors a large number of endemic plants, animals, and communities now rare in mainland California. Argentine ants are known to have significant impacts on ecosystems, with particularly negative effects on native invertebrates. TNC and NPS have implemented biosecurity procedures to reduce human transport of the ants or new introductions. We are working with experts to detect and delimit the infestations, develop control methods with minimal impacts to non-target species, complete environmental compliance, and study the effects of Argentine ants on island ecology. The planned containment, and perhaps ultimate eradication, of Argentine ants follows our ambitious ecological restoration program which included removal of non-native cattle, pigs, sheep, honey bees and selected habitat-modifying weeds.

NPS Bibliographic Metadata Exchange Standard (BMES)/Bibliographic Metadata Application Profile (BibMAP)

Amalin Ferguson, NPS Library Program Manager
NPS, OCIO-NISC, Resource Information Services Division (RISD), Fairfax, CA
Chris Dietrich, OCIO-NISC, Resource Information Services Division (RISD), Denver, CO
Christie McDonald, OCIO-NISC, Resource Information Services Division (RISD), Denver, CO

The NPS BMES is a proposed core bibliographic element set based on Qualified Dublin Core (DC) — the BibMAP provides guidance supporting its use. The purpose of the BMES is to facilitate exchange and aggregation of NPS bibliographic metadata. DC was selected because it's well maintained and widely implemented. Crosswalks are available from DC to metadata standards used by major information domains, including FGDC (geospatial) and MARC (library). A DC-based BMES thus supports the enterprise goal of enabling discovery and retrieval of NPS information across resource types and formats, communities, platforms, parks and program areas via a central portal. The BibMAP adopts best practices and recommendations contained in the DC Library Application Profile (DC-Lib) and incorporates guidance from RDA (Resource Description and Access), the new cataloging standard for English-speaking countries. BibMAP appendices provide crosswalks to major NPS bibliographic systems and references and links to related metadata resources and tools.

The Sierra Nevada Adaptive Management Project

Shasta Ferranto, PhD Candidate, University of California–Berkeley, Berkeley, CA
Lynn Huntsinger, Professor, University of California–Berkeley, Berkeley, CA
Maggi Kelly, Professor, University of California–Berkeley, Berkeley, CA

The Sierra Nevada Adaptive Management Project (SNAMP) is a collaborative adaptive management project focused on Forest Service vegetation management treatments in California's Sierra Nevada. This project began in 2005 and includes federal and state resource agencies, a team of university scientists, and interested members of the public. While the Forest Service is responsible for implementing vegetation treatments to reduce wildfire occurrence in the Sierra Nevada, the science team is studying the effects of these treatments on fire behavior, forest health, wildlife (Spotted owls and Pacific fishers), and water quality and quantity. The science team also coordinates and researches public participation in adaptive management through active outreach, public meetings, and targeted research. SNAMP is currently in the middle stages of the adaptive management cycle. This poster will discuss the overall SNAMP project with a focus on the methods and outcomes of SNAMP's public participation efforts.

Tracking Dinosaurs in Alaska's National Parks: Research and Management Find a Happy Marriage

Anthony Fiorillo, Curator of Earth Sciences, Museum of Nature and Science, Dallas, TX
Linda Stromquist, Geologist, National Park Service, Alaska Regional Office, 240 West 5th Ave, Anchorage, AK

In 2000, the Alaska Region National Park Service, with the Museum of Nature and Science in Dallas, Texas launched a successful partnership in paleontology through the Challenge Cost Share Program. As a result, dinosaurs, the charismatic megafauna of ancient life, are now known from five national parks in the Alaska Region. These dinosaurs, and related fauna, were inhabitants of the high latitudes some 65-70 million years ago. Further, these animals lived under greenhouse conditions compared to modern climatic conditions. Given the abundant and rapidly growing dinosaur record in Alaska NPS units, the NPS has a unique opportunity to study an ancient arctic to subarctic terrestrial ecosystem a time when management and societal concerns are focused on what a future warm arctic might look like. Recognizing this resource, NPS units are investing in further research to support their management needs.

Assessing Vulnerability: Decision Support for Cultural Heritage, Climate Change and Disasters

R. Jay Flaming, Archaeology GIS Analyst, National Park Service, Pacific West Region, Seattle, WA

How can computer simulation, GIS, and databases support our efforts to protect the physical vestiges of our cultural heritage in national parks? What do we need to change in archaeological and historical practices to enable these sorts of analyses on regional and national scales? This poster explores these questions and demonstrates how old and new technologies can intersect with human practice to be improve our stewardship of cultural resources in the U.S. National Park Service.

Species Observations and Vouchers using the Entity-Attribute-Value Data Model

Michelle Flenner, IRMA Database Specialist, MBS (NPS Inventory and Monitoring Division), Fort Collins, CO
Alison Loar, National Park Service

Species observations and vouchers are stored in a new database schema that is utilizing the Entity-Attribute-Value (EAV) data model. This adds flexibility to the data model by allowing many possible attributes (or fields) to be stored about observations and vouchers and will make adding new fields easy. In addition the EAV data model saves space because only fields that a record has values for will be stored in the database; this is different from a flat table which would have many empty spaces for fields where values did not exist. This poster illustrates these two points.

Monitoring East Texas Nature Reserves through a University-NGO Partnership

William Forbes, Assistant Professor of Geography, Stephen F. Austin State University, Nacogdoches, TX
Markus Hodges, Stephen F. Austin State University, Nacogdoches, TX
Michael Haven (no affiliation given)
Mark Hammett (no affiliation given)
Ellen Denney (no affiliation given)
Damika Thomas (no affiliation given)
Margaret Forbes (no affiliation given)
William Godwin (no affiliation given)

A small university geography program volunteered to conduct mapping and monitoring of local nature reserves owned by the Texas Land Conservancy, whose main office lies over 200 miles away in Austin, Texas. This poster describes efforts made through classes and Geography Club field activities to build baseline information on two reserves: Banita Creek Preserve, an urban, streamside forest near the University; and Catahoula Preserve, a ridge top, longleaf pine stand located approximately 60 miles south of the University. Students set up and measured vegetation transects and stream health in Banita Creek

Preserve. Students also measured stand density and native grass cover before and after a prescribed burn in the fire-suppressed Catahoula Preserve. Such partnerships can build student field skills in plant identification, forest and stream monitoring, and geographic information technology. These efforts can also help document land health restoration results and opportunities, while building social capital in local protected areas.

National Parks: National Treasures at Risk from Sea Level Rise in the Southeastern United States

Mark Ford, Regional Wetland Ecologist, National Park Service, New Orleans, LA

In the southeastern region of the National Park Service, 24 coastal parks, seashores, preserves, monuments and historic sites are at risk from the effects of sea level rise related to climate change. With a combined area of 3,383.4 square miles, the area currently at risk is greater than the total land area of the State of Delaware (2, 490 sq mi). Representing 35% of all NPS marine and estuarine areas, these units also have 620 miles of coastline. Current IPCC (2007) sea level rise projections range from 7.2 to 23.6 inches (18.5-59.9 cm) per century worldwide. Other more recent studies predict a range of 75-190cm of sea level rise by the end of the 21st century. Some parks, many historic monuments which are built on wetlands or barrier islands, and all of the National Seashores are in danger of major to total submersion. Without aggressive system-wide landscape restoration programs, and funding to implement, some of these national treasures will either be irrevocably damaged or lost altogether.

Monitoring Mangrove/Marsh Ecotonal Movement

Timothy Fotinos, Research Associate, Florida International University, Miami, FL
Kevin R.T. Whelan, Community Ecologist, National Park Service, Miami, FL
Robert B. Shamblin, Botanist, National Park Service, Miami, FL
Carolina Cabal, Climate Change Intern, National Council for Science and the Environment, Miami, FL
Tiara Thanawastien, Resource Monitoring Intern, Florida International University, Miami, FL

The impacts of future sea level rise are potentially great, particularly in a flat, low-lying region such as Everglades National Park (EVER). Saltwater intrusion, coupled with the effects of fire, augmented fresh water flows, and hurricanes, make monitoring movement of the mangrove/marsh ecotone of great importance. As a tier one vital sign for the South Florida / Caribbean Inventory and Monitoring Network (SFCN), our vegetation monitoring protocol calls for tracking the movement of mangrove communities at the local and landscape scale. Witness posts will be established along the mangrove/marsh ecotonal boundary. A subset of these sites will include a transect from mangrove forest to open marsh. At these intensive sampling sites, plant community structure will be monitored in order to understand changes occurring at the local level. The remaining witness posts will serve as ground truthing locations for regional scale monitoring using aerial imagery.

A Prototype Enterprise Solution to Managing Climate Data for the Purpose of Monitoring Climate Change

Brent Frakes, Functional Analyst, National Park Service, Inventory and Monitoring Division, Fort Collins, CO

Understanding climate change requires the ability to analyze many years of weather observations. Unfortunately, data provided directly by common monitoring networks isn't adequately processed for the purpose of trend analysis. Thus, when further processing is necessary, a strategy for managing the data is also required. To address this need, the Inventory and Monitoring Division (IMD) is prototyping a NPS-wide solution to managing the data. This solution includes the automatic acquisition of data from national weather networks, storing the data in an enterprise database, adding data that is further processed or provided by additional observation networks, developing tools for tabular and graphical summaries, and ensuring that the data can be downloaded for further analysis and processing. IMD is prototyping this solution with some I&M networks to understand how this solution may be scalable NPS-wide.

Assessing Regional Climatological Trends with The Climate Grid Analysis Toolset

Brent Frakes, Functional Analyst, National Park Service, Inventory and Monitoring Division, Fort Collins, CO
Kirk Sherrill, Geospatial Technician, MBS, National Park Service, Fort Collins, CO

Increasingly, land managers recognize the need for using historical climatic data to inform management decisions. Additionally, given anticipated climatic change, having baseline knowledge of historical climatic conditions is essential for understating potential implications of future climatic change. While most managers rely on point-based observations, stations are often few in number and not representative of the entire park. Gridded datasets, including PRISM and SNODAS, are derived from observations, spatially continuous (4km and 1km resolutions), and spatially and temporally extensive. The Climate Grid Analysis Toolset (CGAT) is a suite of GIS Python scripts developed to facilitate efficient analysis of PRISM and SNODAS

geospatial climatic datasets. Respectively CGAT performs three main analyses for user-defined spatial and temporal ranges: cell-based average or sum, percentile calculation, and user-defined zonal statistics. Overall, CGAT facilitates use of these two highly relevant and information rich datasets.

Factoring Site Analysis into User Capacity Decisions for Wild and Scenic River Plans in Yosemite National Park

Mae Frantz, Outdoor Recreation Planning Technician, Yosemite National Park Planning Division, El Portal, CA
Jim Bacon, Outdoor Recreation Planner, Yosemite National Park Planning Division, El Portal, CA

The Wild and Scenic Rivers Act requires river managers to address user capacity when developing comprehensive river management plans. Identification of the appropriate kinds and amounts of visitor use a river area can sustain is integral to user capacity determination. Site analysis is being used to inform visitor use and user capacity evaluations for both the Tuolumne River and Merced River plans currently being developed in Yosemite National Park. These user capacity site analyses examined land use and site constraints by overlaying natural and cultural resource data with visitor use information relating to key activity nodes and impact areas. These layers were collectively analyzed to explore for sideboards on the range of appropriate visitor use that may be feasibly accommodated in the river corridor. This presentation provides an overview of how this site analysis was applied to river planning and ultimately informed visitor use and user capacity planning in Yosemite.

The NGPN Vegetation-monitoring Sample Design as a Framework for Multi-resource Studies at Mount Rushmore

Robert Gitzen, Post-doctoral Fellow, Department of Fisheries and Wildlife Sciences, University of Missouri, Columbia, MO
Daniel S. Licht, National Park Service Midwest Region Wildlife Biologist, Rapid City, SD
Joshua J. Millspaugh, Professor, Department of Fisheries and Wildlife Sciences, University of Missouri, Columbia, MO
Amy J. Symstad, Research Ecologist, USGS Northern Prairie Wildlife Research Center, Hot Springs, SD
Bruce Weisman, Chief of Resource Management, Mount Rushmore National Memorial, Keystone, SD
Marcia Wilson, Biological Technician, National Park Service Northern Great Plains Inventory and Monitoring Network, Rapid City, SD
Stephen K. Wilson, Data Manager, National Park Service Northern Great Plains Inventory and Monitoring Network, Rapid City, SD

At Mount Rushmore NMEM (MORU) and other parks of the Northern Great Plains Network (NGPN), the long-term vegetation monitoring protocol utilizes a GRTS probability sample design, which includes a large “”overdraw”“ sample of sites. We assessed the feasibility of using this “”master sample”“ as a framework for several field projects during 2010. For efforts with a park-wide focus (a small mammal occupancy study and a multidisciplinary inventory of red-squirrel middens, common mullein, and other attributes), the GRTS framework was appropriate with some limitations. For two other inventories (of northern flying squirrels and terrestrial snails), budget and information needs limited the efforts to mesic valleys within the park. Therefore, the unstratified GRTS design was not used for these efforts because of the low number of sample sites in these areas. Still, this process emphasized the importance and utility of having a repeatable, defensible plan for spatial sampling even in short-term inventories.

Water-Quality Sampling Design for the Northern Great Plains Network

Robert Gitzen, Post-doctoral Fellow, Department of Fisheries and Wildlife Sciences, University of Missouri, Columbia, MO
Marcia H. Wilson, National Park Service Northern Great Plains I&M Network, Rapid City, SD
Barbara L. Rowe, US Geological Survey South Dakota Water Science Center, Rapid City, SD
John M. Wrede, National Park Service Northern Great Plains I&M Network, Rapid City, SD
Stephen K. Wilson, National Park Service Northern Great Plains I&M Network, Rapid City, SD
Kara J. Paintner, National Park Service Northern Great Plains I&M Network, Rapid City, SD

The Northern Great Plains Network (NGPN) will monitor long-term trends of selected water-quality parameters in National Park Service units in the Dakotas, eastern Wyoming and Nebraska. Diversity of aquatic systems throughout this region combined with budgetary constraints means that NGPN must carefully optimize efficiency of its monitoring design to ensure appropriate inference about long-term trends. Therefore, we used existing data and developed a multi-year pilot study to collect necessary data to examine the magnitude of temporal, spatial, and instrument variation. To address long-term yearly variation, we used U.S. Geological Survey historical water-quality data sets. To assess other sources of variance, we conducted pilot research during 2008-2010. In this work, we used continuous data collected from unattended multi-parameter water-quality sondes equipped with internal data loggers. Based on these results, we compared alternative sampling strategies and revisit intervals in terms of their expected statistical power to assess long-term trends in water-quality parameters.

Managing Human Waste on Mt McKinley: How Tough are Bacteria?

Katelyn Goodwin, Student, Alaska Pacific University, Anchorage, AK
Michael Loso, Alaska Pacific University, Anchorage, AK
Guy Adema, Denali National Park and Preserve, AK

Over 1,000 climbers attempting to climb Mt. McKinley visit the Kahiltna Glacier each year, typically spending more than two weeks on the glacier. Historically, human waste was disposed via crevasses along the routes and seasonal latrine pits at the main camps. Cumulative impacts of this waste are an important element in evaluating management options. To assess water contamination caused by buried human waste, and also by waste that may emerge on the downstream glacier, snow samples were collected along the West Buttress route and water samples were collected from the glacier margins. We searched the downstream glacier surface for evidence of emergent historic waste. Collected samples were analyzed for total coliform, *Escherichia coli* and fecal Streptococci, and temperature and UV-controlled lab experiments help us understand bacterial survival in simulated glacial environments. These results, along with related glaciological work to predict the waste emergence areas, will directly influence park management.

Song Behavior in Carolina Wrens (*Thryothorus ludovicianus*) in Traffic Noise Impacted Areas

Sarah Goodwin, Graduate Student, University of Massachusett–Amherst, Amherst, MA
W. Greg Shriver, University of Delaware, Newark, DE
Giselle Mora-Bourgeois, Science Education Coordinator, Center for Urban Ecology, Washington, DC

Noise in urbanized areas is rapidly creating a new sound environment that organisms must contend with. Here, we investigate potential changes to the song behavior of Carolina Wrens in loud areas at two National Parks heavily impacted by commuter traffic: Manassas National Battlefield and Prince William Forest Park. Although Carolina Wrens did not differ in vocal output, total range of pitch, speed of delivery, or number of notes per syllable, we did find some evidence that birds that sing in quieter locations sing more notes per syllable than birds in loud locations. Multiple, rapidly delivered notes may be ever more difficult for a receiver to discern in a noisy location, and may favor a bias for adults in these areas to sing songs that have fewer notes. The sample size was small to detect this effect, and merits further research.

Tamarisk–Tamarisk Beetle Interactions in Grand County, Utah: Patterns of Beetle Abundance and Tamarisk Defoliation, 2004–2010

Tim Graham, Ecologist, Grand County Weed Department, Moab, UT
Wright Robinson, Grand County Weed Department, Moab, UT
Tim Higgs, Grand County Weed Department, Moab, UT
Gery Wakefield, Southeast Utah Group, National Park Service, Moab, UT

Tamarix species (tamarisk) are invasive shrubby trees that alter riparian and aquatic ecosystems; mechanical or chemical control of these species is difficult and expensive. Biological control of tamarisk has recently become an option, various Diorhabda species (tamarisk beetle) have now been released in the western U.S. The first releases of tamarisk beetles in Grand County, UT were in 2004. Systematic monitoring of beetle abundance and tamarisk response has occurred each year since 2007. Numbers of beetles are counted on sentinel trees, and canopy condition (percent green) is estimated every 10-14 days. Tamarisk defoliation expanded from 1.6 ha in 2005 to almost 1,000,000 ha by October 2010. Beetle numbers varied in time and space differently among years. We will present animations demonstrating how beetle populations "slosh" back and forth across the landscape; the timing of this dynamic affects the spatial pattern of tamarisk mortality and how quickly beetles will kill tamarisk.

Changing Environments: Grazing and Cultural Resources in National Park Narratives

Stephanie Guerra, Graduate Teaching Assistant, MA Candidate, Colorado State University, Department of History, Fort Collins, CO

My project explores the history of Basque sheepherders in Yosemite National Park. This project helps the National Park Service reevaluate the history of grazing by assessing the pastoral heritage of diverse groups while also examining cultural resource strategies in national parks and public lands. The history of Basque sheepherders highlights changes in both physical and social environments. Blazes left by Basque sheepherders, on pine and aspen trees, represent vanishing resources, provide opportunities to consider cultural resource strategies, and enable public audiences to reevaluate and connect with national park narratives. This study builds upon research I conducted as Cultural Resources Diversity Intern at Yosemite National Park, within the Cultural Anthropology Program, during the summer of 2010. This project incorporates both secondary and

primary data to assess cultural resource strategies in Yosemite National Park and to help park staff address cultural resource management and diversity initiatives linked to public lands.

Collections and Contemporary Pursuits in Science

Kirstie Haertel, Pacific West Regional Archeologist, National Park Service, Seattle, WA
S. Terry Childs, Museum Program Manager, Department of the Interior, Washington DC
Greg McDonald, Senior Curator of Natural History, National Park Service, Fort Collins, CO

There is considerable potential for existing natural history and archeology collections held by land managing agencies and organizations to inform current pursuits in science. Much of the potential rests with the accessibility of basic specimen descriptions and available assessments of data reliability needed to attract researchers to the possibility of assemblage use for study. Current research focusing on issues of taxonomy, environmental effects on species and human health, look to iconic museums for applicable collections. The variety and scope of agency-owned collections should be among those institutions queried for research but currently are not regularly approached. This poster will present the breadth and depth of agency collections, introduce and discuss projects being conducted using existing collections, and discuss steps needed to promote collections for research.

World War II Historic Places in the National Park Service

Stephen Haller, Historian, National Park Service, Golden Gate National Recreation Area, San Francisco, CA

The importance of World War II history as a theme is represented in the National Park System by seventeen parks with major historic places from that era. These NPS units are working together in an informal network to “”enhance the preservation, interpretation and public recognition of the value of our World War II heritage.”“ This poster would highlight these NPS units on a map of the United States and present brief textual and photographic information about the wide range of resources being managed, ranging from historic landscapes and battlefield archeological sites, to presidential homes and internment camps. An internet link to these parks’ websites will allow conference attendees to delve deeper into each of these places.

Hydrokinetic Energy Projects and Recreation: A Guide to Assessing Impacts

Joan Harn, Rivers and Hydro Leader, National Park Service, Washington, DC
Rich Bowers, Hydropower Reform Coalition, Bellingham, WA
Susan Rosebrough, National Park Service, Seattle, WA
Bo Shelby, Oregon State University, Corvallis, OR
Rupak Thapalaiya, Hydropower Reform Coalition, Washington, DC
Randy Thoreson, National Park Service
Doug Whittaker, Confluence Research and Consulting

The National Park Service, Hydropower Reform Coalition, and Department of Energy have developed a guide to assessing impacts from wave and current hydrokinetic projects on recreation (http://www.hydroreform.org/hydroguide/hydrokinetic-recreation). The report reviews types of projects, types of recreation that occur in hydrokinetic project settings, types of studies that can be used to assess them, and ways study findings may assist with project siting, design, or mitigation. The poster will review contents from the report, focusing on: Information project developers should provide in FERC license applications to support recreation impact assessments; site characteristics that are more vs. less sensitive to recreation; potential impacts on recreation, including access restrictions, safety, aesthetics, changes in wave or hydraulic characteristics, wreckage/salvage impacts, and changes in fish and wildlife resources; and types of recreation studies organized by needed level of resolution and corresponding effort, with brief descriptions of study approaches.

Annual Climate Monitoring for Great Lakes Parks

Mark Hart, Data Manager, NPS, Great Lakes I&M Network, Ashland, WI

The Great Lakes Inventory & Monitoring Network monitors climate in and adjacent to the nine affiliated parks. Climate is a primary driver of many natural processes and understanding it is crucial for the Network’s and park’s efforts to understand cycles and changes observed in natural resource monitoring efforts. The Network uses current and historical meteorological data from 5 to 18 permanent weather stations representative of each park’s climate to prepare annual climate summaries. Each summary includes annual summary statistics of temperature and precipitation, climatic extremes, Great Lakes ice cover, and indexes for drought, heat, and winter severity. A comparison of the annual climate with 30-year normals and period of record of some representative stations is also presented to give a context for possible climate change.

Alcid Breeding Habitat Restoration on Santa Barbara Island, California

A. Laurie Harvey, Seabird Biologist, Channel Islands National Park, Ventura, CA
Darrell L. Whitworth, California Institute of Environmental Studies, Davis, CA
Harry R. Carter, Carter Biological Consulting, Victoria, British Columbia, Canada

At Santa Barbara Island, most breeding Cassin's Auklets (*Ptychoramphus aleuticus*) were extirpated by cat predation and other factors in the early 20th century; breeding Xantus's Murrelets (*Synthliboramphus hypoleucus*) have declined since the 1970s, with impacts from high depredation by deer mice (*Peromyscus maniculatus*) and barn owls (*Tyto alba*), as well as other factors. Extensive past grazing and introduced plants have limited natural vegetation to the island perimeter. As part of the Montrose Settlements Restoration Program, plant habitat restoration has been underway since 2007 to provide additional breeding habitat and more natural breeding conditions for murrelets and auklets. Initial plant restoration was implemented in three sites along the northeastern portion of the island adjacent to murrelet nesting areas and later expanded to include areas on the western portion of the island adjacent to Elephant Seal Point where small numbers of auklets bred in 1977-94. A social attraction system for auklets was deployed near northeast plant restoration plots in January 2009. Nest monitoring, shoreline nest searches, and at-sea spotlight surveys and captures were used to assess population size, reproductive success, and distribution of murrelets and auklets.

From Ecosystem Top to Bottom—Status of Three I&M Spatial Inventories: Vegetation, Soils, Geology (set of six posters)

Bruce Heise, Geologist, National Park Service, Lakewood, CO
Pete Biggam, Soil Scientist, National Park Service, Lakewood, CO
Karl Brown, Biologist, National Park Service, Fort Collins, CO
Tim Connors, Geologist, National Park Service, Lakewood, CO
Chris Lea, Botanist, National Park Service, Lakewood, CO
Tammy Cook, Biologist, National Park Service, Fort Collins, CO

Vegetation, Soils, and Geology, three of the 12 original Inventory and Monitoring inventories, are spatial, that is, their deliverable product is a digital map or GIS. Each requires not only different types of data acquisition, but from completely different sources as well. The Vegetation Map Inventory relies on private contractors and cooperators working to updated NPS specifications for their taxonomic and map data development. The Soil Resources Inventory acquires products from the USDA, Natural Resources Conservation Service thru Interagency Agreements that follow National Cooperative Soil Survey Standards. And the Geologic Resources Inventory is dependent upon original mapping done by the USGS, state geologic surveys, academic institutions, or private contractors to provide the basic information. These posters will display examples of products produced by each inventory, a status report on each inventory's progress, an example of how this information is being used by the parks, and a projected 2011 completions.

The Crayfish Corps: Creating Future Park Stewards as a Management Tool at Valley Forge

Kristina Heister, Natural Resource Manager, Valley Forge National Historical Park, King of Prussia, PA
Kate Jensen, Ecologist, Valley Forge National Historical Park, King of Prussia, PA

The last two miles of Valley Creek flow through Valley Forge National Historical Park to its confluence with the Schuylkill River in front of George Washington's Headquarters. This designated 'Exceptional Value Waterway', which is both historically and ecologically significant, is threatened by the recent invasion of rusty crayfish (*Orconectes rusticus*). The rusty crayfish is a highly invasive, non-native species that has been introduced from the Ohio River Basin into 19 states and many parks over the last 40 years. With a small natural resource staff, the 'Crayfish Corps' was created as the primary means of managing this aggressive species. In two years, more than 2,000 volunteer hours have resulted in the successful removal of over 6,000 rusty crayfish. Focusing on the creation of future park stewards, the 'Crayfish Corps' is now one of the parks most popular volunteer programs and its only program where approximately 50% of participants are youth.

Online Outdoor Safety Education and Accident Prevention: Is it Adequate?

Michael Huffman, Associate Professor, University of Memphis, Memphis, TN

U.S. National Parks launch over 4,000 Search and Rescue (SAR) missions a year. When the number of SAR missions for other federal, state and local agencies is considered, it is obvious that accident prevention should be more of a priority. Many states are enacting legislation that allows agencies to recoup SAR expenses from injured parties; particularly when gross negligence is evident. Why has this become such a problem? One expert believes that many participants receive little or no training for outdoor activities. They obtain minimal information and proceed directly to participation. With ninety three percent of

young adults using the Internet, online information is extremely popular. This study presents a content analysis of 200 websites for ten popular outdoor activities with regard to the quality and quantity of safety information. Government, organizational, commercial and personal websites are examined. Trends, issues and recommendations for improving online safety information are presented.

World War II Military Aircraft Accidents in National Park Service Areas: A Preliminary Assessment

Adrian Hunt, Director, Flying Heritage Museum, Everett, WA
Vincent L. Santucci, Chief Ranger, George Washington Memorial Parkway, McLean, VA

Aircraft archeology continues to expand as a specialized discipline supporting historic research and resource management. The remains of World War II military aircraft accidents have been documented across the U.S. "Home Front." Preliminary research indicates that the majority of these military plane crashes were related to non-combat accidents. The corresponding loss of airmen and their crew was substantial. Evidence of military plane crashes is reported from at least eighteen units of the National Park Service including: Channel Islands, Death Valley, Denali, El Malpais, Grand Canyon, Grand Tetons, Great Smoky Mountains, Guadalupe Mountains, Joshua Tree, Lake Mead, Rocky Mountain, Olympic, Mount Rainier, Saguaro, Sequoia-Kings Canyon, Shenandoah, World War II Valor in the Pacific and Yosemite. In addition to any historic information associated with the aircraft remains, a variety of resource management issues often arise related to the presence of hazardous materials, explosives, and human remains.

Understanding Protected Area–People Interactions in Context of Tiger Conservation

Syed Ainul Hussain, Professor, Wildlife Institute of India, Dehradun, Uttrakhand, India
Ruchi Badola, Professor, Wildlife Institute of India, Chandrabani, Dehradun, Uttrakhand, India

Due to recent concerns of declining tiger populations strong PA network for Tiger Conservation has been created in its entire range. Yet, tigers now exist in only 7% of their historical range. The investment in tiger conservation in India has seen a steady increase. However, in spite of increasing scientific knowledge, economic investment and political support, the population of tiger is rapidly declining. One of the reasons for such failure is lack of support from the people living in vicinity of tiger conservation units. This is because the local communities are unable to perceive the marginal gain from improvement in tiger habitat due to conservation or are apprehensive of their share in it. Using the case of Corbett Tiger Reserve, India, the present study examines costs and benefits of tiger conservation to local communities, reasons for their non participation and ways to increase benefits to local people from tiger conservation.

"Why Prediction Matters: A Case Study Using Whitebark Pine Vital Signs Monitoring Data

Cathie Jean, Ecologist/Management Assistant, Greater Yellowstone Network, National Park Service, Bozeman, MT

Understanding the influence of environmental covariates on the distribution and abundance of forest insect and disease is relevant for managers of large parks who must make choices regarding actions that have potential to affect conditions on the ground. For example, the ability to predict where white pine blister rust is most likely to spread or intensify may help managers decide if and where a treatment such as propagating rust resistance whitebark pine trees is warranted. A collaborative project between the Greater Yellowstone Network and the USGS Grizzly Bear Study Team to develop quantitative models that explain patterns of insect and disease is underway. Preliminary results and management implications are presented as a USGS Status and Trends case study.

Elk Monitoring Protocols for the North Coast and Cascades Network of National Parks

Kurt Jenkins, Research Wildlife Biologist, USGS Forest and Rangeland Ecosystem Science Center, Port Angeles, WA
Paul Griffin, Wildlife Biologist, USGS Forest and Rangeland Ecosystem Science Center, Port Angeles, WA
Patti Happe, Wildlife Branch Chief, Olympic National Park, Port Angeles, WA
Mason Reid, Wildlife Ecologist, Mount Rainier National Park, Ashford, WA
Carla Cole, Natural Resources Project Manager, Lewis and Clark National Historical Park, Astoria, OR
John Boetsch, Database Manager, North Coast and Cascades Network, Olympic National Park, Port Angeles, WA
Katherine Beirne, Geographic Information Specialist, North Coast and Cascades Network, Olympic National Park, Port Angeles, WA

Elk are ecologically, historically, and culturally vital components in Pacific Northwest national park ecosystems. In Olympic and Mount Rainier National Parks, we developed double-observer methods to improve accuracy of helicopter surveys of elk. At Mount Rainier, we jointly conduct surveys with Washington Department of Fish and Wildlife, Muckleshoot Indian Tribe,

and Puyallup Tribe of Indians. With their participation, we developed a sightability model that corrects for visibility bias and adjusts raw counts of elk to increase accuracy of elk abundance and composition estimates. In Lewis and Clark National Historical Park, we use pellet surveys to monitor trends in spatial patterns and abundance of elk, road surveys to monitor elk sightings near the park, and incidental observations of elk posted via the internet to document elk use in the surrounding region. Park staffs draw on the elk monitoring program for habitat and elk management objectives, education, and community outreach.

Connecting Students Engaged in Public Land Internships

Jingxian Jiang, Ph.D. Student, Texas A&M University, College Station, TX
Ulrike Gretzel, Associate Professor, University of Wollongong, New South Wales, Australia

The RMSSN Academy, a program sponsored by the Rocky Mountain Sustainability and Science Network, provides training for undergraduate students involved in internships on public lands or research projects related to environmental sciences. Its overarching aim is building a network among students who share interests in sustainability and climate change to increase the retention of these students in the field. The Academy maintains a website to encourage exchanges of internship experiences, help in career planning, and foster social interactions. As part of the Academy requirements, the students were asked to blog about their public land internship experiences on the website. Using network analysis, this paper analyzes the students' interactions with the website, the contents of their blogs, and their interactions to see if the website helped in fostering strong ties and building a common body of knowledge. Implications for connecting students who engage in public land internships are drawn.

Publication Guidance for Multiple Versions of NPS Natural Resource Publications

Fagan Johnson, Assistant Data Manager, NPS, Natural Resource Program Center, Fort Collins, CO

This poster will provide guidance on publishing subsequent versions of previously published NPS Natural Resource Technical Reports, Natural Resource Reports, and Natural Resource Data Series reports. Topics covered include the suggested report title naming conventions for different versions of a report, when to publish the new version as a new stand-alone report (whenever multiple report versions need to remain in distribution), and how to proceed when the newer version of a report completely replaces the older one (usually restricted to minor edit changes, and to procedural reports that change over time).

Submitting Reports to the National Park Service Natural Resource Publication Series

Fagan Johnson, Assistant Data Manager, NPS, Natural Resource Program Center, Fort Collins, CO

This poster will provide an overview of the report submission procedures for NPS Natural Resource Technical Reports, Natural Resource Reports, and Natural Resource Data Series. It will include new information pertaining to the online distribution of all national reports through the recently activated NRInfo document storage and retrieval system.

Southeast Alaska Oceanography Monitoring: the Benefits of Integrated Data Management

William Johnson, Data Manager, NPS Southeast Alaska Inventory and Monitoring Network, Juneau, AK

The Southeast Alaska Inventory and Monitoring Network recently developed a physical oceanography monitoring program for Glacier Bay National Park and Preserve. From the onset of protocol development, data management constraints were taken into account and modern data management techniques were specified. In its second year of operation, the program is exhibiting high data quality in its twelve formal products, high data availability from its exclusive use of publicly-accessible web dissemination, high data security through comprehensive archiving, and high efficiency in which a small part-time staff completes nine data collection cruises every year. Key to the program's success is a very well-defined set of information deliverables. Because specifications were clear and fixed in advance, it was possible to build in a high level of automation and realize its benefits.

DSC Planning, Expanding Our Mission Based Services

Damien Joseph, Visual Information Specialist, NPS DSC/Planning Division, Lakewood, CO
Nancy Shock, Supervisor, NPS/DSC/Planning, Lakewood, CO
Jim Corbett, Visual Info Specialist, NPS/DSC/Planning, Lakewood, CO

Our VISION is to be the first choice provider for ever-expanding mission based park planning. We are expanding our products and services and we are committed to excellence in meeting the ever-expanding needs of parks and regions. We wish to be a client-focused leader in the innovative use of technology, tools, and techniques to create useful and accessible planning products and services.

Teaching Statistics with Modules from the Spreadsheets Across the Curriculum, Geology of National Parks Collection

Thomas Juster, Instructor, University of South Florida, Department of Geology, Tampa, FL
Judy McIlrath, University of South Florida, Department of Geology, Tampa, FL
Len Vacher, University of South Florida, Department of Geology, Tampa, FL

The Spreadsheets Across the Curriculum library has recently been expanded with the addition of 20+ modules built around National Resource Challenge topics in selected national parks (http://serc.carleton.edu/sp/ssac/national_parks). Although these modules were designed to be used in a class on the geology of national parks, and are easily applicable to other introductory geology classes, the quantitative literacy topics covered are extensive and allow units to be cobbled together to support other, less obvious subjects. As an example, I describe a unit on statistics that uses four modules from the National Parks Collection. Using data from national parks in Wyoming, Washington, DC, and South Carolina, this unit teaches concepts of (a) elementary probability; (b) frequency; (c) and probability distributions. Such a module could be used in basic courses in statistics, physics, or math at the undergraduate or high school level.

Monitoring Vegetation Diversity Using Remote Sensing Technology on Cadillac Mountain Summit, Acadia National Park

Min Kook Kim, Postdoctoral Research Associate, University of Maine, Orono, ME
John J. Daigle, Associate Professor, School of Forest Resources, University of Maine, Orono, ME

While recreation ecology has played an important role in identifying plant response characteristics as well as species composition and diversity after being disturbed by trampling or off-trail hiking, the challenge is to verify the characteristics and changes when a site boundary is relatively large for on-site measurement. In this study, we utilized remote sensing technology for identifying vegetation diversity at a large spatial scale and eventually for assessing efficacy of employed site and visitor management strategies. By using multi-spectral high resolution remote sensing datasets obtained in 2001 and 2007, a supervised classification method was applied to produce modified plant family level classifications in the vicinity of the summit loop trail, Cadillac Mountain, Acadia National Park. Based on the classification results, the Euclidean Distance (ED) was calculated to compare beta diversity between the study site and a nearby control site with no/little visitor use. Additionally, the Shannon-Weiner (SW) diversity index was statistically tested to directly compare alpha diversity between the two sites based on 30m2 plots created. Vegetation diversities were lower at the experimental site both in 2001 and 2007 (all $p < 0.001$), showing no positive relationship with the employed management strategies in terms of enhancing vegetation diversity during the examined analysis time frame.

Spatial Interaction Analysis between Vegetation Changes and Management Practices: Cadillac Mountain, Acadia National Park

Min Kook Kim, Postdoctoral Research Associate, University of Maine, Orono, ME
John J. Daigle, Associate Professor, School of Forest Resources, University of Maine, Orono, ME

This study presents a novel method for verifying the effect of spatial containment management practices, where visitors are asked or required to use established or designated sites to reduce the amount of vegetation impact and enhance vegetation recovery. Using a bivariate point pattern analysis based on cross K-function, we attempted to prove the spatial efficacy of the management practices at Cadillac Mountain, Acadia National Park, Maine, USA. The analysis results suggested that the management practices have been validated to spatially repulse the creation of the impacted vegetation points around the locations of the management practices, but indicated ineffectiveness to spatially attract vegetation regeneration points by showing the same repulsive relationship within the defined study area. While the applied spatial statistics would be useful to identify overall spatial point patterns and spatial interactions between the two types of point events, site characteristics such as the bare-rock dominant landscape and low resilience vegetation should be considered to effectively discover the degree of vegetation cover changes influenced by the spatial containment management strategies for a future spatial interaction analysis.

Characterizing Disturbances at Voyageurs National Park Using 25 Years of Landsat Imagery

Alan Kirschbaum, Remote Sensing Specialist, National Park Service, Great Lakes Network, Ashland. WI
Ulf Gafvert, GIS Coordinator, National Park Service, Great Lakes Network, Ashland, WI
Robert Kennedy, Research Ecologist, Oregon State University, Corvallis, OR

Landscape scale analysis provides a means to view the pattern, arrangement, and interactions of vegetation communities existing in and around the parks. Examining spatial patterns over time can reveal changes in land cover and use that may be impacting the natural resources within parks. Tracking disturbances on adjacent lands can help explain changes in biological communities within a park. We implemented a landscape dynamics monitoring protocol at Voyageurs National Park in 2009 and

have summarized disturbances over a six year time span (2002-2007). This protocol relies on a set of algorithms, collectively referred to as LandTrendr, to analyze spectral trajectories extracted from 25 years of Landsat imagery. The same methods will be used at eight other parks in GLKN Network on a 6-year rotation. This type of geospatial and temporal data will be useful for resource managers to focus management efforts, and influence policy decisions regarding land surrounding their park.

Exxon Valdez Oil Spill and Kenai Fjords National Park, 20 Years Later

Fritz Klasner, Resource Management Team Leader, Kenai Fjords National Park, Seward, AK
Jim Pfeiffenberger, Education Specialist, Kenai Fjords National Park, Seward, AK
Kristy Sholly, Chief of Interpretation, Kenai Fjords National Park, Seward, AK

The Exxon Valdez Oil Spill of 1989 was a watershed event in Kenai Fjords National Park management—what was learned from the experience has a profound impact on how we operate today. For the 20th anniversary of the spill the park identified lessons learned including: Response to a major event or incident is complex, requires careful yet clearly identified management, exemplary leadership, and specialized skills. The lingering effects can be difficult to identify but are vitally important to understand. Prevention is inordinately cheaper than cleanup. Distance doesn't necessarily mean you're safe (after nearly 2 months, Katmai National Park was struggling with fresh oil). We didn't know much about our resources and still have a lot to learn—a realization which helped initiate Inventory & Monitoring, coastal mapping, and archeological survey efforts. We can and must work well with others—local communities, business, and state & federal government agencies.

NASA's Applied Remote Sensing Education and Training Program

Richard Kleidman, Senior Member Technical Staff, SSAI / NASA Goddard, Greenbelt, MD
Ana Prados, Research Assistant Professor, University of Maryland Baltimore County / JCET, Baltimore, MD

NASA's ARSET program offers training workshops several times a year for professionals who want to learn how to understand, obtain and make proper use of atmospheric remote sensing data. Our primary target audience are those interested in air quality applications. Our website has a large archive of presentations. Our listserv subscribers receive monthly case studies and practice exercises. In the near future we will also offer workshops and materials on land use and water resources management applications.

Identifying Wilderness Designation Priorities to Aid in Landscape Scale

Roopa Krithivasan, Intern, George Melendez Wright Climate Change Internship Program, New Haven, CT

A significant adaptation strategy to lessen severity of climate change impacts is to promote and improve ecosystem resilience by enhancing landscape-level connectivity. We conduct GIS analysis to evaluate which eligible, proposed, and recommended NPS wilderness areas in the Intermountain Region are key interagency links for potential migration corridors, biodiversity protection, and refugia. Connectivity among these NPS areas and other federally protected lands will be analyzed using ArcGIS and FunConn GIS analysis tools. I will use a graph theory model and ArcGIS to determine which eligible, potential, and recommended wilderness areas represent the greatest likelihood for maintaining connectivity of the Intermountain landscape by providing refugia and "stepping stones" for species movement. Identifying the areas with the greatest conservation value will aid climate change adaptation at a landscape scale by allowing the NPS to prioritize these areas in the wilderness designation process.

Health and Well-being Benefits of Nature-based Activity

Linda Kruger, Research Social Scientist, US Forest Service PNW Research Station, Juneau, AK

Communities, broadly defined and representing all scales from local to national, have lost awareness of their connection to public lands and the benefits they receive from recreation, leisure and public lands. This disconnect threatens the viability and sustainability of programs and the agencies that provide them. A lack of public understanding of the contribution of forests, parks and protected areas, and specifically nature for individual and community health and well-being undermines the ability of public agencies to provide adequate services that could contribute to alleviation of social problems. Agencies, interest groups and other supporters can link park and leisure services to goals of education, human and social services and medical communities. The author synthesizes research demonstrating the role public lands, parks and leisure activities play in facilitating increased levels of physical activity, and positive emotional, intellectual, and social experiences and the connection to improved levels of health and wellness.

Alien Species and a Changing World: Will Kelp Forests at the Channel Islands Ever be the Same?

David Kushner, Marine Biologist, Channel Islands National Park, Ventura, CA
Kelly Moore, Channel Islands National Park, Ventura, CA
Joshua Sprague, Channel Islands National Park, Ventura, CA
Dan Richards, Channel Islands National Park, Ventura, CA
Eric Mooney (no affiliation given)
Sonia Ibarra (no affiliation given)
Gabriel Scheer (no affiliation given)

Marine invasive species are increasingly affecting marine ecosystems on a global scale and the impacts of these invasions are now recognized as a significant aspect of global change. Several species have been introduced to open coast kelp forests along the California coast. Though there is little baseline information available, it appears most of these species have had relatively small ecological and/or visual impacts. The present rapid establishment of the invasive alga *Sargassum horneri* appears to be unlike other previous invasions and is likely to soon dominate large subtidal areas along the California coast including Channel Islands National Park. Channel Island National Park's long-term kelp forest monitoring (KFM) program has nearly 30 years of baseline data prior to the first observation of *S. horneri* that will enable us to monitor the invasion and its ecological impacts. The alga was first discovered in Long Beach Harbor in 2003, Catalina Island in 2006, and Anacapa Island within Channel Islands National Park in April of 2009. By October 2009, S. horneri was well established in the areas where it was first discovered with notably higher densities of both small and large plants, some at or near reproductive maturity. In addition, it was found at eight of fifteen survey sites including two long-term KFM sites. In 2010, the alga was observed at six long-term KFM sites at Santa Barbara, Anacapa and Santa Cruz Islands — indicating rapid and widespread expansion in the park. Though it is likely that little can be done to control such an alga in open coast ecosystems, the park's KFM program will continue to monitor its spread and ecological impacts.

Comparison of At-sea Numbers and Distribution of Xantus's Murrelets near Santa Barbara Island, California, in 1976 and 2009

Augie Lagemann, Student, Pomona College, Claremont, CA
Darrell Whitworth, California Institute of Environmental Studies, Davis, CA
Harry Carter, Carter Biological Consulting, Victoria, BC, Canada
Laurie Harvey, Montrose Settlements Restoration Program, Channel Islands National Park, Ventura, CA
Nina Karnovsky, Pomona College, Department of Biology, Claremont, CA

To assist in the assessment of population status and foraging conditions for an on-going restoration project, we examined at-sea numbers and distribution of Xantus's murrelets (Synthliboramphus hypoleucus) at Santa Barbara Island, California and compared them to those found in 1976. Using the NOAA ship R/V Shearwater, we conducted seven radial transects within a portion of the foraging area near the island during the incubation period in 2009 and compared distribution and densities to similar radial transect data obtained in 1976. Xantus's murrelet numbers were higher within the study area in 1976 than in 2009. This finding may reflect a reduction in Xantus's murrelet population size at this colony or a shift in foraging distribution, with a greater proportion of birds foraging farther from the island in 2009. In 1976, Xantus's murrelets may have foraged closer to the island when Northern Anchovies (Engraulis mordax) were abundant there. In both years, highest densities of murrelets were consistently found along the western side of the island, where colder waters occurred and prey resources may be more abundant or more available. Other data being gathered to help assess current population status include nest monitoring, nest surveys, spotlight surveys, and at-sea captures.

Traces of the Past, and Paths to the Future: Fostering Collaboration in Land Management

Nicholas Laluk, Tribal Archaeologist, White Mountain Apache Tribe, Fort Apache, AZ
Mark T. Altaha, White Mountain Apache Tribe Historic Preservation Office, Fort Apache, AZ
Shaunna Ethelbah, White Mountain Apache Tribe Historic Preservation Office, Fort Apache, AZ

Despite more than 100 years of exile, Chiricahua and Western Apache groups still maintain significant and powerful ties to their ancestral lands in what is now southwestern Arizona. Memories, stories, and ceremonies are tied to the land and define Apachean social investment and intergenerational commitments. Apache land ethics, cultural values, knowledge and religion are still maintained through concepts of place and landscapes in spite of persecution and contemporary misinterpretation of Apache culture. Today legislation and policies requires federal land-managing agencies to consult with tribes, potentially ushering in a new age of inter-ethnic communication, cultural collaboration, and environmental justice. Land managers are

beginning to recognize the value of integrating traditional ecological knowledge with science-base practices to develop a more holistic ecosystem restoration. In collaborations with various federal land-managing agencies we will integrate cultural and ecosystem knowledge into contemporary land-managing strategies to better manage our ancestral lands.

Reducing Visitor Conflict and Improving Resource Protection During Lehman Caves Tours, Great Basin National Park, Nevada

Ashley Lange, MS Student, University of Idaho, Moscow, ID
Troy E. Hall, Professor, Department of Conservation Social Sciences, University of Idaho, Moscow, ID
Edwin Krumpe, Professor, Department of Conservation Social Sciences, University of Idaho, Moscow, ID

Extensive research has been done on cave biology, but not on the experience of cave visitors. Staff at Great Basin National Park are concerned about depreciative behavior by visitors during tours, including damaging formations, flash photography, children's disruptiveness, and large tours experiencing difficulty hearing and seeing. 332 visitors on 74 randomly selected tours were surveyed about their perception of problems and support for management. Observational data about disruptive behaviors were collected during the tours, along with the guides' assessments of problem behaviors. Approximately 50% of visitors noticed each of the 12 problems listed, but they did not rate the problems as severe. In contrast, guides noticed more problems and rated them as more serious. Visitors are also generally opposed to restrictive management actions that might improve the quality of the tour experience. Findings may help inform decisions about policies that could reduce depreciative behaviors and improve resource protection.

Bringing Science to the Public in the 1st Annual Santa Monica Mountains Science Festival

Lena Lee, Data Manager, Mediterranean Coast Network, Thousand Oaks, CA
Lisa Okazaki, Education Specialist, Santa Monica Mountains National Recreation Area, Thousand Oaks, CA
Cathy Schoonmaker, Wildlife Biologist, Santa Monica Mountains National Recreation Area, Thousand Oaks, CA

Situated within and adjacent to Los Angeles, the Santa Monica Mountains represent one of the best examples of the Mediterranean-type ecosystem. Hosted by the Santa Monica Mountains National Recreation Area in partnership with the Natural History Museum of Los Angeles County, the 1st annual Santa Monica Mountains Science Festival was an event designed to engage the public to learn about the diversity of plants and animals in the Santa Monica Mountains as well as the science and research occurring at the park in order to understand the biodiversity. Approximately 400 3rd grade students from local elementary schools participated in hands-on science demonstrations with park and local scientists as part of the education program. The public program, consisting of talks and posters of current research, demonstrations of science techniques, partner information booths and children's activities, attracted over 2100 visitors, many of whom were first-time visitors to the park and mountains.

Understanding the Experiences of African Americans at Slavery-related Tourism Sites

Linda Lelo, PhD Candidate, Texas A&M University, College Station, TX

Slavery-related tourism sites in the United States tend to underrepresent and misrepresent the life experiences of enslaved Africans living and working on the plantations (Butler, Carter, & Dwyer, 2008; Eichstedt & Small, 2002). The purpose of this study is to understand African Americans' motivations to visit a slavery-related site, their experiences on-site, and the role of the site in its representation of slavery. This research used the African Burial Ground National Monument (ABG) in New York City as a case study. The results showed that most African Americans visit the ABG to learn about slavery and to honor their ancestors. On-site, they are able to meditate, pray, pay their respects, and feel a sense of peace. Finally, the ABG is a reminder to African Americans of their strong will and resiliency as a cultural group.

Research, Monitoring and Propagation of the Endangered Shivwits Milk-vetch (*Astragalus ampullarioides*), Washington County, Utah

Rebecca Lieberg, Lead Revegetation Biological Science Technician, Zion National Park, Springdale, UT

The Shivwits milk-vetch is a federally-listed endangered plant found only in Washington County. Of known populations, more than 75% are found within the boundaries of Zion National Park. Since 2006, the U.S. Geological Survey and Zion NP have been studying this species in relation to geology and soils, herbivory, exotic plant competition, and mycorrhizal fungi. In addition, annual plant inventories of all Zion sites have been conducted since 2006. Zion staff is also conducting its own caging and seed collection study, and has begun propagation with the goal of developing propagation SOP's and out planting and increasing populations. In 2010, inter-agency personnel joined park staff in conducting surveys in areas in and adja-

cent to Zion NP and were successful in mapping several new populations. Current energies are focused on long-term survival in the greenhouse; performing experimental out plantings; and developing a long-term monitoring plan and monitoring SOPs.

Could Ecotourism be an Effective Tool for Wetland Conservation in Florida?

Li-Pin Lin, PhD Candidate, Texas A&M University, College Station, TX

Florida accounts for the greatest wetland loss in the U.S., and only about one fifths of the existing wetlands are currently under the protection of the park and reserve system. Tourism and recreation in natural Florida, considered one of the contributors to wetland degradation has on the other hand been the economic backbone and the financial supporter for parks conservation work. For the ideal tourism-conservation symbiosis, ecotourism was advocated as a tool that leads nature-based tourism within and outside Florida's protected areas toward sustainability in the state-wide ecotourism policy in 1997. This study examines the relationship between ecotourism and wetland conservation in Florida through investigating the pro-environmental behaviors of tour operators. The research intends to answer the following questions: (1) does involvement in ecotourism significantly contribute to tour operator behaviors that generate favorable environmental outcomes? (2) which benefits of tourism (e.g. ecological, economic, and socio-cultural) are significant predictors of those conservation behaviors?

Interannual Variability of Lake Ice Phenology in Southwest Alaska: Integrating Remote Sensing and Climate Data

Chuck Lindsay, Physical Scientist, National Park Service, Southwest Alaska I&M Network, Homer, AK
Page Spencer, Chief of Natural Resources, Lake Clark National Park and Preserve, Anchorage, AK

The impacts of climate change in the northern high latitudes are expected to alter freeze and breakup dates of lake ice – likely affecting lake ecology, wildlife migration and habitat, and human subsistence and recreation. We used daily Moderate Resolution Imaging Spectrometer (MODIS) imagery and climate data (temperature, precipitation, and wind) to assess variability in the timing of freezing and breakup of 17 lakes, totaling 5,410 km2 in a network of national parks and wildlife refuges in southwest Alaska. Because digital image classification techniques often resulted in misclassification, we relied on manual interpretation of imagery to quantify lake ice cover using a minimum mapping area of 1 km2. During 2001-2010, lake ice phenology exhibited considerable interannual variability, greater for freezing than breakup. Lake ice was responsive to short-term, synoptic-scale, mid-winter weather events including warm air advection events (characterized by above-freezing temperatures, strong wind, and rain) and cold-snaps.

Sabino Canyon Recreation Area: Transportation and Livability in a Changing Canyon

Alexander Linthicum, Operations Research Analyst, USDOT John A. Volpe National Transportation Systems Center, Cambridge, MA
Frances B. Fisher, USDOT John A. Volpe National Transportation Systems Center, Cambridge, MA
David J. Spiller, USDOT John A. Volpe National Transportation Systems Center, Cambridge, MA
Eric J. Plosky, USDOT John A. Volpe National Transportation Systems Center, Cambridge, MA

Federal lands managers recognize the evolving nature of the social, political, and natural environments in which alternative transportation systems operate and make small adjustments as needed. Occasionally, however, a federal land unit will perceive that conditions have changed such that a complete review of its alternative transportation system is required. Following a 1000-year flood event in 2006, Sabino Canyon Recreation Area, part of the Coronado National Forest near Tucson, Arizona, identified such a confluence of evolving factors and undertook an effort to review its alternative transportation system, which has operated largely unchanged since 1978. This poster describes the systemic process used to document past and present conditions, solicit feedback from stakeholders, and construct solutions to transportation challenges in Sabino Canyon. The flexible methodology presented in this poster is a powerful model for analysis and planning of both mature and new alternative transportation systems at federal land units nationwide.

NPSpecies Redesigned

Alison Loar, NPSpecies Data Manager, NPS Inventory and Monitoring Division, Fort Collins, CO

The new NPSpecies data schema now allows for more than one species list for a park unit by taxonomic category. This is useful for three reasons: 1) to have the ability to compare species status over time, 2) to import a species list with status information from MS Access or Excel for merging into a working species list for a unit, and 3) create a sandbox species list for training sessions or demonstrations with no fear of editing a master species list for a unit. Each of these types of species lists are identified by a specific type of workbench. This poster depicts specific actions that may be taken using the different types of workbenches as examples.

Occupancy Modeling of Terrestrial Herpetofauna at Cabrillo National Monument

Kaye London, Biological Technician, Mediterranean Coast Inventory and Monitoring Network / Cabrillo National Monument, San Diego, CA

Stacey Ostermann-Kelm, Ecologist/Program Manager, Mediterranean Coast Inventory and Monitoring Network, Thousand Oaks, CA

Lena Lee, Data Manager, Mediterranean Coast Inventory and Monitoring Network, Thousand Oaks, CA

Benjamin Pister, Chief of Resources, Cabrillo National Monument, San Diego, CA

Katy Semple Delaney, Wildlife Ecologist, Mediterranean Coast Inventory and Monitoring Network/Santa Monica Mountains National Recreation Area, Thousand Oaks, CA

Seth Riley, Wildlife Ecologist, Santa Monica Mountains National Recreation Area, Thousand Oaks, CA

Stephen Hayes, Lecturer, Gonzaga University, Spokane, WA

Reptiles and amphibians in the three parks of the Mediterranean Coast Inventory and Monitoring Network in Southern California are affected by numerous stressors and impacts to their habitat. Urban development and land use have significantly altered or destroyed critical habitat for many species, especially in Cabrillo National Monument located in San Diego, California. Our long-term monitoring objectives include determining the annual status and long-term trends in: (1) annual percent area occupied, (2) community dynamics (species richness, evenness, and extinction and colonization rates), and (3) capture rates for herpetofaunal species in selected vegetation communities. Here we present preliminary results from occupancy modeling that incorporates detection probabilities using herpetofaunal monitoring data from Cabrillo National Monument.

Connecting To Adjacent NPS Lands: A Changing Landscape at Delaware Water Gap NRA

Patrick Lynch, Chief, Resource Management and Science, Delaware Water Gap NRA, Bushkill, PA

John Donahue, Superintendent, Delaware Water Gap NRA, Bushkill, PA

Amanda Stein, Biologist, Delaware Water Gap NRA, Bushkill, PA

Leslie Morlock, GIS Specialist, Delaware Water Gap NRA, Bushkill, PA

Delaware Water Gap NRA (DEWA) is at a crossroads of preserving its unique landscape(s) in light of rampant development near its borders. The adjacent areas impacts have become broader than just suburban-like sprawl. Industrial and utility development have now crept into the development scene as a consequence of our present economy. DEWA has established a regional conservation strategy with its partners to identify related lands and waters outside its boundaries that lend themselves to a more sustainable landscape than what would exist if suburban, industrial and utility development occurs at its projected rate. This poster will outline those strategies that have been put in place, to date.

Species–Environment Relationships in the Fossil Record of the John Day Fossil Beds National Monument, Central Oregon

Kaitlin Clare Maguire, Graduate Student, University of California–Berkeley, Berkeley, CA

In the face of today's climate change, the paleontological record provides an opportunity to study how environmental change has influenced species in the past in order to predict the future of extant species. Approximately 15-16 million years ago, global temperatures rose 3-4° C, resulting in the largest warming event of the Late Cenozoic. This event, the mid-Miocene Climatic Optimum, is recorded in the fossiliferous beds of the Mascall Formation located in the John Day Fossil Beds National Monument of Central Oregon. Here I examine the mammals and environments of the Mascall Formation in order to understand how species reacted to this change in climate. More specifically, I test whether species tracked their preferred habitat (niche stability) as the environment changed or whether they remained in place and adapted to a new environment (niche evolution). To do so I use ecological niche modeling to reconstruct species distributions in the fossil record.

Building Curricula to Communicate Climate Change Issues and Impacts to Middle School Students

Bryan Maloney, Intern, George Melendez Wright Climate Change Internship Program, Bethesda, MD

The two main goals of the internship were to develop climate change curriculum and provide an interpretive program on climate change for implementation in the Schoodic Education Adventure (SEA) program, for middle school students throughout the state of Maine. The curriculum developed consists mostly of short activities/experiments emphasizing properties of marine chemistry and oceanic change with the purpose of providing scientific information to a non-scientific audience, teaching students about the science behind climate change. The climate change program builds an hour-long discussion and was given six times throughout the summer. The interpretive program covers the basics of climate change and its impact on the New England region. The interpretive program provided reliable science-based information to over 125 park visitors. These programs help bridge the essential gap between scientific analysis and public understanding of climate change issues.

Cattail Hybridization: A Cryptic Form of Invasion in Wetlands of National Parks

Joy E. Marburger, Research Coordinator, Great Lakes Research and Education Center, Indiana Dunes National Lakeshore, Porter, IN
Steven E. Travis, Associate Professor, Department of Biological Sciences, University of New England, Biddeford, ME

Cattails out-compete other aquatic plants in wetlands, reducing biological diversity and altering nutrient dynamics and succession pathways. Two species of cattail, *Typha latifolia*, native to North America, and *T. angustifolia*, considered an introduced exotic, have hybridized in the continental U.S. Cattails in six Great Lakes national parks showed high morphological variation in plant traits. Molecular genetic analysis of leaves from plant clones in each park indicated interbreeding of the species, resulting in production of F1, F2, and backcross generations that form complex hybrid swarms of mixed genetic stock. Hybridization has resulted in *T. latifolia* becoming increasingly rare as a consequence of aggressive spread of the hybrids during the past century. Several of the more remote interior lakes and isolated wetlands have remnant native *T. latifolia* populations, suggesting that conservation of native cattail may be more feasible in these areas. Comprehensive management protocols can help reduce hybrid and exotic cattail expansion.

Effects of Community-based Tourism Conservancies on Well-being and Self-determination: Comparison by Participation and Gender

Kathryn Martin, Ph.D. Student, North Carolina State University, Raleigh, NC
Duarte B. Morais, Associate Professor, Parks, Recreation and Tourism Management, North Carolina State University, Raleigh, NC

Studies have suggested that community-based tourism conservancies facilitate wildlife conservation and economic development efforts in developing areas. However, it remains unclear what influence conservancies have on improvements in the quality of life in local communities, especially pertaining to women. This study investigated the influence of community-based wildlife tourism projects on two quality of life determinants (well-being and self-determination) and their influence on indigenous men and women in Namibia's Kunene region. Data was collected from two pairs of participating and non-participating communities, and consisted of 3-5 interviews with groups from each village. Findings suggest individuals' ability to prosper was the most critical factor influencing perceived well-being, in addition to health, social relatedness, and relationships with the natural realm. Results demonstrate that implementing community-based tourism conservancies in indigenous villages is associated with higher subjective well-being and an enhanced sense of self-determination, suggesting that these programs may contribute to quality of life.

It Takes a Village: Lessons from the NHL Nomination Process for Lawrence Halprin's Portland Parks

Laurie Matthews, Cultural Resource Planner, MIG, Portland, OR

If accepted, this nomination will result in the first National Historic Landmark listing for one of Lawrence Halprin's groundbreaking public open spaces. The road has been winding and unconventional, but has provided valuable lessons for how to navigate the nomination process when multiple people and organizations are involved. The co-authors, who are developing the NHL nomination on behalf of the Halprin Landscape Conservancy, have pooled resources and assistance from allies such as architects, a local developer, a magazine editor, politicians, students, professors and scholars, performance artists, the National Park Service, State Historic Preservation Offices, and volunteers. The multi-disciplinary nature of this effort will not only result in a National Register nomination, but is helping highlight innovative research methodologies and techniques for developing interactive documentation of historic landscapes.

The New NPS Focus Digital Asset Management System

Christie McDonald, Digital Data Manager/Developer, NPS-OCIO-NISC-RISD, Denver, CO
Joe Gregson, RISD Chief, NPS-OCIO-NISC-RISD, Denver, CO
Chris Dietrich, Digital Information Resources Program Manager, NPS-OCIO-NISC-RISD, Denver, CO

The current NPS Focus Digital Library and Research Station (http://focus.inside.nps.gov) is a NPS-wide repository for digital assets, and a federated search portal. NPS Focus is used by parks and programs to manage, share, and discover information related to the protection and management of all types of park resources. The technology utilized by NPS Focus is being replaced, and the system is being decoupled into two systems: the NPSFocus Digital Library and the NPSearch portal. The re-designed NPS Focus Digital Library will be based upon i-cubed's product, GAME (Geospatial Asset Management Environment), and will improve digital asset management and discovery using current technologies. The new system will fea-

ture full support for embedded image metadata, metadata harvesting tools, direct upload of digital assets from mobile devices, enhanced geospatial tools for searching and tagging assets, and much more. The re-designed NPS Focus and new NPSearch sites are planned to be launched in 2011.

NPSearch: A New NPS Search Portal

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Joe Gregson, RISD Chief, NPS-OCIO-NISC-RISD, Denver, CO
Chris Dietrich, Digital Information Resources Program Manager, NPS-OCIO-NISC-RISD, Denver, CO
Dan Warner, Server Admin/Software Developer/Analyst, NPS-OCIO-NISC-RISD, Denver, CO

NPSearch (http://npsearch.nps.gov) is a new search portal for the NPS. NPSearch is one of two new subsystems resulting from the decoupling of the NPS Focus Digital Library and Research Station components. NPSearch replaces the "Research Station" function with the requirement to index and search across information systems NPS-wide, the ultimate goal being all NPS systems. There is a potential with NPSearch for indexing one hundred or more repositories and several million metadata records and linked digital assets. NPSearch is based upon Microsoft Search Server (MSSS), which provides a highly scalable product line with many robust search engine features. MSSS integrates with SharePoint services, a future target, and inherently crawls HTTP sites. MSSS is being customized to harvest XML metadata. The NPSearch portal is planned to be released in 2011, with the initial portal searching across ten systems, including NPS Focus, NRInfo GIS, NPS Voyager, InsideNPS, nps.gov, doi.gov, Landsnet and e-TIC.

Monitoring Phenology and Vegetation Production in Parks with the Terrestrial Observation and Prediction System

Forrest Melton, Research Scientist, California State University–Monterey Bay / NASA Ames Research Center, Moffett Field, CA
Sam Hiatt, Software Engineer, California State University Monterey Bay, Seaside, CA
Gong Zhang, PhD Candidate, Utah State University, Logan, UT
Andrew Michaelis, Software Engineer, California State University Monterey Bay, Seaside, CA & NASA Ames Research Center, Moffett Field, CA
Rama Nemani, Senior Research Scientist, NASA Ames Research Center, Moffett Field, CA

Future climate change is predicted to impact both vegetation phenology and vegetation productivity for ecosystems within many parks and protected areas. Monitoring these parameters over large areas can be challenging, however, making it difficult to implement cost effective monitoring protocols to detect emerging trends. Satellite data and ecosystem models can be applied to derive indicators of interannual changes in these parameters over large areas to supplement other measurements and observations. We present the use of the Terrestrial Observation and Prediction System (TOPS), an ecological modeling and data assimilation framework developed by NASA, to develop indicators of phenology and vegetation productivity to characterize interannual variability and evaluate patterns from 2000-2010. We present results from indicators developed for five partner parks (YOSE, SEKI, YELL, ROMO, DEWA) under the NASA-NPS PALMS project, and describe an interactive web interface for querying the data to generate summaries for ecosystem or regions of particular interest.

Smokey Says, "Keep Your Ash Off the Beach and Your Butts Out of the Woods!" Implementing a No Smoking Policy on Whiskeytown's Swimming Beaches

Jim Milestone, Superintendent, National Park Service, Whiskeytown, CA
Nathan Read, Shasta County Health and Human Services Agency, Redding, CA
Louis Jarvis, Shasta County Health and Human Services Agency, Redding, CA

In 2009, Shasta County Health and Human Services Agency approached park managers at Whiskeytown National Recreation Area in Northern California, requesting them to consider implementing a "Smoke Free Beach Policy" at the park's popular designated swimming beaches. Shasta County Public Health has been pro-active in implementing public area smoking bans throughout Redding, California. The National Park Service at Whiskeytown believed the idea of establishing beaches free of second hand cigarette smoke was consistent with the policies of Whiskeytown's management which promotes healthy outdoor physical activities such as hiking, mountain biking and water sports. Whiskeytown's park management team, in partnership with County Health, launched a public scoping process to introduce visitors to the idea of implementing a "Smoke Free Beach Policy" during the summer of 2009. Findings of this effort were shared with the public during subsequent public meetings and news letters that discussed the pros and cons of establishing "Smoke Free" beaches at the park's four designated swimming beaches. The public response to establishing "Smoke Free" beaches had a majority of the public support. The park implemented the "Smoke Free Policy" on May 1, 2010, and had a successful summer with reduced cigarette smoking on its popular beach areas.

Canada Goose Herbivory Monitoring along the Anacostia River, Washington, DC

Mikaila Milton, National Capital Parks–East, Washington, DC
Cairn Krafft, Botanist, USGS Patuxent Wildlife Research Center, Beltsville, MD
Stephen Syphax, Chief of Natural Resource Management, National Capital Parks–East, Washington, DC

Browsing by resident Canada geese is threatening a series of wetland restoration projects installed in the Anacostia River in Washington DC. As part of an Environmental Impact Statement (EIS) to determine the best management of the Anacostia wetlands and Canada geese at National Capital Parks–East, the park is working with USGS researcher Cairn Krafft to monitor the effects of Canada geese on the tidal freshwater wetland vegetation and provide quantitative data documenting the effects of Canada goose herbivory on wetland vegetation. In 2009, sixteen modules were established in Kingman Marsh, a 40-acre wetland constructed in 2000 by the US Army Corps of Engineers, District Department of the Environment, NPS (National Capital Parks-East), USGS, volunteers from the Anacostia Watershed Society, and others. As of August, 2010, a second year's worth of data has been collected which also shows a growing difference between exclosure and control plots in the modules that were established in bare marsh soil, indicating that if goose pressure is removed the marsh vegetation is likely to return to this portion of the Anacostia River.

Local Observations of Climate Change and Impacts on Subsistence Fisheries in Noatak, Alaska

Katie Moerlein, Master's Student, University of Alaska–Fairbanks, School of Fisheries and Ocean Sciences, Fairbanks, AK

Northwest Alaska is undergoing significant climatic changes with potentially severe social and ecological consequences. This project is systematically documenting traditional ecological knowledge (TEK) of climate and related ecological changes that affect the harvest, processing, and practices of subsistence fisheries in Noatak, Alaska. The community is primarily Inupiat Eskimo and subsistence activities are a central focus of the culture. TEK is a place-based knowledge system that has much to offer to the scientific community in understanding the ecological complexity associated with climate change. Primary analysis of interview data reveals that informants are acutely aware of climatic changes and impacts on subsistence fishing resources. Of particular concern are local decreases of Dolly Varden (*Salvelinus malma*), population increases of beaver in the waterways and subsequent effects on fish, decreased predictability of travel conditions, changes in the run timing of certain species of fish, and impacts of changing weather conditions on fish processing.

Monitoring Thermal Habitat Characteristics of Lake Clark, Lake Clark National Park and Preserve, Alaska

Claudette Moore, Southwest Alaska Network, National Park Service, Anchorage, AK
Dan Young, Lake Clark National Park and Preserve, Port Alsworth, AK
Jeff Shearer, Aquatic Ecologist, Southwest Alaska Network, National Park Service, King Salmon, AK

Water temperature is among the most influential environmental variables on chemical and biological processes in aquatic systems, especially in high latitude lakes were temperatures tend to be low and ice-free periods short. From a long-term monitoring perspective, tracking water temperature dynamics provides a consistent record for detecting trends in lake phenology, such as freeze-up and thermal stratification, and habitat characteristics critical to a host of aquatic organisms. Here we present a process for and results of thermal habitat monitoring for Lake Clark, a 31,337 hectare lake in Lake Clark National Park and Preserve in southwest Alaska. Lake Clark provides critical habitat for sockeye salmon *Oncorhynchus nerka* and lake trout *Salvelinus namaycush*, species of vital ecological, recreational, and subsistence importance. Our approach provides resource managers with a means of tracking potential influences of climate change as well as quantifying habitat conditions vital to fisheries resources.

Mountain Meadow Productivity in Relation to Climatic Factors

Peggy Moore, Plant Ecologist, U.S. Geological Survey, El Portal, CA
Jan W. van Wagtendonk, Research Forester (emeritus), U.S. Geological Survey, El Portal, CA

In montane areas of the west, meadow ecosystems act as centers of biological diversity, provide important ecosystem services, and support recreational activities. Nevertheless, basic ecological information on the structure and function of montane meadows is limited. We examined peak standing crop over 7 years within three subalpine meadow types with differing moisture regimes and compared it with climatic factors. Mesic and hydric meadows had lower productivity in wetter years: 20.7 g/m2 in wet vs. 27.8 g/m2 in dry years and 37.2 g/m2 in wet vs. 49.9 g/m2 in dry years, respectively. Wet years tend to have longer-lasting snow pack and shorter growing seasons. The data from all meadow types strongly support AICc models that contain an indication of growing season length (snow free date) and a measure of cumulative growing season warmth (thawing degree days). Understanding key factors influencing ecosystem variability will assist managers in protecting these fragile systems.

The Use of NASA's Invasive Species Forecasting System for the Control of Wavyleaf Basketgrass

Rachel Moore, NASA DEVELOP Internship Program Center Lead, NASA Goddard Space Flight Center, Greenbelt, MD
Josh Henkai, NASA DEVELOP Internship Program, NASA Goddard Space Flight Center, Greenbelt, MD
John L. Schnase, Office of Computational and Information Science and Technology (CISTO), NASA Goddard Space Flight Center, Greenbelt, MD

NASA, in partnership with the US Geological Survey, the National Park Service, and other federal agencies, has developed the Invasive Species Forecasting System (ISFS). The ISFS uses geostatistical modeling and NASA Earth observations to create landscape- and regional- scale predictive habitat suitability maps for invasive species. In this case study, the ISFS was applied to the Wavyleaf basketgrass (WLBG), a highly invasive grass species, which occurs throughout Maryland. It is estimated that this species could invade and destroy up to 10% of the forests in the eastern quarter of the United States in the next decade. In response to this threat, the NASA DEVELOP Internship Program has partnered with the Maryland Department of Natural Resources, using the ISFS to help natural resource managers understand the potential distribution of this species. This poster presentation will discuss the capabilities of the ISFS, as well as its role in the control of WLBG.

Communicating Science: Air Quality in National Parks

Kristi Morris, Physical Scientist, National Park Service, Denver, CO
Melanie Ransmeier, National Park Service
Dee Morse, National Park Service
Bruce Nash, National Park Service
Ellen Porter, National Park Service
Colleen Flanagan, National Park Service

Several recent efforts focused on communicating air quality science will be showcased in a multi-media presentation. Audiences addressed through new products include the public, researchers, teachers and students, resource managers, and park visitors. The Air Resources Division (ARD) hosts 16 webcam web pages which provide new images every 15 minutes and air quality data hourly. These highly popular web pages were recently redesigned to improve the communication of air quality information to the public. ARD has also produced its first podcast called On the Air; created a module for VIEWS, an educational tool that provides information for teachers; and redesigned Air Quality in Parks, an air resource information system for parks and the public. The Air Resources Division wishes to increase awareness and use of these products and collaborate with NPS colleagues on future efforts to communicate about science and air quality in national parks.

Planning for Federal Lands: Transportation Systems

Lindsey Morse, Community Planner, USDOT John A. Volpe National Transportation Systems Center, Cambridge, MA
Benjamin Cotton, USDOT John A. Volpe National Transportation Systems Center, Cambridge, MA
Michael Kay, USDOT John A. Volpe National Transportation Systems Center, Cambridge, MA
Eric J. Plosky, USDOT John A. Volpe National Transportation Systems Center, Cambridge, MA

Federal land management agencies (FLMAs)—the National Park Service (NPS), the U.S. Forest Service (USFS), the U.S. Fish and Wildlife Service (FWS), and the Bureau of Land Management (BLM)—face a number of planning challenges, including changes in population, recreational behavior, and environmental conditions. Key to addressing these planning challenges is the design and implementation of sustainable transportation systems that enable enjoyable visitor experiences without degrading sensitive landscapes or detracting from agencies' sustainability goals. This poster highlights what FLMA units of various sizes, locations, and demographics have been doing to successfully integrate transportation solutions with the planning objectives of surrounding communities. Case studies, including Acadia National Park (NPS, Bar Harbor, ME), Chincoteague National Wildlife Refuge (FWS, Chincoteague, VA), and White River National Forest (USFS, Glenwood Springs, CO) provide models of effective partnerships between communities and FLMAs to achieve mutual goals related to livability, land use, and environmental stewardship.

Using Mosses and Lichens to Detect Contaminant Deposition and Ecological Change in Alaska's Parklands

Peter Neitlich, Chief of Natural Resources / Ecologist, Western Arctic National Parklands, Winthrop, WA

Since 1999, researchers have used Hylocomium moss tissue to monitor patterns of heavy metal deposition adjacent to the world's largest Pb and Zn mine in Northwest Alaska. Zn, Pb and Cd pollution is widespread on NPS lands, and has impacted lichens important for winter forage and tundra diversity. Coupling contaminant and lichen data has allowed a determination of critical values beyond which lichen degradation occurs. Initial publications on spatial patterns of deposition near the Red Dog

Mine spurred engineering controls that ultimately decreased dust-borne contaminants by 50-70%. Two I&M networks in Alaska are currently using Hylocomium tissue to detect local, regional and global inputs of metals, sulfur and nitrogen. By coupling lichen community data with a predictive model of absolute deposition based on moss tissue contaminant levels (currently under development), we plan to develop lichen-based critical loads for N and selected metals.

Monitoring Landscape Dynamics of U.S. National Parks with NPScape

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Bill Monahan, Ecologist, I&M, National Park Service, Fort Collins, CO
John Gross, Ecologist, I&M, National Park Service, Fort Collins, CO
Mara Kali, GIS Specialist, I&M, National Park Service, Fort Collins, CO
Leona Svancara, Research Associate, Landscape Dynamics Lab, University of Idaho, Moscow, ID
Peter Budde, Natural Resources GIS Team Lead, National Park Service, Fort Collins, CO
Brent Frakes, Business Analyst, I&M, National Park Service, Fort Collins, CO
Shepard McAninch, Ecologist. CUPN I&M, National Park Service, Blacksburg, SC
Tom Philippi, Ecologist, I&M, National Park Service, Fort Collins, CO
Mike Story, Remote Sensing Specialist, I&M, National Park Service, Denver, CO
Sean Worthington, GIS/Remote Sensing Specialist, I&M, National Park Service, Denver, CO
Nick Viau, GIS Student Intern, I&M, National Park Service, Fort Collins, CO
Thomas Flowe, GIS Student Intern, I&M, National Park Service, Fort Collins, CO

NPScape is a landscape dynamics monitoring project that provides landscape-level data and evaluations for park natural resource management and planning at local, regional, and national scales. The project delivers a suite of products that focus on a set of landscape-scale indicators for more than 270 parks with significant natural resources. Initial analyses summarized measures in 6 major categories: population, housing, roads, land cover, pattern and conservation status. These products include all source and processed data, metadata, documentation of all processing steps, processing scripts and maps for both parks and FWS Landscape Conservation Cooperatives (LCCs). The primary delivery mechanism is the NRInfo Reference application, a web-based portal designed for search and discovery of National Park Service natural resource information, reports and data. We provide an overview of NPScape and include example products to illustrate their applicability to questions related to natural resource management.

Assessing the Extent of Visitor-Caused Impacts to Bank Stability along the Merced River

Todd Newburger, Biologist, Division of Resources Management and Science, Yosemite National Park, El Portal, CA
Jim Roche, National Park Service
Dave Pettebone, National Park Service

In order to determine appropriate visitor capacities, baseline information on the degree and types of impacts to sensitive environments is often sought. One such impact that is of major concern to managers in many parks is visitor caused erosion of riverbanks. Yosemite National Park has developed a long term monitoring protocol related to riverbank condition along a 17km stretch of the Merced River in Yosemite Valley. Initial efforts identified 24 random sampling sites which examined bank stability, vegetation condition and trend, and channel morphology. Subsequent sampling has focused on establishing relationships with amounts and types of visitor use at selected sites. The findings associated with visitor use estimations and functional group vegetation cover will be discussed. In the fall of 2010, a condition assessment focused on addressing large wood function and an independent condition assessment of the entire reach will be implemented. The findings from the randomly selected sites as well as the independent reach length assessment will provide tools for standards development for the suite of indicators of visitor related impacts to riverbank.

Wilderness Encounters in Yosemite National Park, An Adaptive Approach to Data Collection and Indicator Development

Todd Newburger, Biologist, Division of Resources Management and Science, Yosemite National Park, El Portal, CA
TJ Broom, Acting Wilderness and Trails Manager, Gifford Pinchot National Forest, Mt. Adams Ranger District
Troy Hall, Professor, Department of Conservation Social Sciences, University of Idaho, Moscow, ID

In order to evaluate the wilderness visitor's opportunity for solitude, the wilderness encounters protocol provides a widely used tool for determining encounter rates and to a lesser degree, wilderness travel patterns. In 2009, Yosemite and the University of Idaho to investigate encounter rates along 7 day-use trail segments in the Tuolumne Meadows area. Linear regression was used to evaluate relationship between the numbers of people entering and exiting wilderness trails and encounter rates

between groups on these trails. In 2010, Yosemite's Branch of Visitor Use and Social Science staff and a dedicated group of volunteers continued the work, collecting field observations and trail use counter data at 6 additional locations within the Merced and Tuolumne river corridors. This presentation demonstrates an adaptive approach to protocol development and implementation utilized by Yosemite National Park in its effort to monitor visitor use in wilderness. Analysis of results from 2010 and 2009 field seasons will be discussed.

Using Remote Sensing to Manage the Okanogan-Wenatchee National Forest

Michelle Newcomer, DEVELOP National Program Student Manager, NASA Ames Research Center, Mountain View, CA
Erin Justice, Student Manager, DEVELOP National Program, NASA Ames Research Center, Mountain View, CA
Susan Prichard, Research Scientist, University of Washington, Seattle, WA
J.W. Skiles, DEVELOP Mentor, NASA Ames Research Center, Mountain View, CA

Many areas in the Okanogan-Wenatchee National Forest in northeast Washington are in poor health due to an increase in burns, sequential droughts, and the subsequent outbreak of the mountain pine beetle (MPB). A long history of fire suppression over the past century has lead to the accumulation of forest litter, increasing fuels in dry western forests. However, fuel treatments, including tree harvesting and prescribed burning, have proven to be an effective strategy for mitigating burn severity and decreasing carbon emissions. To aid in efforts for understanding forest disturbance, remote sensing offers a cost-effective and feasible tool for assessing forest health and developing effective management practices. In this study, burn severity and MPB infestation maps were generated from Landsat TM5, and NASA satellite sensors MODIS, ASTER, and Hyperion images that were calibrated with in-situ measurements to evaluate forest health in the Okanogan-Wenatchee National Forest. Continued use of remote sensing will provide managers with the ability to accurately map the health of the forest ecosystem.

Bridging the Gap: Improving Science Communication in the San Francisco Bay Area Network

Michelle O'Herron, Science Communication Specialist, San Francisco Bay Area Network, San Francisco, CA

Following the completion of a natural resource communication plan last fall, the San Francisco Bay Area Network (SFAN) has been making great strides in improving the way information is shared throughout the network and with park partners. Through partnerships with natural resources and interpretation staff, the I&M Program, the Pacific Coast Science and Learning Center, and park non-profits we have: undertaken a major initiative to create a one-stop-shop website to house natural resource information; increased the number and breadth of participants in the annual natural resources and science symposium; expanded and improved the monthly natural resources update; worked with interpretation staff to develop subject-specific resource briefings that appeal to a wider audience; increased the number of multimedia products produced; and developed a plan for how to get information to partners in a way that supports dissemination through social media channels.

Water Quality Monitoring in the Mediterranean Coast Inventory and Monitoring Network: Cabrillo National Monument

Stacey Ostermann-Kelm, Program Manager, Mediterranean Coast Inventory & Monitoring Network, Thousand Oaks, CA
Benjamin Pister, Chief of Resources, Cabrillo National Monument, San Diego, CA
Barry Hibbs, Professor, California State University–Los Angeles, Los Angeles, CA

The overarching objectives of this monitoring program are to determine the status and long-term trends in water quality at Cabrillo National Monument (CABR) in Southern California. We are interested in: (1) whether contaminants at the Monument exceed water quality standards, (2) the quantity and effects of storm runoff on the Point Loma Peninsula, (3) the extent to which pollutants from the San Diego Bay affect water quality, and (4) the relationships between groundwater and the rest of the CABR's hydrological landscape. Here we present a sampling plan to determine the status and trends in levels of core parameters (nutrients, metals, PAHs), as well as to detect exceedances in water quality parameters.

A Multi-discipline Approach to Management of NPS Cave and Karst Areas

Dale Pate, Acting National Cave and Karst Program Coordinator, National Park Service, Carlsbad, NM

National Park Service (NPS) units contain significant cave and karst resources including numerous fragile populations of endemic species, complex geological structures, archeological and paleontological sites, vast quantities of fresh water, and a host of other important and valuable resources. There are many unknowns concerning NPS cave and karst areas. The National Cave and Karst Program within the Geologic Resources Division was established to help parks identify specific needs, to provide guidance on educational opportunities, and to provide assistance and recommendations for management of these resources. Future directions should include a multi-disciplined approach to identify and understand park cave and karst resources, the hydrologic flow paths that transcend park boundaries and any potential contamination sources that may place these resources at risk.

Managing the Biscayne BioBlitz Data Storm

Judd Patterson, GIS Specialist, National Park Service, Palmetto Bay, FL

The National Geographic Society and the National Park Service partnered in May 2010 to hold the first marine-based BioBlitz. This 24 hour event engaged scientists and the public in a challenge to find and identify as many species as possible within the park. As hundreds of volunteers spread across the water and islands, the flow of data sheets and photographs grew from a trickle to a torrent. The data management plan developed by the National Geographic Society, Natural Resource GIS Program, Biscayne National Park, and the South Florida/Caribbean Network handled many facets including field sheets, photo geotagging, data entry, and on-demand reporting. The plan proved to be very adaptable and ensured that tallies were ready in time for the closing ceremony. Critical data quality checks continued after the event and brought the final tally to an impressive 828 species, including 324 that were previously unknown inside the park.

Enhancing Fire Science Exchange: The Joint Fire Science Program's National Network of Knowledge Exchange Consortia

Donna Peppin, SW Consortium Coordinator, Northern Arizona University, Flagstaff, AZ
Andrea Thode, SW Consortium PI, Northern Arizona University, Flagstaff, AZ
Eugénie MontBlanc, Great Basin Consortium Coordinator, University of Nevada, Reno, NV
Eric Toman, Lake States Consortium Co-PI, Ohio State University, Columbus, OH
Vita Wright, Northern Rockies Consortium PI, RMRS / NPS, Kalispell, MT

The Joint Fire Science Program is developing a national network of knowledge exchange consortia comprised of interested management and science stakeholders working together to tailor and actively demonstrate existing fire science information to benefit management. This poster describes the background, vision, and goal behind the network, provides an overview of existing regional consortia, and illustrates examples of the types of activities and services the consortia provide.

National Parks, Art and Climate Change: The 2nd Nature Pilot Program

Natlie Perez, Intern, George Melendez Wright Climate Change Internship Program, Falls Church, VA

The 2nd Nature pilot program is a partnership between the National Capital Region of the NPS and the Art and Media house of the Latin American Youth center in Washington, D.C. The program was created to facilitate a connection between inner city youth (ages 14-21) and the natural environment. As a George Wright Melendez Climate Change intern, I was tasked with educating youth about climate change. Starting with an assessment of their individual carbon footprints, we discussed what factors make their impact on the environment. It was the first time many of the youth understood how climate change will affect them in their daily lives. The youth were able to bring all this knowledge as well as personal thoughts and feelings about climate change into their final creative pieces for the summer. The results yielded powerful and motivating poetry, music and media about climate change in their community.

Hiding in Plain Sight: Lessons Learned from Klamath Network Data Mining

Elizabeth Perry, Program Assistant, National Park Service, Klamath Network, Ashland, OR
Sean Mohren, Data Manager, National Park Service, Klamath Network, Ashland, OR

Recognizing how crucial knowledge is to sound natural resource management, the National Park Service's Inventory and Monitoring Program led a nationwide effort to compile data on 12 natural resource inventories. To assimilate data on these inventories for the Klamath Network's six parks, we undertook an extensive data mining project from 2001-2007. The Network populated Park Service databases with standardized metadata for park-specific references and datasets, cataloging bibliographic records and assisting in developing species lists for each park. In many cases, we helped parks discover information that had been lost to obscurity. For most parks, this was the first standardized park-specific bibliography and species list open to resource managers outside of the archives collections. This effort has given parks the tools to learn more about their resources in an efficient manner. In this poster, we will summarize the key accomplishments and lessons learned from the Klamath Network data mining experience.

Getting the Lead Out: Gaining Support for Non-Lead Hunting Practices Across NPS Units

Jim Petterson, Biologist, Pinnacles National Monument, Paicines, CA
Daniel George, Condor Program Manager, Pinnacles National Monument, Paicines, CA
Kirsten Leong, Program Manager, Human Dimensions of Biological Resource Management, BRMD NPS

Recently, scientific research has shown that scavenging eagles, imperiled California condors, grizzly bears and other mammals are being poisoned by incidental ingestion of spent lead bullet fragments when they feed on gut piles and carcasses that remain

on the landscape after hunting activities. Risks to human health also exist when people eat game meat shot with lead-based bullets. An innovative, interdisciplinary outreach effort has been launched across several NPS regions that highlights the threats to both wildlife and human health when lead bullets are used. A multi-faceted approach that incorporates video, printed media, websites, PowerPoint presentations and actual bullet demonstrations at shooting ranges has been developed for use at parks that allow hunting. Consequently, hunters and ranchers in communities adjoining the parks, and park visitors have gained an appreciation for the scope of the problem, and more importantly how the use of copper-based bullets for hunting alleviates the problem.

Geologic, Energy and Mineral Resource Survey of the National Park Service

Rebecca Port, Geoscientist, National Park Service, Lakewood, CO

The National Park Service Geologic Resources Division (Division) developed an on-line survey for over 270 parks with significant natural resources to identify the needs and priorities of park managers related to geologic resource management and energy and minerals development inside and near parks. This poster summarizes the results of the survey and identifies new focus areas for the Division. Over 160 parks contain nationally significant geologic resources, yet there are less than 100 practicing geologists service-wide to address these resources. Geologic resources are a valuable part of our heritage and parks are often obligated by law to ensure their protection. Furthermore, parks must manage energy and minerals development in and near parks to avoid adverse impacts on park resources and values. The survey results will help the Division gain an understanding of park manager's needs, factors limiting managers from addressing these needs, and strategies to help them meet their needs.

Evaluating the Role of Nitrogen as a Cause of Marsh Loss in Jamaica Bay, Gateway National Recreation Area

Patricia Rafferty, Coastal Ecologist, National Park Service, Northeast Region, Patchogue, NY

Nitrogen loading may cause or contribute to marsh loss in Jamaica Bay. On average, 15,785 kgd-1 of N enter the bay via wastewater discharge, subway dewatering, landfill leachate, submarine groundwater discharge and atmospheric deposition. High nitrogen levels may result in the reallocation of energy from roots to shoots in Spartina alterniflora. High N loading may alter plant function by decreased nitrogen resorption efficiency, lowered nitrogen resorption proficiency and decreased belowground productivity. Diminished root production can lead to a loss in marsh elevation relative to sea level rise. In addition, roots bind sediments and slow sediment compaction and erosion. In 2009, research was initiated to evaluate the role of N on plant function at three marshes in Jamaica Bay. Mechanisms of marsh loss due to changes in plant function, research methodology and preliminary results will be presented.

Understanding Horseshoe Crab Population Dynamics in New York and New Jersey National Parks

Patricia Rafferty, Coastal Ecologist, National Park Service, Northeast Region, Patchogue, NY

Mary-Jane James-Pirri, Marine Research Associate, Graduate School of Oceanography, University of Rhode Island, Narragansett, RI

The American horseshoe crab (*Limulus polyphemus*) is an important component of the marine ecosystem and a valuable socioeconomic species. Crabs are harvested commercially for bait and by the biomedical industry, that produces a critical pharmaceutical product from their blood. Coastal National Parks in the New York and New Jersey area all have actively spawning populations of horseshoe crabs; however, little is known about population dynamics in terms of spawning densities, spawning sex ratios, or egg densities. In 2011, horseshoe crab monitoring and tagging, in conjunction with the USFWS Cooperative Tagging Program, will begin at Fire Island National Seashore, Sagamore Hill National Historic Site, and Gateway National Recreation Area. This project will provide information on regional horseshoe crab populations that is essential for the conservation and management of this species. An additional goal for this project is the development of park-specific, long-term citizen-based monitoring programs to sustain future data collection.

Predicting Hiker Movement Rates Via Terrain Characteristics at Rocky Mountain National Park

Joel Ramtahal, Graduate Research Assistant, Southern Illinois University–Carbondale, Carbondale, IL

Logan Park, Assistant Professor of Forest Recreation and Park Management, Southern Illinois University–Carbondale, Carbondale, IL

Steve Lawson, Director, Public Lands Planning and Management, Resource Systems Group, Inc., White River Junction, VT

A historical criticism of the Visitor Experience Resource Protection framework developed by the National Park Service is that it is reactive, allowing resources and experiences to come to harm before adaptive management interventions are enacted.

Recent research has demonstrated that computer simulation modeling can help park managers to be more proactive in anticipating and averting resource impacts by predicting outcomes of various management alternatives. One application of this approach is modeling hiker crowding conditions by simulating hikers in a trail network. However, the mathematics used to simulate hiker movement were developed decades ago, and may no longer be accurate. Using detailed GPS data collected from a representative sample of hikers at Rocky Mountain National Park, these equations can be updated for modern simulation use. We will discuss how computer simulation can assist in solving management problems before they develop, and other applications including search and rescue.

Assessment of Riparian Conditions at Chattahoochee River National Recreation Area

Allyson Read, Biologist, National Park Service/ Chattahoochee River NRA, Sandy Springs, GA

The Chattahoochee River National Recreation Area (CRNRA) consists of 15 discrete park units along a 48-mile reach of the Chattahoochee River in metropolitan Atlanta. The park completed a comprehensive inventory and assessment of wetlands and riparian areas in the summer of 2010. Each park unit was inventoried and mapped using existing data from 2009 aerial photos, existing GIS data, 2006 USFWS National Wetland Inventory (NWI) maps and the NRCS Web Soil Survey. Potential wetland areas were identified in the GIS, then located and field-verified using GPS. Wetlands were mapped and classified according to hydrology, hydric soils, and vegetation criteria. The total wetland acreage of 2486.80 represents an increase of 435.78 acres (or 21%) over the 2006 NWI inventory, with the largest increase being freshwater ponded wetlands. This baseline data provides resource managers the information needed to better manage water resources, including wetland integrity, ecological function, and wildlife habitat.

Assessment of Tropical Cyclone Induced Transgression of the Chandeleur Islands for Restoration and Wildlife Management

Ross Reahard, Student Intern, NASA DEVELOP, Stennis Space Center, MS
Brandie Mitchell, NASA

Historically, tropical cyclonic events have had a great impact on the transgression of barrier islands, especially the Chandeleur Island chain off the Eastern coast of Louisiana. These islands help buffer Southeastern Louisiana from major storms, provide habitat for nesting bird species, and are part of the second oldest wildlife refuge in the country. In 1998, Hurricane Georges caused severe damage to the chain, prompting restoration and monitoring efforts by federal and state agencies. Increased storm events have steadily diminished the state of the islands, reversed all previous restoration efforts, and intensified island erosion and vegetation loss. Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) and Landsat 5 Thematic Mapper (TM) were utilized to detect shoreline erosion, land loss, and vegetation change, from 1998 to 2009. The study created a more synoptic view of the transgression of the Chandeleur Islands and the impact extreme storm events had over the last decade.

Documenting Dinosaurs: GeoCorps America Geologists at Denali National Park Develop Field Inventory of Paleontological Resources

Nadine Reitman, Physical Science Technician, Denali National Park and Preserve, Denali Park, AK
Phil Brease, Geologist, Denali National Park and Preserve, Denali Park, AK (recognized posthumously)
Guy Adema, Natural Resource Manager, Denali National Park and Preserve, Denali Park, AK
Chad Hults, Geologist, USGS Alaska Science Center, Anchorage, AK
Alexander de Moor, GeoCorps America Intern, Denali National Park and Preserve, Denali Park, AK

Over the course of five years, GeoCorps America interns have helped Denali discover, record, and protect sensitive paleontological resources. Interns document field fossil sites and have developed a comprehensive paleontologic database. The digital database incorporates and organizes paleontological resources in an easy-to-use, searchable format, enabling future interns, researchers, and park managers to identify existing resources and plan projects. Using standardized attributes, scientists can use the database to search for specific fossil types and quality, and managers can search for sensitive paleontological resources. The GeoCorps America program is a partnership between the National Park Service and Geological Society of America that places temporary geoscientists in parks through a cooperative internship program, providing parks with valuable expertise and participants with unique experience. The success of this program is evidenced through the accomplishments of this project and others like it occurring in Denali over the past 10 years.

Protected Areas Tools of the Commission for Environmental Cooperation (CEC)

Karen Richardson, Program Manager, Commission for Environmental Cooperation, Montreal, Quebec, Canada
Jeff Stoub, Commission for Environmental Cooperation, Montreal, Quebec, Canada

The Commission for Environmental Cooperation's (CEC's) North American Environmental Atlas and Guide to Ecological Scorecards for Marine Protected Areas in North America are two recent tools that provide support for protected area experts and managers. The Atlas hosts the geospatial datasets and maps for the terrestrial and marine protected areas of North America. The Guide to Ecological Scorecard is an easy to use how-to-guide for resource managers that presents a tested methodology to assess the health of key ecosystem elements such as water, habitat and living resources through ecological scorecards. These tools will be presented as both a computer demonstration and in hardcopy.

Protecting Our Greatest Asset in NPS Natural Resources—Our Employees

Samantha Richardson, Public Affairs Specialist/Communications Editor for National Park Service Safety Leadership Council, National Park Service, Lakewood, CO
Jerry M. Mitchell, Chief, Biological Resource Management Division, NPS Natural Resource Program Center, National Park Service, Fort Collins, CO

This poster will graphically illustrate the importance of safety in natural resource field activities. It will highlight how the incorporation of Operational Leadership (OL) into the culture of natural resource management empowers employees to be assertive about their safety and the safety of their team, and encourages participation in the decision making and risk management process. The poster will illustrate the operational leadership principles to identify key risk factors that affect individual and team performance in the natural resource professions. It will also include suggested strategies for encouraging safer individual behavior within natural resource professions that can lead to discussions about the inherent risks of natural resources work and an awareness of how structure (protocols, policies, etc.) and human behavior interact in risk-related field situations.

Spatial Patterns of Environmental Contaminants in Bald Eagles from Three Parks in the Upper Midwest

Bill Route, Ecologist / Program Manager, Great Lakes I&M Network, Ashland, WI
Paul Rasmussen, Wisconsin Department of Natural Resources, Monona, WI
Rebecca Key, National Park Service, Great Lakes Inventory & Monitoring Network, Ashland, WI
Mike Meyer, Wisconsin Department of Natural Resources, Rhinelander, WI
Mark Martell, Audubon Minnesota, St. Paul, MN

The Great Lakes I&M program is monitoring environmental contaminants in bald eagle nestlings at the Apostle Islands National Lakeshore (APIS), Mississippi National River and Recreation Area (MISS), and the St. Croix National Scenic Riverway (SACN). The monitoring includes heavy metals, agricultural pesticides, and industrial-use chemicals. We found contaminant levels in eaglets (n=288) to be associated with proximity to municipal and industrial waste and to watersheds with certain physical and chemical characteristics. Mercury was highest where wetlands influenced water chemistry and hence methyl mercury production. Nestlings from remote islands in Lake Superior had levels higher than expected for some contaminants – probably due to high retention of aerially transported pollutants from global sources. Eaglet productivity was above thresholds for healthy populations and many contaminants were in decline; however, contaminant "hot spots" were found, likely the result of point and non-point pollution combined with bio-magnification in the local food web.

The Phylogenetic Structure of Stingray *Neotrygon kuhlii* in Indonesia

Jeremy Rude, Student, Humboldt State University, Arcata, CA

The Coral Triangle encompasses the most diverse marine life in the world. During the Pleistocene glacial periods, sea levels dropped by 130 meters, revealing the Sunda Shelf. This resulted in limited genetic exchange between Pacific and Indian Ocean populations, divergent populations, and ultimately the biodiversity we see today. This study focuses on the phylogenetic structure of the stingray *Neotrygon kuhlii* in Indonesia and the social and conservation implications of its current distribution.

Vegetation Monitoring at Voyageurs National Park

Suzanne Sanders, Ecologist, Great Lakes I&M Network (NPS), Ashland, WI
Jessica Grochowski, Botanist, Great Lakes I&M Network (NPS), Ashland, WI

We initiated a long-term vegetation monitoring program at Voyageurs National Park (VOYA) in summer 2008. The goals of this

monitoring program are to detect forest change and to draw inferences about forest health so that management recommendations can be provided to Great Lakes Network parks. Data were collected on tree density and basal area, sapling density, disease, shrub cover, herb frequency, and coarse woody materials. Thirty-eight plots were established at VOYA in 2008 spanning four habitats. Most overstory species were exhibiting healthy regeneration and recruitment into the canopy, however there were some exceptions. The data collected at VOYA was then compared to data collected by the National Forest Service under the Forest Inventory and Analysis Program (FIA), on land outside VOYA but in adjacent counties, to determine if there is significantly greater tree basal area and tree density within the boundary of the National Park.

World War II Military Intelligence Programs at P.O. Box 1142, Alexandria, Virginia

Vincent Santucci, Chief Ranger, George Washington Memorial Parkway, McLean, VA
David Lassman, Park Ranger, George Washington Memorial Parkway, McLean, VA
Matt Virta, Cultural Resources Program Manager, George Washington Memorial Parkway, McLean, VA
Dan Gross, Volunteer, George Washington Memorial Parkway, McLean, VA
Brandon Bies, Site Manager, Arlington House, McLean, VA

P.O. Box 1142 was a secret World War II military intelligence facility based at Fort Hunt, Virginia between 1942 and 1946. The men and women who served at this top secret camp operated programs vital to the war effort: MIS-Y and OP-16-Z interrogation of high ranking POWs; MIS-X, escape and evasion aid to American servicemen fighting overseas; and MIRS, analysis of captured enemy documents. Through their efforts, the Allies learned about enemy research in such areas as rocketry, the atomic bomb, the jet engine, U-boats, microwaves, and infrared technology. The accomplishments of P.O. Box 1142 contributed to the Allied victory and led to advances in scientific technology and military intelligence that directly influenced the Cold War. Since 2005, the staff at the George Washington Memorial Parkway have conducted over seventy oral history interviews with veterans associated with the military intelligence activities at P.O. Box 1142.

Monitoring Landbirds in Gulf Coast Inventory and Monitoring Network Parks

Martha Segura, Program Manager, National Park Service, Gulf Coast I&M Network, Lafayette, LA
Daniel J. Twedt, U.S. Geological Survey, Patuxent Wildlife Research Center, Vicksburg, MS

The Gulf Coast Network comprises 8 parks distributed from south Texas to Florida. Resident and migratory landbirds are high priority for long-term monitoring in all Gulf Coast Network parks. The proposed framework, sampling design, and methodology for monitoring landbirds within these parks provide information for: (1) baseline inventories of avian species, (2) assessment of relative abundance of detected species, (3) estimates of population density for commonly detected species, (4) estimation of the geographic distribution of detected species within a park, and (5) the opportunity for extrapolation of species distributions to unmonitored areas of a park when combined with information on habitats, vegetation structure, and geomorphology. Public access databases serve as repositories of collected data such that these data may contribute to established long-term programs that provide regional estimates of bird populations.

Healthy Parks Healthy People: The Evolution Continues

John Senior, Manager, International Strategy, Parks Victoria, Melbourne, Victoria, Australia

Since it was featured in the 2007 George Wright Society Conference, the "Healthy Parks Healthy People" approach of Parks Victoria (Australia) has gained international credibility and acceptance. In 2008 it was featured as the main component of one (of three) themes at IUCN's World Conservation Congress. More recently, in April 2010, Parks Victoria staged the inaugural International Healthy Parks Healthy People Congress, attracting 1200 delegates from 37 countries from a variety of disciplines (e.g. mental and physical health, tourism, planning, community development, and environment) demonstrating the 'connection' was meaningful. Fifteen internationally eminent speakers from this array of professions provided keynote presentation and were unanimous in their endorsement of the concept. The success of the event is leading to a variety of global and local initiatives. This session will discuss the outcomes, implications and opportunities arising from the Congress and especially the interest of the National Parks Service and Parks Canada.

Developing a Post Fire Cheatgrass Abundance Prediction Model

Kirk Sherrill, Geospatial Technician, MBS, National Park Service, Fort Collins, CO
Bill Romme, Fire Ecologist, Colorado State University, Fort Collins, CO
Tamara Naumann, Botanist, National Park Service, Dinosaur, CO

We are developing a geospatial post-fire cheatgrass abundance prediction model at Dinosaur National Monument (DINO). The

goal is to develop a modeling methodology which can be applied to numerous western NPS units. Model development is contingent on the availability of a mature set of interdisciplinary derived NPS Inventory and Monitoring (I&M) data. In DINO this consists of vegetation and soil inventory data, a fire occurrence database, and ancillary geospatial data. Using these I&M data we have derived four groups of explanatory variables: Biogeophysical, Climatic, Disturbance History/Source related, and Fire Properties. Preliminary classification tree modeling, using the best variables from each respective group, predicted occurrence of cheatgrass after fire with overall accuracy of 0.68, with temperature as a key predictive variable. Once validated, the model can be applied to subsequent fire events, providing land managers a timely and spatially explicit estimate of the expected cheatgrass response to fire.

Travel Time Cost Surface Model: A Planning and Logistical Resource Tool

Kirk Sherrill, Geospatial Technician, MBS, National Park Service, Fort Collins, CO
Brent Frakes, Business Analyst, National Park Service, Fort Collins, CO
Stephani Schupbach, GIS Specialist, MBS, National Park Service, Fort Collins, CO

The travel time cost surface model (TTCSM) calculates travel time from defined locations to other locations within a user-defined area of interest. Modeling is done using GIS and readily available geospatial products such as road, trail, and stream networks, digital elevation models and land cover data to name a few. The model is designed to be dynamic in nature in order to accommodate user (e.g., hiker / skier / ATVer / etc.), temporal (e.g., winter/summer data collection) and park specific needs. Outputs from the TTCSM are point-to-point specific travel time least cost paths (i.e. the modeled fastest path(s)) and raster maps in which each cell value is the modeled time required to reach the given cell from the specified starting location(s). Overall the TTCSM is intended to be used as a tool to facilitate more efficient field data sampling design and planning.

Utility of the Monitoring Avian Productivity and Survivorship Program for Managing Birds on Public Lands

Rodney B. Siegel, Executive Director, Institute for Bird Populations
David F. DeSante, Comptroller and President, Institute for Bird Populations
Stephen M. Fettig, Wildlife Biologist, National Park Service, Los Alamos, NM

The Monitoring Avian Productivity and Survivorship (MAPS) program is a network of bird banding stations operated by public agencies, private organizations, and individual bird banders across North America. MAPS data can be analyzed at multiple spatial scales, from local to continental, to help resource managers assess the effects of climate change and other ecological stressors, and develop and test bird conservation strategies. Preliminary analysis of the first 15 years of MAPS data indicates a 1.77% per year decline in the number of adult birds captured, a 0.46% per year decline in adult survival, and a 0.25% per year decreasing tendency in productivity. More nuanced analyses, including detailed assessments of the demographic rates and population trends of over 100 species, are underway. Supporting and expanding the network of MAPS stations on public lands is an effective strategy for strengthening science-based land management and helping land managers to safeguard bird populations.

Geotemporal Vectors of Shoreline Change along Assateague Barrier Island, 2005–2010

Tanya Silveira, Research Scholar, Sandy Hook Cooperative Research Programs, Highlands, NJ
Norbert P. Psuty, Director, Sandy Hook Cooperative Research Programs, Institute of Marine and Coastal Sciences, Rutgers University, Highlands, NJ
Courtney Schupp, Geologist, Assateague Island National Seashore, Berlin, MD
Neil Winn, Geographer, Assateague Island National Seashore, Berlin, MD
Carl Zimmerman, Management Assistant, Assateague Island National Seashore, Berlin, MD

A long-term program to monitor shoreline position along Assateague Island National Seashore is the basis for evaluating the evolution of the coastal system. Seasonal and annual comparisons between 2005 and 2010 show a persistent inland displacement for most of the length of the island (average of -6 m in the National Park area), although there is some oscillatory variation related to circulation cells. The area adjacent to the Ocean City Inlet shows a pronounced seaward displacement, up to 60 meters in the 5-year period, influenced by the jetties, the ebb-tide delta, and the bypassing activities related to the dredging of the inlet channel. However, the southernmost end of the island shows prominent shoreline accretion, reaching 200 m in one year. Rates and trends of shoreline change along Assateague Island are a result of the sediment availability, intensity of storms, and human interventions taking place along the island.

ORV Noise in National Parks

Randy Stanley, Acoustic Specialist, National Park Service, Natural Sounds Program, Fort Collins, CO

Managing off-road vehicle (ORV) noise is an emergent issue in a number of national park units. ORV plans need to address where, how many, and how often ORVs can travel, as well as potential impacts on sensitive sites. Geographic noise modeling is a powerful tool to help illustrate ORV noise impacts and to help guide park managers. Examples of geographic ORV noise modeling are shown.

Strategy for Enhanced Monitoring to Address Climate Change Effects in North Atlantic Coastal Parks

Sara Stevens, Northeast Coastal and Barrier Network Program Manager, National Park Service, Kingston, RI

Brian Mitchell, Program Manager, National Park Service, Northeast Temperate Network, Woodstock, VT

J. Patrick Campbell, Program Manager, National Park Service, Inventory and Monitoring, National Capital Region, Washington, DC

Marcia B. Brown, Foundations of Success, Bethesda, MD

Erika Patenaude, Biologist, National Park Service, Northeast Coastal and Barrier Network, University of Rhode Island Coastal Institute, Kingston, RI

In fiscal year 2010, several groups of National Park Service Inventory and Monitoring Networks were provided funding to review their existing monitoring programs in light of climate change and propose enhancements. One of these groups was the North Atlantic Coast, which includes the Northeast Coastal and Barrier Network, the Northeast Temperate Network, and the National Capital Region Network. With input from federal partners and scientists from academic institutions, these networks identified critical monitoring needs by developing conceptual ecosystem models focused on climate change effects, and linking both existing and potential vital signs and indicators to the models. The team used Miradi Adaptive Management Software (Foundations of Success) to assist with the development of models and prioritization of indicators. Through the use of conceptual models and indicator tables, the networks were able to identify gaps, as well as prioritize areas of additional need for climate change monitoring.

Vegetation Classification Tree of the Appalachian National Scenic Trail's Southern Blue Ridge Ecoregion

Andrew Strassman, Biologist, USGS, La Crosse, WI

Jennifer J. Dieck, Chief, Geospatial Sciences and Technologies Branch, USGS, Upper Midwest Environmental Sciences Center, La Crosse, WI

The Appalachian National Scenic Trail (APPA) traverses more than 2,175-miles, stretching through 14 eastern states and covering an amazing range for habitats and ecoregions, including the Southern Blue Ridge (SBR) Ecoregion. To assist in the National Park Service Vegetation Inventory Program (NPSVIP) mapping of APPA, the Resource Mapping and Spatial Analysis Team (RMSAT) at the US Geological Survey (USGS) Upper Midwest Environmental Sciences Center (UMESC) has created a vegetation classification tree to provide a route to each of the 66 map classes along with key characteristics to help distinguish each map class from related map classes. The information used to create this tree were derived from the National Vegetation Classification System (NVCS) and natural community reports, existing field data, and six-weeks of field surveys conducted by UMESC and supporting ecological teams within the SBR.

Insights into Recreation Demand: A Spatial Interpretation of Users and Federal Facilities

Stacy Supak, Doctoral Fellow, Department of Parks, Recreation and Tourism Management, North Carolina State University, Raleigh, NC

Hugh Devine, Professor, Department of Parks, Recreation and Tourism Management, North Carolina State University, Raleigh, NC

Gene Brothers, Associate Professor, Department of Parks, Recreation and Tourism Management, North Carolina State University, Raleigh, NC

Understanding the demand for recreation on federal lands can improve management decisions affecting both natural preservation and visitor enjoyment. Since 1999, the National Recreation Reservation Service has provided reservation services for participating partner agencies (e.g. NPS, BLM, USDAFS). At a single web-presence, users can browse, query and reserve over 60,000 facilities (individual campsites, cabins and group facilities) at over 2,500 locations. Approximately 7.5 million reservations comprise the dataset from 1999 to 2007. For management planning and marketing efforts, it is critical to gain insight related to the use of each facility and the populations who are using the facilities. Descriptive statistics and visualizations are used to characterize visitation travel patterns, potential travel markets and destination usage distributions.

Monitoring Wilderness Character: A Pilot Study from Lassen Volcanic National Park

Brian Tarpinian, Wilderness Stewardship Fellow, National Park Service, Mineral, CA

"Wilderness" may seem, at times, to be an abstract concept. In the United States, the National Wilderness Preservation System is administered by four federal agencies that have struggled for decades to find an objective method for assessing the condition of congressionally designated wilderness areas. At Lassen Volcanic National Park, I have pioneered a method of monitoring trends in the wilderness resource by utilizing language from the Wilderness Act. Taking key legislative words like "untrammeled," "natural," "undeveloped," and "opportunities for solitude or primitive and unconfined recreation," I have identified current threats to the wilderness and described potential indicators for a monitoring program. This new framework is an overhaul of some traditional views of natural and cultural resource protection because it uses a wilderness-specific "lens." This concept can be easily applied to any wilderness. By providing examples from Lassen, I hope to promote a new approach to wilderness stewardship.

Comparing Two I&M Spatial Inventories: Can Soil Maps be Used to Predict Vegetation Communities?

Amy Tendick, Ecologist, National Park Service, Moab, UT

Aneth Wight, Cartographic Technician, National Park Service, Moab, UT

The Inventory and Monitoring Program has completed final inventory products for many national parks across the nation. Arches National Park now has a complete and current soil survey map and a vegetation inventory map. It is a common belief among some mappers, ecologists, and others in natural resource fields that soils and vegetation maps covering the same area will look nearly identical. I propose to test this theory by comparing the soils and vegetation maps of Arches NP using several vegetation and soil types as examples. Will vegetation communities occur consistently on one soil type? Will one soil type support mostly one vegetation community? How closely linked are soils and the vegetation they support? Using a Colorado Plateau park as an example, this poster will display the results of comparing the current soil survey and vegetation inventory spatial data in an attempt to answer these questions.

Inventory and Mapping of Riparian Willow on the Northern Range of Yellowstone National Park

Michael Tercek, Ecologist, Walking Shadow Ecology / Montana State University, Gardiner, MT

Roy Renkin, Vegetation Specialist, Yellowstone Center for Resources, National Park Service, Yellowstone National Park, WY

After the reintroduction of wolves to Yellowstone in 1995–1996, a number of publications reported widespread recovery and growth of willow, aspen, and cottonwood on the northern range of Yellowstone National Park (YNP), which is the ~300,000 acre winter home to the park's northern elk herd. One explanation for this widespread plant growth involved a 'trophic cascade' in which wolves changed elk behavior, thus reducing elk browsing of willow. We conducted a 5-year effort to map and measure all willow on streams second order and larger on the northern range of Yellowstone. The results suggest that the trophic cascade theory may not be a complete explanation for willow recovery. Willow height varied greatly on fine spatial scales, and there were differing responses among willow species. The inventory data from this project will serve as a baseline for long-term monitoring of plant status in response to climate change.

Restoring and Protecting Great Parks on the Great Lakes: The Great Lakes Restoration Initiative

Jerrilyn Thompson, Research Coordinator, NPS, Great Lakes Northern Forest CESU, St. Paul, MN

Phyllis Ellin, Midwest Region Partnerships Liaison, NPS, Chicago, IL

During 2010, congress authorized $475 million in new funding for the Great Lakes Restoration Initiative, the largest investment in the Great Lakes in two decades. Led by the EPA, sixteen federal departments and agencies worked together to develop an Action Plan for 2010-2014, targeting some of the most serious threats to the Great Lakes. National Parks in the Great Lakes watershed received $10.5 million of this funding for 13 projects in five "focus areas" of the Initiative: 1) Cleaning up toxics and toxic hotspot "Areas of Concern"; 2) Combating invasive species; 3) Promoting nearshore health by protecting watersheds from polluted run-off; 4) Restoring wetlands and other habitats; and 5) Working with strategic partners on outreach. The National Park Service will provide measures of progress and benchmarks for success over the next five years for each project. For more information on the initiative and the action plan, go to www.greatlakesrestoration.us.

Building Place-Based Climate Change Education through the Lens of National Parks and Wildlife Refuges

Jessica Thompson, Assistant Professor, Human Dimensions of Natural Resources, Colorado State University, Warner College of Natural Resources, Fort Collins, CO

Karen Hevel-Ming, Program Manager, Southwest Regional Office, National Parks Conservation Association, Salt Lake City, UT

Angie Richman, Communication Specialist, Climate Change Response Program, National Park Service, Fort Collins, CO

Framing climate change communication and education through the lens of the protected landscapes of the national parks and wildlife refuges offers a powerful tool connecting the science of climate change with diverse audience groups through informal education. The Climate Change Education Partnership (CCEP) is a thematic partnership that will facilitate the development of high quality, relevant educational tools and resources based on current and evolving climate science in the context of national parks and wildlife refuges.

One Hundred Years of Avian Community Change in Sierra Nevadan National Parks

Morgan Tingley, Ph.D. Student, University of California–Berkeley, Berkeley, CA
S.R. Beissinger, Department of Environmental Science, Policy & Management, University of California, Berkeley, CA

Climate change over the last 100 years may have already led to noticeable impacts on bird populations. We present findings from a recently completed 8-year resurvey of bird communities at sites that were originally surveyed 80 to 100 years ago. Survey sites focused on three main National Park regions: Lassen Volcanic, Yosemite, and Sequoia-Kings Canyon. Looking at over 100 species, we tested for shifts in elevational range over time. We found upward shifts to be the dominant response while some species shifted their ranges downward. From a community perspective, site-level species diversity has generally increased over the last century, resulting in many species that likely were historically isolated to now co-occur. Our results provide strong evidence over an unusually long time span that climate change has already begun affecting bird ranges and communities in our National Parks, with important implications for ecology, evolution, and conservation.

Pikas in Peril: Fostering Communication for a Climate Sentinel Species

Paulina Tobar-Starkey, Science Communication Specialist, University of Idaho / Upper Columbia Basin I&M Network, Moscow, ID
Linda Hilligoss, Science and Learning Center Education Coordinator, Crater Lake National Park, Crater Lake, OR
Ted Stout, Chief of Interpretation, Craters of the Moon National Monument and Preserve, Arco, ID
Mackenzie Jeffress, Research Associate, University of Idaho/Upper Columbia Basin Network, Moscow, ID
Lisa Garrett, Program Manager, National Park Service/Upper Columbia Basin Network, Moscow, ID

The American pika (*Ochotona princeps*) is a climate sensitive focal species that is being studied to determine its vulnerability to climate change. In an effort to learn more about pika distribution and vulnerability in parks, a team of academic researchers and National Park Service staff are working together on the Pikas in Peril project. An integral component of this project is to communicate scientific results in a way that will lead to greater understanding of how climate change affects pika populations. Scientists alongside interpretive staff from eight participating parks are developing informational material to communicate their findings. This interpretive group has developed products such as handouts, resource briefs, websites, video podcasts, and interpretive programs, in order to reach target audiences. Communicating about the results of this research significantly enhances park efforts to create a connection with the public about climate change and its effects on natural resources.

Dead Wood in Mesic Loess Bluff Hardwood Forest

Daniel Twedt, Research Wildlife Biologist, USGS Patuxent Wildlife Research Center, Vicksburg, MS

Historically, the mesic loess bluff hardwood forests along the eastern edge of the Mississippi Valley experienced widespread conversion to agriculture, although the steepest areas were not suitable for cultivation and some escaped deforestation. The remaining loess hardwood forests are jeopardized by continued erosion, exurban encroachment, conversion to pine forests, and invasion of exotic plants. In many areas, including Vicksburg National Military Park, significant erosion spurred abandonment of agriculture and subsequent return of forests. I assessed forest conditions in this park using 1-m2 BAF (prism) plots and concurrently assessed the density of snags (standing dead trees) and downed woody debris. I quantified dead wood and examined the relationship between dead wood and severity of slope to evaluate: if areas of steeper slope have greater total volume of dead wood resulting from being refugia from clearing, and if snags are less abundant on steeper slopes as increased erosion destabilizes standing trees.

Creating Fact Sheets about Natural and Cultural Resources: Collaboration with Researchers for Educational Outcomes

Lucy Tyrrell, Research Administrator, Denali National Park and Preserve, Denali Park, AK

Researchers are accustomed to sharing results in specialized journals or as technical posters and talks. I have worked with researchers after their experiences in Denali to create fact sheets for a general audience. The researcher provides text and figures to show methods and results, and I edit the text, create a two-page layout, and email a draft to the researcher with ques-

tions and comments. The researcher(s) and I work back and forth, until we are satisfied that the message is clear and accurate. The outcomes are (1) a printed fact sheet about the research process and results, and (2) an increased ability by the researcher to share data in a straightforward, simplified manner. When researchers working in national parks are able to clearly communicate their research results, they connect people with park resources, build support for research in parks, and provide information for science-based management of protected areas.

Geology of National Parks Spreadsheet Modules for the Spreadsheets Across the Curriculum Library

H.L. Vacher, Professor, Department of Geology, University of South Florida, Tampa, FL
Judy McIlrath, Department of Geology, University of South Florida, Tampa, FL
Tom Juster, Department of Geology, University of South Florida, Tampa, FL
Meghan Lindsey, PhD student, Department of Geology, University of South Florida, Tampa, FL

The Geology of National Parks Collection (http://serc.carleton.edu/sp/ssac/national_parks), within the online Spreadsheets Across the Curriculum (SSAC) Library, consists of more than twenty modules made in collaboration with eight NPS Research Learning Centers in a project funded by the National Science Foundation (NSF DUE 0836566). SSAC modules are stand-alone ca. 20-slide PowerPoint presentations that guide students to build and use spreadsheets to study quantitative concepts "in context." The purpose of the collection and library is to enhance quantitative literacy (QL) education in introductory college courses. The Geology of National Parks Collection aims specifically at the course of that title; in particular, it emphasizes environmental geological topics pertinent to park management and the Natural Resource Challenge. QL topics (e.g., ratio and proportion, percent change, elementary statistics), though challenging to many math-avoidant college students, are foundational, and so the modules may also find use in high school mathematics courses.

The Vegetation Mapping of Four Small Parks

Rachel Vargas, Data Management/GIS Technician, National Park Service, Palmetto Bay, FL

For the past couple of years the South Florida/Caribbean Network has worked on and completed vegetation maps for four small parks. These parks include: Buck Island Reef National Monument and Salt River Bay National Historical Park & Ecological Preserve in the U.S. Virgin Islands, and De Soto National Memorial and Dry Tortugas National Park in Florida. Due to data availability and local logistics each vegetation map was created differently. Some maps required the extensive analysis of aerial photographs and/or LIDAR, while others required data collection in the field. These methods will be further explained. As these are small parks, each park's products (all mapping data, maps, and reports) are packaged in a user-friendly DVD and can also be found on our website.

Improving Accountability for Scientific Equipment in Wilderness

Judy Visty, Ecologist, Continental Divide Research Learning Center, Estes Park, CO
Jeff Connor, National Park Service

Although much of Rocky Mountain National Park's backcountry has long been managed as wilderness by policy, permanent Wilderness was legislated in 2009. The park has a robust research program with more than 120 permits annually, some of which involve installations and plots in designated wilderness. Over the last few years, park wilderness managers and research staff worked together to improve accountability of research activities in wilderness. Actions have included: 1) Setting up a database linked to a map layer and a photo file so research installations can be visualized and tracked; 2) Testing a simple system for assessing cumulative impacts by watershed; 3) Institutionalizing knowledge of science-based monitoring that can be used to track wilderness health; 4) Using the Minimum Requirement Decision Guidelines (MRDG) document recommended by the Aldo Leopold Institute for reviewing proposed research installations. Taken together, these actions have improved accountability for scientific activities conducted in the park's wilderness.

Preserving America's Treasures: A View from the Scaffolding (two-part poster)

Thomas Vitanza, Senior Historical Architect, National Park Service Historic Preservation Training Center, Frederick, MD
Rebecca Cybularz, Historical Architect Intern, National Park Service Historic Preservation Training Center, Frederick, MD

A review of the Historic Preservation Training Center's (HPTC) portfolio of completed preservation projects and training sessions in FY2010. The unique fusion of learning and development with preservation practice creates a compelling sense of purpose and results in dozens of preserved cultural resources for NPS and its partners.

The New and Improved Dry Tortugas National Park 2010 Benthic Habitat Map

Robert Waara, Marine Bio Tech, SFCN National Park Service, Miami, FL

The South Florida Caribbean Network (SFCN) in 2007 established a cooperative agreement with Fish and Wildlife Research Institute of the Florida Fish and Wildlife Conservation Commission to produce a current, consistent, accurate and reproducible benthic habitat map for Dry Tortugas National Park (DRTO), which will be accomplished by using the best available technology and appropriate methods. This marine benthic habitat mapping was completed in 2008 under contract with Avineon. In 2009, with the acquisition of high resolution side scan sonar data, as well as over 3000 field data points SFCN refined the Avineon 2008 benthic habitat map and build upon it to create a new map. This new mapping product was able to eliminate all of the unknown polygons that the 2008 benthic map contained, along with a refinement of the line work, patch reef and hard bottom habitats by using the additional data sets. There were two new subclasses added to the 2010 product, low relief spur and grove and aggregate reef remnant, which added to the classification scheme descriptors of the larger reef habitat areas. In addition, for the first time a bathymetry data set with a horizontal 1m resolution was produced for over 91% of the park.

Light Pollution Impact on Federal Class 1 Areas

Robert Wagner, President, Board of Directors, International Dark-Sky Association, Kansas City, MO

Using a 1997 Google Earth Light Pollution overlay, we are able to show the impact of light pollution on Federal Class 1 areas. The poster will show all of the areas, categorize them by level of impairment and summarize the findings. Through this review, we can see that over half of these areas have moderate to severe light pollution problems.

Engaging College Students in National Parks

Daniel Wakelee, Associate Dean, California State University–Channel Islands, Camarillo, CA

Don Rodriguez, Associate Professor and Chair, Environmental Science & Resource Management Program, California State University–Channel Islands, Camarillo, CA

National Park Service, the National Parks Foundation, and the National Parks Promotion Council have begun to focus on methods for reconnecting the college demographic (18-25 yrs.) with National Parks. Engaging the college student in coursework about protected areas presents a range of challenges. An interdisciplinary general education course was developed at CSU Channel Islands and delivered based on a partnership between faculty and park staff. Its objective was to engage undergraduates from a range of academic majors to focus on issues, functions, and spaces that characterize units of the National Park Service. It was co-taught with the park superintendent and the assistance of park personnel. Presenting both the park service mission and contemporary management challenges in ways that are relevant to students with limited exposure to national parks poses a particular challenge. This paper explores successful and unsuccessful strategies for making meaningful connections with students in the college classroom.

Recent Advancements Among Virtual Research Learning Centers: A Dynamic Model for Science Communication

Janine Waller, Editorial Assistant, Greater Yellowstone Science Learning Center, Yellowstone National Park, Yellowstone National Park, WY

Jerry Freilich, Coordinator, North Coast and Cascades Science Learning Network, Port Angeles, WA

Michael Liang, Visual Information Specialist, North Cascades National Park, North Coast and Cascades Science Learning Network, Sedro-Woolley, WA

Pam Anning, Web Developer and Database Specialist, Sonoran Institute, Flagstaff, AZ

Michelle O'Herron, Science Communications Specialist, Golden Gate National Parks Conservancy, National Park Service, Pacific Coast Science and Learning Center, San Francisco, CA

Susan Teel, Director, Southern California Research Learning Center, Thousand Oaks, CA

Stacey Ostermann-Kelm, Program Manager, Mediterranean Coast Network, Southern California Research Learning Center, Thousand Oaks, CA

Robert E. Bennetts, Coordinator, Southern Plains Network, Learning Center of the American Southwest, Des Moines, NM

Tami Blackford, Editor, Yellowstone National Park. Greater Yellowstone Science Learning Center, Yellowstone NP, WY

Bill Zoellick, Executive Director, Schoodic Education and Research Center, Winter Harbor, ME

Sara Delheimer, Science Communication Intern, Schoodic Education and Research Institute, Winter Harbor, ME

Tara Carolin, Director, Crown of the Continent Research Learning Center, West Glacier, MT

The Virtual Research Learning Center (VRLC) model has been adopted by seven Research Learning Centers nationwide: the

Greater Yellowstone Science Learning Center, Learning Center of the American Southwest, Schoodic Education and Research Center, North Coast and Cascades Science Learning Network, San Francisco National Parks Science & Learning, Crown of the Continent Research Learning Center, and the Southern California Research Learning Center. This consortium of VRLCs uses a flexible website template and independently customizes features for the communication needs of various partners. New features are easily shared among participants. The websites provide an outlet for dissemination of resource information in a timely and easily accessible format to diverse audiences. In addition to the suite of synthesis and outreach products already available on the sites, recent innovations include hosting and development of multimedia content, enhanced bibliographic references, and the development of practical applications for communication of multi-scale resource issues like climate change.

Archiving Historic Bird Checklists from Southwest Alaska's National Parks into eBird and AKN Databases

Kelly Walton, Assistant Zoologist, Alaska Natural Heritage Program, University of Alaska–Anchorage, Anchorage, AK
Tracey Gotthardt, Program Zoologist, Alaska Natural Heritage Program, University of Alaska–Anchorage, Anchorage, AK
Jennifer Garbutt, Student Intern, Alaska Natural Heritage Program, University of Alaska–Anchorage, Anchorage, AK
William L. Thompson, Quantitative Ecologist, Southwest Alaska Network, National Park Service, Anchorage, AK

During 2008, the Alaska Natural Heritage Program visited Alaska's 16 National Park Service offices to gather records of historical bird observations. These records, primarily from field camps and ranger logs, were at risk of being lost if not properly archived. eBird and Avian Knowledge Network (AKN) are international databases used by birders for archiving bird information. The goals of this project were to compile historical bird records from park units in southwest Alaska and enter these records into a publicly accessible, archival database (eBird or AKN). We summarized 8,704 observations for 183 species, including 32 species of conservation concern, from 82 sources dating back to 1919. Four new bird species were added to park checklists and 23 had their status upgraded from probably present to present. We also developed a user's manual for entering observations into eBird; this information could be used to annually update park checklists.

Micro-Conservation: A New Method for Bringing Awareness and Financial Sustainability to Protected Areas

Yiwei Wang, PhD Student, University of California–Santa Cruz, Santa Cruz, CA
Tamara Pulst, President, ecoReserve, San Francisco, CA

The ecoReserve micro-conservation model introduces fresh marketing approaches to harness the collective power of individual donors towards conservation, restoration, and sustainable livelihood projects operated by our NGO partners around the world. Inspired by the micro-financing phenomenon Kiva.org, ecoReserve aims to bring the same level of enthusiasm and connectedness into the arena of people and parks conservation. By using interactive graphics, high resolution aerial imagery and social media tools, our website Ecoreserve.org will allow visitors to adopt their own personal reserves, learn from video blogs by scientists and local residents, and connect with their own communities in a novel way. Our model is designed to ensure financial sustainability because each one time donation pays for the purchase and ongoing maintenance of the entire reserve. Here, we discuss micro-conservation as a new paradigm for conservation and present a demonstration of our website and online community in action.

An Examination of Partnership Attitudes and Behaviors among Partners of the National Park Service

Melissa Weddell, Assistant Professor, Appalachian State University, Boone, NC
Brett A. Wright, Clemson University, Parks, Recreation and Tourism Management, Clemson, SC
Rich Fedorchak, Partnership Training Manager, National Park Service, Stephen T. Mather Training Center, Harpers Ferry, WV

As partnerships are increasingly becoming a standard management practice, it is critical that employees have the skills necessary to create lasting relationships. The purpose of this study was to determine partnership training and development priorities for National Park Service (NPS) associative groups by obtaining baseline data regarding knowledge, skills, and abilities as well as partnership attitudes that will identify existing and future training needs of partners associated with the NPS. This study was a collaborative research effort between the NPS and Association for Partners for Public Lands. This session will present the results of the study and discuss the interconnectiveness between job descriptions, evaluation tools, and training methods as a way to increase partnership success. Moreover, participants will broaden their horizons by learning how the NPS was able to incorporate the evaluation results in their training model and address partnership training gaps to enhance partner relations.

Harnessing the Power of Pictures

Jessica Weinberg, Science Communications Intern, San Francisco Bay Area Network Inventory and Monitoring Program, Sausalito, CA

Many of us throughout the National Park Service document our work with digital photos. Others are constantly in need of images for reports, interpretive materials, or websites. For the benefit of both, the San Francisco Bay Area Network (SFAN) Inventory and Monitoring Program is exploring several ways of enhancing its digital image workflow. It is examining techniques for taking more impactful photographs, choosing the best images for publication and writing effective captions and keywords. To ensure that these efforts are never wasted and that valuable visual resources remain accessible long into the future, SFAN is also considering the use of IPTC metadata to describe, organize and manage its digital photo collections. Software options such as Abander PhotosControl and Microsoft Pro Photo Tools are being considered, as are IPTC metadata use guidelines that meet the NPS Digital Photo Metadata Standard and are intuitive for photographers and image users alike.

Paul S. Sarbanes Transit in Parks Technical Assistance Center for Alternative Transportation in Federal Lands

Jenni West, TAC Manager, Paul S. Sarbanes Transit in Parks Technical Assistance Center, Bozeman, MT
Phil Shapiro, Deputy Director, Paul S. Sarbanes Transit in Parks Technical Assistance Center, Bozeman, MT

The Paul S. Sarbanes Transit in Parks Technical Assistance Center (TAC) is a one-stop shop for information, training, and technical support designed for resource management professionals who face transportation challenges. Resource management professionals in public lands are the dedicated stewards of some of this nation's most beautiful and iconic places. Every day, they try to maintain the delicate balance between maximizing access for current visitors and preserving resources for future visitors. Toward that end, the TAC was created to help land managers develop and implement successful alternative transportation projects. The TAC is sponsored by the Federal Transit Administration in partnership with federal land management agencies. Services are provided by a team of nationally-known public and private transportation professionals, led by the Western Transportation Institute at Montana State University. This team has extensive expertise on transportation and public lands issues, with "on-the-ground" knowledge and experience at over 80 federal land units.

Exploration and Assessment of Climate Change Impact in a High Elevation Alpine National Park

Clinton Whitten, Intern, George Melendez Wright Climate Change Internship Program, Lakewood, CO

Climate change in Rocky Mountain National Park affects all biota in the park. The internship focus internship was to participate in a number of studies involving various aspects of climate change in the Park and produce a podcast summarizing the studies. The main study areas are permafrost, pika habitat, forest fire frequency, limber pine trees, and the GLORIA project. The permafrost study collects data from shallow temperature sensors; the pika project assesses likely locations to conduct pika population studies; the forest fire frequency study determines frequency from views of lake cores up to 10,000 years old; the limber pine project uses synthetic pheromones to repel pine beetles, allowing testing of trees for resistance to blister rust; the Gloria project monitors changes in alpine vegetation. A podcast was produced to raise public awareness of ongoing efforts to prepare the Park for climate change, and to enhance baseline data for ongoing studies.

Progress in the Recovery of the Xantus's Murrelet Eight Years after the Eradication of Black Rats from Anacapa Island, California

Darrell Whitworth, Seabird Biologist, California Institute of Environmental Studies, Davis, CA
Harry Carter, Carter Biological Consulting, Victoria, British Columbia, Canada
Laurie Harvey, Montrose Settlements Restoration Program, Channel Islands National Park, Ventura, CA
Josh Koepke, California Institute of Environmental Studies, Davis, CA
Richard Young, Department of Wildlife, Humboldt State University, Arcata, CA
Franklin Gress, California Institute of Environmental Studies, Davis, CA

Black Rats (*Rattus rattus*) were eradicated from Anacapa Island in 2002, benefiting Xantus's Murrelets (*Synthliboramphus hypoleucus*) and other breeding seabirds. In 2000, nest searches were initiated in 10 sea caves (the only areas with evidence of nesting in 1994-97 surveys), and standardized monitoring began in 2001 to measure changes in hatching success and nest occupancy after rat eradication. Hatching success increased considerably post-eradication (30% in 2001-02 versus 86% in 2003-10) and contributed to strong population growth in sea caves. Nest occupancy increased from a maximum of 26% pre-eradication to 65% in 2010. Murrelets also began breeding outside sea caves post-eradication, with 26 nest sites found in cliff and shoreline habitats since 2003, where none were previously known. Recent nest site competition between murrelets, Pigeon Guillemots (*Cepphus columba*) and Cassin's Auklets (*Ptychoramphus aleuticus*) suggests that suitable crevice nest

sites may be limited in some sea caves and other habitats. To date, colony growth has been limited to certain sea caves and shoreline habitats, as extensive surveys in 2009 found no evidence of murrelets nesting in apparently suitable upper island habitats. Full colony recovery may require several decades, but habitat enhancement and social attraction may speed re-use of upper island habitats where murrelets have been absent for about a century and evidence of former occupation by rats persists. Continued annual nest monitoring is desirable to best document colony recovery.

Monumental Landscape Change: An Interdisciplinary Approach to Resource Management Decision Making at Mount Rushmore National Memorial

Bruce Weisman, Director of Resource Management, Mount Rushmore National Memorial, National Park Service, Keystone, SD

A landscape-level mountain pine beetle (MPB) epidemic is occurring in the central Black Hills. The most active area of MPB infestation and highest concentration of tree mortality is in close proximity to the Memorial. Tree mortality has reached nearly 100% in much of the affected area, and the oncoming infestation has recently been observed within the park. The outbreak may be caused in part by dense stands of ponderosa pine caused by a century of fire suppression. Subject matter experts recommended thinning to make it fire and insect resistant, protect high value scenic vista trees, and suppress the outbreak by treating green affected trees. These actions, especially hazard fuel thinning will help restore the forest of the Memorial to one that is more consistent with a natural, historic condition. The current epidemic threatens visitor safety, visitor enjoyment, as well as cultural and natural resources of the Memorial.

Estimating Climate-mediated Stress in a Sentinel Species and NPS "Key Vital Sign"

Jennifer Wilkening, PhD Student, University of Colorado–Boulder, Boulder, CO

The American pika (*Ochotona princeps*) has been identified as a climate-sensitive sentinel species and key vital sign by several NPS Networks. Pika monitoring programs are in place for parks within these networks, using a protocol that relates current site use by pikas with data on local habitat characteristics, such as elevation, to infer potential effects of climate change on park systems. The data generated by these monitoring studies can be used to identify the trends in site use by pikas in relation to habitat covariates. However, this approach cannot demonstrate whether pika trends can be explained by current stressors in the local environment. I developed a simple procedure designed to identify more direct evidence of physiological stress in pikas inhabiting different environments. Using this method and pika fecal pellets from a broad array of currently occupied sites, I will be able to analyze relationships between metrics of stress (e.g., fecal corticosterone) and local habitat characteristics, including climate.

Sandhill Cranes: Measuring Effects of Human Visitors on the Behavior of a Charismatic Migratory Species

Kate Wilkins, Graduate Student, Colorado State University, Fort Collins, CO

Residents and visitors flock to the San Luis Valley in Colorado to celebrate the annual migration of about 20,000 Sandhill cranes during the annual spring Crane Festival. This study asks how visitors impact crane behavior. Under my supervision, undergraduates collected data on visitors and Sandhill cranes at three refuge sites with pullouts, and one private field with no pullout. Visitor and crane observations began simultaneously and were collected at five minute intervals. Every five minutes, one team would record numbers of people inside versus outside their car, and car types. Another team used a spotting scope to monitor individual cranes for five minutes, cataloguing each time the cranes changed position. The goal of this study involves providing information to the Monte Vista National Wildlife Refuge on potential impacts to a charismatic migratory species so that the refuge can account for this as it develops a new Collaborative Conservation Management Plan.

Assessing the Sustainability of Trail Systems and Alternate Alignments Using GIS Analyses

Jeremy Wimpey, Founder, Applied Trails Research, LLC, State College, PA
Jeff Marion, Virginia Tech, Blacksburg, VA

We developed methods for the evaluation of trail sustainability using GIS techniques that incorporate recent advancements in Digital Elevation Models (DEMs), accurate GPS data, and high-resolution aerial imagery. We review our GIS methods that calculate several trail design and landform variables that research has shown to significantly influence the erosion and width of natural surface trails. These techniques allow for rapid assessment of large trail systems, visualization, and ranking of the sustainability of trails and alternate trail alignments. Analyses are dependent on quality inputs, particularly DEMs; for method development we utilized LiDAR and ground survey based terrain models. Sites and data from two NPS units are used to illustrate the techniques and discuss the issues and opportunities associated with these spatial analyses.

Deepwater Horizon Oil Spill: South Florida/Caribbean Network Field efforts and Data Management

Brian Witcher, Data Manager, South Florida/Caribbean Network NPS, Palmetto Bay, FL

As part of the National Park Service response to the Deepwater Horizon Oil Spill the South Florida/Caribbean Network (SFCN) conducted both baseline monitoring and data management operations. SFCN field crews collected sediment samples, water samples, semi-permeable membrane devices (detected presence of oil), and coral biopsies. SFCN also provided data management leadership and assistance at the onset of South Florida activities before transitioning to an Incident Command data manager. This included tailoring a Gulf Coast Network database to local needs, data sheet development, sample site selection, translating field protocols into systematic action, GIS support, initial data management plan development, image management, and recommendations for the data management organizational structure.

Long-term Ecological Monitoring to Detect Trends in Northern Colorado Plateau Uplands

Dana Witwicki, Ecologist, Northern Colorado Plateau Network, National Park Service, Moab, UT

Dustin W. Perkins, Program Manager, Northern Colorado Plateau Network, Inventory and Monitoring, National Park Service, Grand Junction, CO

The Northern Colorado Plateau Network (NCPN) of the National Park Service monitors upland vegetation and soils in 11 parks on the Colorado Plateau. Upland ecosystems in this region are characterized by low resistance and resilience, and global climate change is expected to alter levels and seasonality of dominant precipitation events, with unknown implications for plateau systems. Monitoring was initiated in 2006 based on survey designs for each park with random spatially-balanced plots. Preliminary analyses of grassland ecosystems at Capitol Reef National Park indicate that areas currently grazed by cattle have more invasive annuals, lower cover of perennial grass and biological soil crust, and larger canopy gaps than areas that are no longer grazed. NCPN will begin to look for trends after 5 full years of data collection.

Beyond Boundaries: An Osprey Family's Migration from Grand Teton National Park

Susan Wolff, Wildlife Biologist, Grand Teton National Park, Moose, WY

Steve Cain, National Park Service

B. Bedrosian (no affiliation given)

Little is known about the migration of osprey that spend the summer months breeding, nesting, and raising their young in Grand Teton National Park. In the summer of 2010, Grand Teton National Park in collaboration with Craighead Beringia South captured and radio-marked 3 osprey, 2 adults and 1 young, and in an effort to investigate a family group's timing and path of migration. The information gained from this study will provide managers and researchers with information about what the potential outside threats are to a species that is important to the park's overall biodiversity. This poster will present preliminary findings from the fall 2010 migration.

Amphibian Monitoring on JELA—Barataria Preserve: *3* Years and Counting for Phase 1

Robert L. Woodman, Network Ecologist, NPS Gulf Coast Inventory & Monitoring Network, Lafayette, LA

Jeff Bracewell, NPS Gulf Coast Inventory & Monitoring Network, Lafayette, LA

Whitney Granger, NPS Gulf Coast Inventory & Monitoring Network, Lafayette, LA

Kurt Buhlmann, University of Georgia & SREL, Aiken, SC

The GULN initiated "Phase I" monitoring of aquatic and arboreal amphibians on Jean Lafitte - Barataria Preserve (JELA) in MAR, 2008 to field-test sampling methodology and design proposed for use in monitoring for 8 network parks. Testing began with funnel-trap and PVC-pipe arrays supported by photo-documentation. Air and water parametric sampling were added in 2009, followed by formalized visual ground-search methodology in 2010. The combination of faunal and environmental sampling yields a spatially- and taxonomically-explicit composite picture of the JELA amphibian assemblage over time. "Phase I" monitoring substantially validated the sampling methods and design, verified most species identified in park inventory studies, documented seasonal behavior patterns and reproduction cycles in some species, and documented coastal storm impacts on the sampled fauna. This poster presents a summary of the monitoring project methodology and procedures along with examples of key findings from 3 years of test project implementation.

The Texas Tortoise on PAAL: Monitoring Leading to Informed Resource Management Decision-making

Robert L. Woodman, Network Ecologist, NPS Gulf Coast Inventory & Monitoring Network, Lafayette, LA

Jeff Bracewell, NPS Gulf Coast Inventory & Monitoring Network, Lafayette, LA

Whitney Granger, NPS Gulf Coast Inventory & Monitoring Network, Lafayette, LA

Rolando Garza, Palo Alto Battlefield NHP, Brownsville, TX

The GULN has implemented spatially-explicit mark-recapture-based monitoring of Texas Tortoise (*Gopherus berlandieri*) (TT) on Palo Alto Battlefield NHP since May, 2008. TT is a Texas state-listed species of concern and a significant park faunal resource. To date, 70+ individuals have been identified and tracked in hemi-annual sampling. Monitoring yields size, weight, age, and sex-ratio estimates for the PAAL population, plus a developing understanding of tortoise habitat preference and movement within the park. The sampling process and findings, coupled with vegetation information derived from remote sensing data, has lead to development of a park-wide predictive TT habitat model (presented in another poster). The habitat model and population description, activity and distribution assessment developed from monitoring comprise a multi-faceted tool-set to inform and support park vegetation resource management planning. This poster provides a synopsis of the sampling process and key findings, and describes the relationship of TT to PAAL vegetation management.

Community Valued, Privately Owned: Solutions for Protection of Naturally, Culturally and Recreationally Significant Private Lands

Bethany Wylie, Master's Student, Stanford University, Stanford, CA

This poster explores the emerging topic of collaborative park planning and management at the site of M h 'ulepu, Kaua'i, Hawai'i. Threatened by encroaching development from the nearby resort town of Poipu, this privately owned, multiple use, culturally important, and high biodiversity area is in great need of protection. This project took an innovative approach to the protection of a natural area by addressing, from the beginning of the planning process, the needs of the M h 'ulepu community relative to biodiversity and cultural heritage goals. Ultimately, through discussions with stakeholder representatives, it was concluded that this area is not suitable for a rigid, government-owned park. Instead, it has great potential as a privately owned, but community managed natural area because many of the conflicting stakeholder groups have similar goals. While this poster highlights a specific area, it has wide applicability for the protection of biodiversity increasingly concentrated in privately owned land.

A Cross-Cultural Comparison of Stress-Coping Behavior in Natural Environments

Jee In Yoon, Ph.D. Candidate, Texas A&M University, College Station, TX
Gerard Kyle, Texas A&M University, College Station, TX

Recreation research has paid little attention to how different cultures perceive and respond to stressful situations encountered during their leisure. Given the increasing racial and ethnic diversity of the recreationists visiting U.S parks and protected areas, a more informed understanding of visitors' response to a diverse range of potential stressors will enable agencies to better anticipate and act on social and environmental factors impacting visitor experience. This research compared the stress/coping responses of visitors to two lake-based recreation areas in Korea and the U.S. The stressors we explored reflected both social factors (e.g., behavior of others, number of people) and physical conditions (e.g., weather, facility conditions). We observed that Korean visitors tended to choose cognitive coping strategies (e.g., rationalization of the condition encountered) while American visitors tended to employ behavioral strategies (e.g., adjusting the timing of their visit, choosing different locations).

Extrapolating Climate Change Data to Identify Impacts to Cultural Landscapes for Improved Adaptation Strategies

Roberta Young, Historical Landscape Architect, National Park Service, Midwest Regional Office, Omaha, NE

Cultural landscapes are defined by characteristics and features, both natural and manmade, which convey human manipulation and adaptation to an environment. Existing climate change science currently focuses on natural resources. Extrapolation of this data is necessary to identify potential impacts and threats to cultural landscapes. Applying data and methods from the National Park Service Climate Change Scenario Planning Workshop to cultural landscapes allows information about this resource type to be incorporated into climate change response strategies. Completing this critical first step identifies the known and expected impacts of climate change on cultural landscapes and allows for holistic resource planning that goes beyond the standard treatments of preservation, restoration, and rehabilitation to a model that balances all resource needs. Integrating cultural landscapes into climate change scenario planning will assist managers in mitigating impacts and adapting to change, improving resource management and visitor experience.

Exhibits

Freesatnding Exhibits

Invasive Plants: A Growing Issue in National Parks

Rita Beard, NPS, WASO, NRPC, Biological Resources Management Division, Fort Collins, CO

This exhibit highlights efforts across the National Park System on managing the increasing threats from invasive plants. Invasive plants are found in parks units across the system in urban, cultural and wildland settings. Parks, Exotic Plant Management Teams and the Inventory and Monitoring Networks have responded with efforts in prevention, management, inventory, monitoring, restoration and research. We are working across landscapes and jurisdictions through Cooperative Weed Management Areas, regional and national invasive organizations to develop and implement integrated approaches.

National Natural Landmarks Program: Supporting Conservation of America's Natural Heritage

Margi Brooks, National Natural Landmarks Program Manager, National Park Service, Tucson, AZ

Heather Germaine, National Park Service

The National Natural Landmarks (NNL) Program was established by Stewart Udall in 1962 to encourage and support the voluntary conservation of sites that illustrate the nation's geological and biological history, and to strengthen appreciation of America's natural heritage. The program offers private, municipal, state, and federal landowners the opportunity to share information, solve problems cooperatively, and conserve important natural areas. The National Park Service administers the program, reports on condition of the NNLs, and advocates for the protection of designated sites. National Natural Landmarks are selected for their outstanding condition, illustrative value, rarity, diversity, or value to science and education. The NNLP holds an annual photo contest and produces a calendar showcasing the winning photographs of landmarks across the country. The calendar highlights the outstanding beauty and diverse nature of the landmarks, and will be available at this exhibit.

U.S. Geological Survey: Your Source for Science You Can Use

Colleen Charles, Associate Program Coordinator TFME, U.S. Geological Survey, Reston, VA

A general introduction to the USGS, one of the conference co-sponsors.

Island Press

Book sales table of the nonprofit publisher Island Press.

Talking Map of Tlingit place names of the Huna Káawu

Robert Starbard, Tribal Administrator, Hoonah Indian Association, Hoonah, AK

Place names are potent descriptive symbols that provide clues to the natural and cultural history of our land and people. Tlingit names describe more than just location, they convey the rich tapestry of human perception and experience that comprises the Tlingit world view. The "Talking Map," while centered on Glacier Bay, depicts Tlingit place names within the traditional use area of the Hoonah Tlingit people, or Huna Káawu. The talking map, rich with anthropological and cultural detail, provides auditory, visual, and written details about each location and is intended to preserve our knowledge of the Huna Káawu territory, that it may remain a vital part of our living culture.

Southern California Research Learning Center

Susan Teel, Director, Southern California Research Learning Center, National Park Service, Thousand Oaks, CA

Nick De Roulhac, Southern California Research Learning Center, National Park Service, Thousand Oaks, CA

Kevin Schallert, Southern California Research Learning Center, National Park Service, Thousand Oaks, CA

The Southern California Research Learning Center would like to present a 360 degree walk around interactive freestanding exhibit. The exhibit features two skyline presentation boards that are arranged back to back with interactive displays at either end. The boards highlight the goals and mission of the Southern California Research Learning Center, while the interactive displays highlight current and recent projects. We would also like to demonstrate 1 Live Interactive Virtual Exploration (LIVE) at the exhibit at some point during the conference. This will consist of a live presentation from a remote location where the audience will be able to interact directly with the presenter.

Showcasing Parks Canada

John Waithaka, Conservation Biologist, Parks Canada, Gatineau, QC, Canada

Booth of conference supporter Parks Canada.

Bridging the Gap: Advancing Cultural Resilience through Ecological Restoration within the Earth Partnership for Schools Program

Fawn YoungBear-Tibbetts, Student Intern/Researcher, University of Wisconsin-Madison Arboretum, Madison, WI

Since 1991 Earth Partnership has been building the capacity of students, teachers, non-formal educators, conservation practitioners, and citizen volunteers to restore schoolyards and natural areas, and to address diversity, pollution prevention and ecological literacy, across age, ecosystem, discipline, place, and culture. We engender an ethic of caring for children and nature and reaches kids who are at risk or in need of new educational strategies. Climate change and endangered species are problems that seem big and far away. EPS offers problems students can solve that are real and manageable—a rain garden can positively impact water pollution. EPS teachers and support encourage students to practice mental and physical skills that prepare them for the real world of work and environmentally and literate citizenship—critical thinking, communication, collaboration, persistence, and flexibility. Currently we are developing a new Center for School and Community Ecology, for which a new culturally appropriate curriculum is being developed.

Tabletop Exhibits

New Techniques in Sound Monitoring

Emma Lynch, Acoustical Resource Specialist, National Park Service Natural Sounds Program, Fort Collins, CO

Jessica Briggs, National Park Service, Fort Collins, CO

Cecilia Leumas, National Park Service, Fort Collins, CO

The National Park Service Natural Sounds Program (NSP) was established in 2000 to help parks manage sounds in a balanced way, providing visitor access to parks while protecting resources for future generations. In the years since its inception, NSP has refined its monitoring techniques. While baseline monitoring is essential, the range and scope of impacts to acoustic environments in parks demand a level of analysis which extends beyond a mere inventory of audible sounds. We will showcase equipment and techniques used to quantify the impacts of extrinsic noise sources (such as vehicles and boats) on natural soundscapes. We will also exhibit various ways that NSP communicates the value of natural quiet to the public. Interactive displays will encourage visitors to become acoustic technicians themselves by exploring the sounds of our National Parks.

Leadership and Management in a Changing World

Jodie Riesenberger, Program Director, NPCA's Center for Park Management, Fort Collins, CO

The National Parks Conservation Association's Center for Park Management works with the National Park Service to provide fact-based analysis and management expertise, working together to help build leadership and management capacity. Rather than simply providing recommendations, we help implement strategies that result in meaningful, systemic improvement, and address the management challenges facing park managers. The National Park Service and the Center for Park Management are three years into a multi-year collaborative agreement to conduct a series of significant system wide projects to establish and maintain management excellence within the Park Service. The exhibit will provide general information about the ongoing work, results to date and opportunities to get involved.

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