

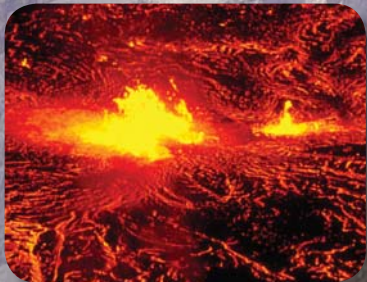
A Report by a Panel of the

# NATIONAL ACADEMY OF PUBLIC ADMINISTRATION

*for the National Park Service, Natural Resource Stewardship and Science Directorate*

## STRENGTHENING AMERICA'S BEST IDEA:

*An Independent Review of the National Park Service's  
Natural Resource Stewardship and Science Directorate*



2010





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**June 2010**

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Natural Resource Stewardship and Science Directorate*

**PANEL**

**Frank Hodson,\* Chair**

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The views expressed in this report are those of the Panel. They do not necessarily reflect the views of the Academy as an institution.

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## FOREWORD

*Today, across our land, the National Park System represents America at its best. Each park contributes to a deeper understanding of the history of the United States and our way of life; of the natural processes which have given form to our land; and to the enrichment of the environment in which we live.*

—George B. Hartzog, Jr., Director, National Park Service (1964-1972)

Today, our National Park Service manages over 80 million acres of land throughout the country with the objective of preserving natural and cultural resources for current and future generations. Critical to NPS's mission is the Natural Resource Stewardship and Science Directorate (NRSS), which is responsible for providing relevant and timely information across the Service, enabling managers to effectively conserve the park's natural resources.

NRSS requested that an independent Panel of the National Academy of Public Administration conduct a review of its effectiveness in five core functions, its relationships with key internal stakeholders, and its performance measurement system. Over the course of a six-month review, the Academy Panel determined that NRSS has made significant progress on these functions. NRSS is highly regarded across NPS for its expertise and customer service orientation, performing a critical role for the Service as a source of independent, credible scientific expertise and technical information. The Panel's report validates the critical importance of NRSS, presents a high-level strategic agenda to guide future natural resource activities, and contains practical recommendations for addressing key internal organizational issues. Implementation of the Panel's recommendations will help NRSS and the Service as a whole respond to the significant environmental challenges affecting park units and ensure that the best available information is utilized for management decision-making.

The National Academy appreciates the opportunity to have conducted this review. I extend much appreciation to the Panel members for their excellent work, to the NRSS Working Group for their insights and advice, and to the study team for its excellent research and daily management of this project. Thanks also to the external experts and NPS staff in the Washington Office, the regional offices, and the parks who generously contributed their time, expertise, and perspectives to this effort.

A handwritten signature in dark ink, reading "Jennifer Dorn". The signature is fluid and cursive, with a large, stylized initial "J" and "D".

Jennifer L. Dorn  
President and Chief Executive Officer

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## ACRONYMS

<b>ARD</b>	Air Resources Division
<b>BLM</b>	Bureau of Land Management
<b>BRMD</b>	Biological Resource Management Division
<b>CCRP</b>	Climate Change Response Program
<b>CESU</b>	Cooperative Ecosystem Studies Unit
<b>DOD</b>	Department of Defense
<b>DOI</b>	Department of the Interior
<b>DOJ</b>	Department of Justice
<b>EPA</b>	Environmental Protection Agency
<b>EQD</b>	Environmental Quality Division
<b>FAA</b>	Federal Aviation Administration
<b>FEMA</b>	Federal Emergency Management Agency
<b>FMSS</b>	Facility Management Software System
<b>FWS</b>	Fish and Wildlife Service
<b>GAO</b>	Government Accountability Office
<b>GPRA</b>	Government Performance and Results Act
<b>GRD</b>	Geologic Resources Division
<b>HPPG</b>	High Priority Performance Goals
<b>IMD</b>	Inventory and Monitoring Division
<b>IRMA</b>	Integration of Resource Management Applications
<b>OMB</b>	Office of Management and Budget
<b>NEPA</b>	National Environmental Policy Act
<b>NNL</b>	National Natural Landmarks Program
<b>NPS</b>	National Park Service
<b>NPCA</b>	National Parks Conservation Association
<b>NR</b>	Natural Resources
<b>NRPC</b>	Natural Resource Program Center
<b>NRAG</b>	Natural Resource Advisory Group
<b>NRC</b>	Natural Resource Challenge
<b>NRCA</b>	Natural Resource Condition Assessments
<b>NRDAR</b>	Natural Resources Damage Assessment and Restoration Program
<b>NRSS</b>	Natural Resource Stewardship and Science Directorate
<b>OEPC</b>	Office of Environmental Policy and Compliance
<b>OFS</b>	Operations Formulation System
<b>OMB</b>	Office of Management and Budget
<b>ONPS</b>	Operation of the National Park System
<b>PART</b>	Program Assessment Rating Tool
<b>PMDS</b>	Performance Management Data System

<b>PMIS</b>	Project Management Information System
<b>PRIDE</b>	Protecting Resources through Informed Decision-making and Education
<b>PSRPA</b>	Park System Resources Protection Act
<b>PUPS</b>	Pesticide Use Permit System
<b>REA</b>	Recreation Enhancement Act
<b>RLCs</b>	Research Learning Centers
<b>RSS</b>	Resource Stewardship Strategy
<b>SCC</b>	Service-wide Comprehensive Call
<b>SSD</b>	Social Science Division
<b>SWOT</b>	Strengths, Weakness, Opportunities, and Threats
<b>TAC</b>	Technical Assistance Call
<b>TAG</b>	Technical Advisory Group
<b>USGS</b>	United States Geological Survey
<b>WASO</b>	Washington Office
<b>WNS</b>	White Nose Syndrome
<b>WRD</b>	Water Resources Division



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## PANEL MESSAGE

Wallace Stegner, the famous Pulitzer Prize winning author, called the national parks "the best idea we ever had." This is the "radical" notion that the American people own the nation's most special places, and that these places should be preserved for the enjoyment of current and future generations. Since its creation in 1916, the National Park Service (NPS) has worked to make this idea a reality for all of us.

For the past six months, the Panel has conducted an independent review of the NPS Natural Resource Stewardship and Science Directorate (NRSS). Among other things, this directorate is responsible for providing usable natural and social science information throughout the Service. The Panel applauds the NRSS Associate Director for requesting that the Academy undertake this study at such an opportune time: the current NPS Director, Jon Jarvis, was confirmed in September 2009; the NRSS Associate Director was appointed two years ago, in June 2008; and the NRSS Deputy Associate Director was appointed in 2009.

This review examined NRSS's performance on five core functions:

- Assisting park managers in identifying, monitoring, and understanding park natural resources;
- Evaluating the condition of park natural resources, landscapes, and processes;
- Integrating natural resource information and compliance requirements into decision-making;
- Taking actions to conserve natural resource conditions for appropriate use and enjoyment; and
- Tackling emergencies and catastrophic events.

As part of this examination, the Panel evaluated the relationship between NRSS and the NPS Director, the regions, and the parks, as well as the current performance measurement system. Given the scope of work for this study, the Panel was unable to explore the contributions of NRSS to the Department of the Interior, other Interior bureaus, universities, and non-governmental organizations.

NRSS is a complex organization. It includes seven major program divisions<sup>1</sup> that cover a wide range of subject matter, programs, and responsibilities, along with other organizational units and functions outside the scope of this study. The Panel and the study team have been impressed with the professionalism of the NRSS employees involved with this project.

The Panel determined that NRSS is a highly regarded organization recognized across NPS as providing significant value as a source of independent, credible scientific expertise and technical information. The directorate has made demonstrable progress on each of its five core functions.

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<sup>1</sup> These divisions cover air quality, including natural sounds and night skies; biological resources; environmental quality; geological resources; inventory and monitoring activities; water resources; and social sciences.



At the same time, the Panel believes that NRSS—and, in many cases, NPS as a whole—should take additional steps to advance natural resource stewardship and science throughout the Service. Because NRSS is a Washington office with no line authority over park employees, some of the Panel’s recommendations are directed to both NRSS and the NPS Director.

Most visitors have a grand time in the national parks, yet many are unaware of the significant natural resource challenges facing these special places. To name just a few: the mountain glaciers of Glacier and the North Cascades are melting; the Alaskan snowfields are disappearing; and the pine forests at Bandelier National Monument and Rocky Mountain National Park are struggling to survive.

Against this backdrop, the Panel believes it is critical for NRSS to work with the NPS Director and other senior leaders to develop a readily explainable index of park natural resource conditions and trends. This will not only inform the nation’s policy-makers and key NPS decision-makers, but also educate the public about the state of their national parks. Moreover, to conserve park resources for current and future generations, the Panel believes that additional steps should be taken across the Service to ensure that critical NRSS data, information, and expertise are integrated into decision-making at the national, regional, and park levels.

What matters most is the role that NPS’s natural resource programs can perform for the nation as a whole. In this vein, the Panel believes that NRSS’s mission will become even more important in the future given the nation’s daunting environmental challenges, the lack of scientific and natural resource expertise in many parks, and the increasing need for “landscape scale” solutions. Because the national parks are in a more natural state than other lands, they are extremely valuable to the nation as places where broad ecosystem changes can be monitored and documented.

To strengthen natural resource stewardship and science across the Service, the Panel has eight recommendations for the NPS Director and the NRSS Directorate. Identified briefly below, the body of this report contains detailed discussions of each recommendation and associated implementation actions.

### *Responding to Environmental Challenges*

- **Recommendation 1.** To respond to the significant environmental challenges that originate outside of park borders and adversely impact park resources, the Panel recommends that NPS and NRSS continue to develop and support landscape-scale networks and partnerships.

### *Strengthening NRSS as an Organization*

- **Recommendation 2.** NRSS should increase its professional and personal presence among national park units to ensure that they are not only aware of the Directorate’s full suite of services, but also able to make the best available use of NRSS expertise.
- **Recommendation 3.** The Immediate Office of the NRSS Associate Director should be increased to ensure that the Directorate has the necessary human capital physically present in Washington, DC, to address critical national-level issues.
- **Recommendation 4.** NRSS Division Chiefs should report directly to the Associate Director of NRSS.
- **Recommendation 5.** NRSS should engage in a workforce planning process to develop a comprehensive recruitment, retention, and training strategy to meet future workforce needs.<sup>2</sup> This is particularly important given the significant projected retirements of NRSS employees, especially at the higher grade levels.<sup>3</sup>

### *Utilizing the Best Available Science and Educating the Public*

- **Recommendation 6.** The NPS Director and NRSS should work collaboratively to establish a vision and process for ensuring scientifically-based decision-making at the national, regional, and park levels.
- **Recommendation 7.** The NPS Director and NRSS should work collaboratively to develop the framework for an index with a small set of indicators that show the condition and trend of park natural resources over time. This index would increase the public’s knowledge about the condition of the natural resources in their national parks, thus responding to the top voted idea from the Academy’s online dialogue with NPS employees.

### *Improving the Performance Measurement System*

- **Recommendation 8.** NRSS should work with the NPS Director, DOI, and OMB to simplify its performance measurement system in order to improve its usability for managers across the Service and to educate the public.

The Panel is pleased to have had the opportunity to conduct this review. Clearly, the Natural Resource Stewardship and Science Directorate provides a critical service to NPS through its national leadership and program oversight, professional natural and social science support, and

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<sup>2</sup> Proactive workforce planning focused on a five- to ten-year time horizon is especially critical to NRSS given the problem of “budget erosion.” This means that, even when the total appropriation increases, it often does not keep pace with increasing labor and non-labor costs (salaries, benefits, cost-of-living, locality pay, facilities, and so on).

<sup>3</sup> Agencies across the federal government are facing a wave of looming retirements, which can be especially challenging if a significant amount of an agency’s talent leaves federal service in the same timeframe. Because many employees continue to work at NPS long after they are fully eligible to retire, NPS could have a more acute knowledge transfer problem than many other agencies.

specialized technical assistance. By implementing this report’s eight major recommendations and associated implementation actions, the NPS Director and NRSS have an opportunity to further strengthen the core mission of the park system: the protection, preservation, and conservation of park resources and values for the enjoyment of present and future generations.

## STUDY SCOPE/METHODOLOGY AND ONLINE DIALOGUE RESULTS

As noted in the Panel Message, NRSS requested that an independent Panel of the National Academy of Public Administration (the Academy) conduct a review of the Directorate’s performance with respect to the five its five core functions, as shown in Table 1 below.

**Table 1**  
**NRSS’s Five Core Functions Reviewed in this Report<sup>4</sup>**

NRSS Function	
1.	Assist park managers in identifying, monitoring, and understanding park natural resources.
2.	Evaluate the condition of park natural resources, landscapes, and processes.
3.	Integrate natural resource information and compliance requirements into decision-making.
4.	Take actions to conserve natural resource conditions for appropriate use and enjoyment.
5.	Tackle emergencies and catastrophic events.

As part of this review, the Panel examined NRSS’s:

- progress in implementing its five core functions;
- support to the NPS Director, regions, and parks’; and
- challenges with the performance measurement system.<sup>5</sup>

The Academy convened a three-member expert Panel to lead this independent review, guide the study team’s research, issue findings, and make recommendations for improving NPS stewardship of park natural resources. Appendix A provides biographical sketches of the three Panel members and key project staff.

The Academy convened an 11-member Working Group of senior NRSS officials to provide input, assistance, and advice to the Panel. These individuals participated in three group sessions, and most were interviewed individually by the study team. The Working Group was integrally involved over the course of the project and provided valuable input, insights, and advice. The

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<sup>4</sup> Although the core functions refer specifically to natural resources, the NRSS Social Science Division has an important role because, among other things, the actions and inactions of people have an impact on the resources (natural and cultural) that NPS is expected to protect.

<sup>5</sup> The Panel did not review NRSS’s support for DOI, interagency, and non-governmental activities, as this topic was outside the scope of this study.

Academy appreciates the Working Group's hard work, significant contributions, and volunteered time. Working Group members are identified in Appendix B.

Based on the technical proposal and the work plan agreed to between the Academy and NRSS, the Panel's review primarily examined the NRSS Directorate at the national or headquarters level of management. The cooperative agreement's scope and resources did not allow for a detailed analysis of all NRSS organizations and functions. The review was not expected to conduct a detailed examination of each NRSS division's branches, programs, or activities. Furthermore, the activities of three organizational units were outside of the scope of this review:

- National Natural Landmarks Program;
- CESU Network; and
- Research Learning Centers.

Because the Climate Change Response Program was recently established, a detailed examination of its activities was also outside the scope of this study.<sup>6</sup>

Other NRSS contributions to NPS outside of the Academy's scope included visitor issues, the interrelationships with cultural landscapes and social science initiatives, and external relationships with such agencies as the Federal Aviation Administration and the Environmental Protection Agency, other DOI bureaus, the department, other agencies, universities, and nongovernmental organizations. Similarly, the Academy was not tasked with examining the NRSS research and permitting system through which academics and other external actors conduct research in parks.

In reviewing NRSS's performance on its five core functions, the Panel's review focused significantly, but not exclusively, on NRSS's inventory and monitoring efforts because it is by far the Directorate's largest program in dollar terms. Inventory and monitoring activities—whether conducted by I&M or other directorates—is also an integral part of the first core function that the Panel was charged with reviewing, and each Division Chief reported that their organization had at least some role in this function.

Over the course of this review, the Panel and study team conducted a wide range of primary and secondary research:

- examination of key DOI, NPS, and NRSS policy and program background documents;
- individual and group interviews with Working Group members;

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<sup>6</sup> In comments on the agency review draft of this report, the NRSS Working Group indicated that the Climate Change Response Program has initiated a number of actions in FY 2010 consistent with the Panel's findings and recommendations.

- interviews with NPS and NRSS staff at all levels of the service, including a visit to Rocky Mountain National Park, as well as outside stakeholders with a range of perspectives on the management of natural resources in national parks;<sup>7</sup>
- analyses of NPS/NRSS budget, workforce, and performance data; and
- identification of effective practices in other organizations (NatureServe, National Parks Conservation Association, and Parks Canada)

NPS employee ideas on how to improve NRSS and strengthen natural resource stewardship across the Service were gathered through an Academy-sponsored online dialogue. Although this dialogue was a useful way to gain employee input on these critical issues, it has some limitations. The dialogue was not a random sample survey of NPS employees. Pursuant to NPS policies, NRSS leadership sent a letter to the NPS National Leadership Council, the Natural Resource Chiefs in each regional office, and the Natural Resource Advisory Group with a request that they further distribute the dialogue link to their employees. When it became clear that not all employees received information about the dialogue through this mechanism, the study team began distributing the link to each regional and park interviewee, with a request that the interviewee not only participate, but also forward information about the dialogue to other employees in their region and/or park. After the dialogue closed, the Panel and study team did have to interpret the meaning of some ambiguous ideas when analyzing the dialogue results. Despite these challenges, the Panel believes that the dialogue generated useful ideas, validated many initial findings, and provided useful input into the recommendations. The Panel expects the dialogue results to be useful to NRSS leadership, as each dialogue participant was either an NRSS employee or an internal NPS stakeholder.

With the methodological caveats discussed above, Table 2 shows the top ten ideas across each of the five forums in the Academy’s online dialogue.<sup>8</sup> As shown, the idea that ranked first across all dialogue forums was the need to ensure “public engagement in long-term conservation and the natural resource values of the parks.” Three of the top dialogue ideas addressed integration needs—that is, integration of natural resource information into park management and planning, as well as further links between natural resource efforts and maintenance/development decisions.<sup>9</sup> To ensure that information is integrated into decisions that conserve natural resources, another top idea was to provide more interpretation to enable controversial, but presumably necessary, actions to be taken.

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<sup>7</sup> Interviews averaged approximately one-hour each and were conducted both in-person and by phone. The majority of interviews were one-on-one; some in-person interviews with NPS regional office and park staff were conducted in small groups. Interviewees were assured their responses would not be attributable and that the results of the interviews would be aggregated.

<sup>8</sup> To assist the reader to understand the meaning of the dialogue ideas, some have been paraphrased, as appropriate, in the body of this report. Appendix D presents detailed tables on the dialogue ideas from each forum, with the ideas reproduced verbatim, except for minor typographical and grammatical corrections.

<sup>9</sup> The integration of natural resource efforts with maintenance—that is, the need to further integrate natural resource programs and policies into other divisions, especially in terms of development projects and maintenance—was the idea that ranked first in the conservation actions forum. In support of this idea, it was reported that some parks had put in culverts (conduits used to enclose flowing bodies of water to allow it to pass underneath roads, railways, or embankments) that have led to stream disturbances. Similarly, new buildings, while energy efficient, are not always night sky friendly. Participant comments indicated that this is an area where internal NPS stovepipes make it more difficult to take the needed conservation actions.



Two of the top ideas addressed workforce issues: the need to recruit and train superintendents to ensure science-based management and the limited park-based natural resource staff/expertise. Several of the top ideas addressed the inventory and monitoring function: expanding the I&M inventorying phase,<sup>10</sup> building on and strengthening I&M networks, increasing I&M’s role in climate change, and maintaining and improving comprehensive planning and monitoring efforts in the parks.

**Table 2**  
**Top Ten Ideas Across All Online Dialogue Forums<sup>11</sup>**

Rank	Idea	Votes
1.	Ensuring public engagement in long-term conservation and natural resource values of parks. <i>NPS Natural Resource Challenges</i>	165
2.	Effective integration of research, information management, data analysis, and park management. <i>NPS Natural Resource Challenges</i>	161
3.	Recruiting and training superintendents with resource backgrounds to ensure science-based management. <i>Integrating natural resource information and requirements into decision-making</i>	152
4.	An enhanced and broadened inventory phase of the I&M program. <i>Understanding and evaluating park natural resources</i>	146
5.	Integration of Maintenance and Natural Resource efforts. <i>Taking Conservation Actions</i>	137
6.	Improved park-based natural resource staff/expertise. <i>NPS Natural Resource Challenges</i>	134
7.	Build upon and strengthen the I&M networks. <i>Understanding and evaluating park natural resources</i>	131
8.	More interpretation targeted to change specific behaviors so that even controversial actions in favor of resource protection can be taken. <i>Taking Conservation Actions</i>	118
9.	A greater I&M role in the climate change initiative. <i>Taking Conservation Actions</i>	116
10.	Better integration of scientific data and expertise in park planning. <i>NPS Natural Resource Challenges</i>	115
(TIED)	Maintained and improved comprehensive planning and monitoring efforts in parks. <i>Emergencies and catastrophic events</i>	115

## STRUCTURE OF THE REPORT

After providing an overview of NPS and NRSS, this report is organized to address the four major issues identified through the research conducted over the course of this study:

- Issue 1—Impact of Environmental Challenges on NPS and NRSS
- Issue 2—NRSS Organizational Structure, Function, and Relationships
- Issue 3—NRSS Performance on Five Core Functions

<sup>10</sup> This refers to expanding beyond the 12 basic inventory subjects.

<sup>11</sup> The online dialogue had five forums. In each forum, a participant could cast up to 20 votes; the most a participant could give to any one idea was 3 votes. An idea could receive a significant number of votes because of frequency and/or intensity. That is, a broad number of participants could frequently vote for it (possibly giving it 1 or 2 votes), a smaller number of participants could intensely favor it (possibly providing it 3 votes), or some combination of frequency and intensity could exist.

- Issue 4—Performance Measurement Systems

The Panel has findings and recommendations within each of the issues listed above.

In addition, the report has seven appendices:

- Appendix A—Panel and Study Team Biographies
- Appendix B—List of Individuals Interviewed or Contacted
- Appendix C—NPS Online Dialogue Engagement and Participation Analysis
- Appendix D—NPS Online Dialogue Ideas
- Appendix E—Summary of NRSS Divisions’ Planning Documents
- Appendix F—Select Role and Activities of NRSS Divisions in NRSS’s Core Functions
- Appendix G—NPS’s Performance on Natural Resource GPRA and PART Measures

## **OVERVIEW OF NPS AND NRSS**

The National Park Service (NPS) was created in 1916 “to conserve the scenery and the natural and historic objects and the wild life [in national parks, monuments, and reservations] and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.” As an agency within the U.S. Department of the Interior, NPS currently manages America’s over 84 million acre national park system—which includes national parks, national military parks, national historic sites, national monuments, national scenic trails, national seashores, and a variety of other federally designated units.<sup>12</sup> NPS has approximately 21,000 employees<sup>13</sup> and an annual budget of approximately \$2.7 billion for FY 2010.

Within NPS, the Natural Resource Stewardship and Science (NRSS) Directorate is responsible for using the tools of natural and social science, as well as technology, to assess the condition of NPS’s natural resources and to protect park resources and values. The NRSS Directorate provides:

- national leadership and program oversight;
- centralized and integrated professional natural and social science support to parks and organizational units across the Service; and

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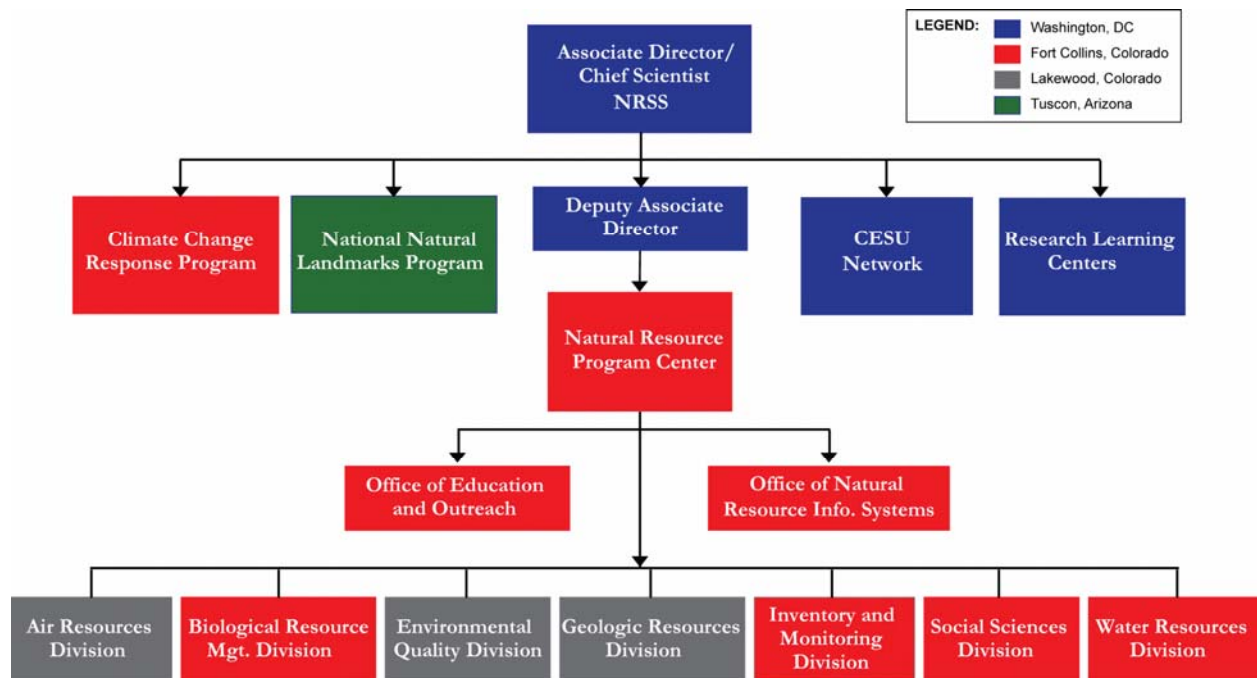
<sup>12</sup> The “National Park System” is the comprehensive term for the collection of all the units managed by the National Park Service. Of NPS’s 392 units, a total of 58 are designated as national parks. The other units include: (1) national military parks, national battlefield parks, national battlefield sites, and national battlefields [total of 24]; national historical parks, national historic sites, and international historic sites [123]; national lakeshores [4]; national memorials [28]; national monuments [74]; national parkways [4]; national preserves and national reserves [20]; national recreation areas [18]; national rivers, wild and scenic rivers, and river-ways [15]; national scenic trails [3]; national seashores [10]; and other designations, such as the White House and the National Mall [11].

<sup>13</sup> FedScope data (March 2009); the President’s FY 2010 Budget requested 21,600 FTE for NPS. (Team will get the latest numbers from FedScope.)

- specialized technical assistance to parks and others within the Service through technical expertise that cannot be provided at the park/regional levels or elsewhere.

The NRSS Directorate is led by an Associate Director who reports to the NPS Deputy Director of Operations. The color in Figure 1 corresponds to the physical location of the office head, indicating that NRSS, despite being a headquarters function, is a geographically dispersed organization. The NRSS Associate Director and Deputy Associate Director, as well as the national officials responsible for the Cooperative Ecosystem Studies Units and the Research Learning Centers, are physically located in Washington, DC. The Natural Resource Program Center (NRPC) is located in Fort Collins, Colorado, and headed by a Center Director who reports to the NRSS Deputy Associate Director. The seven programmatic divisions, the Office of Education and Outreach, and the Office of Natural Resource Information Systems are located in Fort Collins or Lakewood, Colorado, not Washington, DC. These individuals report to the NRPC Director.

**Figure 1**  
**NRSS Current Organizational Structure and Physical Location of Office Heads**  
**WASO<sup>14</sup>**



Source: NRSS Associate Director's Briefing to the Obama Administration (2009)

<sup>14</sup> NRSS has not made a final decision about where the Coordinator of the Climate Change Response Program will be duty-stationed (the Acting Coordinator is located in Fort Collins, CO). The Research Learning Centers Coordinator position is currently vacant, but will be duty-stationed in Washington, DC.

The seven programmatic divisions are critical parts of NRSS's ability to perform each core function effectively:

- **The Air Resources Division** works to protect air quality, natural sounds and dark night skies through monitoring; scientific studies; technical, planning, and regulatory assistance to parks; policy development; collaboration with other agencies and partners; and outreach programs. This division includes the Natural Sounds and Night Skies Program.
- **The Biological Resources Management Division** provides leadership and technical expertise in the areas of plant and animal invasive species management, wildlife management and health, endangered species and biodiversity, migratory species and conservation genetics, integrated pest management, and ecosystem restoration, species of management concern, and human dimensions of natural resources. This office also has added a Landscape Ecologist to address climate change issues associated with biological resources, corridors and expertise on fragmentation issues. This Division also supports the Service-wide Exotic Plant Management Team structure.
- **The Water Resources Division** provides program leadership, technical assistance, and funding to parks in the areas of water rights, water quality, surface water and ground water hydrology, planning, floodplain and fishery management, watershed and wetland protection, policy and regulatory analysis, information management and interpretation, and training. This unit also oversees the NPS Ocean and Coastal Resource Program.
- **The Geologic Resources Division** works collaboratively to support NPS managers by providing technical information, regulatory tools, and specialized services effectively to manage geologic and mineral resources, including assistance with restoration of disturbed lands and abandoned mines and protection of park resources and values from incompatible mineral development in and adjacent to parks.
- **The Environmental Quality Division** provides guidance and project-management support on complex, controversial, and often precedent-setting NEPA decisions and documents; coordinates NPS review of other federal actions that could impact NPS resources; and provides guidance and case-management support on response, damage assessment, economic, and restoration actions taken to prevent or minimize injuries, recover damages, and restore injured park resources.
- **The Inventory and Monitoring Division** provides funding, technical assistance, and coordination for 32 I&M Networks to conduct basic natural resource inventories and to monitor the condition, or "health," of key vital sign parameters. This unit collects, organizes, and analyzes natural resource data to ensure that park management and decision-making is scientifically informed.
- **The Social Science Division** conducts and promotes state-of-the-art social science, visitor surveys, public use statistics, and research to address high priority national needs; estimates the economic impacts of park visitation; and provides technical assistance to park and program managers, the scientific community, and the public related to social sciences.

The NRPC Center Director provides programmatic oversight, administrative support, and management direction to the seven divisions. This office consists of two organizational subunits:

- **The Office of Outreach and Education** assists in distributing usable knowledge on natural resources to parks and the general public, and in developing and implementing appropriate communication methods for the public, educators, and park visitors, including internet based information.
- **The Office of Natural Resource Information Systems** develops and manages information systems to support NRSS operations at park, regional and national level. It also provides an essential, reliable infrastructure for information storage, management and sharing.

Several programs are administered directly by the Associate Director for NRSS, including:

- **The Climate Change Response Program** is a relatively new program responsible for coordinating NPS efforts to respond to climate change, including science, adaptation, mitigation and communication strategies. The program leverages capabilities across NRSS Divisions and programs, other NPS Directorates, and with regions and parks as well as collaborating with other bureaus, agencies and partners.
- **The National Natural Landmarks Program** supports the voluntary conservation of outstanding geological and biological sites, regardless of ownership. Ongoing partnerships with public and private landmark owners allow participants to share information, solve problems cooperatively, and conserve outstanding examples of our nation's natural history.

Decision-making within NPS has been highly decentralized, residing primarily with park superintendents. In that year, NPS substantially reduced the number of regional staff, collapsed the number of regions from 10 to 7, clarified that regional office staff are primarily “service providers” to the parks, and provided greater authority to park superintendents. Each park superintendent reports to his or her respective Regional Director. This means the formal line of authority runs from the NPS Director to the Regional Director to the park superintendent.

Headquarters directorates are expected to support the NPS Director, with regional offices supporting the Regional Director and providing various services to the parks. The performance of each park superintendent is evaluated annually based on an individual performance plan that outlines goals and expectations. Despite a statutory mandate, NPS has not established an administrative requirement that superintendent performance plans include an element related to resource management.<sup>15</sup>

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<sup>15</sup> Federal law requires that the “trend in the condition of resources in the National Park System shall be a significant factor in the annual performance evaluation of each Superintendent of a unit in the National Park System” (see 16 USC 5936).



Most superintendents organize their staffs in groups around the following core functions:

- Visitor Services;
- Visitor and Resource Protection;
- Maintenance;
- Natural Resources;
- Cultural Resources; and
- Administration.

Depending on the nature and size of the park and its staff, these functions are bundled in different ways and with varying staffing complements. For example, cultural and natural resource programs are frequently combined under a unified “resource management” division. A few large parks have discrete staff for natural resources, while in other parks a single staff person may be responsible for multiple natural resource program areas. Many small parks have no staff dedicated to natural resources, covering these responsibilities with staff from other divisions as collateral duties. Conversely, natural resource staff may spend a significant amount of time on collateral duties unrelated to natural resources.

For most superintendents, ensuring the enjoyment of park visitors is the highest priority concern. The Panel notes, however, that NPS management policies place greatest emphasis on the conservation mission, emphasizing that the Service will:

preserve and protect the natural resources, processes, systems, and values of units of the national park system in an unimpaired condition to perpetuate their inherent integrity and to provide present and future generations with the opportunity to enjoy them. The National Park Service will strive to understand, maintain, restore, and protect the inherent integrity of the natural resources, processes, systems, and values of the parks while providing meaningful and appropriate opportunities to enjoy them.

NRSS’s objective is to provide scientific and natural information to help superintendents fulfill their primary function of resource protection.

Although the large majority of NRSS employees are located in Fort Collins and Lakewood, all of NRSS is considered a part of the NPS Washington Office (WASO). As such, it has no line authority over park employees. Through its inventory and monitoring function and the new climate change program, however, NRSS does have programmatic influence through the annual allocation of funding for specific positions in the regions and the parks.

## NRSS Budget and Workforce

The NRSS Directorate, its divisions, and its programs cascade from WASO through the regions and the parks where applicable. Financial assistance is provided to the parks and regions through base-funding and direct funding from WASO in the form of project funding, staff funding, and direct technical assistance from WASO staff. Because NRSS funds park projects and particular positions, as well as offers technical assistance and scientific expertise to the field on a regular basis, it has a more active role than traditional headquarters functions in other public organizations.

NPS funds its service-wide natural resource stewardship and science activities through the Operation of the National Park System (ONPS) appropriation. These funds are allocated to NRSS, the parks, and Everglades restoration. NRSS provided the Academy with budget data from FY 1999 to FY 2010. The study team analyzed this data to conduct all budget analyses in this report. In FY 2010, the total appropriation of \$228,426,000 was distributed as follows:

- NRSS received \$110,168,000 (48 percent), most of which is further distributed to the parks, networks, and the regions;<sup>16</sup>
- Parks received \$108,276,000 (47 percent);<sup>17</sup> and
- Everglades received \$9,982,000 (4 percent).

As shown in Figure 2, the nominal dollar value of this program increased from \$107,031,000 in FY 1999 to \$228,426,000 in FY 2010.<sup>18</sup> During this 12-year period, nominal resources more than doubled, or, examined in a different way, equate to an annual increase of roughly 7 percent per year over this time. Between FY 2000 and FY 2008, the Natural Resource Challenge provided base fund increases for natural resource stewardship and science of \$77,552,000. The majority of this increase is reflected in the WASO figures; NRC funds permanently transferred to the parks are reflected in the park figures. Most NRSS funds, however, are transferred on an annual basis to the regions or the parks. In FY 2010, for example, more than 83 percent of NRSS funds were transferred to the regions or the parks for natural resource activities.<sup>19</sup>

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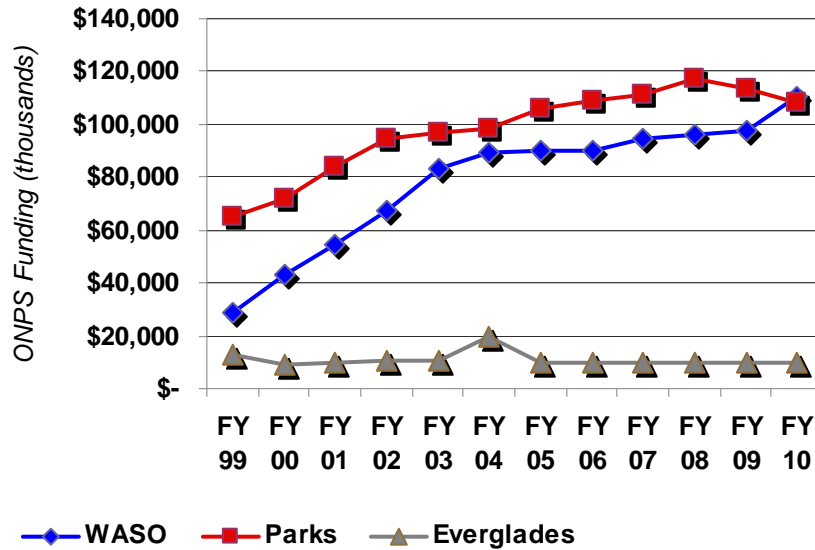
<sup>16</sup> The NRSS figure contains only the dollars over which NRSS and WASO have influence. The Everglades Restoration Project consists of funds earmarked every year in the appropriations for that purpose.

<sup>17</sup> Park-based money goes directly to parks with some regional assessments taken off the top. The Park superintendent can re-allocate 10 percent from year to year without regional approval.

<sup>18</sup> A total of \$10,000,000 of the WASO FY 2010 budget was for the new Climate Change Response Program; another \$1,250,000 was for ocean and coastal resources.

<sup>19</sup> These funds are used for such activities as condition assessments, vital signs monitoring, the Exotic Plant Management Teams, the National Cave and Karst Research Institution, and NEPA planning projects.

**Figure 2**  
**Natural Resource Stewardship and Science**  
**Operation of National Park System Base Funding (in thousands)**  
**Distribution between WASO, Parks, and Everglades<sup>20</sup>**



*Source:* NRSS provided budget data (FY 1999 to FY 2010)

Regional funds are not included in the figure above. Most regional natural resource positions are funded at the discretion of the Regional Director in one of three ways:

- ONPS base funds specifically given to regions;
- NRSS base fund transfers (for example, specific I&M Network staff funded through annual funding allocations from NRSS); and
- annual regional assessments against park ONPS base funds (typically, half of 1 percent of all park bases over \$1 million).<sup>21</sup>

Although the Academy did not receive budget or human capital data for the regions, the study team was told that, since the mid-1990s, the regional natural resource workforce has been curtailed significantly due to the reduction in the number of regional offices and the associated reduction in regional office base funding. NRSS’s ability to allocate annual funding for regional

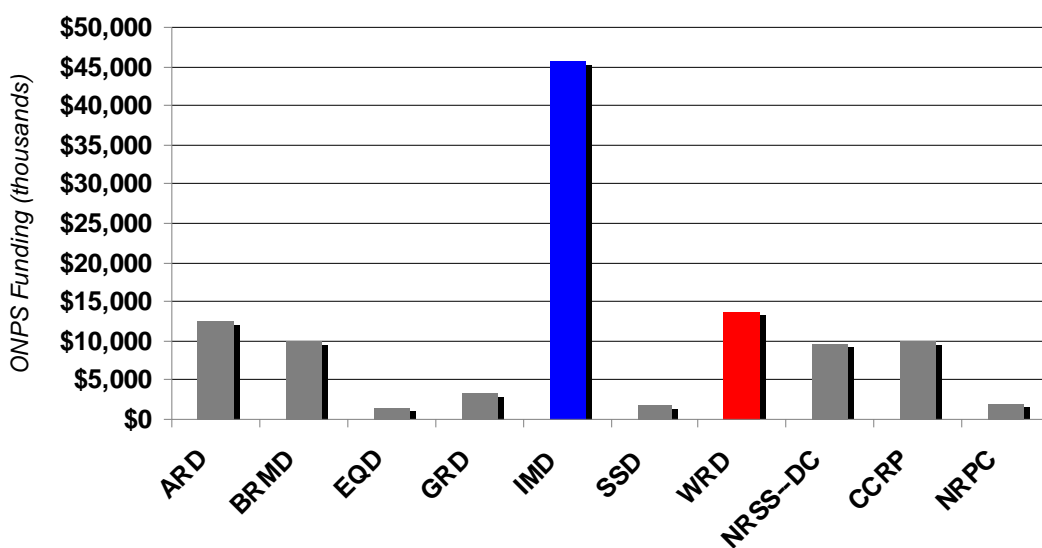
<sup>20</sup> Not all NRSS funding is received from the ONPS appropriation. The Environmental Quality Division and the National Natural Landmarks Program receive some funds from the National Recreation and Preservation appropriation. In addition, NRSS can administer funding for natural resource stewardship and natural and social science projects received through NPS fee programs (recreational fees and the National Parks Pass), from other NPS project funds, and from DOI natural resource damage assessment funds. (NPS must compete with other NPS entities for access to the fee funds.)

<sup>21</sup> Because of multiple regional assessments (including a regional IT assessment, regional equipment replacement, and others), the parks as a whole do not receive all of the ONPS base funding listed in Figure 2.

natural resource staffing has provided needed assistance to the regional offices. Interviewees did note, however, that the regional offices have other unmet staffing needs.

Figure 3 presents the breakdown of NRSS FY 2010 base funding by major organizational unit. The Inventory and Monitoring Division accounts for the largest proportion of NRSS funding (41 percent), followed by the Water Resources Division (13 percent).<sup>22</sup>

**Figure 3**  
**Distribution of NRSS WASO Base Funding by Division**  
**Operation of the National Park System (in thousands)<sup>23</sup>**  
**FY 2010**



Source: NRSS provided budget data (FY 2010)

NRSS provided the Academy with a workforce spreadsheet with data, as of March 2010, on the NRSS employees and contractors physically located in Washington, DC, Fort Collins or Lakewood, CO, and Tucson, AZ. The study team used the human capital data provided by NRSS to conduct all workforce analyses presented in this report.

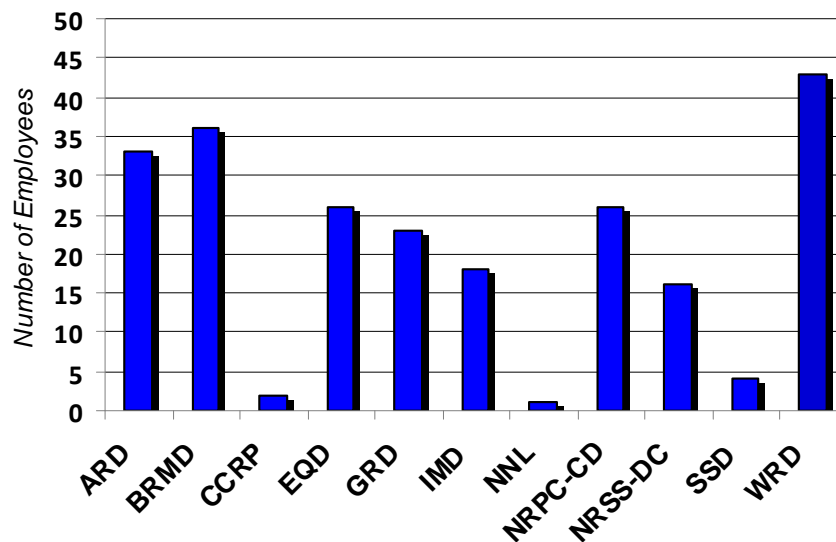
As shown in Figure 4, the NRSS *federal workforce* in these four locations, as of early March 2010, consisted of 228 employees. Of the major programmatic divisions, the largest by number of employees was Water Resources, and the smallest programmatic division was the newly established Social Science Division. As of March 2010, the DC-based staff of the Immediate

<sup>22</sup> EQD’s total approved financial plan for FY 2010 was \$7,295,510 (only \$1,453,000 of the total was ONPS funding; the balance was funded from project funds). The NRSS Associate Director’s funds include \$8,099,000 of NRPP and \$283,000 of NR Protection project funds.

<sup>23</sup> For the purposes of this figure, the National Natural Landmark program is included within the Immediate Office of the NRSS Associate Director (NRSS-DC).

Office of the NRSS Associate Director consisted of 16 individuals (approximately 7 percent of the total workforce).<sup>24</sup> NRSS also utilizes contractors, but they are not reflected in this figure.<sup>25</sup>

**Figure 4**  
**NRSS WASO Workforce**  
**Number of Federal Employees March 2010**



*Source:* NRSS provided workforce data spreadsheet (March 2010)

<sup>24</sup> In this figure and subsequent workforce figures, the Immediate Office of the NRSS Associate Director (“NRSS-DC”) includes those NRSS employees who are duty-stationed in this office, including liaisons from the divisions. The Climate Change Response Program is listed as a separate organization (“CCRP”) because, though included in the NRSS Associate Director’s office numbers provided to the Academy, its employees currently are not duty-stationed in Washington, DC. Similarly, the National Natural Landmarks (NNL) Program head is listed as a separate organization, rather than being included within the NRSS Associate Director’s numbers above, because this position is duty-stationed in Tucson, AZ. As noted in the body of this report, the NNL structure and mission was outside the scope of this study.

<sup>25</sup> In an earlier version of this report that was sent to NRSS for review, this figure incorporated the contractor data contained in the workforce spreadsheet provided to the study team. Because some NRSS Working Group members noted discrepancies in those contractor numbers, they have been excluded from this figure. These discrepancies indicate that NRSS has challenges with its existing data systems and/or its data maintenance and entry, at least for contractors. These are important issues to investigate and resolve, but were beyond the scope of this study to address.



The apparent disconnect between IMD's funding and staff numbers is due to IMD monies (1) funding some inventory and monitoring activities in other NRSS divisions and (2) funding approximately 200 federal positions and over 60 partners in regions, networks, and parks.<sup>26</sup> With this information as background, the report moves into the first of the four key issues identified through the research conducted for this study.

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<sup>26</sup> The Academy was not provided data on the number of NRSS-funded positions outside of DC, Fort Collins, and Lakewood. In 2007, I&M funded 200 federal and 62 partner FTE in networks, regions, and parks. In these cases, NRSS provides an annual allocation to the recipient organization, establishes performance expectations, and may have some input into the individual's annual performance evaluation.

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## ISSUE I

### IMPACT OF ENVIRONMENTAL CHALLENGES

**Given the nation’s documented environmental challenges, the lack of scientific and natural resource expertise in many parks, and the increasing need for landscape scale solutions, NRSS will be called upon to increase its assistance to the parks in order for them to meet their natural resource stewardship responsibilities.**

The United States national park system is a treasure often referred to as “America’s best idea.” It consists of 392 parks (a total of 270 of them with significant natural resources), covering 84 million acres in 49 states. Roughly 50 percent of the total acreage of the national park system is located in Alaska. The system has 26,000 historic structures, 2,200 cultural landscapes, and more than 121 million museum specimens and artifacts. The national park system generates \$13.3 billion of local private sector economic activity and supports 267,000 private sector jobs nationwide. NPS is entrusted with conserving 74 ocean and great lakes park units in 26 states and 3.1 million acres of ocean and great lake waters.

America’s geologic heritage is exemplified in the park system. More than 160 parks contain nationally significant geologic resources. These include the Grand Canyon, the ancient fossils of Dinosaur National Monument, the longest recorded cave system in the world at Mammoth Cave National Park, the greatest density of arches in the world at Arches National Park, and the largest and most colorful collection of petrified wood in the world at Petrified Forest National Park. Yellowstone National Park contains over half of the world’s known geysers. Over 150 parks contain scientifically important fossil deposits; 81 parks contain 3,600 known caves; and another 40 parks have known karst systems. Furthermore, 97 parks protect 7,500 miles of shoreline; 52 parks contain geothermal systems; 38 parks have volcanoes as a major feature; and 37 have active glacial features.<sup>27</sup>

The grandeur, beauty, and purpose of the nation’s park system is increasingly at risk due to environmental challenges arising from urbanization and energy development, as well as the impact of climate change on the range of species in the parks, ocean temperatures, water patterns, invasive species,<sup>28</sup> disease migration, and many more. Currently, many parks are experiencing warmer temperatures, melting mountain glaciers, the loss of permafrost and sea ice, rising sea levels, longer wildfire seasons, and species range shifts.<sup>29</sup> Approximately 2.6 million acres are infested by invasive species, some of which may be a result of climate change. Invasive species impose significant economic costs to park lands and surrounding areas.

The NPS Director, Jon Jarvis, has been at the forefront in acknowledging the impact of climate change, publicly stating that it “challenges the very foundation of the National Park System and our ability to leave America’s natural and cultural heritage unimpaired for future generations.” At the same time, he acknowledged, “[o]ur national park units can serve as the proverbial canary

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<sup>27</sup> NRSS Geologic Resources Division, *Strategic Plan* (March 2008).

<sup>28</sup> An invasive species is a non-native species whose introduction causes (or is likely to cause) economic or environmental harm or harm to human, animal, or plant health.

<sup>29</sup> NPS Climate Change Program Brief, “Responding to the Challenge of Climate Change” (September 2008).

in the coal mine, a place where we can monitor and document ecosystem change without many of the stressors that are found on other public lands.”<sup>30</sup> Jarvis has told Congress:

To succeed in its mission in the face of climate change, the Department of the Interior and National Park Service must lead by example in minimizing our carbon footprint and promoting sustainable operational practices. We must take responsibility for understanding how climate change will impact the national parks and take appropriate steps to protect these national treasures.<sup>31</sup>

In response to the threat of climate change, Secretary Salazar issued Secretarial Order No. 3285 on March 11, 2009, to make production and transmission of renewable energy on public lands a priority for the Department.<sup>32</sup> In the previous Administration, NPS witnessed a roughly ten-fold increase in non-renewable oil and gas lease applications surrounding parks. Although renewable energy generally is cleaner than non-renewable energy, it still can have impacts on park air quality, water quality and quantity, wildlife, habitat, soils, sound-scapes, and night sky visibility. Many parks struggle with how to be supportive of renewable energy development outside park boundaries while ensuring that such development does not adversely impacts park resources and values. How to allow conventional and alternative energy and mineral development without sacrificing other park values, such as visitor experience, wildlife biology, water quantity and hydrology, and national landmark protection. Through a coordinated effort, the NRSS has been working aiding park managers influence the programmatic and site-specific decisions of other agencies to protect parks and other special status areas like national trails and national historic sites from the spillover impacts associated with conventional and renewable to decision-making minimize the negative effects of this energy development outside park boundaries.

The parks’ environmental challenges primarily originate outside their borders. For example, air pollution can lead to increased nitrogen deposition in parks miles away from the original source. The National Parks Conservation Association identifies the key environmental threats as (1) emissions and climate change and (2) adjacent land use and consumptive water use. Pollution from motor vehicles and industry not only obscures scenic vistas, but also forms ground-level ozone that harms people, wildlife, and plants. Noise pollution can prevent animals inside parks from finding mates and food. Similarly, residential development outside park boundaries may change water use patterns, destroy wildlife habitat, block migratory routes, and produce noise and light pollution that impacts natural resources and visitors alike.<sup>33</sup>

One of the Academy’s online dialogue forums was devoted to the subject of natural resource challenges. Participants were asked the following questions:

- What are the most significant natural resource challenges facing the national park system?

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<sup>30</sup> Environmental News Service (2009), “Obama Nominates Jon Jarvis to Head National Park Service.”

<sup>31</sup> Environmental News Service (2009), “Obama Nominates Jon Jarvis to Head National Park Service.”

<sup>32</sup> In the previous Administration, NPS witnessed a roughly ten-fold increase in non-renewable oil and gas lease applications surrounding parks.

<sup>33</sup> National Parks Conservation Association (2008), *Park Resource Index*, pp. 24 - 25.

- What actions should NRSS take to address the National Park System’s natural resource challenges?

Table 3 presents the top five ideas from that forum by rank and vote. As shown, the top ideas in this forum focused most heavily on actions that NRSS could take to address critical natural resource needs, as opposed to the identification of specific environmental challenges such as invasive species and habitat conversion. For example, the top idea in this forum was ensuring effective public engagement in long-term conservation and the natural resource values of the parks. Along the same lines, the fifth top idea was to engage other landowners and managers in landscape scale conservation. Two of the top ideas focused on the need to improve integration of research and information into NPS management and planning. Another top idea identified the lack of park-based natural resource staff and expertise as a challenge. These ideas indicate that NPS and NRSS will need to continue to enhance their outreach to the public and improve internal management practices.

**Table 3**  
**Top Five Ideas**  
**Forum on NPS Natural Resource Challenges**

Rank	Idea	Votes
1.	Ensuring public engagement in long-term conservation and natural resource values of parks	165
2.	Effective integration of research, information management, data analysis, and park management	161
3.	Improved park-based natural resource staff/expertise	134
4.	Better integration of scientific data and expertise in park planning	115
5.	Engagement of non-park land owners and managers in landscape scale conservation.	112

**FINDING I-1:**

*NRSS’s mission to provide usable natural and social science knowledge will become even more critical as (1) environmental challenges originating outside park boundaries pose further problems for park natural resources and (2) NPS land managers increase the attention paid to landscape-scale environmental and land use challenges.*

Fundamentally, NRSS is expected to provide support to all levels of NPS—from park superintendents and employees to the Director of NPS—as well as the Department of the Interior and the Congress to protect and conserve park natural resources for the enjoyment of future generations. The NRSS Directorate generally works to provide the following support:

- credible, timely and accurate scientific data;
- natural resource and management expertise;

- legal and regulatory support;
- resource management policy and guidance; and
- engagement with other agencies and organizations.

NRSS’s support of both the natural resource managers in the field and the national-level leadership provide it the benefit of being involved in both program-specific activities at the park level and national-level policy discussions. This dual perspective creates a valuable organization that successfully combines expertise and experience in service of NRSS stakeholders and NPS as a whole.

Through the Natural Resources Challenge, NRSS has substantially improved its capacity to conduct credible scientific inquiry through a broad array of inventory, monitoring, and research activities in support of improving the management of natural resources in the parks. The Natural Resource Challenge set out to:

- increase inventorying and monitoring capability aimed at assessing broad categories of natural resources and the programs needed to protect them unimpaired for future generations;
- provide increased support to programs and projects designed to maintain and restore park natural resources, including actions to recover endangered species and eliminate exotic species;
- improve awareness of parks as “natural laboratories” for use by scientists—for example, taxonomic and ecological research; or other types of scientific activities appropriate to the setting of particular parks;
- ensure that park visitors, residents of communities adjacent to parks, and the general public are connected to the parks through up-to-date and hands-on science education about the results of research activities conducted within the parks; and
- undertake outreach to partners in universities, federal and state agencies, local science education organizations, and other entities to gain their cooperation in successfully implementing the Natural Resource Challenge.

In general, interviewees believed that the mission or function of NRSS should not change, but it is clear that NRSS staff will be called upon more often in the future to help parks and the Park Service to begin to address its many challenges including:

- **Physical challenges**—preventing air, noise and light pollution, mitigating external and internal development of energy and geological resources;
- **Biological challenges**—loss of rare species, species in parks alone, ecosystem imbalances and habitat degradation;
- **Interdisciplinary challenges**—climate change, loss of land due to sea level rise, impacts of changing storm patterns and thermal regimes, and the adaptation of park ecosystems;
- **Cultural concerns**—physical and biological agents, the causes of potential threats, avoidance of adverse impacts on facilities, collections, cultural landscapes, and statues;

- **Land use changes inside and outside parks**—habitat fragmentation, wildland fire/urban interfaces; and
- **Human condition change**—changing attitudes towards the parks resulting from declines in outdoor experience.

A full analysis of NRSS’s relationship with external stakeholders was beyond the scope of this study, but interviewees emphasized that partnerships and a network approach to pressing landscape scale environmental challenges are becoming more important. The increasing attention being paid to addressing landscape scale environmental challenges will create a greater demand for the experience and expertise of NRSS staff. Although NPS grants park superintendents (not NRSS) the authority to enter into landscape scale partnerships, NRSS can provide valuable information, advice, and assistance in the negotiation process. NRSS’s seven divisions and their programs will become even more important sources of assistance for resource managers in the field and at the national level, especially as providers of information on environmental challenges that cross park boundaries. At the same time, NRSS cannot be the sole source of natural resource expertise. Especially on more routine matters, capacity in the regional offices, parks, and cooperators will continue to be critically important.

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#### **FINDING I-2:**

*NPS and NRSS are building upon their existing stakeholder relationships and formal networks to bring good science to bear on landscape-scale resource management decisions.*

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Landscape-scale conservation is based on the recognition that adaptation to and/or mitigation of certain environmental problems requires coordinated actions by many stakeholders over larger geographic regions, including areas outside of the parks. NRSS has the appropriate perspective to stimulate just such actions. Interviewees emphasized that partnerships and a network approach to pressing environmental issues are becoming more important, especially since NPS is one of many land management and natural resource organizations within the federal government. As Director Jarvis has publicly stated, NPS must engage in “an unprecedented level of collaboration and cooperation with other agencies and partners ... to acquire needed scientific information, protect resources, and effectively expand the teaching of the benefits and necessity of natural and cultural resource conservation across the nation and the world.”<sup>34</sup>

The Natural Resource Challenge was a catalyst in NPS’s shift to geographic networks. In the 1990s, as part of “Reinventing Government,” additional authorities and responsibilities were shifted from the regional directors to superintendents at the park level. The result was a highly decentralized organizational structure lacking a baseline across the parks on the condition and trends of natural or cultural assets. One of the major program areas in the NR Challenge was filling the need for park natural resource inventories and long term monitoring, with dedicated inventory and monitoring staff embedded at the park level through a series of geographic

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<sup>34</sup> Environmental News Service (2009), “Obama Nominates Jon Jarvis to Head National Park Service.”

networks. This distributed network of dedicated staff, working at and in conjunction with parks, has sparked a culture shift towards data integration. The networks have also, for the first time, given many natural resource managers long-term strategic data to inform decision-making.

NPS has direct relationships with the other bureaus of the Department of the Interior and reports to the Secretary. The NPS science program includes the U.S. Geologic Survey as a key partner for assisting NPS in development of methods and conducting primary research on park natural resources. The Environmental Protection Agency and the Park Service work together on monitoring and improving air quality and water quality, and the Climate Friendly Park program helps the parks develop sustainable strategies to mitigate their green house gas emissions. More recently, the Climate Change Response Program has launched an adaptation planning initiative that uses climate change scenarios to help park managers plan in the face of uncertainty and adapt to the impacts of climate change.

DOI Secretary Order No. 3289 on “Addressing the Impacts of Climate Change on America’s Water, Land, and Other Natural and Cultural Resources” (issued on March 11, 2009) explains that:

Given the broad impacts of climate change, management responses to such impacts must be coordinated on a landscape-level basis. For example, wildlife migration and related needs for new wildlife corridors, the spread of invasive species and wildfire risks, typically will extend beyond the borders of National Wildlife Refuges, BLM lands, or National Parks. Additionally, some bureau responsibilities (e.g., Fish and Wildlife Service migratory bird and threatened and endangered species responsibilities) extend nationally and globally. Because of the unprecedented scope of affected landscapes, Interior bureaus and agencies must work together, and with other federal, state, tribal and local governments, and private landowner partners, to develop landscape-level strategies for understanding and responding to climate change impacts. Interior bureaus and agencies, guided by the Energy and Climate Change Council, will work to stimulate the development of a network of collaborative ‘Landscape Conservation Cooperatives.’ These cooperatives, which already have been formed in some regions, will work interactively with the relevant DOI Climate Science Center(s) and help coordinate adaptation efforts on the ground.

Through the new CCRP, eight new positions have been funded for regions to participate in the DOI LCCs and CSCs<sup>35</sup>

NPS and NRSS must work in concert with a wide range of partners. To protect park resources, NPS must pursue joint efforts with other federal agencies; state, tribal, and local governments; and non-profits, the private sector, and the general public. Resource stewardship and science have both narrow and broad foci, from the needs of a single park, to resource management at a landscape scale. At the park level—the heart of the NPS system—park managers have to create a balance among programs, visitors, maintenance, and the unexpected. NRSS has already developed a number of networked approaches to stretch dollars and expertise further, and bring new resources into service for the parks. For example, NPS established Exotic Plant

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<sup>35</sup> See [http://elips.doi.gov/app\\_so/act\\_getfiles.cfm?order\\_number=3289A1](http://elips.doi.gov/app_so/act_getfiles.cfm?order_number=3289A1).



Management Teams (EPMT) in 2000 to combat invasive plants. These teams assist parks to prevent the introductions of new species, reduce existing infestations, and restore native plant communities and ecosystem functions. A total of 16 EPMT teams are now at work in over 225 park units. They are led by individuals with specialized knowledge and experience in invasive plant management. Each field-based team operates over a wide geographic area and serves over a dozen parks to increase operational efficiency. In addition to NPS staff, the EPMTs work with volunteers, contractors, and service organizations.<sup>36</sup> Other examples of a network approach include the Inventory and Monitoring Networks, discussed elsewhere in this report, and the interagency Cooperative Ecosystem Studies Units (CESU Network).

Through these networks, NRSS can build its capacity to work collaboratively with stakeholders outside the parks, such as municipalities, counties, and states, and improve the condition of park resources by engaging the caretakers of the large landscapes in which the parks reside. In the process, the networks help NPS and NRSS achieve the goal of flexible, adaptive management. The need to work collaboratively in networks to address environmental challenges is a long-term proposition. NPS employees hired in 2010 will be dealing with the impacts of these landscape-scale challenges, such as climate change, for their entire career. NPS Director Jon Jarvis has been at the forefront in acknowledging the impact of climate change, publicly stating that it "challenges the very foundation of the National Park System and our ability to leave America's natural and cultural heritage unimpaired for future generations."

As part of this continuing evolution in how NPS does business, breaking down internal stovepipes among the NRSS divisions and NPS directorates is a significant interdisciplinary challenge. For example, climate change will not just impact the natural resources of parks, but will have an impact on cultural resources, historic preservation, and visitor experience. For this reason, the new CCRP is evolving as a cross-cutting program that involves a small core office and additional positions strategically located in the existing divisions. The idea that ranked seventh in the online dialogue forum on understanding and evaluating park natural resource conditions was the need to "promote organizational integration and information exchange among natural and cultural resource managers." This must be viewed in the context of landscape-scale challenges that will not only impact park natural resources, but also will have a significant impact on cultural resources, historic preservation, and visitor experience.

The Panel notes that existing NRSS-generated information could help address specific landscape scale challenges. The Chesapeake Bay, for example, currently has more than 17 federal agencies, 6 states and the District of Columbia, and a variety of non-governmental organizations working collaboratively through the Environmental Protection Agency's Bay Program Office.<sup>37</sup> Approximately 50 national parks are located in this area. I&M network monitoring data could be used to help assess existing progress and inform restoration activities. If environmental conditions across the Bay are improved, park natural resource conditions should also improve. By taking advantage of opportunities to provide information that helps to manage large landscapes, NRSS can benefit other public and private landowners, as well as NPS.

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<sup>36</sup> See [http://www.nature.nps.gov/biology/invasivespecies/EPMT\\_teams.cfm](http://www.nature.nps.gov/biology/invasivespecies/EPMT_teams.cfm).

<sup>37</sup> The Chesapeake Bay Watershed covers areas in the states of New York, Pennsylvania, Delaware, Maryland, Virginia, and West Virginia, as well as the District of Columbia.

In research conducted for this study, NPS's park-based budget/financial system was cited as a hindrance to the full development of a network approach. Because landscape scale networks are not recognized as organizational units within various NPS financial systems, they may encounter difficulty in requesting additional staff or receiving specific project and equipment funds through the Operations Formulation System (OFS) and the Project Management Information System (PMIS). Through these systems, individual parks submit a list of priorities for funding to their regions; the regions examine these proposals, forwarding their recommendations to headquarters for final decision. As the recognized organizational units within these systems, parks are put in the difficult position of having to forgo a specific park-based priority to make room for a network need. Thus, while the Natural Resources Challenge has received justifiable praise for creating effective multi-park operations, NPS financial systems can be a challenge to fully implementing collaborative, cross-organizational approaches across the Service.

**Based upon the two findings above, the Panel issues a recommendation to help NPS and NRSS respond to the environmental challenges impacting the nation's park system. This recommendation is presented and discussed in more detail below.**

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## RECOMMENDATION 1

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**To respond to the significant environmental challenges that originate outside of park borders and adversely impact park resources, the Panel recommends that NPS and NRSS continue to develop and support landscape-scale networks and partnerships.**

To implement this recommendation, the NPS Director and NRSS should:

- include key landscape scale networks as organizations in the OFS and PMIS systems;
- share effective practices from individual parks on how to engage communities and develop partnerships;
- build on the experiences of I&M networks, Exotic Plant Management Teams, Energy Response Team, and CESU networks, since they already work across park boundaries and may provide useful lessons learned;
- engage critical external stakeholders, including public landowners, non-NPS regulators (such as EPA, FAA, and state and local environmental and land use agencies), and communities outside the parks;
- support continued participation in the emerging DOI Landscape Conservation Cooperatives and Climate Science Centers by filling a minimum of one NPS position at each;

- work across NPS and other federal stovepipes to address landscape scale challenges by building, as appropriate, cross-cutting and interdisciplinary relationships among NPS directorates, divisions, and parks;<sup>38</sup> and
- ensure that all data collected by NRSS is made accessible, through an appropriate data management system, to federal and non-federal partners in a retrievable, meaningful, and integrated manner.

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<sup>38</sup> Existing examples of such practices within NPS include multi-park arrangements around invasive species, Exotic Plant Management Teams, and the Geologic Resources Division's energy development efforts.

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## ISSUE II

### ORGANIZATIONAL STRUCTURE, FUNCTION, AND RELATIONSHIPS

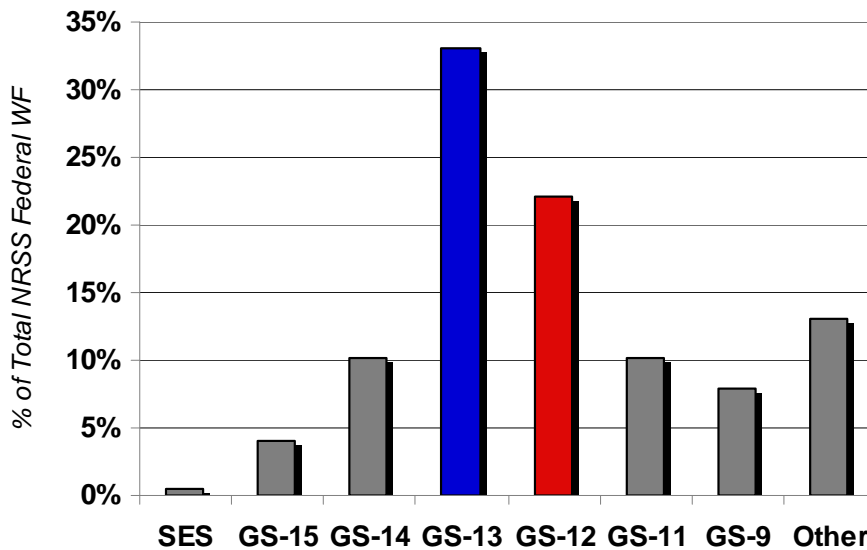
**As a Directorate, NRSS is a geographically dispersed “big tent” that consists of divisions covering a wide range of subject matter and responsibilities. Across the National Park Service, NRSS is a highly regarded organization that is recognized by stakeholders at all levels as providing significant value as a source of independent, credible scientific expertise and technical information.**

In implementing five core functions, NRSS works to provide useful knowledge to the parks by providing:

- national leadership and program oversight;
- centralized and integrated professional support to parks and NPS in the areas of natural and social science; and
- specialized technical assistance to parks and NPS through the provision of technical expertise that would not be reasonable to expect individual parks or regions to provide.

Overall, as shown in Figure 5, NRSS has a fairly high-graded workforce, with 47 percent of its federal workforce at the GS-13, GS-14, GS-15, or SES levels. Its GS-15 cadre, however, constitutes just 4 percent of its federal workforce, and it only has one SES.

**Figure 5**  
**NRSS Grade Structure**  
**GS Level as Percent of Total NRSS Workforce, March 2010**



*Source:* NRSS provided workforce data spreadsheet (March 2010)

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**FINDING II-1:**

*NRSS's current mission and function within NPS does not need to change in any significant way. It generally is highly regarded as a source of reliable information, has strong relationships with regions and park units, and has a reputation for ably responding to requests from park units for assistance. However, not all parks with natural resources are aware of the full suite of services that NRSS can make available to them.*

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As explained earlier, NRSS is a WASO program office that does not exercise line authority over Regional Directors or Park Superintendents. Although working relationships between parks and regional offices vary from region to region, with some Regional Directors and Park Superintendents placing greater priority on natural resources than others, NRSS generally has strong relationships with regions and parks.

Within each park, the park superintendent has discretion to interpret policy, set priorities, allocate resources among programs, and hire staff (in some cases in consultation with regional office staff about which vacancies to fill) within the constraints of federal laws and regulations, as well as Interior and NPS policies, directives, and guidelines.

Within NPS's highly decentralized context, NRSS provides assistance to the parks in several major ways:

- **The Natural Resource Technical Assistance Call (TAC)** provides a coordinated means for parks, regions, and other NPS programs to request professional assistance from NRSS programs. This Call provides NRSS with the means to identify and plan for the support of known natural resource issues. Parks, regions, and other NPS programs are expected to utilize this process to identify their anticipated needs for technical assistance. NRSS managers evaluate the regional and other program requests and take action on as many as possible of these, based on staff availability. NRSS covers its own staff costs, but has a more limited ability to cover staff travel and other related costs. For this reason, the TAC is not considered a funding mechanism.

- **The Service-Wide Comprehensive Call** is a mechanism through which NRSS programs can fund projects at the regional and park levels. Organizational units requesting project funding are expected to document all anticipated natural resource project-funding needs over a five-year period. Within each of the project funding areas, each region is allocated a limited number of project proposal submissions.<sup>39</sup> For example, the Air Quality Division allowed each region to submit a maximum of two projects for the FY 2010 budget to assess ecological effects; by contrast, the Natural Sounds Program allocated a different number of projects to each region (two regions were allowed to submit four projects; others were allowed to submit two or three; and one region was not allowed to submit any project proposals).
- **Response to Real-Time Requests.** Parks often call NRSS for immediate, unplanned assistance in response to an unforeseen event—for example, a recent outbreak of White Nose Syndrome (WNS) in bats<sup>40</sup> or a proposal to build an airport in close proximity to a park’s border. Similarly, there has been a notable increase in the need to respond to Fast Track energy projects by the NRSS Energy Response Team. NRSS works to respond to these requests in real time.
- **Climate Change Vulnerability Assessment and Scenario Planning.** The CCRP is providing guidance and training for assessing the vulnerability of resources to climate change and techniques for incorporating results into park management.
- **I&M Network Staff Ongoing Technical Support to Parks.** Each network supports a core, professional staff that conducts the network’s daily activities and collaborates with staff from network parks and other programs/agencies to organize and catalogue data; perform data analysis, synthesis, and modeling; and provide data and expertise to park employees.

NRSS generally is highly regarded as a source of reliable information. Some interviewees noted that NRSS’s customer service orientation has not only improved over the past few years, but is one of the strongest attributes of the Directorate. NRSS is recognized as performing a critical role in such areas as:

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<sup>39</sup> During the FY 2010 Service-Wide Comprehensive Call, for example, the Air Quality Division offered funding to address and assess the effects of atmospheric pollutants on biological and/or ecological resources; the Natural Sounds Program offered funding to projects that would address and/or assess the noise impacts of air tours on biological and cultural resources, or visitor enjoyment; the Biological Resource Management Division offered funds for projects to help NPS achieve its overall performance goals with respect to specific biological goals; the Natural Resource Preservation Program offered funding for projects in the areas of disturbed land restoration, natural resource management, regional program block allocation, regional small park block allocation, and threatened and endangered species; and regions were able to submit up to four projects that provide parks with a mechanism to develop strategic approaches for the use of law enforcement to protect natural resources, or to assist parks in applying innovative investigative techniques to protect park natural resources.

<sup>40</sup> The U.S. Fish and Wildlife Service estimates that more than 400,000 bats have died from WNS, including 25,000 federally endangered Indiana bats, and many more bats are at immediate risk. At least 60 bat habitats in ten states (Connecticut, Massachusetts, Maryland, New Hampshire, New Jersey, New York, Pennsylvania, Vermont, Virginia, and West Virginia) are known to be affected by WNS.

- providing expertise in both natural resource and social science to assist parks on specialized issues and statutory/regulatory requirements for which expertise is not adequately provided at the park or regional levels;
- performing, directing, and/or managing service-wide activities to inventory, monitor, assess, restore, and inform the management conditions of park natural resources and human use/enjoyment of parks; and
- providing budget and performance accountability information for transmission to the U.S. Department of the Interior, the Office of Management and Budget, and Congress.

That said, some interviewees expressed concern that some medium and smaller parks are unaware that NRSS, through the NRPC, is available to offer them assistance, or are unaware of the full suite of services available to them. This observation would indicate that additional outreach by NRSS to smaller park units, or those with limited natural resource management capacity, would benefit the Directorate, regions, and park units. It also indicates that the NPS regional offices need to do more to ensure that parks are aware of how NRSS can assist them with natural resource issues.

Because most NRSS employees have not had park-based work experience, one idea from the Academy's online dialogue was for NRSS professional staff to visit a number of parks to improve their firsthand understanding of parks' on-the-ground implementation challenges. For example, an NRSS professional could have a field visit with park staff or temporary assignments in the parks, including research projects. While in the parks, NRSS personnel could learn more about the key issues facing park managers, increasing the Directorate's overall understanding and capacity. This would benefit NRSS by providing an opportunity to learn more about the parks' highest priority natural resource issues and would benefit the parks by increasing their understanding of NRSS services. One dialogue participant indicated that NRSS visits to the parks might even provide an opportunity to be more proactive in addressing natural resource issues, thus moving away from what were characterized as "reactive" technical assistance requests. Travel and funding restrictions, however, were identified as a significant impediment to the implementation of this idea.

In the 1990s, interviewees said that NPS ended a 10-week comprehensive natural resource training program that was not only a good introduction to NRSS's role and key staff, but also helped establish a strong connection between the Directorate and park managers. Discontinuation of this comprehensive training program removed from NRSS an excellent opportunity to educate new resource managers about its programs and to interact professionally with resource managers across NPS. The Second Century Commission recommended that NPS should follow private sector effective practices by investing an amount equal to 4 percent of its annual personnel budget each year in professional development.<sup>41</sup> NPS currently invests less than 1 percent in professional development.

Despite the identification of various challenges, interviewees generally were pleased with the support they had received from the Directorate, especially over the past few years with its

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<sup>41</sup> National Parks Second Century Commission, *Advancing the National Park Idea*, p. 47.



increased customer service orientation, and did not see a need for it to deviate from its current mission or function in any significant way.

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**FINDING II-2:**

*The advantages of physically locating NRSS officials outside the Washington, DC, Metropolitan Area outweigh the disadvantages, but the Immediate Office of the Associate Director in the Nation's Capital does not have sufficient staff. Like the rest of the federal government, NRSS will also face future workforce challenges due to the likely retirements of a significant number of employees, especially at the senior leadership level.*

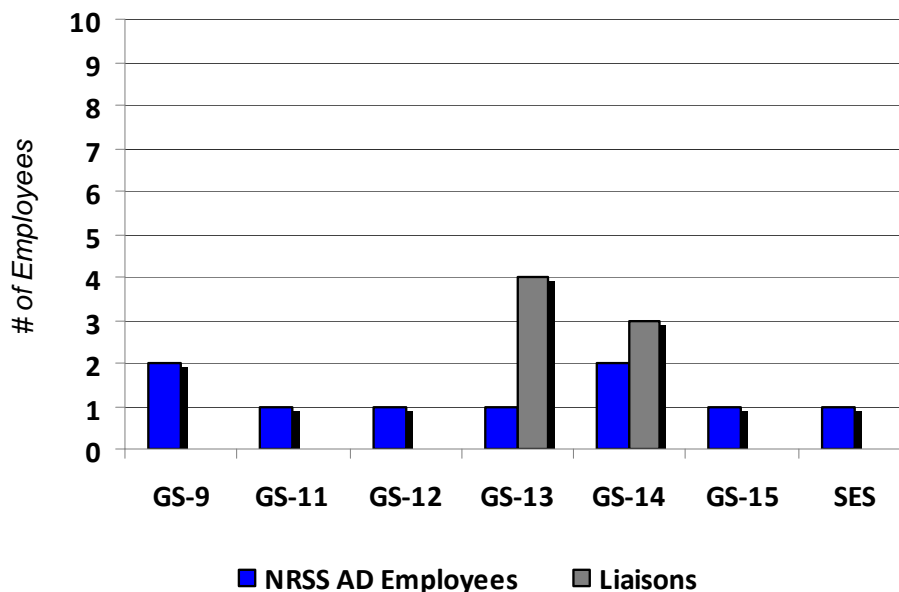
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As noted earlier, NRSS headquarters officials work in three locations: Washington, D.C.; Fort Collins, Colorado; and Lakewood, Colorado. Of the 228 NRSS federal employees located in these areas, only 16 are in the nation's capitol. The placement of headquarters officials outside the D.C. metropolitan area has precedent in the U.S. Department of the Interior. For example, a significant number of the Bureau of Reclamation's components are located in the Denver area, including its Chief Information Office, the Director of Security, Safety and Law Enforcement, and the Director of Policy and Administration, among many others.

Interviews indicated that there are several advantages to this approach. First, NRSS's location in the central part of the country provides a convenient base from which to provide technical assistance and scientific advice to all parts of the nation's park system. Second, much of the nation's park acreage with significant natural resources is located in the central to western portion of the coterminous 48 states. Third, NRSS may have an easier time with recruitment and retention being based in the Lakewood-Fort Collins area.

Despite these advantages, there are concerns that the immediate office of the Associate Director for NRSS, physically located in DC, does not have sufficient staff to perform its national-level responsibilities. This office consists of 16 individuals. As shown in Figure 6, a total of seven employees are division liaisons to the NRSS Associate Director. Although they provide important subject matter expertise for their division, they do not necessarily have the broad, generalist expertise or the skills required to speak for the Associate Director for NRSS at high-level policy meetings with senior Interior officials and the NPS Director's office, or in Congress and at OMB.

**Figure 6**  
**Immediate Office of the Associate Director for NRSS**  
**Grade Structure of Federal Employees Physically Located in Washington, DC**



*Source:* NRSS provided workforce data spreadsheet (March 2010)

In Washington, NRSS needs to address a variety of national-level issues. These include high-profile issues at individual parks, such as the Yellowstone winter use plan, as well as issues affecting multiple parks that require resolution at the national level, such as mitigating and adapting to climate change or developing Air Tour Management Plans with FAA to mitigate the impacts from noise at over 120 park units. Concerns were expressed that the Associate Director and Deputy Associate Director for NRSS have a significant workload that impedes their ability to participate fully in high-level policy meetings, thus losing sight of key national-level policy issues. It was noted, for example, that NPS received just \$10 million in climate change funding for FY 2010 and none in the President’s FY 2011 budget request. NRSS needs to balance its programmatic assistance to parks and regions with its responsibility to set and pursue its strategic vision at the national level. Among other things, some interviewees said NRSS should exercise a more proactive leadership role at the Natural Resource Advisory Group (NRAG) by ensuring that the group not only addresses park-specific and regional issues, but national issues as well. These changes would require some additional personnel physically present in Washington, D.C., would be useful to provide direct, in-person, real-time support to the Associate Director for NRSS and could be particularly useful given the current Administration’s strong focus on natural resource issues.

In a related vein, concerns were expressed about delays in the review of documents—both internally within NRSS and NRPC, as well as at the DOI Assistant Secretary level. This indicates that DOI and NPS have an opportunity to review the distribution of current authorities to ensure that as much final decision-making responsibility as possible takes place at the appropriate level. The National Parks Second Century Commission identified similar

challenges, recommending that NPS “analyze all processes and reports required with the goal of simplifying management systems and distributing as much decision-making authority as possible to the field level.”<sup>42</sup>

Within the next five years, the Academy was told that over 35 percent of NRSS’s employees will be eligible to retire—and over 50 percent will be eligible over the decade. This is a problem facing agencies across the federal government. For example, a *Park Science* article notes:

Workforce succession—the dynamic change that occurs with the personnel and management of any institution—is an ongoing process that varies in both character and rate. Like natural succession, certain events and forces can initiate more dramatic types and rates of change in workforce succession than is normal. Retirement can be such an event and force. As the American population ages, so does its workforce. The baby boomer generation, born between 1946 and 1964, is preparing to retire, and agencies and institutions must be concerned with who will replace those leaving the workforce. The National Park Service is not immune to this successional event: it too must be cognizant of the dynamics of its workforce relative to the recruitment, training and transfer of bureau knowledge during periods of employee and management succession.<sup>43</sup>

Given projected retirements, now would be an opportune time to start this workforce planning effort.<sup>44</sup> Among other things, NRSS could use this process to develop a more explicit rationale for how positions are distributed between these three locations. Interviews indicated that the distribution was largely determined by where positions had traditionally been based and on the needs of particular employees, not necessarily the needs of the organization. A workforce planning effort would offer NRSS an opportunity to reallocate positions and funds among divisions if the Directorate determines that a different mix of skills and functions is needed in the future. NRSS has an opportunity to promote additional personnel exchanges at all levels—between NRSS in D.C., Fort Collins, and Lakewood, as well as between the parks and the regions. Not only would this broaden the experience base of NRSS employees, but it would also help address the leadership gap that may result should a number of senior officials retire around the same time.

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<sup>42</sup> National Parks Second Century Commission Report, p. 35.

<sup>43</sup> William E. Hammitt et al, “Workforce Succession and Training Needs among National Park Service Program Managers,” *Park Science* (Winter 2006-2007, p. 72).

<sup>44</sup> NRSS is currently doing a review of its administrative and budget support functions, but this is not intended to be a comprehensive forward-looking review of the workforce as a whole.

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**FINDING II-3:**

*Through the Natural Resources Program Center (NRPC), NRSS has taken steps to break down internal stovepipes, but there are concerns about the role of the NRPC Director's office and Division Chief reporting relationships.*

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Largely because a significant portion of NRSS personnel are in the field, the Directorate has established the NRPC—headed by a Center Director—to perform such functions as:

- oversee the management of a variety of national programs;
- provides scientific, technical, and policy support;
- promote the understanding, appreciation, and protection of park resources through web media and print publications, education, and outreach through its Office of Educational Outreach; and
- initiate and manage information technology solutions to support NRSS operations at all levels through the Office of Natural Resource Information Systems.

Established in the wake of the 1996 NPS reorganization, NRPC has identified the following future goals:

- advance communications within the organization and with the public;
- improve internal NRPC collaboration and work processes;
- focus Directorate-wide efforts on restoration; and
- more effectively and strategically foster partnerships, including international partnerships.

Through NRPC, the divisions are expected to work together on such cross-cutting issues as climate change, restoration, and oceans. Cross-divisional teams such as Technical Advisory Groups (interdisciplinary groups for restoration planning, education/outreach, and information management) have been established. Consequently, NRSS has made progress in a number of areas in engaging the divisions on cross-cutting issues, such as oceans, climate change, and outreach efforts. Despite this progress, the study team was told that NRSS continues to face some challenges in ensuring that the needs, projects, and initiatives of these interdisciplinary, cross-divisional groups get on each Division's annual work plan. NRPC has worked to improve internal communications by instituting annual NRPC all-hands meetings to provide a forum for discussion and build camaraderie. NRPC has also initiated a quarterly newsletter to share information about each division's work, a weekly NRSS division chiefs call, and a weekly NRSS call to address directorate-wide concerns and coordinate with DC-based officials.

Although NRPC has taken useful steps, as discussed above, to reduce “stovepipes” and make the Center more than the sum of its parts, questions have been raised about how this structure works in practice. For example, some believe the directorate's outreach efforts is hindered because the

field is not always clear that NRPC is part of NRSS. A December 2008 NRPC brochure identifies its mission as “providing Service-wide leadership, expertise, and scientific information to ensure the natural resources of the National Park System remain unimpaired for future generations.” Although this brochure was a very informative overview of the services offered by NRPC, it only mentioned NRSS once: “The Natural Resource Program Center is the core of the NPS Natural Resource Stewardship and Science Directorate.”<sup>45</sup> Even at the staff level, the study team was told that many people consider themselves employees of NRPC, not NRSS *per se*.

During the early years of NRPC, individual Division Chiefs served as the head of the center on a rotating basis. Approximately four years ago, an official NRPC Director position was established and filled. Questions have been raised about reporting relationships. Currently, the Division Chiefs report to the NRPC Center Director, despite the fact that the Division Chiefs oversee the management of major NRSS programs while the NRPC Center Director is expected to perform an administrative/operational function.<sup>46</sup> Although the study team was told that informal communications exists between the NRSS Associate Director and the Division Chiefs, this existing reporting chain is at best confusing. In practice, it means that the head of NRSS does not have the formal, legal responsibility to evaluate his major program leaders’ performance on an annual and semi-annual basis, establish their performance expectations, and communicate with them as their supervisor. Because the Division Chiefs are heading major NRSS’s major programs, effective management practices across the federal government would indicate that these individuals should formally report to a programmatic head, not a non-programmatic (mission support) head. That the Division Chiefs are located in Fort Collins and Lakewood, not Washington, DC, strengthens the argument for reinstating a formal reporting relationship between them and the NRSS Associate Director.

**Based upon the three findings above, the Panel issues four recommendations to strengthen NRSS as an organization. Each recommendation is presented and discussed in more detail below.**

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## RECOMMENDATION 2

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**The Panel recommends that NRSS increase its professional and personal presence among national park units to ensure that they are not only aware of the Directorate’s full suite of services, but also able to make the best use of available NRSS expertise.**

To implement this recommendation:

- NRSS should provide additional opportunities for its personnel to gain first-hand experience in parks of all sizes, thereby improving NRSS understanding of, and assistance to, the parks.

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<sup>45</sup> See [http://www.nature.nps.gov/publications/pdf/NRPC\\_Brochure012008.pdf](http://www.nature.nps.gov/publications/pdf/NRPC_Brochure012008.pdf).

<sup>46</sup> Although the Division Chiefs report to the NRPC Director, the Climate Change Response Coordinator (also located at NRPC in Fort Collins) reports directly to the Associate Director for NRSS.

- NRSS division staffs should take advantage of face-to-face interactions, such as approved conferences, training sessions, and large meetings, to connect personally with Natural Resource or park managers and raise awareness of NRSS services available to the regions, networks and parks.
- NRSS should identify and, consistent with NPS policies, reach out to park units that have not received or requested NRSS support in the last five years either directly or indirectly through the regions to identify those parks' needs and suggest opportunities to engage such support.<sup>47</sup>
- NPS should incorporate information on NRSS into NPS training programs. Additionally, NPS should consider whether to reestablish its comprehensive natural resource training program to enhance NRSS employees' understanding of park management needs.
- NRSS should utilize personnel exchanges at all levels to increase its employee's understanding of park management needs and requirements.
- Where appropriate, NRSS should take available opportunities to facilitate dialogues about how national, natural resource management standards can be balanced against regional, network, or park perspectives, and their local partners' needs.

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### RECOMMENDATION 3

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**The Panel recommends that the Immediate Office of the NRSS Associate Director be increased to ensure that the Directorate has the necessary human capital physically present in Washington, DC, to address critical national-level issues. This increase should be reflected in the Administration's FY 2012 budget submission to Congress.** Although the office has a reasonable number of highly qualified program specialists, the Associate Director requires a limited number of additional staff of higher graded "generalists" able to provide national level, strategic policy assistance. The DC-based Associate Director's office needs staff that can work directly with senior leadership at the Department of the Interior, the National Park Service, the Congress, and the other Executive Offices, as well as represent the NRSS Directorate at-large in policy and decision-making.

The purpose of this staff is not to "add another layer" of review to existing field activities or documents, but to provide additional capacity to the Immediate Office of the NRSS Associate Director to address and effect policy issues in the nation's capitol. With this additional staff, the NRSS Associate Director should work to ensure that the Directorate continually looks across the nation's landscape and DOI/NPS programs to identify opportunities to strengthen existing policies/programs, as well as establish and fund new ones as the need is demonstrated in order to increase protection for park natural resources.

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<sup>47</sup> In comments on the agency review draft of this report, it was noted that NPS may need to revise existing funding and travel ceilings to implement this action.

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## RECOMMENDATION 4

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**The Panel recommends that the NRSS Division Chiefs report directly to the Associate Director of NRSS.** This would enhance the Associate Director’s ability to lead the organization by increasing his ability to have direct access to his/her staff, to set performance expectations for senior managers, and to hold the senior leadership team accountable. Because it is important to ensure that the divisions work together on crosscutting issues, the Associate Director should establish performance expectations and align incentives such that the Division Chiefs work together, as appropriate, on cross-divisional issues. Given the geographically dispersed nature of NRSS, the Panel also believes that the NRPC Director, who interacts with the Division Chiefs on a regular basis, should have advisory input into the Division Chief’s annual performance appraisal. Within this structure, the NRPC Director’s office should be transformed and made primarily responsible for providing mission support functions, especially in the area of information technology. This change would benefit the directorate as a whole by more clearly delineating and aligning the responsibilities of the Office of the Center Director vis-à-vis the NRSS Associate Director and the Division Chiefs—ensuring that the NRPC Director’s office is widely seen as, and expected to function as, a mission support office.<sup>48</sup>

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## RECOMMENDATION 5

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**The Panel recommends that NRSS engage in a workforce planning process to develop a comprehensive recruitment, retention, and training strategy to meet future workforce needs.** This is especially critical because over 35 percent of NRSS’s workforce is eligible to retire within the next 5 years and over 50 percent within 10 years.<sup>49</sup>

To implement this recommendation, NRSS should develop a workforce plan that:

- determines the critical skills and competencies needed to achieve current and future programmatic results, particularly in landscape protection;
- assesses the appropriate distribution of human capital resources across the D.C., Fort Collins, and Lakewood locations;
- assesses the appropriate distribution of human capital resources across organizational units;

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<sup>48</sup> Of the 27 employees in the NRPC Center Director’s office, a total of 13 employees (48 percent) are in the Office of Natural Resource Information Systems; a total of eight (30 percent) are in the Office of Education and Outreach. Only six employees (22 percent) are in the Immediate Office of the NRPC Center Director: NRPC Director; Administrative Officer; 1 Program Analyst; 1 Administrative Assistant; and 2 Clerks.

<sup>49</sup> This is a challenge facing agencies across the federal government.

- identifies tailored strategies to recruit and retain the knowledge, skills, and abilities required to meet the NRSS mission at the Washington, regional, network, and park unit levels;
- increase the diversity of the NRSS workforce;<sup>50</sup>
- includes strategies to maintain critical institutional knowledge in the wake of looming retirements; and
- establishes mechanisms to monitor and evaluate progress.

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<sup>50</sup> The workforce data provided to the Academy did not include information on race/national origin or gender, but NRSS appears to have limited ethnic diversity in its leadership ranks. This is consistent with the results of a 2002 survey of NPS's Advanced Level Natural Resources Program Managers (GS-12 and above), in which over 90 percent were white. See William E. Hammitt et al, "Workforce Succession and Training Needs among National Park Service Program Managers," *Park Science* (Winter 06-07, pp. 72 - 77).



## ISSUE III

### NRSS'S PERFORMANCE ON FIVE CORE FUNCTIONS

**NRSS has made significant progress on each of the five core functions reviewed in this study, but additional steps should be taken in the future to develop a systematic evaluation of natural resource conditions and trends, as well as to further integrate key data and information into decision-making at the national, regional, and park levels.**

Consistent with the decentralized nature of NPS, NRSS plays a supporting role to decision-makers at all levels. Interviewees emphasized that NRSS's efforts are largely in service of the parks, with the goal being to provide usable knowledge to park superintendents, natural resource chiefs in the regions and the parks, and other key decision-makers. The Inventory and Monitoring Program, in particular, has been widely recognized outside NPS as a successful endeavor. For example, the Fish and Wildlife Service (FWS) is co-locating the national staff of its new Inventory and Monitoring Program for the National Wildlife Refuge System with NPS in Fort Collins, so that the NPS and FWS I&M Programs can share expertise and protocols and work together on integrated data system development.

As explained earlier, the five core functions of NRSS reviewed as part of this study are to:

1. assist park managers in identifying, monitoring, and understanding park natural resources;
2. evaluate the condition of park natural resources, landscapes and processes;
3. integrate natural resource information and compliance requirements into decision-making;
4. take actions to preserve the condition of park natural resources for appropriate use and enjoyment; and
5. respond to emergencies and catastrophic events.

NRSS's performance on the five core functions was assessed through performance data and background documents, suggestions for improvements by online dialogue participants, and interviews across NPS. Interviewees were typically requested to apply a six-point Likert Scale when evaluating NRSS's performance in each of the five core functions:

1. extremely effective;
2. very effective;
3. somewhat effective;
4. somewhat ineffective;
5. very ineffective; and
6. extremely ineffective

NRSS's five core functions cover a wide range of activities, and the role played by particular divisions varies by function. All seven divisions have recognized that they each, in varying degrees, have a role in each of the five functions, bringing its own perspective and expertise to bear on each activity. The functions themselves overlap to varying degrees, but highlights of how NRSS manages these five core functions are discussed below.

On Core Function 1 (and, to some extent, Core Function 2), NRSS manages and allocates the funding for the Inventory and Monitoring (I&M) Division and Vital Signs program staff positions through annual transfers and project specific funding. NPS has established 32 I&M networks to inventory natural resources; monitor park ecosystems; integrate inventory and monitoring information into NPS planning, management and decision making; and share NPS accomplishments with internal and external partners and colleagues. The initial funding level (average \$100,000 per park), would have allowed each park on average to hire one professional position (GS-9 or GS-11) plus about \$30,000 to \$40,000 in operating expenses. Through the network approach, a group of parks share a professional staff and funding and have access to a larger professional staff. All 32 networks are now funded for long-term monitoring, and all 270 parks (100 percent) have identified their vital signs to monitor. The most common vital signs address water quality; air quality; land cover and use; invasive/exotic plants; birds; surface water dynamics; mammals; aquatic macro invertebrates; vegetation communities; weather and climate; forest/woodland communities; soil function and dynamics; amphibians and reptiles; stream channel characteristics; threatened and endangered species/communities; and fish.

In most cases, the I&M networks themselves (not NRSS employees in Fort Collins or Lakewood) have direct responsibility for performing inventory and monitoring activities on the ground. The Air Resources Division and Water Resources Division also directly support the parks with monitoring expertise and equipment to comply with the Clean Air Act and the Clean Water Act, in addition to providing funding for field-based professional staff in the areas of air and water. Although the I&M program and EPMT networks are the most visible programs in the parks, it is just one part of a larger effort in some parks to track conditions and resources to provide data for management decisions. These networks have given many natural resource managers long-term strategic data to inform decision-making. To respond specifically to Core Function 2, NRSS has been supporting the completion of an initial set of Natural Resource Condition Assessments (NRCA) and Resource Stewardship Strategies (RSS). Both of these are discussed in more detail later in this report.

On Core Functions 3 and 4, NRSS does not have direct responsibility for integrating information and taking actions at the park level, as it has no line authority over park superintendents. NRSS can, however, work to integrate information into management and policy decisions within its domain. It also can work with senior NPS leaders (Director, Deputy Director, and Science Advisor) and DOI leadership to integrate information into key Service-wide decisions, including policy formulation. Similarly, NRSS itself is not the primary actor in taking conservation actions in parks, but can provide assistance to park managers. That NRSS plays a facilitative role in each of these functions means its information must be credible, relevant, and usable to decision-makers at all levels—especially to park managers.

On Core Function 5, NRSS has accomplished a significant amount given limited resources. These resource limitations have meant it has been unable to be as proactive as it would like in preparedness or in establishing standing natural resource teams to respond to significant events. An important part of the fifth core function is the *Park System Resource Protection Act, 16 U.S.C. § 19jj*. Section 19jj allows the NRSS’s Environmental Quality Division (EQD), on behalf of the National Park Service, to seek civil damages from those who harm park resources. The damages recovered are then used to restore, replace, or acquire the equivalent of the resources that were lost or injured. EQD has used this authority successfully on multiple occasions, including a multi-million dollar settlement with the Water Supply and Storage Company for damages to the Grand River Ditch in Rocky Mountain National Park. In addition, NRSS has a role at the DOI and interagency level in facilitating the provision of technical assistance from NPS to respond to national level emergencies. Due to limited resources, however, NRSS and EQD’s roles have primarily been limited in their response actions. EQD has been unable to effectively work with parks to mitigate potential hazards (by, for example, advising about where roads should/should not be built). This is especially important due to the potential for increased frequency of catastrophic events due to climate change. In addition, EQD is not readily able to respond to incidents due to staff and budget limitations, although increases are requested every year.

Table 4 shows the top 10 ideas from the four Academy online dialogue forums that addressed NRSS’s core functions. As shown, the top idea was a larger task for NPS, not NRSS *per se*, in recruiting and training superintendents with natural resource backgrounds. Three ideas specifically addressed the I&M program: broadening inventorying, strengthening the I&M networks, and expanding I&M’s existing climate change role. Four ideas addressed the need to integrate across stovepipes and to make information more usable for decision-makers. Two ideas addressed workforce and training issues.

**Table 4**  
**Top Ten Ideas across Forums on NRSS’s Core Functions**

Rank	Idea	Votes
1.	Recruiting and training superintendents with resource backgrounds to ensure science-based management. <i>(Integrating natural resource information and requirements into decision making)</i>	152
2.	An enhanced and broadened inventory phase of the I&M program. <i>(Understanding and evaluating park natural resources)</i>	146
3.	Integration of Maintenance and Natural Resource efforts. <i>(Taking conservation actions)</i>	137
4.	Build upon and strengthen the I&M networks. <i>(Understanding and evaluating park natural resources)</i>	131
5.	More interpretation targeted to change specific behaviors so that even controversial actions in favor of resource protection can be taken. <i>(Taking conservation actions)</i>	118
6.	A greater I&M role in the Climate Change Initiative. <i>(Taking conservation actions)</i>	116

Rank	Idea	Votes
7.	Maintained and improved comprehensive planning and monitoring efforts in parks. ( <i>Emergencies and catastrophic events</i> )	115
8.	Increased technical assistance capacity to compensate for lack of natural resource staff in parks. ( <i>Integrating natural resource information and requirements into decision making</i> )	107
9.	Easier access for park staff to find and download copies of data and reports. ( <i>Integrating natural resource information and requirements into decision making</i> )	106
10.	Enhanced natural resource training for all NPS employees by updating the NPS Fundamentals. ( <i>Understanding and evaluating park natural resources</i> )	102

One online dialogue forum dealt with emergencies and catastrophic events, which corresponded to the fifth core function. Participants were asked the following questions:

- How can NPS and NRSS more effectively prepare for emergencies and catastrophic events that may affect park natural resources?
- How could relationships between NRSS, the regions, and the parks be improved to enhance preparation for, and response to, emergencies and catastrophic events?
- Are there any changes that should be made to improve the parks' ability to effectively prepare for and respond to emergencies?

Table 5 presents the top ideas from that forum by rank and vote. As shown, the top idea was for continuation of, and improvements to, comprehensive planning and monitoring in the parks. A related idea was to integrate resource information into facility placement decisions in the parks.

**Table 5**  
**Top Five Ideas**  
**Forum on Emergencies and Catastrophic Events**

Rank	Idea	Votes
1.	Maintenance and improvement of comprehensive planning and monitoring efforts in parks.	115
2.	Improved hazard identification and risk assessment methods in parks.	97
3.	Improved planning to incorporate resource information in facility placement.	89
4.	Service-wide identification of subject matter experts for response (with travel expenses covered for park-based experts).	85
5.	Avoidance of emergencies by not rebuilding roads on coastal barrier islands where they repeatedly wash out.	68

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**FINDING III-1:**

*As a result of NRSS's inventory and monitoring activities, the National Park Service is collecting more data and information about its natural resources than ever before, and this can be used to strengthen its performance on the other core functions.*

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NPS established the I&M program to provide funding, technical assistance, and coordination to complete 12 basic natural resource inventories and to begin monitoring the status and trend of park natural resources.<sup>51</sup> The 32 NPS I&M networks that serve more than 270 parks were a central component of the Natural Resource Challenge (NRC). Originally envisioned as a \$100 million program, NRC received approximately \$78 million through FY 2008. This has strengthened natural resource management throughout NPS, reinforcing its stewardship and science legacy.<sup>52</sup>

The networks are intended to facilitate collaboration, information sharing, and economies of scale in inventory and monitoring. Each network supports a core, professional staff who conduct the day-to-day activities of the network and who collaborate with staff from network parks and other programs and agencies to implement an integrated long-term program to monitor the highest-priority vital signs. Network staff members conduct such tasks as organizing and cataloging data; performing data analysis, synthesis, and modeling; and providing data and expertise to park managers and planners. Network personnel are also occasionally called upon to provide data and expertise for resource assessments and resource stewardship strategies, and to contribute to performance reporting. They are responsible for determining the status and trends of a few key natural resources for each park, as well as effectively delivering information to park managers, planners, interpreters, scientists, and other key audiences.

By September 30, 2008, 85.3 percent of the 2,767 total inventory data sets had been completed.<sup>53</sup> As shown in Table 6, all but four of the 12 basic inventories have been completed:<sup>54</sup>

- Air Quality Related Values (initial phase estimated to be complete by 2010);
- Geologic Resources Inventory (initial phase estimated to be complete after FY 2012);
- Soil Resources Inventory (initial phase estimated to be complete after FY 2012); and
- Vegetation Inventory (estimated to be complete after FY 2012).

#### *I&M Basic Inventories*

Table 6 shows the status of the 12 basic I&M inventories, as described in the *Strategic Plan for Natural Resource Inventories: FY 2008 – FY 2012*.

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<sup>51</sup> I&M Strategic Plan (FY 2008 – FY 2012), p. vii.

<sup>52</sup> Natural Resource Stewardship and Science, National Park Service, U.S. Department of the Interior, *Funding to the Natural Resource Challenge, Report to Congress, Fiscal Year 2008*, p. 5.

<sup>53</sup> Natural Resource Program Center, *Strategic Plan for Natural Resource Inventories: FY 2008 – FY 2012*, p. vii.

<sup>54</sup> See NRSS's *Annual Report to Congress* (2009).

**Table 6  
Status of I&M Basic Inventories**

<b>Basic Inventory</b>	<b>Description</b>	<b>Status</b>
<i>Natural Resource Bibliography</i>	This first critical step in park natural resources inventories discovers, compiles, and organizes existing records, reports, maps, manuscripts, gray literature, and other historical scientific information for park staff & cooperators.	Initial phase complete
<i>Base Cartography Data</i>	The cartographic information provides six customized products to the parks that feed into GIS spatial displays and analyses, allowing managers to locate potential habitats for endangered species or predict the likely course of wildfires.	Initial phase complete
<i>Air Quality Data</i>	Air Quality Data focus on indicator pollutants regulated under the Clean Air Act, providing parks with actual-measured or estimated concentrations of indicator air pollutants. This inventory provides statistical summaries from data collected by the national air monitoring networks during five-year periods of observation. It also generates GIS maps portraying spatial concentrations of air pollutants.	Initial phase complete <sup>55</sup>
<i>Air Quality Related Values</i>	The objective is to develop AQRV lists (resources sensitive to air quality, such as vegetation, soils, water, fish, wildlife, and visibility) for all natural resource parks, not just the Class I area. parks.	Initial phase estimated to be completed by 2010.
<i>Climate Inventory</i>	This inventory describes parks' climactic settings to make current weather and climate data accessible to the parks, including through an integrated, on-line system for discovery, acquisition, analysis, and reporting of climate data.	Initial phase complete
<i>Geologic Resources Inventory</i>	This inventory will provide key data and information about geologic features and processes needed for resource, visitor, and infrastructure protection.	Initial phase estimated to be complete <i>after</i> FY 2012.
<i>Soil Resources Inventory</i>	This inventory provides the basic information needed to manage soil sustainability in parks and to protect water quality, wetlands, vegetation communities, and wildlife habitats.	Initial phase estimated to be complete <i>after</i> FY 2012.
<i>Water Body Location and Classification</i>	This inventory provides information useful for a wide variety of park planning, monitoring, resource condition assessments, management decision-making, and interpretation and outreach purposes.	Initial phase complete
<i>Baseline Water Quality Data</i>	This data provides descriptive information on water quality status and trend information.	Initial phase complete
<i>Vegetation Inventory</i>	This inventory will provide high-quality, standardized maps, and associated data sets on vegetation and other land-cover occurring within parks.	Initial phase estimated to be complete <i>after</i> FY 2012. <sup>56</sup>
<i>Species Lists</i>	These lists compile existing species lists and evidence records, with the long-term goal of establishing an accurate inventory of all life forms within a park	Initial phase complete
<i>Species Occurrence and Distribution</i>	This data provides park managers with comprehensive, scientifically-credible information about the nature and status of selected biological resources occurring within park boundaries in a form that increases its accessibility and utility.	Initial phase complete

<sup>55</sup> Air quality maps and estimate tables for 270 natural resource parks are complete. Updates have been completed for 1999 – 2003 and 2001 – 2005, and an update for 2003 – 2007 is in progress.

<sup>56</sup> Although the initial phase for all 270 parks has not been completed, the basic set of vegetation inventory products has been provided for 155 of these parks.

In the initial phase, each inventory is expected to develop and deliver the minimal set of natural resource information that all I&M parks have in common. According to the I&M Strategic Plan, “[h]igh-priority inventories that were not common across all parks, or could not be undertaken efficiently because of the knowledge and technical information available at the time, were deferred until later.” Examples of continuing inventories (that is, those beyond the initial phase) include inventories of submerged resources, lichens, invertebrates, fossils, and wetlands. Over time, the I&M networks will also be working on recurring inventories—that is, those that need to be repeated or updated at future intervals because of changes in resource status.<sup>57</sup>

### *Vital Signs Monitoring*

In addition to the inventories, the networks are responsible for monitoring vital signs to provide the minimum information needed to track the overall condition of natural resources in parks and to provide early warning of situations that require intervention. The scientifically sound information obtained will have multiple applications for management decision-making, park planning, research, education, and promoting public understanding of park resources. Park vital signs are a subset of physical, chemical, and biological elements and processes of park ecosystems that are selected to represent the overall health or condition of park resources, known or hypothesized effects of stressors, or elements that have important human values.

Development of the Vital Signs for 270 park units was conducted over three phases:

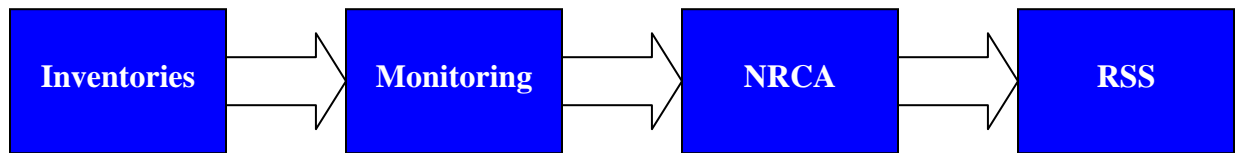
- **Phase 1** involved defining goals and objectives; beginning the process of identifying, evaluating and synthesizing existing data; developing draft conceptual models; and completing other background work that needed to be done before the initial selection of vital signs. Each network was required to document these tasks in a Phase 1 report, which was then peer reviewed and approved at the regional level before the network proceeded to the next phase. (The Phase 1 report was a first draft of the chapters of the final monitoring plan that present the Introduction/Background and Conceptual Models.)
- **Phase 2** involved prioritizing and selecting the vital signs that were included in the network's initial integrated monitoring program.
- **Phase 3** entailed the detailed design work needed to implement monitoring, such as developing specific monitoring objectives for each vital sign, developing sampling protocols and a statistical sampling design, developing a plan for data management and analysis, and determining the type and content of various products of the monitoring effort (such as reports and websites).

As of 2010, all 32 I&M networks have selected their Vital Signs, completed the multi-year planning and design process for vital signs monitoring, and begun operational monitoring of the signs. The networks have provided NPS and NRSS with more useful natural resources data than they have ever had before. The chain described in Figure 6 illustrates how the I&M results are expected to relate to Natural Resource Condition Assessments and Resource Stewardship Strategies.

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<sup>57</sup> Natural Resource Program Center, *Strategic Plan for Natural Resource Inventories: FY 2008 – FY 2012*, p. 3.

**Figure 7**  
**How I&M Results Should Feed into Other NPS Assessments/Plans**



One of the forums on the Academy’s online dialogue involved understanding and evaluating park natural resources, which corresponded to NRSS’s first and second core functions. Participants were asked the following questions:

- How should NPS and NRSS improve their identification, monitoring, and evaluation of the condition of park natural resources?
- How can NPS employees outside NRSS, as well as external stakeholders, enhance the understanding and evaluation of park resources?
- How can the evaluation and understanding of park natural resources be strengthened through more effective utilization of performance measures?
- How can relationships between NRSS, the regions, and the parks be strengthened to improve the understanding and evaluation of park natural resources?

Table 7 presents the top five ideas from that forum by rank and vote. As shown, the top idea was for an expansion of the inventory phase of the I&M program.

**Table 7**  
**Top Five Ideas**  
**Forum on Understanding and Evaluating Park Natural Resources**

<b>Rank</b>	<b>Idea</b>	<b>Votes</b>
1.	An enhanced and broadened inventory phase of the I&M program.	146
2.	Build upon and strengthen the I&M networks. <sup>58</sup>	131
3.	Enhanced natural resource training for all NPS employees by updating the NPS Fundamentals.	102
4.	Clear links between I&M research and monitoring to improve its usefulness for decision making.	100
5.	Links between monitoring results and climate data.	84

<sup>58</sup> Participants indicated that the I&M networks have made progress in bringing managers and scientists together to focus on priority data needs and having parks share funding and a professional staff. One commented that NPS should build on this approach by providing additional professional staff to serve the parks and continue to use the network approach to engage the superintendents and park resource chiefs.



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**FINDING III-2:**

*NRSS has been working to make the information it generates more available and usable to decision-makers at all levels, but the effective delivery of usable data and information to educate the public, as well as to support NPS strategic planning and programmatic decision-making, is a continuing challenge.*

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The NRSS divisions generate a wide range of information that can be utilized across NPS based on the scientific and technical expertise of all NRSS divisions. Information generated either directly or indirectly by NRSS includes:

- inventorying and monitoring data funded through the various NRSS divisions;<sup>59</sup> I&M and other divisions;
- results of park research projects funded by NRSS;
- research conducted in the parks by non-NPS personnel through the NRSS managed Research Permitting and Reporting System; and
- information about resource conditions obtained through Natural Resource Condition Assessments and Resource Stewardship Strategies.

Individual parks also fund their own inventory and monitoring efforts.

Beginning in 2004, NRSS funded a “user needs analysis” effort called “Protecting Resources through Informed Decision-making and Education” (PRIDE) that involved a series of workshops and stakeholder interviews to determine key park, regional, and national needs in terms of access and delivery of natural resource data and information. The study included a SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats) based on stakeholder interviews. Respondents were asked about such issues as:

- how they interact with inventorying, monitoring, and applied treatments;
- information technology systems;
- additional products/services that would be useful; and
- vision for inventorying, monitoring, applied management treatments, and information transfer.

Table 8 shows the strengths of existing natural resource data/information access and delivery, as identified by the PRIDE analysis.

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<sup>59</sup> I&M is not the only division that funds inventory and monitoring activities. For example, the Air Resources Division and the Water Resources Division provide funding for air, acoustic, night skies, and water monitoring.

**Table 8**  
**2007 PRIDE Analysis Identified Strengths**  
**Natural Resource Data/Information Access and Delivery**

Ranking	Identified Strength
1.	I&M has helped the park service complete its inventory tasks.
2.	The shared team and service center approach (Denver Service Center, Exotic Plant Management Teams, I&M Networks) is effective.
3.	Park partnerships with institutions of higher learning produce good results (for example, the Cooperative Ecosystem Studies Units).
4.	NRSS staff is motivated and dedicated.
5.	Some parks have mature I&M underway.
6.	NPS has a positive public perception.
7.	Decentralization allows local initiatives to thrive and best meet local needs.

*Source:* PRIDE Analysis (2007)

Table 9 shows the weaknesses of existing natural resource data/information access and delivery, as identified by the PRIDE analysis.

**Table 9**  
**2007 PRIDE Analysis Identified Weaknesses**  
**Natural Resource Data/Information Access and Delivery**

Ranking	Identified Weakness
1.	The I&M networks do not produce a scorecard in an easy format that gives the status of natural resources in the parks, showing whether they are in better or worse condition than the year before. They do not produce information in a format that managers can understand. For it to be useful, the data needs to be synthesized to make more sense to the general public and to NR managers.
2.	There is ineffective communication between different groups (for example, between natural resource and interpreter personnel, or fire management and natural resources personnel).
3.	There is concern about losing institutional memory as people retire and normal turnover in park staffs takes place.
4.	A lot of time is spent on requesting funding.
5.	A lot of natural resource information is on three different websites and not linked effectively, and does not relate to the needs of individual parks.
6.	Many parks do not have their own I&M Program.
7.	Collaboration is a result of personal relationships; the travel budget has been reduced, so new employees do not get a change to build these relationships; people cannot travel to seminars or conferences.

*Source:* PRIDE Analysis (2007)

PRIDE participants recommended improvements in a number of areas:<sup>60</sup>

- NPS should synthesize data/information into an understandable, reasonable format that will facilitate the education of the general public about park needs (for example, releasing wolves to the wild for ecosystem reasons).
- If parks could rely on some funding every year, allocated fairly to parks, they could spend more time dealing with emerging issues.
- NPS should try to integrate its data management systems and create a searchable interface for park managers. There are too many data collection systems.
- The number of networks in the regions should be increased (building on the model of the I&M networks). Resources would be shared—for example, for interpretation, applied management treatments, and fire management.
- Park organization is heavily dependent on information technology. IT staff understand applications and networks, but not the data these systems carry. GIS people understand spatial data, but not data management, tabular databases and record management. This means the parks do not have current information that they need. Tools should be made available to the field to help it with its work.
- Interpreters cannot translate the data, as between researchers and users. They are short staffed. There should be another group, such as technical writers, to make this data available to interpreters and natural resource managers.
- The US population has changed, but NPS is very homogenous. If NPS's workforce does not reflect the diversity of the population, Congressional and public support for NPS's mission may decline.
- Research Learning Centers need a vision that fits as a component of the Natural Resource Challenge, rather than as a stand-alone program.
- The Research Learning Center website, or the I&M website, should allow users to drill down for more detail.

Over the past three years, NRSS has worked to address many of these issues, relying heavily on the development of Integration of Resource Management Applications (IRMA) to improve discovery of, and access to, natural resource data and information. The U.S. Department of the Interior has recognized NRSS for its implementation of information technology systems through the DOI Chief Information Officer's Special Recognition Award for Best Agency SOA Application.<sup>61</sup> IRMA will “eventually integrate all natural resource applications (starting with NatureBib, NPSpecies, and the NPS Data Store); eliminate redundant data storage; and streamline standard functions across applications (data entry, editing, searching, and data retrieval).<sup>62</sup>

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<sup>60</sup> These recommendations have been paraphrased from the original text.

<sup>61</sup> See <http://www.doi.gov/ocio/architecture/>

<sup>62</sup> The NPScape landscape-scale data project has produced a suite of tools, initial datasets, products, and analyses for each I&M park (or cluster of parks when they share a contiguous geography), as well as an interpretive guide that helps to explain the relevance of calculated metrics to park resources. In 2010, NPScape plans to (1) develop a

IRMA is being developed in phases, with a new release coming out every few months that provides additional features and functionality. For over a year, IRMA provided NPS employees with only read-only access to non-sensitive data and documents. With the scheduled release of a new version in June 2010, authorized NPS park users will be able to view sensitive data for their park, as well as to edit and delete records. The system currently contains records for more than 300,000 natural resource datasets, documents, images, and GIS products. By December 2010, IRMA is expected to be available to the public and partner agencies (sensitive information will be withheld).<sup>63</sup> Within NRSS, some concerns have been expressed that IRMA has not only been too costly for the functionality achieved to date, but also has not been developed in a transparent, collaborative manner. Supporters of the system report that hundreds of people have been interviewed during the scoping and design of IRMA, and briefings have been provided to all divisions. A detailed analysis of IRMA's functionality, cost, and development was outside the scope of this study.

As a way to increase NRSS's outreach to external stakeholders, NRPC is also working to improve NRSS's science communication efforts. It is a challenge to communicate complicated scientific efforts to park and public (constituents), and this has been acknowledged as an area that remains a work-in-progress. From an internal communications standpoint, NRPC has acknowledged the need to improve NRSS's web presence, Internet, Share Point, and Intranet. Some park units such as Everglades are experimenting with Twitter. Social media is another mechanism by which to communicate within NPS and to the larger public about critical natural resource issues.

Despite some progress, the *Strategic Plan for Natural Resource Inventories* for FY 2008 to FY 2012, published just a year ago (May 2009), identifies the "effective delivery of data and information to key audiences" as a major continuing challenge:

To effectively manage, utilize, and deliver the basic data and information needed for natural resource management and protection, a major challenge ... will be to transition to a more efficient data management infrastructure, one that meets stakeholder needs at all organizational levels. Among other things, the infrastructure will need to enhance communication, standardize data formats, improve the ability of staff to find existing data and products they need, and increase the use of natural resource data to guide management, research, and policy decisions throughout the organization.<sup>64</sup>

The online dialogue results indicate that additional steps are needed to ensure that natural resource information is both usable and available across NPS. Two ideas were for scientific information to be delivered to parks in ways that are more useful to their needs and for staff to have online access to relevant scientific literature. Based on online dialogue responses and other research, NRSS has an opportunity to take additional steps to ensure that the data it gathers is

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number of sample reports, (2) introduce additional datasets and metrics, and (3) provide guidance on the development of landscape dynamic reports suitable for local usage.

<sup>63</sup> See <http://science.nature.nps.gov/im/datamgmt/IRMA.cfm>

<sup>64</sup> Natural Resource Program Center, *Strategic Plan for Natural Resource Inventories: FY 2008 – FY 2012* (Fort Collins, CO), p. 29.

translated into knowledge about park natural resources that can be used to inform strategic planning and management decision-making, as well as to educate the public.

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**FINDING III-3:**

*NPS and NRSS have made progress in integrating natural resource information into decision-making, but additional opportunities exist to make use of NRSS information in the future, especially as I&M networks produce more operational monitoring data.*

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NPS has a statutory mandate to “assure that management of units of the National Park System is enhanced by the availability and utilization of a broad program of the highest quality science and information.” Similarly, the Secretary of the Interior is mandated to “take such measures as are necessary to assure the full and proper utilization of the results of scientific study for park management decisions.”<sup>65</sup> Like other federal agencies, NPS must comply with government-wide environmental statutes and requirements such as the Clean Air Act, the Clean Water Act, and the National Environmental Policy Act. In most cases, park superintendents are not required to consult with NRSS or other WASO officials when taking resource management actions, though they must comply with NEPA and environmental statutes.

Federal law requires that the “trend in the condition of resources in the National Park System shall be a significant factor in the annual performance evaluation of each Superintendent of a unit in the National Park System.”<sup>66</sup> NPS has not, however, included resource stewardship as a performance appraisal element. By implementing this statutory mandate, NPS would provide park superintendents with additional incentives to make science-based resource decisions. Because most of the environmental challenges originate outside park borders, this would have to be undertaken carefully. In comments on the agency review draft of this report, it was observed that the time scale for environmental challenges and responses is longer than the normal tour of duty time scale, which means a superintendent may inherit problems caused by previous park management. To ensure that park superintendents are treated fairly, they could be evaluated on their achievement of reasonable management targets, rather than holding these individuals fully responsible for natural resource trends and conditions that may be outside of their control.

In March 2006, the Alaska region published a document on “integrating science to enhance resource management in a changing world” that began to establish a vision for that region of how to “generate scientific questions and collect and process data to identify the sustainable balance between preservation and park use to support adaptive management.”<sup>67</sup> According to the Alaska region, the way to achieve this strategy objective is through:

- enhancing scientific research in, and knowledge about, national park resources and stressors (that is, more science);

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<sup>65</sup> See the National Park Omnibus Act (16 USC 5932, 5936).

<sup>66</sup> Public Law 105-391, Title II, Section 206 (November 13, 1998), 112 Stat. 3500.

<sup>67</sup> National Park Service, *Alaska Region Science Strategy for 2006 and Beyond: Integrating Science to Enhance Resource Management in a Changing World* (March 2006), p. viii.

- creating a framework to guide interdisciplinary research, data integration, and synthesis for identifying sustainable balance (that is, more integration); and
- delivering data in a format designed to inform decision-making, promote adaptive management, and educate the public (that is, better use).

NPS is funding a limited number of Resource Stewardship Strategies, which are park-specific planning documents designed to provide parks with an objective assessment of the condition of natural/cultural resources relative to desired conditions, as well as to document comprehensive strategies to achieve and maintain desired conditions.<sup>68</sup> According to the Denali RSS:

The RSS is a program planning document that serves as a bridge between the qualitative statements of desired conditions established in the park General Management Plan (GMP) and the measurable goals and implementation actions determined through park strategic planning. The RSS is not a decision-making document. It is an analytical document that focuses on identifying and tracking indicators of desired conditions, recommending comprehensive strategies to achieve and maintain desired conditions over time, and assessing and updating these comprehensive strategies periodically based on new information and the results of completed activities.

Natural Resource Condition Assessments (NRCA), discussed in more detail later in this report, are expected to be an input into these strategies. The RSS will delineate areas geographically by management zone in a park and provide qualitative descriptions of conditions in those areas. The RSS will provide strategic guidance for park research, resource management, and resource education programs, based on current or foreseeable conditions, and identify the gaps between desired conditions and current conditions. Although it is not a decision-making document *per se*, it is expected to be a forward-looking document that guides NPS's financial investments in natural and cultural resource stewardship over a 15 to 20 year timeframe. Once developed, a park's RSS is expected to provide a framework for reducing the gap between the current condition of park natural resources and their reference condition. The RSS is intended to integrate the reference conditions identified through the NRCAs, the ongoing monitoring, and other scientific information and scholarly literature to achieve and maintain desired resource conditions.

NRSS held a workshop with pilot RSS parks in April 2010. The Academy was told that park participants in this workshop emphasized the importance of the RSS as a management tool. Similarly, dialogue participants expressed concerns that NPS has made limited progress in actually implementing the RSS effort. According to NRSS, a total of 35 RSSs (7 per year) were to be funded from Recreation Enhancement Act (REA) fees from FY 2006 to FY 2010.<sup>69</sup> Funding constraints, however, have resulted in significant disruption to the process. Some parks are ready to develop an RSS, but have no funding available; in other cases, funds became available at unexpected times, and parks were no longer ready to initiate their RSS. The

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<sup>68</sup> The predecessor to the RSS was the Park Resource Management Plan, the bulk of which focused on what resources were most important in the park, and included an appendix of all the project statements.

<sup>69</sup> Under this program, a full 100 percent of the fees charged to park visitors are returned to NPS (80 percent remain at the site where it was collected; 20 percent can be used Service-wide at the Director's discretion).

unreliability of the REA fee funding stream has negatively impacted the ability of parks scheduled to prepare RSSs to do so.

One online dialogue forum focused on taking conservation actions, which corresponded to the fourth core function. Participants were asked the following questions:

- What actions should be taken by NRSS, the regions, and the parks to ensure that NPS natural resources are protected and conserved for appropriate use and enjoyment?
- How can performance measures or other data be utilized to support conservation actions?
- How can NRSS and the regions help the parks take conservation actions?
- Are there any changes that should be made to improve the parks’ ability to take conservation actions?

Table 10 presents the top five ideas from that forum by rank and vote. As shown, the top idea was to integrate maintenance and natural resource efforts. This idea referred to the need to further integrate natural resource programs and policies into other divisions, especially in terms of development projects and maintenance. For example, it was reported that some culverts<sup>70</sup> put in by parks had led to stream disturbances. Similarly, new buildings, while energy efficient, are not always night sky friendly.

**Table 10**  
**Top Five Ideas**  
**Forum on Taking Conservation Actions**

Rank	Idea	Votes
1.	Integrate Maintenance and Natural Resource efforts.	137
2.	Provide more interpretation targeted to change specific behaviors so that even controversial actions in favor of resource protection can be taken.	118
3.	A greater I&M role in the climate change initiative.	116
4.	Provide a significant longer term funding source for ecological restoration (5-10 years).	100
5.	Increase conservation efforts in lands that surround park units.	96

Another online dialogue forum concerned integrating natural resource information and requirements into decision-making, which corresponded to NRSS’s third core function. Participants were asked the following questions:

- How can NRSS and NPS ensure that natural resource information and compliance requirements are integrated into park management decisions?
- How can NRSS help the parks and regions more effectively to integrate natural resource information and compliance requirements into their management decision-making?

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<sup>70</sup> Culverts are conduits used to enclose flowing bodies of water to allow it to pass underneath roads, railways, or embankments.



- How can performance measures or other data be made more usable for decision-making by parks?
- Are there any changes that should be made to improve the parks' ability to integrate information and requirements into decision making?

Table 11 presents the top ideas from that forum by rank and vote. As shown, the participants believed that science-based management requires NPS to recruit superintendents with resource backgrounds and train them in this subject—this was the top idea.

**Table 11**  
**Top Five Ideas**  
**Forum on Integrating NR Information and Requirements into Decision-Making**

Rank	Idea	Votes
1.	Recruiting and training superintendents with resource backgrounds to ensure science-based management.	152
2.	Increase technical assistance capacity to compensate for lack of natural resource staff in parks.	107
3.	Make it easier for park staff to find and download copies of data and reports.	106
4.	Provide better online access to scientific literature.	93
5.	Link natural and cultural resources, science, and management in RSS plans and provide funding to this end.	76

Dialogue participants had a number of useful ideas for how to improve the integration of information into decision-making. Some suggested the use of modeling to evaluate the effectiveness of management actions—that is, the evaluation of past actions and prediction of likely futures. Another idea was to increase the interaction and consultation between park managers and I&M staff in the development of park project statements. Outside the dialogue, the Integrated Pest Management Strategy developed in August 2006 was cited as an effective practice in integrating scientific information and the scientific method into park management. This strategy consists of the eleven steps described in Table 12.



**Table 12**  
**Steps to Develop and Implement an Integrated Pest Management Strategy**<sup>71</sup>

<b>Step</b>	<b>Description</b>
1.	Describe your site management objectives. Establish short- and long-term priorities.
2.	Build consensus with stakeholders (occupants, decision-makers, and technical experts).
3.	Document decisions and maintain records.
4.	Know your resource (site description and ecology).
5.	Know your pest. Identify potential pest species; understand their biology and the conditions conducive to supporting the pests (air, water, food, shelter, temperature, and light).
6.	Monitor pests, pathways, and human and environmental factors, including population levels and other data.
7.	Establish “action thresholds”—that is, the point at which no additional damage or pest presence can be tolerated.
8.	Review available tools and effective management practices. Develop a management strategy specific to your site and the identified pests. A variety of management strategies and tools (physical, mechanical, cultural, biological, and/or chemical) may be used.
9.	Define responsibilities and implement the lowest risk, most effective pest management strategy, in accordance with applicable laws, regulations, and policies.
10.	Evaluate results. Determine if objectives have been achieved, and modify strategies if necessary.
11.	Conduct education and outreach. Continue the learning cycle.

Based on interviews, NRSS and NPS do appear to have taken important actions to integrate information on a case-by-case basis. For example, an ongoing project to monitor the status of the panther population in Big Cypress National Preserve has provided information that management has used to support and enhance panther recovery, as well as to monitor the panthers’ behavioral and/or demographic responses to natural events, management actions, and human impacts. After initial water quality monitoring found high levels of *E. coli* at Zion National Park, further sampling documented this as a chronic condition, leading the state to take additional steps to protect the watershed.

Although progress has been made, the online dialogue results and other research conducted for this study indicate that the integration of information into decision-making continues to be a challenge. In fact, the idea that ranked second across all dialogue forums was the need to integrate research, information management, data analysis, and park management effectively. Furthermore, dialogue participants emphasized the need to: (1) provide clear links between I&M generated information and knowledge to improve its usefulness for decision-making and (2)

<sup>71</sup> See <http://www.nature.nps.gov/biology/imp/>

support projects that inform management of projected future resource conditions. Clearly, NRSS cannot do this alone, a point demonstrated by another top dialogue idea to recruit and train superintendents with resource backgrounds to ensure science based management. Dialogue participants emphasized the need for superintendents to understand science and noted that additional annual training might help in this area.

Since most parks with significant natural resources currently do not have NRCAs and RSSs, NPS by definition has additional opportunities to ensure that park management decisions are informed by needed scientific and technical information. Strengthened park planning processes are important to connect science and management in establishing needed strategies to address critical natural resource challenges. By further integrating scientific information and expertise in a comprehensive way into park planning and decision-making processes, NPS can ensure that actions to conserve park resources are informed by the best available scientific and technical information.

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**FINDING III-4:**

*The Panel identified two other organizations (NatureServe and Parks Canada) that have developed useful conceptual depictions of how information should be integrated into natural resource planning and management decisions, and these may be helpful to NRSS.*

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As NPS and NRSS continue their drive to make science basic to NPS management decisions, they will need to work collaboratively to develop and implement a model/process for how scientific information is integrated into decision-making across the service. Two potential examples of an effective practice in this area have been identified.<sup>72</sup> Figure 8 shows NatureServe's Conservation Information Value Chain, which, at a conceptual level, identifies the three major phases and supporting steps needed to ensure that this information is used to guide action.

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<sup>72</sup> These are presented here only as frameworks that NPS might further develop and implement within its own context; determining how these models work in practice was beyond the scope of this study.

**Figure 8**  
**NatureServe’s Conservation Information Value Chain**

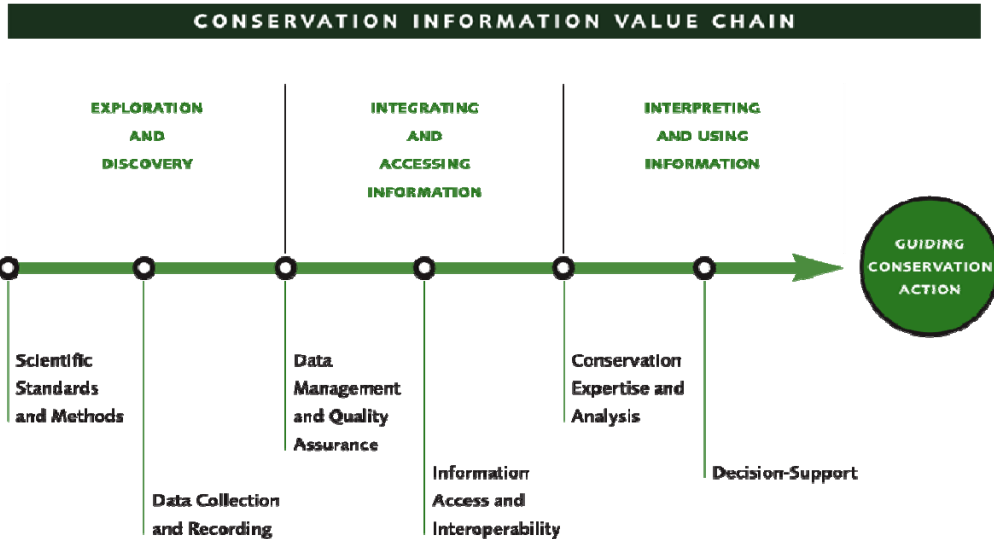
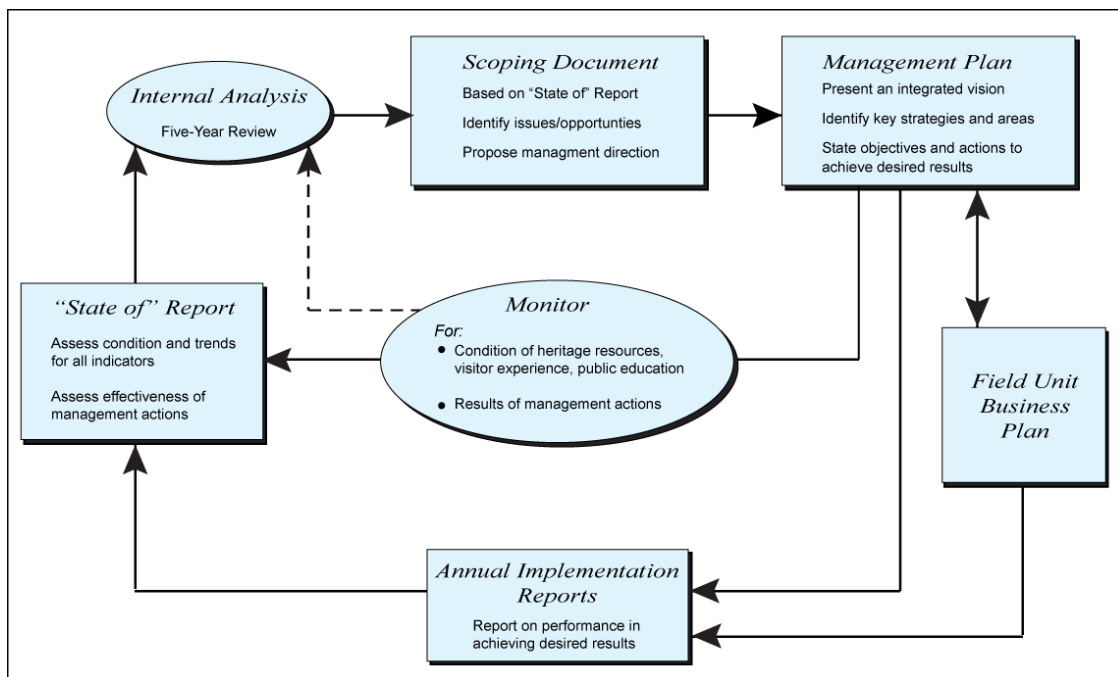


Figure 9 shows the Parks Canada Management Planning Cycle. This model puts the monitoring data at the heart of the entire cycle. It feeds into both the “State of” reports that evaluate park conditions and the internal analyses conducted as part of each park’s five-year review.

**Figure 9**  
**Parks Canada Management Planning Cycle**



Source: Pacific Rim, National Park Reserve of Canada, State of the Park Report (2008)

It is important for NPS and NRSS establish a process whereby they can continuously evaluate and review its data and information to ensure it is of maximum utility—that is, accessible in usable form to park natural resource managers; interpreted for specific audiences; and used by park managers for strategic planning and management decision-making, as well as to educate the public. NPS needs processes and policies that integrate science into the culture of decision-making, with the goal of ensuring that management decisions are informed by the best available science.

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**FINDING III-5:**

*NRSS lacks a comprehensive Natural Resource Index that clearly displays the current condition of natural resources in individual parks, or regionally or nationally. The Air Resources Division has, however, developed a tool for air quality. A comprehensive index would be useful in performing NRSS's second core function of evaluating the condition of park natural resources, landscapes, and processes.*

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In the FY 2003 Appropriations Act, Congress instructed and funded NPS to assess environmental conditions in National Park units. Accordingly, NRSS established the Natural Resource Condition Assessment Program to gain greater understanding about current resource conditions and some of the factors that influence those conditions (that is, threats and stressors).<sup>73</sup> Over time, it is expected that this understanding will inform park actions using partnerships and educational efforts to address threats to resources arising at park, watershed, and regional levels. Eleven NRCAs have been completed and approximately 70 pilot NRCAs at various parks are in various stages of completion.

By 2014, NRCA projects are expected to be active in most or all of the 270 parks in the 32 NPS I&M networks. According to NRCA standards and guidelines, these assessments are “a spatially explicit multi-disciplinary synthesis of existing scientific data and knowledge from multiple sources to help answer the question: What are the current conditions for important park natural resources?” NRCAs are expected to have practical value for park managers in the following areas:

- developing near-term strategies and priorities;
- engaging in watershed or landscape scale resource partnerships and educational efforts;
- conducting formal planning to describe and quantify desired conditions for their most important resources and to develop comprehensive strategies for how best to protect and restore them; and
- reporting on “resource condition status,” using performance/accountability measures as instructed by DOI and OMB.

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<sup>73</sup> Historically, these were narrower “Watershed Condition Assessments.”

NRCAs do not do the following:

- define a park’s desired resource conditions;
- establish park resource management targets;
- recommend specific park management actions or strategies;
- give a single overall-condition score for park areas, unless this is requested by a park and incorporated into the original project scoping/design;
- evaluate alternative futures (for example, through climate change scenario planning);
- emphasize rigorous trend analysis; or
- report on conditions for lands and resources outside park boundaries, though they should consider the impact that regional/landscape issues have on park-managed resources

NRSS does not have a readily assessable system for evaluating and displaying the condition of park natural resources, or a framework for a standard set of indices for multiple geographical levels (park, regional, and national). This is a critical gap, given the significant taxpayer investment through the Natural Resource Challenge and NPS’s primary statutory duty of conserving park resources. This information is needed at the park, multi-park, regional, and national levels. Presumably, the system would start at the park level, and users could amalgamate upwards. This information could be used for decision-making about such issues as:

- Policies
- Planning
- Budgets
- Staff
- Projects
- Others

There are many complex issues relating to the development of a condition index, and some interviewees disagree about the desirability of such a system. Some stated that developing metrics for resource conditions is a very difficult and complex task and that amalgamating data up to a national level can oversimplify a complicated endeavor, leading to either misleading or meaningless evaluations of condition. Others were concerned that it might be more difficult to obtain buy-in at the park level if a formal rating were given. By contrast, other interviewees emphasized the importance of being able to explain the state of park natural resources to the American people and the Congress in a clear way. Others offered that it is difficult for staff in a science-based organization to understand the need for “a short” description of park resources when they are engaged in detailed work day to day. Instead, they assert that the parks need a simple document that interpreters, superintendents and others can use to communicate with NPS neighbors—citizens and citizen groups; local, state, and tribal governments; other federal agencies; and Congress. After careful consideration, the Panel supports the latter view.

Within NRSS, the Air Resources Division has developed an assessment tool for its particular resource. In *Air Quality in National Parks: 2008 Annual Performance & Progress Report*, the general status of air quality in selected parks was assessed for visibility, nitrogen deposition, sulfur deposition, and ozone according to the following color codes:

- Red Circle = Significant Concern.
- Yellow Circle = Moderate Concern.
- Blue Circle = Good Condition.

In addition, air quality trends are assessed as follows:

- Upward Red Arrow Trend = Degrading.
- Sideways Yellow Arrow Trend = Stable.
- Downward Blue Arrow Trend = Improving.

In 2008, the Superintendent of Yellowstone National Park presented a report on all its vital signs (not just air quality) as a way to assess the health of the park's ecosystem.<sup>74</sup> This report assessed five resource categories:<sup>75</sup>

- Ecosystem Drivers;
- Landscape-Scale Indicators;
- Rare and Sensitive Areas;
- Stressors; and
- Focal Resources.

Additional examples of condition indexes can be found outside the National Park Service. Parks Canada publishes State of the Park reports that “help raise awareness among key partners and visitors of the condition and status of park resources, activities, and relationships.”<sup>76</sup> They also identify key issues and challenges that must be considered in park management planning. These reports evaluate three core areas:

- Ecological integrity (that is, natural resources);
- Cultural resources; and
- Visitor experience (includes outreach education and stakeholder relations, sometimes called “connection to place”).

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<sup>74</sup> See [http://www.nps.gov/yell/planyourvisit/upload/YELL\\_08\\_vital\\_signs\\_rep.pdf](http://www.nps.gov/yell/planyourvisit/upload/YELL_08_vital_signs_rep.pdf).

<sup>75</sup> Across these five categories, the current condition and reference condition for a total of 27 vital signs and 45 indicators were assessed. For each vital sign (and for some particular indicators), the report identified which were within the reference condition.

<sup>76</sup> Parks Canada, *Pacific Rim National Park Reserve of Canada: State of the Park Report* (2008), p. i.

Table 13 shows the structure used by Parks Canada to evaluate the trend and condition of an individual park's natural and cultural resources.

**Table 13**  
**Parks Canada Rating and Trend Evaluation Structure**  
**Natural and Cultural Resources**

Condition		Trend	
<i>Good:</i> the condition of the indicator/measure is satisfactory (for natural resources = good/unimpaired ecological integrity).		<i>Improving:</i> the condition of the indicator/measure is improving since the last assessment.	
<i>Fair:</i> there is concern regarding the state of this indicator/measure (for natural resources = fair/moderately healthy ecological integrity).		<i>Stable:</i> the condition of the indicator/measure is unchanged since the last assessment.	
<i>Poor:</i> the condition of the indicator/measure is low (for natural resources = poor state of ecological integrity).		<i>Declining:</i> the condition of the indicator/measure is declining since the last assessment.	
<i>Not rated:</i> there is insufficient information to determine condition.		<i>Not rated:</i> there is insufficient information to determine trend.	

*Source:* Banff National Park of Canada: State of the Park Report & Pacific Rim National Park Reserve of Canada: State of the Park Report (both in 2008)

The Parks Canada State of the Parks reports can drill down at a deeper level into specific measures. For example, the Pacific Rim National Park Reserve considers six major indicators: (1) sub-tidal; (2) intertidal; (3) shoreline; (4) streams; (5) forest; and (6) lakes and wetlands. For each indicator, the park is able to assign a status (good, fair, poor, or undetermined) and a trend (improving, stable, declining, or undetermined). Each indicator consists of a small number of relevant measures with an individual status and trend. Figure 10 shows ecological integrity indicators at the Canadian Pacific Rim Reserve.

**Figure 10**  
**Pacific Rim National Reserve of Canada**  
**Ecological Integrity Assessment**

INDICATOR	STATUS	TREND	MEASURE	STATUS	TREND
subtidal (40% of park)	●	↓ <sup>4</sup>	KELP DENSITY	◆	?
			KELP MACROINVERTEBRATE COMMUNITY	◆	?
			KELP FISH COMMUNITY	◆	?
			PACIFIC HERRING BIOMASS	●	↓
			MARbled MURRELET POPULATION	●	↔
			SEABIRD POPULATION	▼	↓
			GREY WHALE POPULATION	▼	↔
intertidal <sup>5</sup> (4% of park)	▼	↔	NATIVE INTERTIDAL BIVALVES	▼	↔
			INVASIVE INTERTIDAL BIVALVES	▼	↑
			ANTHROPOGENIC DISTURBANCE INDEX	◆	?
			EELGRASS HEALTH	■	?
			EELGRASS FISH COMMUNITY	▼	?
shoreline <sup>6</sup> (435.3 km)	■	↔	BLACK OYSTERCATCHER POPULATION	■	↔
			GLAUCOUS-WINGED GULL POPULATION	■	↔
			EUROPEAN DUNEGRASS EXTENT	●	↓
streams <sup>7</sup> (313.5 km)	▼	↔	RIPARIAN HABITAT	■	↔
			RIPARIAN LANDSCAPE DIVERSITY	▼	↔
			FRESH WATER QUALITY	▼	↔
			SALMONID POPULATIONS	●	↓
forest <sup>8</sup> (53% of park)	■	↔	ANTHROPOGENIC DEVELOPMENT	■	↔
			OLD-GROWTH COVER	■	↔
			WILDLIFE HABITAT FRAGMENTATION	■	↔
			MARbled MURRELET NESTING HABITAT	■	↔
			CARNIVORE HABITAT	■	↔
			INVASIVE PLANT EXTENT	◆	?
Lakes <sup>9</sup> & wetlands (3% of park)	◆	?	NATIVE AMPHIBIAN POPULATION	◆	?
			INVASIVE AMPHIBIAN POPULATIONS	◆	?

*Source:* Pacific Rim, National Park Reserve of Canada, State of the Park Report (2008)

Such an assessment and reporting system could be useful to NRSS as a directorate and NPS as a whole. First, the reports contain a comprehensive evaluation of a park—not just its natural resources, but also its cultural resources, visitor experience, and other aspects of particular importance for the given park. Second, they provide an easy-to-understand rating of condition and trend for the park as a whole—not just a particular resource. Third, they include trend and condition for particular resource measures. Fourth, they position this information as part of the broader park management planning cycle. And, finally, they evaluate park management actions. Parks Canada does not appear to roll these individual park reports up to identify the collective state of resources across the system, but this would be a useful additional step for NRSS and NPS to consider adopting.

Within the United States, the National Parks Conservation Association (NPCA) has done reports on the state of natural and cultural resources in individual parks. It also has amalgamated past



resource assessments into a Resource Index for the national park system as a whole. For natural resources, its index considers the following areas:

- **Ecosystem extent and function**—the average rating in 2008 for the parks assessed for this category was 64 (fair). Scores ranged from 32 (critical) to 92 (excellent), with a standard deviation of 14 and a standard error of the mean of 2.
- **Species composition and condition**—the average rating in 2008 for the parks assessed for this category was 66 (fair). Scores ranged from 47 (poor) to 98 (excellent), with a standard deviation of 11 and a standard error of the mean of 2.
- **Biotic impacts and stressors**—the average rating in 2008 for the parks assessed for this category was 69 (fair). Scores ranged from 53 (poor) to 87 (good), with a standard deviation of 8 and a standard error of the mean of 1.
- **Environmental quality factors**—the average rating in 2008 for the parks assessed for this category was 69 (fair). Scores ranged from 33 (poor) to 100 (excellent), with a standard deviation of 14 and a standard error of the mean of 2.

Development of a condition assessment index for NPS park natural resources is an unmet need. The Service now has the benefit of inventory and limited vital signs monitoring data. It would benefit from an index tool to help communicate the outcomes of investments in the park system to visitors, partners, and Congress. This tool would be useful to NPS staff to promote and protect natural resources through developing understanding.

**Based upon the five findings above, the Panel issues two recommendations designed to ensure that NPS is able to utilize the best available science and educate the American public about the condition of their national parks. Each recommendation is presented and discussed in more detail below.**

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## RECOMMENDATION 6

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**The Panel recommends that NRSS work collaboratively with the NPS Director and other senior NPS leaders to establish a vision and process for ensuring scientifically based decision-making at the national, regional, and park levels.** The goal should be to ensure that (1) usable scientific and technical information is available as needed to decision-makers at all levels, (2) managers consider and utilize this information to the maximum extent possible when making decisions, and (3) NPS/NRSS can monitor the results of these decisions to determine whether they improve the condition of park natural resources.

To implement this recommendation, the NPS Director should:

- seek full funding for the planned Resource Stewardship Strategies originally slated for FY 2006 – FY 2011 (many of which have been delayed due to shortfalls in projected REA funds);

- establish a framework in the NPS Director’s Science Strategy for how NRSS’s scientific and technical information should be integrated into decision-making;
- recruit superintendents with a demonstrated track record of using the best available science to conserve natural resources;
- include a resource management element in the performance appraisal of each superintendent of a park with significant natural resources; and
- facilitate the entry of employees with natural resource education and/or background into management positions across the National Park Service

To implement this recommendation, the NPS Director and NRSS should:

- provide clear guidance on the alignment and purpose of inventory and monitoring data and information, general management plans, natural resource conservation assessments and natural resource stewardship strategies and park specific, regional, and national indices;
- revise policy requirements, as needed, to ensure that decision-makers are required to use the best available science when making decisions; and
- survey park superintendents on their information needs and how existing NRSS information meets these needs.

In addition, NRSS should work to ensure that the data it gathers is made available in a user-friendly manner, with the goal of providing knowledge about park natural resources that can be used by decision-makers at all levels.

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## RECOMMENDATION 7

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**The Panel recommends that NRSS should work with the NPS Director and other senior leaders to develop a framework for an index with a small set of indicators that shows the condition and trend of park natural resources over time.** The index should be able to illustrate resource condition at the park, regional, and national levels.

To implement this recommendation, a “dashboard” with a limited number of “gauges” should be developed based on the existing data gathered through vital signs monitoring. Currently, each I&M network has identified their vital signs. NPS should use the most common signs as the basis for the natural resource index.<sup>77</sup> Every park with significant natural resources should include the trend and condition for each vital sign it monitors in its index—filling in the remaining “slots,” at the superintendent’s discretion, with other indicators important to that

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<sup>77</sup> As listed in the body of the report, the common signs across NPS are water quality; air quality; land cover and use; invasive/exotic plants; birds; surface water dynamics; mammals; aquatic macro invertebrates; vegetation communities; weather and climate; forest/woodland communities; soil function and dynamics; amphibians and reptiles; stream channel characteristics; threatened and endangered species/communities; and fish.

park.<sup>78</sup> Regional offices should “roll this data up” to show the trends and conditions of park vital signs in their region, as well as any of the limited number of others included by individual parks. NRSS should do a further roll-up of this data nationally.

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<sup>78</sup> For a given vital sign such as land cover and use, each park would need to (1) identify the most specific relevant measures, (2) assess their current state and trends, and (3) make an overall judgment of the status and trend for the sign itself.

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## ISSUE IV PERFORMANCE MEASUREMENT SYSTEMS

**When judged by its GPRA and PART performance measures, the National Park Service has been improving the condition of its natural resources. Across NPS, however, there is frustration with the Service’s multiplicity of data systems and performance measures. Because this is an NPS-wide issue, it must be addressed at this level, not just within NRSS.**

The National Park Service has a considerable number of agency strategic goal measures (GPRA measures) and program assessment measures (PART measures) for the period FY 2008 – FY 2012. Specifically, NPS has 68 total GPRA measures (four additional ones pending), with a total of 17 for natural resources. NPS has 64 PART measures, 7 of which are for natural resources, some of which overlap with the strategic goal measures. WASO reports on five of these measures and reports jointly with the parks on two others; WASO reports on all of the natural resource PART measures. The parks are responsible for reporting on most of the natural resource GPRA measures.

In 2003, NRSS was one of the first programs to receive a PART review from OMB. The answers to questions in each of the four sections result in a numeric score for each section from 0 to 100 (100 being the best). The program is then given an overall qualitative rating based on a weighted average of the sectional scores: purpose and design (20 percent), strategic planning (10 percent), program management (20 percent), and results and accountability (50 percent). The overall rating can be Effective, Moderately Effective, Adequate, or Ineffective. Programs that do not have acceptable performance measures or have not yet collected performance data generally receive a rating of Results Not Demonstrated.

The PART review judged NRSS to be “Moderately Effective.” The scores for each of the assessment areas are shown in Table 14.<sup>79</sup>

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<sup>79</sup> <http://www.whitehouse.gov/omb/expectmore/detail/10001089.2003.html>

**Table 14**  
**NRSS's 2003 PART Rating**

<b>Topic</b>	<b>Percent Rating</b>
Program Purpose and Design	100%
Strategic Planning	88%
Program Management	100%
Program Results/Accountability	68%

Since the 2003 PART, NRSS has completed four program improvement plans and sponsored this review. The four completed improvement plans accomplished the following:

- gradually increased funding for the Natural Resource Challenge;
- greater integration of existing performance measures into the Department of the Interior's overall strategic plan;
- refined efficiency measures used to identify best practices such as the most cost-effective ways to treat lands disturbed with exotic plants; and
- reports on the first group of parks that have identified vital signs to show how each park can use these measures to provide an overview on the health of its ecosystem.

**FINDING IV-1:**

*The National Park Service is meeting or exceeding most of the natural resource GPRA and PART measures cited in the President's FY 2011 Budget Request.*

NRSS is only responsible for reporting in the NPS Performance Management Data System on approximately 30 percent of the 17 FY 2008 – FY 2012 natural resource GPRA measures (all water or air quality measures). WASO, as a whole, reports on the following:

- visibility in NPS reporting parks remaining stable or improving;
- ozone in NPS reporting parks remaining stable or improving;
- atmospheric deposition in NPS reporting parks remaining stable or improving;
- the percentage of surface water stream miles in parks that meet state and federal water quality standards as defined by the Clean Air Act; and
- the percentage of surface water acres in parks that meet state and federal water quality standards as defined by the Clean Water Act.

The remaining GPRA natural resource measures are the responsibility of the parks:

- percentage of disturbed parkland acres targeted in a park plan for restoration that has been treated for restoration;
- percentage of acres infested with invasive species being maintained free of invasive species;
- percentage of NPS-managed stream channel and shoreline miles in desired condition;
- percentage of NPS acres managed in a natural condition that are in desired condition;
- miles of stream channel and shoreline miles targeted in a park plan for restoration that have been treated for restoration;
- percentage of park populations of federally listed endangered species that occur or have occurred in parks making progress toward recovery;
- percentage of park populations of native endangered species of management concern that are managed to desired condition;
- percentage of park populations of exotic (non-native) invasive animal species effectively controlled;
- percentage of paleontological localities in good condition; and
- percentage of park-targeted work products and activities that protect, restore, and monitor water quality conditions in NPS-managed surface and ground water systems.

NRSS and the parks share reporting for one GPRA measure:

- number of surface and ground water systems directly managed or influenced by NPS that will be protected and/or restored to meet human and ecological needs.

WASO programs “own” all of NPS’s PART measures. The PART natural resource measures are as follows:

- acres of disturbed park lands prepared for natural restoration each year;
- percentage of parks with significant natural resources that have identified their vital signs for natural resource monitoring;
- percentage of park lands containing ecosystems in good or fair condition;
- percentage of completed data sets of natural resource inventories;
- average cost of treating an acre of land disturbed with exotic plants;
- percentage of disturbed parkland acres that are being restored; and
- percentage of streams and rivers managed by NPS that meet Federal Water Quality standards.

Appendix F provides detailed information regarding NPS's performance on the natural resource GPRA and PART measure data presented in the President's FY 2011 Budget Request for several end outcome goals: (1) improved land health and aquatic resources, (2) improved plant and animal communities, and (3) protection of historical and natural icons for future generations. As these tables show, NPS met or exceeded 13 of the targeted goals for the reported measures.

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#### **FINDING IV-2:**

*The National Park Service's performance measurement system is challenging for managers throughout NPS and NRSS. The combination of 17 natural resource GPRA measures and 7 natural resource PART measures is too many to provide a dashboard for program management; and the OMB High-Priority Performance Goal initiative—while understandable as a key component of the Administration's effort to build a transparent, high-performing government—has added yet another layer of complexity.*

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Within NPS, the existing performance measures are widely seen as having limited relevance to day-to-day decision-making, and parks often feel overburdened by reporting. This is the case for all NPS performance measure areas, not just natural resources. Current GPRA measures, while being general enough to “roll up” to provide consistency in Department-wide reporting, have limited relevance to the parks. There is a broadly shared view across NPS that current GPRA measures are a reporting tool only, and do not function adequately as a management tool. Interviewees noted that many park employees believe the extensive reporting requirements take them away from their core day-to-day responsibilities.

In the Panel's 2008 report regarding NPS cultural resources,<sup>80</sup> interviews with park and regional staff revealed widespread concern about reporting systems, including PMDS, PMIS and FMSS. These concerns centered on the workload associated with electronic reporting relative to its utility to park and regional office staff. In that study, staff interviewed generally estimated that a quarter of their time is taken up in reporting for all electronic systems. Further, it was the broad perspective of field staff that this reporting reduces, rather than supports, their ability to effectively manage both natural and cultural park resources.

In addition, individuals interviewed for that study expressed concerns about the following issues:

- inefficiencies arising from multiple, disparate software systems;
- requirements at times to duplicate entry of the same data into more than one system;<sup>81</sup>
- each system's requirement for a unique user name and password; and
- delays of up to 6-7 weeks in completing the security clearances required to access the NPS intranet (at which point, half the tenure of a seasonal staff person is over)

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<sup>80</sup> National Academy of Public Administration, *Saving Our History: A Review of National Park Cultural Resource Programs* (Washington, DC: 2008).

<sup>81</sup> At the time of the Academy's cultural resources report, the study team was told that the WASO Park Facility Management Division expected to have a “bridge” linking FMSS and PMIS by the fall of 2008 to resolve the challenges with the duplication of data entry.



In 2007, the U.S. Government Accountability Office (GAO) surveyed federal managers on their use of performance information. The self reports showed that DOI made very limited use of this information for decision-making. Both DOI officials and NPS managers reported a proliferation of measures “including some that, while meaningful for department-level accountability, were not relevant to their day-to-day management.” Moreover, NPS managers reported that “poorly integrated performance and management information systems contributed to an environment where the costs of performance reporting—in terms of time and resources—outweighed what they described as minimal benefits.”<sup>82</sup>

GAO’s research revealed a number of challenges at DOI and NPS. First, DOI and NPS officials reported uneven leadership commitment to using performance information in decision-making. Second, measures that lacked credibility to bureau level managers, along with a proliferation of measures, detracted from the usefulness of performance information. Third, labor-intensive and poorly integrated data systems increased the burden of performance reporting at NPS and the Bureau of Reclamation.

Against this backdrop, OMB has mandated that agencies identify a limited number of high-priority performance goals. These goals are intended to:

- represent achievement of key agency missions and/or be of direct public value;
- require congressional authorization and appropriations for successful implementation;
- meet coordination, operational, or other implementation challenges;
- incorporate performance measures that can be clearly evaluated and are quantifiable/measureable in a timely fashion; and
- require a concerted focus of agency resources.

For each high-priority performance goal, agencies must:

- define the problem;
- define the goal to be accomplished, stating what is intended to be accomplished in the next 12 to 24 months;
- identify contributing programs within the agency;
- identify lead personnel responsible; and
- briefly outline the strategy and key measures.

The goals and their associated reporting requirements are to operate outside the established GPRA process.

DOI has identified climate change as one of its high priority performance goals. To address this goal, it is working to establish 11 Landscape Conservation Cooperatives (which it intends to

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<sup>82</sup> U.S. Government Accountability Office, *Results-Oriented Management: Strengthening Key Practices at FEMA and Interior Could Promote Greater Use of Performance Information* (GAO-09-676)

increase to 21). The implementation of the HPPG system will result in additional reporting requirements to be completed on a *quarterly basis*. For example, NPS and other bureaus will be required to report on such milestones and measures as:

- inventory area for which climate change related data is available;
- number of climate change vulnerability/impact assessments;
- number of climate change adaptation projects;
- number of adaptation projects initiated;
- number of DOI partnership agreements established;
- number of non-DOI partner agreements established;
- number of acres assessed for climate change impact vulnerability;
- number of species assessed for climate change impact vulnerability;
- number of acres and/or species being addressed through initiated adaptation projects; and
- number of climate change datasets/inventories completed.

In FY 2010, NPS only received \$10 million for its Climate Change Response Program, and the President's FY 2011 budget requests no funds for NPS climate change.<sup>83</sup> Interviewees observed that quarterly reporting is disproportionate to NPS climate change funding.

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**FINDING IV-3:**

*NRSS has developed a useful internal proposal for revising existing GPRA and PART natural resource measures.*

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The NPS Director has requested that the program directorates, including NRSS, work to simplify performance measures and make them more meaningful. NRSS has appointed an internal working group to recommend a revised set of measures. This group has submitted a set of recommendations to the Associate Director for NRSS, but it is not clear when the measures themselves will be revised.

Under this proposal, existing natural resource measures (GPRA and potentially PART) would be collapsed into four major goals:

- Natural resource health—percentage of natural resources routinely monitored that are in good or moderate condition).

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<sup>83</sup> If Congress chooses not to appropriate FY 2011 funds for climate change, as proposed by the President's FY 2011 budget request, NPS reportedly would not be required to report on a climate change HPPG after the FY 2010 funds have been spent.

- Natural resource trends—percentage of natural resources routinely monitored that have stable or improving trends.
- Ecological restoration—percentage of disturbed, infected, or contaminated lands that have been restored (or number of acres).<sup>84</sup>
- Visitor satisfaction.<sup>85</sup>

NRSS believes that these four goals would yield important information for the Directorate and the parks. They focus on what the parks choose to monitor, chose to take action on, or should continue to take action on. This information would be relevant to the Panel’s Recommendation 7 for the development of an index.

NRSS proposes that WASO take primary responsibility for doing the “rollup” of this data, thus ensuring that the parks are not unnecessarily burdened with generating compilations. At the same time, parks would be free to develop their own conclusions based on the data. The internal proposal recognizes that it might be possible to develop a mechanism to compile all the monitored information across the system, and for each park, as part of the scorecard/index development process. This process envisions that the number of measures monitored by parks would vary (for example, many more at Yellowstone and the other major natural resource parks than at smaller parks).

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**FINDING IV-4:**

*Several high-level principles may be useful to NPS and NRSS as they work to revise the existing performance measurement system.*

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Table 15 identifies some ways that agency leaders may be able to maximize success with performance measurement systems.

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<sup>84</sup> NPS materials relevant to the proposal note that this broad goal could be broken into the following sub-goals: (a) percent of disturbed lands restored; (b) number of acres treated for or cleared of invasive plants; (c) number of invasive animal (land and sea) populations treated or eradicated; and (d) number of hazards mitigated or eliminated.

<sup>85</sup> No specific measure of visitor satisfaction was included in the materials.

**Table 15**  
**Principles for Success in Performance Measurement**

How to Maximize Success
<ul style="list-style-type: none"> <li>▪ Simplify and automate the performance measurement system.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Performance measurement systems should be a means to an end, not a destination.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Performance measurement systems should be a key component in the development of a learning organization.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Carefully consider what is included in performance measurement systems because they should drive organizational activity and results.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Communicate leadership priorities to all employees in order to maximize buy-in by ensuring that they understand the purpose of performance measures.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Seek employee buy-in to the measures to ensure their use in program management.</li> </ul>

First, simplifying and automating the performance measurement system, as needed, will ensure that NPS and NRSS have a sufficient, yet not overwhelming, set of data that can be used to assess progress on key priorities and manage programs and initiatives. Reducing reporting burdens can not only strengthen the relationship between employees in headquarters and the field, but also help establish a more collaborative relationship between NPS/NRSS and external partners.

Second, performance measurement systems are a means to an end, not a destination, and are useful to document key organizational goals, monitor progress toward the goals, and make needed adjustments to achieve the goals more effectively and efficiently. Employees at all levels should have access to the data and be encouraged to use it to understand their operations and to innovate. Like other agencies in the federal government, NPS’s performance measures and systems have proliferated to the point where the system is on the verge of collapsing under its own weight. Ironically, NPS employees at all levels face challenges using the resulting information precisely because there is too much of it.

Third, performance measurement systems are key components in the development of a learning organization.<sup>86</sup> Learning organizations are more effective at maintaining levels of innovation and competitiveness, responding effectively to external pressures, linking resources to stakeholder needs, improving the quality of outputs, and increasing the pace of needed change. The development of information systems that assess organization-wide and sub-unit performance is a critical aspect of the “systems thinking” adopted by learning organizations. NPS leaders can use this information to determine what is and is not working, identify strengths and weaknesses, and share effective practices across the agency and with stakeholders. At meetings, it is also important to focus not just on problems, but highlight effective performance—especially performance that exceeds expectations.

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<sup>86</sup> According to *The Fifth Discipline* by Peter Senge, a learning organization has five main characteristics: (1) systems thinking, (2) personal mastery, (3) mental models, (4) shared vision, and (5) team learning.

Fourth, what is measured as part of a performance measurement system requires careful consideration. Although it is important to measure inputs (people, technology, and fixed assets) and outputs (processes and activities such as finance, productivity/efficiency, and cycle time), these often become the primary focus of performance management systems, in part because they are easier to measure. These measures frequently proliferate, imposing significant reporting burdens on employees and partners. While streamlining the input and output measures in the current system, it is important to expand efforts to develop a limited set of measures that focus on program outcomes. Outcome measures assess the ultimate objectives of a program. For example, are NPS programs/initiatives producing healthy park lands? What matters most is the impact of the natural resource programs on the nation, and this should be a key focus of the NPS performance measurement system.

Finally, communicating priorities to all employees and obtaining their buy-in to specific measures and means of collection are both critical. This is especially important in a large, dispersed organization such as NPS. Without a full understanding of the key priorities, NPS employees at the middle and front-line levels of the Service will not know how their activities align to the organization's ultimate outcomes. Similarly, partner organizations need to clearly understand how their activities are related to achieving the Service's fundamental priorities. Equally important is buy-in by program managers and their employees to the utility of performance measures and their systems to the day-to-day management of their programs.

**Based upon the four findings above, the Panel issues a recommendation designed to improve the existing performance measurement system within the National Park Service. This recommendation is presented and discussed in more detail below.**

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## RECOMMENDATION 8

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**The Panel recommends that NRSS work with the NPS Director, DOI, and OMB to simplify the performance measurement system in order to improve its usability for managers across the Service.** The goals of this performance measurement system should be (1) to help program managers educate the public, conduct strategic planning, and manage their programs and (2) to hold managers accountable. The Panel endorses the internal NRSS proposal to establish four primary natural resource GPRA goals and encourages NPS to review its electronic systems to ensure that they are appropriately integrated and user-friendly. The Panel urges OMB to be flexible on reporting requirements for HPPGs. Specifically, OMB should not require that NPS report quarterly on climate change, especially given the limited funding it has received for this purpose.

## **CONCLUSION**

The Panel is pleased to have had the opportunity to conduct this review. Over the course of this study, it determined that NRSS is a highly regarded organization recognized across NPS as providing significant value through independent, credible scientific expertise and technical information. NRSS provides a critical service to the Service through its national leadership and program oversight, professional natural and social science support, and specialized technical assistance. By implementing the Panel's eight major recommendations and associated implementation actions, the NPS Director and NRSS can further strengthen the core mission of the national park system: the protection, preservation, and conservation of park resources and values for the enjoyment of present and future generations.

## APPENDIX A

### PANEL AND STUDY TEAM BIOGRAPHIES

#### PANEL MEMBERS

**Frank Hodson**, *Chair\**—Principal Hodson and Associates. Former Deputy Director for Management, U.S. Office of Management and Budget; Chairman, National Endowment for the Arts, National Council on the Arts and Federal Council on the Arts and Humanities; Deputy Assistant to the President and Deputy to Chief of Staff James A. Baker, III; Deputy U.S. Representative for Non-Proliferation and Director, Office of the Law of the Sea Negotiations, U.S. Department of State.

**Denis P. Galvin**—Former Deputy Director of the National Park Service; Associate Director for Planning and Development; Manager of the Denver Service Center; Associate Regional Director for Operations; Board of Trustees of the National Parks Conservation Association and Consultant to the 2009 PBS series, *America's National Parks*.

**Parris Glendening\***—President, Smart Growth Leadership Institute. Former Governor, State of Maryland; County Executive and Council Member, Prince George's County (Maryland); Associate Professor of Government and Politics and Assistant Professor of Government and Politics, University of Maryland College Park; Member, Hyattsville (Maryland) City Council.

#### STUDY TEAM

**Lena E. Trudeau**, *Vice President*—Ms. Trudeau leads the National Academy's service delivery organization, providing executive oversight for all studies in which the organization is engaged. In addition, Ms. Trudeau is a founder of the Collaboration Project, an independent forum of leaders committed to leveraging web 2.0 and the benefits of collaborative technology to solve government's complex problems. Ms. Trudeau's previous roles include: Program Area Director, National Academy of Public Administration; Vice President, Consulting Services, The Ambit Group; Marketing Manager, Americas Public Sector, Nokia Enterprise Solutions; Principal Consultant, Touchstone Consulting Group; Consultant, Adventis Inc.; Associate, Mitchell Madison Group.

**Rick Cinquegrana**, *Program Area Director*—Program Area Director and Project Director for numerous Academy studies, including the Federal Bureau of Investigation. Former Legal Counsel and Special Counsel to the Inspector General, Office of Inspector General, Central Intelligence Agency; Deputy Staff Director/Chief Investigative Counsel, Joint Senate Select Committee on Intelligence-House Permanent Select Committee on Intelligence Inquiry Into September 11, United States Congress; Special Counsel for Policy, Intelligence Community Management Staff; Chief Counsel, National Commission to Review the Performance of the National Reconnaissance Office; Chief Investigative Counsel, House Select Committee on U.S. National Security and Military/Commercial Concerns with the People's Republic of China,

United States House of Representatives; Deputy Inspector General for Investigations, Office of Inspector General, Central Intelligence Agency; Deputy Counsel for Intelligence Policy, Office of Intelligence Policy, U.S. Department of Justice; Assistant General Counsel, CIA Office of General Counsel; Associate Attorney, Private Practice; Intelligence Analyst/Career Trainee, Central Intelligence Agency.

**Joseph P. Mitchell, III**, *Project Director*—Director and Senior Analyst on previous Academy studies for the USDA Natural Resources Conservation Service, Federal Emergency Management Agency, Office of National Drug Control Policy, Centers for Disease Control, National Aeronautics and Space Administration, Federal Bureau of Investigation, National Marine Fisheries Service, Patent and Trademark Office, National Institutes of Health, Department of the Interior, and Forest Service. Former Adjunct Professor at the Center for Public Administration and Public Policy, Virginia Polytechnic Institute and State University.

**Mark D. Hertko**, *Senior Research Analyst*—Academy projects include the Department of Interior; Environmental Protection Agency's National Center for Environmental Innovation, Office of Environmental Information, Office of Water, Office of Environmental Justice, Office of Air and Radiation; Department of Energy's Office of Energy Efficiency and Renewable Energy; and others. Former positions include: Government Relations Researcher Intern, Defenders of Wildlife; Quality Assurance/Quality Control Inspector for Indoor Mercury Contamination, Accord Enterprises; Community Relations Coordinator Intern, Illinois Environmental Protection Agency; Environmental Educator, Illinois Ecowatch.

**Steve Guagliardo**, *Research Associate*—Staff on Academy projects, including the Department of Homeland Security's Quadrennial Homeland Security Review National Dialogues, the United We Ride National Dialogue for the Coordinating Council on Access and Mobility, as well as ongoing civic engagement initiatives. Former positions include Labor Policy Research Intern, House Committee on Education and Labor and Board of Supervisors Intern, County of Fresno.

**Martha S. Ditmeyer**, *Senior Program Associate*—Staff member providing technical support for a wide range of Academy studies. Former staff positions at the Massachusetts Institute of Technology, Cambridge, MA and the Communications Satellite Corporation, Washington D.C. and Geneva, Switzerland.

\* *Academy Fellow*



**APPENDIX B**  
**LIST OF INDIVIDUALS INTERVIEWED OR CONTACTED**

(+ = NRSS Working Group Member)

- Vaughn Baker**—*Superintendent*, Rocky Mountain National Park, National Park Service (Estes Park, CO)
- Bruce Bingham**—*Regional I&M Program Manager*, Intermountain Region, National Park Service (Lakewood, CO)
- Shawn Carter**—*Climate Change Monitoring Coordinator*, NRSS Inventory and Monitoring Division, National Park Service (Washington, D.C.)
- Jim Cheatham**—*Biologist*, Rocky Mountain National Park, National Park Service (Estes Park, CO)
- Patrick Comer**—*Chief Ecologist*, NatureServe, (Boulder, CO)
- Debi Cox**—*Program Analyst*, Natural Resource Stewardship and Science Directorate, National Park Service (Fort Collins, CO)
- Craig Crutchfield**—*Interior Branch Chief*, Office of Management and Budget (Washington, D.C.)
- Mike DeBacker**—*Program Manager*, Heartland I&M Network, National Park Service (Republic, MO)
- John Dennis**<sup>+</sup>—*Deputy Chief Scientist*, Natural Resource Stewardship and Science Directorate, National Park Service (Washington, D.C.)
- George Dickison**<sup>+</sup>—*Director*, Natural Resource Program Center, Natural Resource Stewardship and Science Directorate, National Park Service (Fort Collins, CO)
- Steve Fancy**<sup>+</sup>—*Chief*, Inventory and Monitoring Division, Natural Resource Stewardship and Science Directorate, National Park Service (Fort Collins, CO)
- Nicole Fernandes**—*NPS Examiner*, Office of Management and Budget (Washington, D.C.)
- Larry W. Frederick**—*Chief of Interpretation and Education*, Rocky Mountain National Park, National Park Service (Estes Park, CO)
- Bert Frost**—*Associate Director*, Natural Resource Stewardship and Science Directorate, National Park Service (Washington, D.C.)
- Sue Haseltine**—*Associate Director for Biology*, United States Geological Survey (Reston, VA)

**Michael Heaney**—*Deputy Vice President*, Center for Park Management, National Parks Conservation Association (Washington, DC)

**Chris Holbek**—*Regional Chief*, Midwest Regional Office, National Park Service (Omaha, NE)

**James Hurban**—*Lead Budget Performance Integration Analyst*, Office of Management and Budget (Washington, D.C.)

**Bill Jackson**<sup>+</sup>—*Chief*, Water Resources Division, Natural Resource Stewardship and Science Directorate, National Park Service (Fort Collins, CO)

**Jon Jarvis**—*Director*, National Park Service (Washington, DC)

**Beth Johnson**<sup>+</sup>—*Deputy Associate Director*, Natural Resource Stewardship and Science Directorate, National Park Service (Washington, D.C.)

**Dan Kimball**—*Superintendent*, Everglades National Park, National Park Service (Homestead, FL)

**Elaine Leslie**—*Deputy Chief*, Biological Resources Management Division, Natural Resource Stewardship and Science Directorate, National Park Service (Fort Collins, CO)

**Gary Machlis**—*Science Advisor to the National Park Service*, National Park Service (Washington, DC)

**John Mack**—*Natural Resources Chief*, Rocky Mountain National Park, National Park Service (Estes Park, CO)

**Sue Masica**—*Regional Director*, Alaska, National Park Service (Anchorage, AK)

**Gary Mason**—*Program Analyst*, Natural Resource Stewardship and Science Directorate, National Park Service (Washington, D.C.)

**Carol McCoy**—*Chief*, Planning, Evaluation and Permits Branch, Geologic Resources Division, Natural Resource Stewardship and Science Directorate, National Park Service (Fort Collins, CO)

**Lisa Mendelson**—*Deputy Regional Director*, National Capital Region, National Park Service (Washington, DC)

**Bryan Mitchell**—*Program Manager*, Northeast Temperate I&M Network, National Park Service (Woodstock, VT)

**Jerry M. Mitchell**<sup>+</sup>—*Chief*, Biological Resources Management Division, Natural Resource Stewardship and Science Directorate, National Park Service (Fort Collins, CO)

**Jeff Mow**—*Superintendent, Kenai Fjords National Park (Seward, AK)*

**Jim Nations**—*Director, Center for the State of the Parks, National Parks Conservation Association (Washington, D.C.)*

**Peggy O’Dell**—*Regional Director, National Capital Region, National Park Service (Washington, DC)*

**Bruce Peacock**<sup>+</sup>—*Acting Chief, Social Science Division, Natural Resource Stewardship and Science Directorate, National Park Service (Fort Collins, CO)*

**Dusty Perkins**—*Program Manager, Northern Colorado Plateau I&M Network, National Park Service (Grand Junction, CO)*

**Ernie Quintano**—*Midwest Regional Director, National Park Service (Omaha, NE)*

**Dave Reynolds**—*Northeastern Regional Natural Resource Chief, National Park Service (Philadelphia, PA)*

**Don Ryan**—*Vice President, Policy Second Nature, Inc. Former Academy Project Director on NPS projects (Washington, D.C.)*

**Ray Sauvajot**—*Chief, Natural Resource Programs, Pacific West Region, National Park Service (Oakland, CA)*

**Dan Sealy**—*Deputy Chief, Center for Urban Ecology, National Park Service (Washington, DC)*

**David Steensen**<sup>+</sup>—*Chief, Geologic Resources Division, Natural Resource Stewardship and Science Directorate, National Park Service (Lakewood, CO)*

**Christine Shaver**<sup>+</sup>—*Chief, Air Resources Division, Natural Resource Stewardship and Science Directorate, National Park Service (Lakewood, CO)*

**Karen Trevino**<sup>+</sup>—*Manager, Natural Sounds and Night Skies Programs, Natural Resource Stewardship and Science Directorate, National Park Service (Fort Collins, CO)*

**Ken Tichelbaut**—*Vice President, Center for Park Management, National Parks Conservation Association (Washington, DC)*

**Judy Visty**—*Research Administrator and Ecologist, Rocky Mountain National Park, National Park Service (Estes Park, CO)*

**Leigh Welling**—*Coordinator, Climate Change Response Program, National Park Service (Fort Collins, CO)*

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<sup>+</sup> *NRSS Working Group Member.*

**Dan Wenk**—*Deputy Director*, National Park Service (Washington, DC)

**Sara Wesser**—*Regional I&M Program Manager*, Alaska Region, National Park Service  
(Anchorage, AK)

**Mike Whatley**—*Chief of Education and Outreach*, Natural Resource Stewardship and Science  
Directorate, National Park Service (Fort Collins, CO)

**Tammy Whittington**<sup>+</sup>—*Chief*, Environmental Quality Division, Natural Resource Stewardship  
and Science Directorate, National Park Service (Lakewood, CO)

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<sup>+</sup> *NRSS Working Group member.*

## APPENDIX C

### NPS ONLINE DIALOGUE

### ENGAGEMENT AND PARTICIPATION ANALYSIS

Between March 4<sup>th</sup> and April 16, 2010, the National Academy of Public Administration hosted an online dialogue as an input to its report on the Natural Resource Stewardship and Science Directorate of the National Park Service. The Dialogue was meant to capture participant's ideas on how to improve natural resource stewardship across the Service and, more specifically, NRSS performance's on its five core functions. Users were allowed to post ideas, comment on other's ideas, and give votes to ideas that they thought were the best. Over 400 people visited the site, and 150 people participated in the process. They provided 98 ideas, and cast over 4,000 votes in relation to those 98 ideas. The ideas that the community brought to the surface through this process factor into the Academy's report.

The Dialogue was not a representative sample of NPS employees. Participants self selected to engage in the dialogue. The dialogue analysis can only be conducted on the basis of the views expressed by those who participated in the dialogue, and analysis of the dialogue can only be in relation to the ideas posted in the dialogue. Although the platform used did not collect demographic information and was not intended to be a survey, there were two broad categories of metrics that were captured. (For more information about dialogues as a methodological tool, see the National Academy's report, *A National Dialogue on Health IT*).<sup>87</sup>

Engagement and participation were both captured through the tools used to analyze the NPS dialogue:

- **Engagement metrics** generally measure the amount of overall traffic to and activity on the site, including metrics such as Unique Visitors, Total Visits, and Page Views. The National Academy used a free Google Analytics tool to capture this information. Also captured are measures of visitor engagement with the site, including “bounce rate”—a measure indicating the “percentage of single-page visits or visits in which the person left [the] site from the entrance (landing) page.”<sup>88</sup>
- **Participation metrics** measure active involvement in the dialogue. Participation metrics collected for this dialogue include registered users,<sup>89</sup> users who submitted ideas, and users who participated by voting or commenting on another's idea.

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<sup>87</sup> Available online at: <http://www.scribd.com/doc/12345523/A-National-Dialogue-on-Health-IT-and-Privacy-Final-Panel-Report>.)

<sup>88</sup> “What does Bounce Rate mean?” Google Analytics.  
<<http://www.google.com/support/analytics/bin/answer.py?hl=en&answer=81986>> November 19, 2008.

<sup>89</sup> A registered user is any individual who creates a unique username on the dialogue site; this step is necessary in order to submit, rate, or tag an idea, or to explore other users' profiles.

## ENGAGEMENT METRICS

**Table C-1**  
**Engagement Metrics**

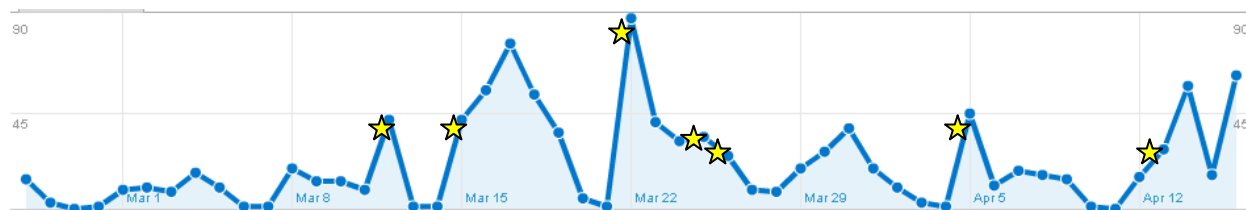
NPS Natural Resource Dialogue	
Live Dates	3/04/2010 – 4/16/2010
Visits	1,085
Unique Visitors	443
Page Views	9,861
Avg. Page Views	9.09
Bounce Rate (%)	23.32
Avg. Time on Site	09:18
Direct Traffic	889 (81.94%)

## Engagement Analysis

Because the NPS Natural Resource Dialogue was conducted as a supplement to a study by the Academy and was not a stand alone dialogue, it is difficult to compare the simple engagement numbers to other dialogues the Academy has hosted. This is further complicated since the NPS natural resource dialogue was hosted by Uservoice, a different platform than most other Dialogues conducted by the Academy for engagement.

Other metrics provide a sense of how users interacted with the site. Average Page Views, Bounce Rate, and Average Time on Site indicate how deeply those users who did visit the site engaged with it, regardless of their level of participation. In terms of average page views and average time on site, the NPS Natural Resource Dialogue did well, and the bounce rate was low, which means fewer people came to the site and navigated away immediately.

The high average page views might be accounted for by the navigation of the platform, since Uservoice requires more steps to engage and thereby more pages, but in conjunction with the higher average time on site this suggests that there was substantial participation by those who “showed up” to the dialogue. This conclusion is further supported by the participation analysis.

Trend Analysis<sup>90</sup>

Overall, it appears that visits were lowest late in each week, and highest between Monday and Thursday of each week. This pattern is consistent with what has been observed in other

<sup>90</sup> Data prior to March 4<sup>th</sup> represents traffic during the Beta Test (pre-live) period of the dialogue.

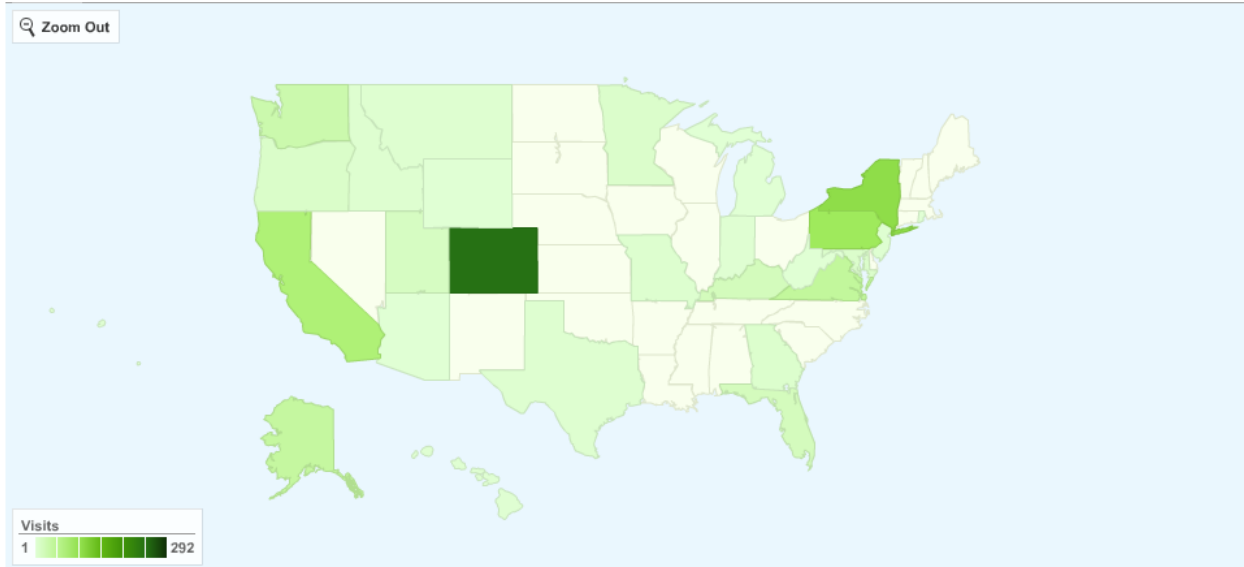
dialogues. One of the factors increasing visits to the site was the outreach conducted by the Academy. Although outreach was initiated from the Associate Director of the Natural Resource Stewardship and Science Directorate throughout the park service, the Academy conducted additional outreach when speaking with the NRSS division chiefs and other interviewees in NRSS and NPS. This additional outreach corresponds with a few notable spikes in participation, especially March 22<sup>nd</sup>. The following table lists the dates that the Academy study team interviewed Park Service employees from mid-March to mid-April and followed-up by asking them to forward the dialogue link to their colleagues.

**Table C-3**  
**Dates of Study Team Interviews with NPS/NRSS Employees**  
**Mid-March to Mid-April 2010**

<b>Dates of Study Team Interviews with NPS</b>	
<b>Day</b>	<b>Visits</b>
Friday, March 12, 2010	42
Monday, March 15, 2010	42
Monday, March 22, 2010	90
Thursday, March 25, 2010	34
Friday, March 26, 2010	25
Monday, April 5, 2010	45
Tuesday, April 13, 2010	28

In the preceding graph, these dates are marked by stars. Typically, a star preceded a spike in traffic, although in two cases it did not. These exceptions might be explained by the day they took place on (that is, the interviews that did not precede a spike in traffic were held on a Thursday or Friday). When information about the dialogue was sent out early in the week, it drove people to the site, which is consistent with other dialogues. When people were reminded about the site, or told about it by a colleague, they were more likely to visit.

**Map Overlay**



The map above indicates where in the United States visitors to the NPS Natural Resource dialogue came from. Visitors came from 27 states, but from every region of the National Park Service. Thus, each NPS region was represented, even though every state was not. One reason the dialogue was conducted was to receive input from individuals who the study team would not otherwise be able to interview. The high number of visits from Colorado suggests that NRSS staff was able to participate in the dialogue, and the numbers from the other regions indicate that regional and park personnel were also able to participate. Many of the ideas proposed by participants were from a park or regional perspective, which is a further indication that field personnel were active participants.

**PARTICIPATION METRICS**

The table below compares the level of actual user participation in each of the dialogues previously hosted by the National Academy.

**Table C-1  
Participation Metrics**

<b>Participation in the Dialogue</b>	
Live Dates	3/04/10 – 4/16/2010
Registered Users	233
As Percent. of Unique Visitors	52.6%
# of Unique Ideas	98
# of Users who posted an idea	52
# of Users who voted or commented on an idea	150
# of Votes Cast	4,350



## Participation Analysis

Over half of the people who visited the site registered for the dialogue. While this number is high for a public website, the NPS natural resource dialogue was only open to NPS employees, and they had to register before they could see any ideas. This was done to ensure that only NPS employees could participate in the dialogue.

Of the 233 registrants, 52 users posted at least one idea. Many posted more than one idea, which is how 52 users generated 98 unique ideas. Users were able to participate across all five forums, and the number of people who posted multiple ideas suggests that there was a strong core of participation in the dialogue. This is further supported by the high average activity score.

The Userve platform keeps track of users who post comments on other's ideas, and who vote on other's ideas. The Userve platform is predicated on participation and users' identifying the best ideas to the community by voting what they think are good ideas up to the top. One hundred fifty users voted or commented on an idea in the dialogue. In Userve, users are allowed to contribute up to three votes per idea. In the NPS Natural Resource Dialogue, 4,350 votes were issued and the average activity score of users who did participate in some way in the dialogue was 130.4. (By comparison, the average activity score of users who participated in the DCIPS Dialogue, which had 1,013 participants vote or comment on an idea, was 69.5.) This means that users were actively involved in voting for ideas in the Dialogue.

At a minimum, the average voter voted on ten ideas, indicating that participants were deeply engaged in the dialogue. Combined with the low bounce rate, high average page views, and high average time on site, it is clear that most participants did not just come to the Dialogue, register, post an idea, and leave. Instead, most participants stayed in the Dialogue, voted on multiple ideas across the dialogue so that the best ideas could "float to the top," and contributed to this important tool that has informed the Academy's report on the NRSS directorate.

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**Table D-1  
Natural Resource Challenges Forum**

Idea	Votes
Ensuring public engagement in long term conservation and natural resource values of parks	165
Effective integration of research, information management, data analysis and park management	161
Lack of park-based natural resource staff/expertise	134
Better integration of scientific data and expertise in park planning	115
Engage other land owners and managers in landscape scale conservation	112
Preserving the NPS mission in the face of climate change	103
Revamp (get rid of self-rated questionnaire) hiring process to recruit high quality candidates	102
a strategic approach to sustainable funding and expert recruitment	89
Communicating via existing and new technologies results obtained by research or monitoring to public	61
increase coordination, funding, and expertise for ecosystem restoration	59
Make National Park resources relevant to currently disinterested public through modern media.	54
Communicate that NPS management has value to resources outside of parks	44
More opportunities for public to participate in park science and research	34
Focus on invasive species	33
Strengthen the level of earth science expertise in the NRSS and parks	33
Remove or significantly reduce overhead charges when working with other DOI agencies/personnel.	28
Restore the Water Resource Program project funding support to parks	22
Develop public understanding of shifting baselines and why management is necessary for restoration.	21
Evaluate the NR Comprehensive Call process with the intent of simplifying it.	16
Hire, enable, and encourage staff to be national and global leaders with vision and goals.	15
Prioritize and implement conservation activities in face of ecological change (eg climate change)	10
Multi-level approach needed - within park and community, at landscape level, and in national arenas.	10
Forest insects and disease are a huge problem in wildlands. We need more emphasis on this topic.	9
NPS Natural Resources GPRA goals need to be re-evaluated	7
Establish long-term positions to support long-term monitoring of Park resources, not temporaries.	5
Place NPS among premiere conservation science entities in the world	5
More consistency among regions for contracting decisions	4
Require an act of congress for any transfer of public land for any purpose.	3
Increase international engagement to help protect NPS resources - e.g., migratory species,	3
Creating a paradigm shift that changes the way we do business.	3
Engaging the public in the mission of the park/NPS	3
Remove unnecessary impediments to hiring and retaining good staff within NRSS	2
external reviews of all NPS internal research and monitoring projects by advisory panels	2
NRSS should actively show better support for its administrative staff	2

## Forum 2: Understanding and Evaluating Park Natural Resources

- How should NPS and NRSS improve their identification, monitoring and evaluation of the condition of park natural resources?
- How can NPS employees outside NRSS, as well external stakeholders, enhance the understanding and evaluation of park resources?
- How can the evaluation and understanding of park natural resources be strengthened through more effective utilization of performance measures?
- How can relationships between NRSS, the regions, and the parks be strengthened to improve the understanding and evaluation of park natural resources?

Table D-2 presents the ideas generated through this forum.

**Table D-2**  
**Understanding and Evaluating Park Natural Resources**

Idea	Votes
The inventory phase of the I&M program was not sufficiently exhaustive. It needs to be broadened.	146
Build on and strengthen the I&M networks, which involve the superintendents and park resource chiefs	131
Enhance natural resource training for all NPS employees by updating the NPS Fundamentals	102
Provide clear links between I&M research and monitoring to its usefulness for decision-making.	100
Link monitoring results to climate data	84
Increase funding for additional research and learning centers	64
Promote organizational integration & information exchange among natural & cultural resource managers	59
Assist non-I&M projects to integrate a monitoring component when their funding source doesn't	52
More exchange of ideas between park managers and I&M staff in developing park project statements	51
Deliver "state of the science" knowledge in ways both useful to parks and scientifically credible	43
select research projects identified in planning documents to provide answers for adaptive management	43
NRSS professional staff should visit a number of parks each year and converse with NR staff	41
Accelerate (add additional funding for) the Natural Resource Condition Assessments and synthesis	39
Support to projects which inform management of projected future resource conditions	26
Leveraging partnerships for research by encouraging use of cooperative agreements, not contracts.	25
Mandate refresher training for resource management staff.	22
Create a biometrician position in each I&M network to assist with design and data analysis	13
Include phenology as a required monitoring for every network	12

### Forum 3: Integrating Natural Resource Information and Requirements into Decision-Making

- How can NRSS and NPS ensure that natural resource information and compliance requirements are integrated into park management decisions?
- How can NRSS help the parks and regions more effectively integrate natural resource information and compliance requirements into their management decision-making?
- How can performance measures or other data be made more usable for decision-making by parks?
- Are there any changes that should be made to improve the parks' ability to integrate information and requirements into decision making?

Table D-3 presents the ideas generated through this forum.

**Table D-3**  
**Integrating Natural Resource Information and Requirements into Decision-Making**

Ideas	Votes
Recruit & train superintendents with resource backgrounds to ensure science-based management.	152
Increase technical assistance capacity to compensate for lack of natural resource staff in parks	107
Make it easier for park staff to find and download copies of data and reports.	106
NPS staff needs to have better online access to scientific literature.	93
Resource Stewardship Strategy plans link natural and cultural resources, science and management—need funds	76
Performance measures should reflect the dynamic nature of biological processes and their time scales	66
Resource planning process must be more flexible and have faster turnover to be adaptive to new information	66
Promote modeling to evaluate the effectiveness of management actions	59
Provide science support that helps parks manage diverse resources and issues in a coordinated way	59
Park decisions should be made by an interdisciplinary team, to involve natural & cultural expertise	57
Develop science information transfer expertise	36
Adequate technological infrastructure is vital	32
Revamp Resource Stewardship Strategies	29
Tie research to hot button issues—begin monitoring before the issue becomes unmanageable.	26
Decision-making also happens through the public input process. Fully Support Research Learning Centers	22
Ensure compliance with permit conditions that address documentation of research.	17
Incorporate ecological risk assessment into planning and decision making efforts.	14
Bolster compliance capacity at the park and region: increase staff and streamline NEPA process	7
Make this a performance measure for all park superintendents.	5
Citing the reference numbers of specific precedent setting permits and completed contractual agreements.	5
Update the Director's Order and Reference Manual	4
Engage the public and other stakeholders including other federal agencies	3
Encourage/establish computer networking tools for the exchange of info among RM staff	2

**Forum 4: Taking Conservation Actions**

- What actions should be taken by NRSS, the regions, and the parks to ensure that NPS natural resources are protected and conserved for appropriate use and enjoyment?
- How can performance measures or other data be utilized to support conservation actions?
- How can NRSS and the regions help the parks take conservation actions?
- Are there any changes that should be made to improve the parks’ ability to take conservation actions?

Table D-4 presents the ideas generated through this forum.

**Table D-4  
Taking Conservation Actions**

Idea	Votes
Integrate Maintenance and Natural Resource efforts	137
More interpretation targeted to change specific behaviors so that controversial actions can be taken	118
Give I+M a greater role in the Climate Change Initiative	116
A significant longer term funding source for ecological restoration (5-10 years)	100
Increase conservation efforts in lands that surround park units.	96
Better integration between fire management planning (short- and long-term), fire effects monitoring, and I&M	74
Allow for multiple approaches to be tried and evaluated	48
Establish a Cyclic Resource Management Fund Source in every Region	31
Identify a Green Coordinator for all NPS conferences and large meetings	20
Articulate better the value of parks—physical, psychological, and economic.	18
Incorporate a no net loss of trees into superintendents’ performance requirements.	9

**Forum 5: Emergencies and Catastrophic Events**

- How can NPS and NRSS more effectively prepare for emergencies and catastrophic events that may affect park natural resources?
- How can NPS and NRSS more effectively respond to emergencies and catastrophic events that affect park natural resources?
- How could relationships between NRSS, the regions, and the parks be improved to enhance the preparation for and response to emergencies and catastrophic events?
- Are there any changes that should be made to improve the parks’ ability to effectively prepare for and respond to emergencies?

Table D-5 presents the ideas generated through this forum.

**Table D-5  
Emergencies and Catastrophic Events**

<b>Idea</b>	<b>Votes</b>
Maintain and improve comprehensive planning and monitoring efforts in parks.	115
Improve hazard identification and risk assessment methods in parks.	97
Improve planning to incorporate resource information in facility placement.	89
Identify subject matter experts Service-Wide for response and cover travel for park-based experts	85
Avoid emergencies by not rebuilding roads on coastal barrier islands where they repeatedly wash out	68
Plan for climate change when developing emergency scenarios and response plans.	39
Partner with the Fire Community in establishing a Service-Wide Resource Advisor Program	22



## APPENDIX E SUMMARY OF NRSS DIVISIONS' PLANNING DOCUMENTS

As part of its research, the study team reviewed a planning document (either the strategic plan or a work plan, depending on which was available) from each division. A summary of each document reviewed is included below.

### AIR RESOURCES DIVISION

Because the study team did not have access to a current Air Resources Division strategic plan, it reviewed a recent AQD annual report, *Air Quality in National Parks: 2008 Annual Performance & Progress Report*. The study team noted that this report *assesses condition and trends. It assessed the condition for visibility, nitrogen deposition, sulfur deposition, and ozone according to the following color code:*

- *Red Circle = Significant Concern.*
- *Yellow Circle = Moderate Concern.*
- *Blue Circle = Good Condition.*

*It assessed the trends for visibility, nitrogen deposition, sulfur deposition, and ozone according to the following color code:*

- *Upward Red Arrow Trend = Degrading.*
- *Sideways Yellow Arrow Trend = Stable.*
- *Downward Blue Arrow Trend = Improving.*

### NPS Role in Air Quality

- NPS works to preserve, protect, enhance, and understand air quality and resources sensitive to air quality in the National Park System. This is crucial to parks because air pollution affects ecological health, scenic views, human health, and visitor enjoyment, even at relatively low levels.
- NPS assesses progress toward improving air quality by examining trends for key air quality indicators:
  - visibility (affects how far and clearly visitors can see);
  - atmospheric deposition (affects ecological health through acidification and fertilization of soil and surface waters); and
  - ozone (affects human health and native vegetation).

### Performance Data

Overall, ARD concluded that “an examination of available trend data in and near National Park Service units suggests that progress is being made in some areas of park air quality ... Despite these improvements, there are significant challenges remaining” (p. 30). These include

ammonium concentrations in wet deposition in the West, ozone concentrations in the West, and ambient ozone concentrations (p. 30).

Specific performance data cited in the annual report include:

- For the 2008 Annual Performance Report, ozone, visibility, and deposition data collected between 1998 and 2007 were examined.
- NPS exceeds air quality performance goals for 2008 (based on trend data examined from 1998 to 2007).
  - 99 percent of the *reporting parks* show stable or improving trends in visibility;
  - 94 percent show stable or improving conditions in ozone concentrations;
  - 83 percent show stable or improving trends in atmospheric deposition; and
  - all but one of the parks trended for visibility (1998 – 2007) recorded stable or improving trends on both clear and hazy days.
- A stable trend in air quality, however, may not be sufficient to protect an area already experiencing poor air quality.
  - Visibility—59 percent of the parks are in good or moderate condition;
  - Nitrogen deposition—only 29 percent of the parks are in good or moderate condition;
  - Sulfur deposition—48 percent of the parks are in good or moderate condition; and
  - Ozone—32 percent of the parks are in good or moderate condition.
- Expectations for the future:
  - Air quality in the parks is expected to improve due to regulations aimed at reducing tailpipe emissions from motor vehicles and at pollution from electricity-generating facilities take full effect over the next few years.
  - States and tribes are in the process of implementing programs to improve visibility in national parks and wilderness areas in response to EPA regulations.

### Information and Collaboration

Making progress toward meeting park air quality goals is challenging, because NPS has no direct authority to control sources of pollution outside park boundaries (it is just given a consultation role under the Clean Air Act). In order to achieve park air quality goals, the NPS works collaboratively with federal and state air regulatory agencies, as well as neighboring land management agencies, to enhance and protect air quality in the parks to the greatest extent possible.

#### *Visibility and Regional Haze*

NPS is continuing to consult with states on their Regional Haze State Implementation Plans.

#### *Ecosystem Protection*

NPS has been encouraging the use of critical loads for atmospheric deposition as indicators of ecological health and benchmarks for evaluating the effect of air pollution control programs.

*Air Pollution Risk*

To assess the air pollution risk to NPS resources, the NPS Inventory and Monitoring Program has enabled broad regional and national-scale assessments of air pollution effects and resource sensitivities to air quality changes in parks. Private sector contractors have been used to assess air pollution risk for 270 national parks. Natural resource risk assessments have been completed for ozone and are underway for mercury, acid deposition, and nitrogen.

*Natural Resource Condition Assessments*

NPS is conducting assessments to determine the current conditions for important natural resources in all parks that are part of the NPS Inventory and Monitoring Program. Each assessment relies on existing data and knowledge, is focused on a park-specific subset of important resource indicators, and summarizes overall conditions by individual park areas.

*Climate Change*

The Climate Friendly Parks Program was funded through July 2009 via an interagency agreement between NPS and EPA. NPS assumes full funding for the program in August 2009. The program encourages and enables national parks to develop strategies to reduce their greenhouse gas emissions. Over 89 parks currently participate.

**BIOLOGICAL RESOURCES MANAGEMENT DIVISION**

In its FY 2006 to FY 2011 Strategic Plan, BRMD identified three primary goals:

1. assist in meeting the Park Service's needs in biological resources;
2. build expertise; and
3. foster effective organization and management.

BRMD's mission is to provide the expertise and leadership needed to protect, preserve and manage biological resources and related ecosystem processes in the National Park System. To implement this mission, the division manages important inventories; responds to current biological management needs; and anticipates emerging issues in individual parks, the park system as a whole, and for Park Service leadership.

BRMD identified five current and emerging challenges:

1. impact of global stress factors on a park's biological resource base;
2. increased significance of invasive species and wildlife and plant diseases;
3. changing assumptions of Biological Management;
4. accountability, information management, and technology; and
5. limited funding and administrative Inflexibility.

**Major Goals and Objectives**

BRMD's first goal is to meet the needs of the national parks. To do so, it works to anticipate and respond to the current and emerging needs of the parks, the park system, and the National Park Service leadership. For this goal, it identified five objectives:

- invest to meet current and emerging needs of the parks and park system;
- anticipate biological resource issues through national interagency and other coordination and planning;
- develop service-wide products that improve management of biological resources in parks;
- maintain a broad ecosystem framework for park management while working on programs that deal with discrete biological resource issues; and
- maintain a creative balance between services to individual parks, the park system, and Park Service leadership.

BRMD's second goal is to build expertise by accessing a wider range of expertise in developing solutions for current and emerging needs. For this goal, it identified three objectives:

- acquire in-house expertise in critical fields;
- expand and secure access to outside expertise through contracts, partnerships, and cooperators; and
- continually maintain and build expertise through regular professional development.

BRMD's third goal is to foster effective organization and management by improving its organization and management of human resources, information, and communications. For this goal, it identified five objectives:

- manage and organize the Division's human resources and programs to maximize flexibility, cross program communication, productivity, and service delivery;
- improve the ability to fund programs that address emerging biological resource issues;
- encourage cross program interdisciplinary communication and learning;
- integrate new and recently created programs into the division; and
- improve employees' ability to be free from accidents, injuries, or occupational illness.

### **Additional Priorities for Division Expertise**

BRMD identified the following as additional priorities for expertise:

- Rangeland ecology  
Information management

### **ENVIRONMENTAL QUALITY DIVISION**

The Environmental Quality Division's (EQD) Strategic Plan covers a five-year period from September 2009 to September 2014. By providing technical and policy expertise, EQD supports parks in environmental planning and incident-caused resource injuries. Specifically, EQD:

- provides guidance and support on “complex, controversial, and often precedent-setting NEPA decisions and documents” (p. 3);
- “coordinates NPS review of other federal actions that could impact NPS resources” (p. 3); and
- “provides guidance and case management support on response, damage assessment, economic issues, and restoration actions taken to prevent or minimize injuries, recover damages, and restore injured park resources” (p. 3).
- Facilitates reviews and commenting on external environmental projects that may affect NPS resources.

EQD’s vision is to be the leader in:

- response, assessment, and restoration of injured park resources; and
- NEPA guidance and project management, resulting in sound environmental decision-making for parks” (p. 3).

In the process, EQD supports NPD units service-wide by “providing NEPA guidance and project management services; helping parks respond to, assess damages for, and restore injured park resources; and managing reviews of actions by other federal agencies that can injure park resources” (p. 2).

According to the Strategic Plan, the “need for EQD’s many environmental services has increased as a result of the addition of American Reinvestment and Recovery Act projects to the NPS agenda. New priorities related to energy, climate change, and oceans have necessitated that EQD be capable, versatile, and ready to provide effective environmental services” (p. 2).

### **Emphasis Areas**

EQD has six emphasis areas (not in priority order).

#### *Environmental Planning and Compliance*

Through environmental planning and compliance, the EQD Environmental Planning and Compliance Branch assists parks and regions by developing and supporting defensible, science-based environmental planning and compliance. EQD’s current actions in this area include:

- providing parks and regions with funding and project management for NEPA planning efforts that have been, or are likely to be, litigated; are of a precedent-setting nature; or are of a particularly complex or controversial nature;
- providing parks and regions with technical review of NEPA planning documents, when requested, to ensure consistency with NEPA and Director’s Order 12;
- providing parks and regions with advice on specific NEPA-related questions when requested;
- providing parks and regions with environmental planning and compliance training (for example, training on Director’s Order 12 and on the Planning, Environment, and Public Comment aspects of environmental regulation;

- maintaining tools to assist parks and regions in complying with NEPA and to facilitate effective planning and project management;
- serving as the NPS-wide focal point for matters concerning NEPA, including regular communication and contacts at the departmental, NRSS Washington Office, program center, regional, and park levels, and with the Council on Environmental Quality;
- formulating guidance on matters related to NEPA planning and other environmental mandates; e.g., guidance on incorporating the issue of climate change in NEPA analysis;
- identifying and tracking emerging issues that affect NEPA planning efforts (e.g., climate change and coastal issues); and
- conducting legal research to identify trends in NEPA litigation, maintain current knowledge on effective practices in NEPA planning, and coordinate such efforts with the Solicitor's Office.

#### *External Environmental Review*

Through external environmental review, the EQD External Affairs Program alerts NPS Regional Environmental Coordinators and Washington officials of potential significant environmental changes. EQD also coordinates NPS reviews of external environmental documents that could affect NPS resources. Its current actions in this area include:

- coordinating NPS reviews and providing comments to OEPC;
- maintaining and updating the ER2000 database;
- determining the appropriate NPS region/division to be involved in each review;
- designating the lead NPS contact for each review;
- submitting documents to appropriate regions/divisions;
- mailing "hard copy" documents to appropriate regions/divisions;
- developing and issuing "instruction sheets" to accompany review documents;
- tracking status of pending reviews; and
- completing and closing out reviews.

#### *Spill Response*

Through spill response, EQD supports and advises parks and regions whenever an oil spill or release of hazardous substances affects, or may affect, natural or cultural NPS resources. This emphasis area is managed in EQD's Resource Protection Branch. Its current actions in this area include:

- providing 24/7 technical assistance to parks when a release of oil or hazardous substances affects, or may affect, park resources;
- the Spill Response Coordinator serving as the primary staff contact within EQD relative to natural disasters, including coordination for the protection of natural and cultural resources (internal and external to NPS);
- coordinating with all appropriate NPS personnel to promote NPS preparedness related to contingency planning and specialized spill response training;
- acting as the NPS point of contact for policy/guidance related to spill response activities, including training, clean-up standards, and the protection of resources; and

- serving as the NRSS member of the NPS Incident Management Program (IMP) Steering Committee and promoting the development of the Resource Advisor role and function within that group.

### *Damage Assessment*

Through damage assessment, EQD prevents, minimizes, assesses, and recovers damages for anthropogenic injuries to NPS resources. Its current actions in this area include:

- providing damage assessment case officers who serve as the lead on Park System Resources Protection Act (PSRPA) case teams or as members of trustee councils on legal cases, and who lead and facilitate communication among interdisciplinary case team members and other affected federal and state agencies and tribal governments;
- supporting ongoing investigation and response actions in PSRPA cases, including emergency restoration;
- assisting and guiding parks in developing litigation-quality cases, including injury assessment, restoration needs, valuation of resource injuries, developing claims for damages, settlement negotiations and litigation, providing expert testimony, and tracking recoveries while ensuring consistent case methodology service-wide;
- performing injury assessments as funding allows, providing expert advice on appropriate methods and the necessary scientific studies needed to conduct an injury assessment, and guiding case teams in identifying needs for technical assistance from other NPS offices or external experts;
- providing expertise and advice in support of the NPS Authorized Official's duties;
- providing an NPS representative on DOI's Natural Resources, Damage Assessment, and Restoration (NRDAR) Workgroup;
- providing policy expertise to NPS management, regional offices, and other support offices in regard to all relevant laws, regulations, and policies concerning damage assessment, recovery of damages, and related proposed legislation;
- developing and updating NPS procedures and recommending policy changes for damage assessment including revising the PSRPA guidance manual; and
- providing training for parks on case management and on the methodology of developing claims under PSRPA.

### *Restoration*

Through restoration, EQD returns injured NPS resources and services to their "baseline" conditions by restoring or replacing them, or by acquiring their equivalent. Its current restoration actions in this area include:

- working closely with park staff on a project team that reviews restoration requirements and activities;
- transferring settlement funds from the DOI NRDAR Fund to NPS accounts;
- preparing and reviewing restoration plans;
- ensuring restoration actions comply with NEPA and other environmental laws and regulations;

- procuring and managing contracted restoration services;
- writing project completion reports;
- planning and overseeing monitoring efforts;
- writing monitoring reports;
- representing NPS on trustee councils; and
- representing the NPS Restoration Program within DOI and with other departments.

*Economic Support*

Through economic support, EQD ensures that adequate and consistent economic support is provided for damage assessment and restoration, NEPA compliance, regulatory rulemakings, and other NPS activities requiring economic analysis. This emphasis area is managed in EQD's Resource Protection Branch. Its current economic support actions in this area include:

- providing economic analyses for damage assessments (Director's Order-14);
- providing economic analyses and technical assistance for environmental planning/compliance, rulemakings, and park decision-making;
- providing interagency support; and
- providing training on economic analyses and economic requirements.

**GEOLOGICAL RESOURCES DIVISION**

In its March 2008 strategic plan, GRD established a vision to:

- provide multidisciplinary expertise and guidance from scientific and policy perspectives to NPS resource managers, stakeholders, and decision-makers for protecting, restoring, and understanding the geologic resources of the park system;
- address the full spectrum of geologic resources, including soils, geologic features, geologic processes, and landscapes; and
- assist park managers in addressing the consequences of human activities, including mineral and energy development, placement of park infrastructure, and restoration of disturbed areas.

GRD works in partnership with parks, regions, networks, and others to preserve, protect, enhance, and understand geologic features/processes. It also works to integrate this knowledge into resource stewardship within the National Park System. Through these activities, GRD plays a key role in ensuring that the parks maintain their unparalleled beauty, rich landscapes, and resources.



## Emphasis Areas

GRD has identified six emphasis areas, each of which is discussed below.

### *Preserve and Manage America's Geologic Heritage (1<sup>st</sup> Emphasis Area)*

Geologic heritage features and landscapes are fundamental to understanding surface processes, succession and diversity of life, climate changes over time, evolution of landforms, and the origin of mineral deposits. A park's geologic heritage is the foundation for its scenic grandeur.

For this emphasis area, GRD provides park managers with technical and policy support for coastal and surficial geologic processes, paleontological resources, and cave/karst systems. As of the time this plan was developed (March 2008), its "capacity to provide this support has diminished with the departure of our paleontological and cave/karst program managers" (p. 3).

Priority actions in this area were identified as follows:

1. filling critical gaps in expertise and increasing capacity to support park management of geologic heritage resources;
2. compiling service-wide data, analyzing trends, and identifying threats to geologic features;
3. promoting and sharing management techniques and information among parks, networks, and regions;
4. gathering and sharing information on the location, condition, and significance of geologic heritage resources; and
5. providing national program coordination among other agencies and academia.

### *Integrate Geo-Science and Policy Information into Park Planning (2<sup>nd</sup> Emphasis Area)*

Geologic resource management information developed for park planning cuts across NRPC division lines and contributes to other projects and programs such as mitigation of natural hazards, restoration activities, climate change projections, and condition assessments. Early and sustained involvement by Division staff throughout the planning process will help park managers. Every park is required to have a current General Management Plan (GMP) and Resource Stewardship Strategy (RSS). In FY 2008, GRD participated in 25 new GMPs and 11 pilot RSSs. Although state and federal agencies routinely ask NPS to be a cooperating agency in environmental impact statements and other land-use planning to avoid possible conflicts at later dates, "Division and other NRPC specialists have been unable to provide all of the needed assistance because of a lack of staff. Additionally, with limited geo-scientists in parks, regions, and networks, many park plans are completed without the benefit of input from a geo-scientist" (p. 4).

Priority actions in this area were identified as follows:

1. increasing GRD capability to integrate geologic and soil resource management information into park planning;
2. developing information management systems to improve access to and usage of information related to geologic resource management; and

3. updating guidance documents and NPS websites that can inform NPS planners about geologic resource management issues, including scientific, technical, and policy concerns.

*Avoid, Mitigate, and Repair Damage from Energy and Mineral Development (3<sup>rd</sup> Emphasis Area)*

Despite the NPS Organic Act's conservation mandate, energy and mineral operations exist inside and/or adjacent to numerous park units. New exploration and development in and around national parks is surging. As conventional, non-renewable energy resources are depleted and awareness increases regarding the effect of fossil fuels on climate, park managers are contending with proposals for large-scale renewable and non-renewable energy projects on their borders.

The extent of this energy and mineral development was documented by the strategic plan:

- More than 230 park units contain non-federal (private and state) mineral rights.
- Currently, more than 700 non-federal oil and gas operations exist in parks.
- Parks contain 1,321 hard-rock mining claims covering 18,161 acres.
- Federal mineral leases occupy 16,359 acres.

NPS is experiencing an increase in renewable energy projects such as wind power and geothermal. NPS anticipates the development of other renewable energy projects such as large-scale solar arrays and tidal power projects, as well as non-renewable energy projects such as oil shale and tar sands.

Priority actions in this area were identified as follows:

1. increasing collaboration with external federal and state agencies to ensure park protection concerns are addressed in their land-use planning documents, rulemakings, and guidance;
2. advocating that planning documents recognize and mitigate the effects of energy and mineral development in and adjacent to park boundaries;
3. tracking changes in laws and policies in other federal and state agencies and updating NPS managers on the effects on park resources and park management plans;
4. expanding present capabilities to fully address in-park minerals management and external threats to parks from conventional energy and mineral exploration and development;
5. strengthening existing regulatory authorities (non-federal oil and gas and hard-rock mining) to increase resource protection and efficiencies, and promulgate new regulations to address other energy and mineral development to further park resource and visitor protection; and
6. building on past minerals management successes, to serve as the NPS-wide lead for identifying and mitigating effects associated with renewable/non-renewable energy.

*Restore and Repair Natural Systems (4<sup>th</sup> Emphasis Area)*

Although national parks are often perceived as the last vestiges of undisturbed ecosystems, nearly 440,000 acres in more than 200 park units (as of 2007) had been identified in the Performance Management Database System as needing restoration. Disturbed acreage includes active and abandoned mines, roads, coastal engineering projects, dams, canals, railroads, grazed

areas, and campgrounds. Lands disturbed by human activity often cause unwanted and long-lasting problems that affect other resources. Disturbances can obliterate soil profiles, lead to exotic plant invasions, result in contamination of water and soil, and accelerate erosion and sedimentation.

Priority actions in this area were identified as follows:

1. increasing funding to address the backlog of park restoration, abandoned mineral lands reclamation projects, and meet GPRA goals;
2. providing technical assistance to meet needs identified in planning and condition assessments;
3. ensuring that park planning documents recognize and address restoration needs;
4. providing post-restoration support to ensure that the site is on a recovery path that will result in desired conditions; and
5. developing information management systems to improve access to information for restoration.

*Improve Awareness and Reduce Damages Caused by Natural Hazards (5<sup>th</sup> Emphasis Area)*

Active and dynamic processes create and modify the spectacular landscapes in the park system. Every year, severe natural events destroy infrastructure and cause injuries and even deaths. Currently, post-incident response has been GRD's primary method of addressing hazard issues in parks. In an effort to reduce impacts, GRD promotes the development and use of sound approaches to deal with natural hazards before they result in injury or loss.

Priority actions in this area were identified as follows:

1. providing mitigation strategies and policy direction to guide park planning on the vulnerability of facilities and visitor safety;
2. facilitating monitoring of natural hazards in parks;
3. guiding and brokering hazard research, risk models, and assessments in parks and interpreting the information for park managers;
4. contributing to adjacent land-use planning to mitigate natural hazards that could impact park resources and ensuring consistency with state and federal natural hazard policies and regulations; and
5. strengthening links between park management, USGS, other agencies, and the scientific community to improve natural hazard planning, monitoring, research, and response.

*Respond to Climate Change (6<sup>th</sup> Emphasis Area)*

Parks face challenges managing resources with respect to climate change. Rates of shoreline erosion in parks are increasing as sea levels rise, storms intensify, and storm surges reach further inland. Storm-related erosion damages wildlife habitat and infrastructure, reducing visitor access and recreational opportunities. Lake levels are lowering due to population growth, greater evaporation, and decreased precipitation, which also affects wetlands and recreational uses. Changes in temperature and moisture regimes in caves and soils will impact the plants and animals that depend on these resources. These changes will affect other natural and cultural resources, facilities, and the ability of visitors to experience and enjoy the parks.

Priority actions in this area were identified as follows:

1. incorporating climate change forecasts and implications into technical and policy assistance to parks in the areas of planning, mitigation, adaptation, and disturbed land restoration;
2. integrating GRD efforts into the overarching climate change response strategy of the Natural Resource Program Center;
3. facilitating climate change scientific research that will provide NPS with information relevant for the long-term management of geologic resources;
4. coordinating with partners such as USGS, NOAA, and the EPA; and
5. participating in the development and implementation of existing, revised, and new legal/policy authorities and guidance to help NPS respond as effectively as possible to climate change.

## INVENTORY AND MONITORING DIVISION

The study team reviewed the I&M Division's FY 2008 to FY 2012 *Strategic Plan for Natural Resource Inventories*. Federal law and NPS policies require park managers to know the status and trends of natural resources. NPS established its I&M program in 1992 to "provide funding, technical assistance, and coordination for more than 270 parks to complete 12 basic natural resource inventories and to begin monitoring the status and trend of park natural resources" (p. vii). The 12 basic inventories are "common to all park units containing significant natural resources. Other inventories ... were to be deferred to a later phase of programmatic implementation or completed using funding from other sources" (p. vii).

The initial phase of each of these inventories was expected to be completed by 2001. The problem was that "less than 20 percent of the funding needed to implement the strategy was provided. By 1999, the total annual funding for all [I&M] activities ... averaged less than \$40,000 per park, and consequently progress was very slow. Beginning in FY 2000 as part of the Natural Resource Challenge, Congress greatly increased the funding for the I&M Program, to accelerate the development and delivery of the basic inventories and to design and implement a program for monitoring park vital signs" (p. vii).

According to the plan:

With the funding increase, the NPS set ambitious goals for delivering the initial set of inventory data sets to the 270 I&M parks, and by September 30, 2008, 85.3 percent of the 2,767 total inventory data sets had been completed ... [T]he delivery of the initially-defined inventory data sets and products to the 270 I&M parks will require at least another seven years at current funding levels, and even longer for some of the large Alaska parks. The I&M Program has played the major role to date in integrating and streamlining the NPS natural resource data systems through the IRMA (Integration of Resource Management Applications) system. In just a few short years, the I&M networks have become known as a key source and supplier of reliable, organized, and retrievable information about parks

that was formerly unavailable, misplaced, or lost to managers and others who needed the information for sound decisions or sound science (pp. vii - ix).

### **Basic Natural Resource Inventories**

There are twelve basic natural resource inventories, each of which is discussed below.

1. Natural Resource Bibliography
2. Base Cartography Data
3. Air Quality Data
4. Air Quality Related Values
5. Climate Inventory
6. Geologic Resources Inventory
7. Soil Resources Inventory
8. Water Body Location and Classification
9. Baseline Water Quality Data
10. Vegetation Inventory
11. Species Lists
12. Species Occurrence and Distribution Inventory

#### **1. Natural Resource Bibliography**

As of October 2008, the Natural Resource Bibliography's initial phase was complete. This inventory was the first critical step to inventory the natural resources in national parks. It was intended to discover, compile, and organize "existing records, reports, maps, manuscripts, gray literature, and other historical scientific information and to make them more available to park staff and cooperators" (p. 7). At a minimum, each park unit "should have a basic compilation of all the natural resource studies that have previously been completed within the park boundaries" (p. 7). I&M developed NatureBib, which is an automated, Internet-based bibliography that makes natural resource information more accessible and user-friendly.

#### **2. Base Cartography Data**

As of October 2008, the Base Cartography Data's initial phase was complete. Cartographic information from this inventory provides GIS data layers to NPS resource management staff, collaborators, and research partners. Through spatial displays and analyses, managers can locate potential habitats for endangered species or predict the likely course of a wildfire (p. 8). This inventory's primary objective is to acquire the suite of cartographic data products that parks require in order to prepare map products and undertake a wide variety of geo-spatial analyses and support activities associated with the use of those products by parks. It delivers six customized products to the I&M parks: (1) digital elevation models; (2) digital line graphs; (3) digital raster graphics; (4) digital orthophoto quadrangles; (5) a National Elevation Dataset; and (6) National Agricultural Imagery Program imagery.

#### **3. Air Quality Data**

As of October 2008, the Air Quality Data inventory's initial phase was complete. This Inventory "focuses on indicator pollutants regulated under the Clean Air Act," with the primary objective to provide parks with actual-measured or estimated concentrations of indicator air pollutants" (p.

9). It prepares statistical summaries “from data collected by the national air monitoring networks during five-year periods of observation” that are used to generate GIS maps portraying spatial concentrations of air pollutants. “The Air Atlas GIS viewer and five-year average estimated values are available to park managers and planners and to the general public on the Internet and from the NPS Data Store.” “Air quality maps and estimate tables for 270 natural resource parks are complete.” Updates have been completed for 1999 – 2003 and 2001 – 2005, and an update for 2003 – 2007 is in progress (p. 10).

#### **4. Air Quality Related Values**

According to the October 2008 plan, the Air Quality Related Values Inventory’s initial phase is estimated to be complete by 2012. Under the Clean Air Act, federal land managers are required to “identify air quality related values (AQRV) for public lands that may be subjected to emissions from new point sources of air pollution.” AQRV includes those resources sensitive to air quality, such as vegetation, soils, water, fish, wildlife, and visibility. This inventory’s primary objective is to develop AQRV lists for all resource parks, not just the Class I area parks” (p. 10). “Information on AQRVs is available through the Internet-based application ARIS (Air Resources Information System) ... ARIS is organized by park and by I&M network, with special emphasis on the 48 NPS Class I air quality areas that are afforded the highest protection under the Clean Air Act” (p. 10).

#### **5. Climate Inventory**

As of October 2008, the Climate Inventory’s initial phase is complete. Information on current and historical climate is critical to interpreting ecological changes and to managing national parks. Most ecological processes and many species strongly respond to climate variability. Weather profoundly influences everyday park operations such as fire management, search and rescue, monitoring of air resources, and maintenance of park infrastructure. This inventory’s primary objective is to describe a given park’s climactic setting and to “improve accessibility by parks to current weather and climate data” (p. 11). The NPCLime Project addresses climate inventory and monitoring needs through its “integrated, on-line system for discovery, acquisition, analysis, and reporting of climate data” (p. 11). This inventory has produced 32 I&M network-specific reports that identify potential sources of climate data and evaluate data availability and adequacy for each park” (p. 11).

#### **6. Geologic Resources Inventory**

According to the October 2008 plan, the Geologic Resources Inventory’s initial phase is estimated to be complete after 2012. “Geologic maps and associated interpretive reports, datasets, and metadata provide park managers and planners with fundamental information about geologic features and processes needed for effective decision-making” (p. 12). The Geologic Resources Inventory provides “the minimal set of data and information about geologic features and processes needed for resource, visitor, and infrastructure protection” (p. 12). The Inventory has provided each of the 270 I&M parks with a geologic scoping meeting, digital geologic map and associated data, and a park-specific geologic report” (p. 12).

#### **7. Soil Resources Inventory**

According to the October 2008 plan, the Soil Resources Inventory’s initial phase is estimated to be complete after 2012. This inventory will provide the basic information needed to manage soil

sustainability in parks and to protect water quality, wetlands, vegetation communities, and wildlife habitats. Parks are given maps showing the locations and extent of soils, and an interpretive report and other products to provide park managers with the ability to predict the behavior of a soil under alternative uses, its potential erosion hazard,” and so on (p. 13). This inventory provides parks “with maps showing the locations and extent of soils and an interpretive report and other products to provide park managers and planners with data and information ...” (p. 13). NRSS works cooperatively with the Natural Resources Conservation Service (NRCS) on this inventory. Inventory products include: (1) geospatial soils data; (2) soil attributes, properties, and interpretations; (3) soil survey manuscript; and (4) metadata.

### **8. Water Body Location and Classification (“Water Resources Inventory”)**

As of October 2008, the Water Resources Inventory’s initial phase is complete. Because water shapes landscapes and supports life, the knowledge of locations and characteristics of park water resources is necessary to understand park ecological and physical systems and processes. This inventory’s primary objective is “to provide information useful for a wide variety of park planning, monitoring, resource condition assessment, management decision-making, and interpretation and outreach purposes” (p. 14). NRSS partnered with the USGS and other agencies to produce a high-resolution National Hydrography Dataset (NHD) “for 8-digit hydrologic units/sub-basins containing national park units” (p. 14). The NHD “is a feature-based geographic database that interconnects” and “identifies all the stream segments” comprising “surface water drainage systems” (p. 15). This inventory also provides parks with water quality use classifications and impairment status for park water bodies.

### **9. Baseline Water Quality Data**

As of October 2008, the Baseline Water Quality Data Inventory’s initial phase was complete. Because the preservation and protection of water resources, as well as water-dependent environments, are fundamental to the NPS mission, parks need to ensure that the physical, chemical, and biological characteristics of their waters sustain healthy aquatic ecosystems, support the purposes of the park, and attain all state-designated beneficial uses (p. 15). This inventory’s primary objective is to “provide descriptive water quality information in a format useful to park managers and planners. For each park, a report is being prepared which summarizes a wide variety of water quality status and trend information” (p. 15). Its products and services include (1) a baseline water quality data inventory and analysis reports; (2) conversion of data sets to digital formats; and (3) water quality gaps filled.

### **10. Vegetation Inventory (“Vegetation Mapping Inventory”)**

According to the October 2008 plan, the Vegetation Inventory’s initial phase is estimated to be complete after FY 2012. The Vegetation Mapping Inventory is a cooperative effort between NPS I&M and USGS to “classify, describe, and map vegetation communities in more than 270 park units” (p. 16). This inventory’s primary objective is to “produce high-quality, standardized maps, and associated data sets of vegetation and other land-cover occurring within parks.” It provides a digital map and other basic information on plant species and communities that are needed by park managers and planners to conserve plant biodiversity; manage challenges such as non-native species, insect outbreaks, and diseases; and understand resources and processes such as wildlife habitat relationships and wildland fires (p. 16). This inventory provides parks with location information and water quality use/impairment status for park water bodies.

## 11. Species Lists

As of October 2008, the Species Lists' initial phase is complete. Because parks require information about the occurrence and status of species in parks in order to meet their mission of managing resources unimpaired for future generations, “[o]ne of the fundamental resources and values that national parks were established to protect is the maintenance of biodiversity” (p. 17). The long-term goal of the Species Lists is to “establish an accurate inventory of all life forms within a park.” Recognizing the challenge of such a goal, “[t]o efficiently use the limited funding available during the initial phase of the Species Lists and Species Occurrence and Distribution inventories conducted prior to 2008, the focus has been on compiling existing data and undertaking targeted field investigations to document the occurrence of at least 90 percent of the species of vascular plants and vertebrates ... currently estimated to occur in parks” (p. 18). “The initial phase of the Species List Inventory was a compilation of existing species lists and evidence records ... in the 270 I&M parks. Data existing as of 2000 ... were entered into the NPS master species database (NPSpecies) in a standard format and were quality-checked (certified) by subject-matter experts. NPSpecies includes standardized information associated with the occurrence of species in parks ...” (p. 18).

## 12. Species Occurrence and Distribution

As of October 2008, the initial phase of the Species Occurrence and Distribution Inventory is complete. In 1993, NPS determined, through a survey of over 250 natural resource parks, that more than 80 percent “lacked reliable information about which species were present, their geographic and ecological distribution, and the relative abundance of species in the park” (p. 18). This inventory “provides park managers with comprehensive, scientifically-credible information about the nature and status of selected biological resources occurring within park boundaries in a form that increases their accessibility and utility ...” (p. 18). Primary products are: (1) peer-reviewed scientific reports; (2) GIS products; (3) voucher specimens or photographs; and (4) digital datasets. “Products are available through the Inventory Tracking Database and are posted on I&M network websites” (p. 19).

## I&M's Five Major Challenges

This October 2008 plan identified the following major challenges:

1. completing the initial phase of basic inventories in a timely manner;
2. meeting park needs for continuing and recurring inventories;
3. adapting to changing needs and priorities as a result of climate change and other emerging issues;
4. effective delivery of data and information to key audiences; and
5. data integration, analysis, and synthesis (“decision support”).



**Long-Term Goals**

Over the longer-term, I&M has the following programmatic goals:

1. establish natural resource inventory and monitoring as a standard practice throughout the National Park System in a way that transcends traditional program, activity, and funding boundaries;
2. inventory the natural resources and park ecosystems under NPS stewardship to determine their nature and status;
3. monitor park ecosystems to increase understanding of their dynamic nature and condition to provide reference points for comparison with other altered environments;
4. integrate natural resource inventory and monitoring information into NPS planning, management, and decision-making; and
5. share NPS accomplishments and information with other natural resource organizations and form partnerships for attaining common goals and objectives.

**WATER RESOURCES DIVISION**

The study team did not have access to a current strategic plan for the Water Resources Division, but did review the Water Resources Division’s 2009 Work Plan. This division provides technical, scientific, and resource management expertise in support of NPS responsibilities to preserve, restore, and protect water resources and water dependent environments for the use and enjoyment of future generations. Its services and assistance are provided directly, or in cooperation with other NPs organization units, agencies or entities, to parks, networks, regions, and the Washington office.

WRD activities include:

- formulating water resources policy recommendations;
- planning assistance and regulatory reviews;
- water resources inventories and monitoring;
- identification, evaluation and mitigation of existing and potential threats to park water quality and quantity;
- floodplain and flood hazard analyses and delineation;
- watershed condition assessment and management;
- erosion and sediment control;
- protection of wetland and riparian habitats;
- fisheries management planning and the assessment and management of fish and aquatic resources;
- ocean and coastal resource management program coordination and technical support;
- locating and testing surface and groundwater sources for potable water needs;
- securing and protecting NPS water rights and water resources;
- modifying and developing methods and procedures for applied water resources management; and
- conducting projects and studies in support of water resource needs.

The primary flow of information is between WRD and management and staff at park, network, and regional levels. The WRD division chief and branch chiefs coordinate with water resource coordinators to identify issues and concerns and to prioritize projects. Annual competitive project calls generally establish project priorities. WRD also assists NRSS and the Denver Service Center with water resource matters.

WRD consists of the following branches:

- Planning and Evaluation Branch
- Water Operations Branch
- Water Rights Branch
- Ocean and Coastal Resources Branch

### **Planning and Evaluation Branch**

This branch promotes science-based management and decision making pertaining to water resources planning, wetland protection and restoration, and fisheries management within units of the National Park System. It has three functional areas, each of which is discussed below.

#### *Water Resources Planning*

- service-wide program development, policy and guidance pertaining to water resources planning;
- guidance and technical support to NPS units and the Denver Service Center through the development of natural resource information for Foundation Statements, General Management Plans, and Resource Stewardship Strategies;
- support to NPS units in the development of water-related PMIS project statements;
- identification and assessment of existing and potential threats to park water and aquatic biological resources;
- watershed protection and planning assistance and regulatory review;
- policy review of the water resources-related aspects of environmental compliance documents;
- liaison activities with other agencies on water-related regulatory matters; and
- participation in the NRPC Planning Technical Advisory Group (PTAG).

#### *Wetlands Protection and Restoration*

- service-wide policy and guidance pertaining to wetlands protection and restoration;
- identification and assessment of existing and potential threats to park wetland and riparian resources;
- technical assistance to parks for wetland and riparian zone restoration and protection;
- assistance with wetland regulatory compliance and review;
- funding for, and coordination of, wetland inventory, restoration, assessment, and protection projects in parks; and
- coordination with other agencies on wetland-related regulatory matters

*Fisheries Management*

- policy guidance and support in the implementation of the NPS recreational fisheries program, “A Heritage of Fishing;”
- policy and guidance for the protection of aquatic biological resources;
- guidance and technical support in developing strategies to address the introduction of Aquatic Invasive Species;
- coordination of policy review of the fisheries and aquatic resources-related aspects of environmental compliance documents;
- program guidance and technical support for fish population/habitat restoration;
- guidance and technical assistance in the development of Fishery Management Plans; and
- coordination with other agencies on fisheries and aquatic resources-related regulatory matters.

**Water Operations Branch**

This branch supports park, region and headquarters managers and natural resource specialists in addressing park management issues in the areas of surface and ground-water hydrology, water contaminants, and watershed and stream processes and conditions. It provides service-wide program, policy, and technical leadership; technical assistance; and special studies/projects. It provides a number of services, each of which is described below.

*Hydrology Program Services*

- surface-water hydrologic and hydraulic assessments;
- floodplain management and compliance;
- ground-water resource analysis, protection and development;
- fluvial geomorphic assessment and sediment transport;
- watershed, stream and riparian area condition analysis and management, and
- assistance with environmental assessment and compliance.

*Water Quality Program Services*

- water quality baseline inventories;
- water quality vital signs monitoring (chemical, physical and biological);
- aquatic contaminants monitoring and aquatic toxicity analysis;
- aquatic contaminants risk assessments;
- regulatory tools to protect park water quality and aquatic resource integrity;
- assistance in environmental assessment and compliance; and
- water quality strategic planning and reporting.

*Information Management Program*

- Water resources database design;
- data management, analysis and reporting;
- EPA-STORET/WQX water quality databases;
- geographic information systems and applications; and
- National Hydrographic Data sets (NHD, NED, EDNA, NWBD).

**Water Rights Branch**

This branch recommends water rights policy and implements the service-wide water rights program for the protection of NPS water rights in coordination with the DOI Office of the Solicitor, Department of Justice and other governmental entities. Its principal functions are to:

- develop and recommend water rights policy;
- recommend service-wide priorities for addressing water rights needs and participate in the budget formulation process;
- develop water rights protection strategies in cooperation with NPS management and DOJ;
- identify technical, policy, and legal support needs for the perfection and protection of NPS water rights;
- prepare case material for the use of DOJ trial attorneys and SOL attorneys, including establishment and verification of NPS water rights, selection of analytical methods for use in quantification and preparation of depositions and responses to interrogatories;
- determine the characteristics of water rights and uses, direct the development use and management of a service-wide rights database, and maintain NPS water rights dockets;
- provide advice to NPS management regarding water right issues and concerns;
- represent the Service in dealings with Federal, state and local agencies or private organizations on technical aspects of NPS water right issues and concerns;
- review proposed actions of the NPS, other Federal agencies and State and local governments for potential implications with regard to NPS water rights;
- coordinate with DOJ and SOL in interpreting and applying appropriate federal and state water right laws and related rules and regulations to Service programs;
- develop guidelines, manuals, and technical references for identifying, quantifying, and protecting federal reserved and state riparian a priori appropriation water rights Service-wide;
- coordinate water right portions of water resources studies in park areas and cooperate with NPS Lands Divisions regarding acquisition and disposition of water rights;
- assist other NPS organizational units in consideration of water rights issues in new park area planning and modification of existing areas; and
- provide training to NPS personnel on water rights topics.

The Water Rights Branch provides operational support in seven areas:

- developing strategies to protect NPS water rights;
- determining and satisfying technical and/or scientific evidence needs to protect and/or acquire water rights;
- developing and maintaining water rights records;
- providing general and technical review and advice to NPS management with respect to Water Right Issues;
- representing management with respect to water rights in administrative, judicial or other state or federal agency proceedings;
- maintaining and protecting existing NPS Water Rights; and
- characterizing and verifying water rights and uses.

### **Ocean and Coastal Resources Branch**

The principal functions of this branch are to:

- facilitate implementation of the National Park Service *Ocean Park Stewardship Action Plan* and the regional ocean coastal parks implementation plans;
- advocate for ocean and coastal resource programs in the National Park Service and provide national leadership in the design and implementation of Service-wide policies and programs and the allocation of resources to address park, ocean, and coast resources and other issues;
- facilitate regular communication and coordination across all NPS organizational units (parks, regions, networks, WASO) and advocate interdisciplinary and coordinated program approaches to addressing NPS ocean park stewardship needs;
- provide a portal to NPS ocean expertise for partners and parks to facilitate cooperation, communication, and access to reliable information about ocean and coastal parks and ocean and coastal issues;
- improve and sustain functional NPS partnerships with EPA, NASA, NOAA, USGS, academia, state resources agencies, non-governmental organizations and local park communities;
- broker expertise and coordinate ocean and coastal activities among NPS work units (parks, regions, networks) and/or with external partners;
- help NPS work units respond to emergencies (e.g., storms, oil spills, etc.) and provide technical assistance for ocean and coastal issues;
- help NPS work units articulate and market solutions to specialized ocean and coastal park needs and advocate their implementation;
- develop, test and demonstrate prototype technical approaches to ocean and coastal exploration, resource protection, restoration and preservation, outreach and public engagement that will increase NPS capacity for ocean stewardship; and
- sustain the distributed nature of the NPS work force and make the fewest changes possible in organizational structure and functions to provide the services and products indicated above.

It has program and tasks in the following areas:

- Benthic habitat mapping
- Coastal Watershed assessments
- National interagency liaison
- National Ocean Policy Support and Resource Management
- Climate Change
- The NPS Dive Program

**APPENDIX F  
SELECT ACTIVITIES AND ROLE  
OF NRSS DIVISIONS IN NRSS CORE FUNCTIONS**

This appendix identifies the primary role and activities each NRSS division performs on the five core functions being reviewed as part of this study:<sup>91</sup>

1. assisting park managers in identifying, monitoring, and understanding park natural resources;
2. evaluating the condition of park natural resources, landscapes, and processes;
3. integrating natural resource information and compliance requirements into decision-making;
4. taking actions to conserve natural resource conditions for appropriate use and enjoyment; and
5. tackling emergencies and catastrophic events.

Table F-1 is intended to cross-walk the activities of each division with the core functions being reviewed as part of this study. This table is based on information provided by the NRSS Division Chiefs during group and individual interviews. It is not intended to summarize all the programs and activities of each division.

**Table F-1  
NRSS Division’s Primary Role/Activities by Function**

Function	Select Activities and Role
<i>Air Resources Division</i>	
1.	<ul style="list-style-type: none"> <li>▪ Air quality monitoring has been ongoing for three decades.</li> <li>▪ AQD has an extensive monitoring network capable of tracking park air quality trends (pre-dates I&amp;M networks) that is able to identify the parks’ compliance with national air standards and determine whether they are healthy from an air quality standpoint; AQD’s monitoring protocols have been designed with EPA’s requirements in mind.</li> <li>▪ The Natural Sounds Program has monitored the acoustic environment of over 62 park units. The Sounds Program has been on the leading edge both nationally and internationally in developing protocols for monitoring soundscapes in protected areas.</li> <li>▪ The Night Skies Program collects baseline data on light pollution.</li> </ul>

<sup>91</sup> These are the core functions identified by the NRSS Directorate’s leaders and staff.

Function	Select Activities and Role
2.	<ul style="list-style-type: none"> <li>▪ AQD is an internationally recognized expert on visibility.</li> <li>▪ The Natural Sounds Program program characterizes the impacts to both natural and cultural soundscapes from various noise sources and also is examining the benefits to visitors and wildlife from being able to hear the sounds of nature.</li> <li>▪ EPA does not have regulatory authority in these areas and therefore, ARD has a niche in the assessment of threats and examination of the effects of noise and light pollution on park resources.</li> </ul>
3.	<ul style="list-style-type: none"> <li>▪ AQD’s role is more externally oriented than other divisions—that is, with other air quality agencies (EPA, the state environmental agencies, groups of states, and local organizations). For noise pollution, the main external relationships are with FAA and DoD, with whom it has relationships established by law.</li> <li>▪ AQD works with the parks to integrate air quality information into decision-making (for example, offering suggestions on how parks can reduce all types of air pollution, including light pollution).</li> <li>▪ AQD provides input on any new industrial source seeking to locate 300 kilometers or closer to national parks.</li> <li>▪ The Night Skies program works with various companies and localities on night sky friendly lighting retrofits</li> </ul>
4.	<ul style="list-style-type: none"> <li>▪ AQD relies heavily on persuasion in working with parks on air quality issues.</li> <li>▪ The Natural Sounds Program works with FAA to develop Air Tour Management Plans, and various of the armed forces on military overflight issue. The Sounds program has also been very involved with USFWS on establishing guidelines for Wind Turbines in assessing the noise impacts to wildlife.</li> <li>▪ AQD works with the parks and BLM on energy issues.</li> </ul>
5.	<ul style="list-style-type: none"> <li>▪ AQD uses sensors to alert the public and set thresholds in every area, including how it affects vegetation and watersheds.</li> <li>▪ It works on wildfire issues.</li> <li>▪ Volcanoes are a big issue in Hawaii.</li> </ul>
<i>Biological Resources Management Division</i>	
1.	<ul style="list-style-type: none"> <li>▪ BRMD conducts service-wide monitoring for biological resources across the system.</li> <li>▪ Threatened and endangered species, Wildlife Health, Wildlife Management, Invasive Plants, EPMT’s, Invasive and exotic Animals, All taxa biologic inventories servicewide, Migratory species, corridors and fragmentation, climate change impacts to biological resources.</li> <li>▪ BMRD jointly share responsibilities for vegetation mapping with I&amp;M.</li> </ul>
2.	<ul style="list-style-type: none"> <li>▪ BRMD Houses technical expertise on matters of ecological restoration</li> </ul>
3.	<ul style="list-style-type: none"> <li>▪ BRMD provides technical expertise policy and law interpretation on matters related to threatened and endangered species, the Endangered Species Act, and species of management concern.</li> </ul>
4.	<ul style="list-style-type: none"> <li>▪ BRMD provides biological expertise human dimensions of natural resources It provides staffing support to the Associate Director of NRSS on national-level biological issues.</li> </ul>



Function	Select Activities and Role
5.	<ul style="list-style-type: none"> <li>▪ BRMD is responsible for addressing policy and guidelines and offering technical expertise on matters of wildlife health.</li> </ul>
<i>Environmental Quality Division</i>	
1.	<ul style="list-style-type: none"> <li>▪ EQD is funded differently than the other divisions in that it receives funding in response to an incident.</li> <li>▪ It does not do inventory and monitoring <i>per se</i>, but does get involved in the planning phase during a project’s submission through a Service-Wide Comprehensive Call.</li> <li>▪ It is responsible for understanding the condition of the resources sufficiently to do a proper planning document.</li> <li>▪ Some EQD-prepared damage assessments may include restoration actions with a monitoring component (the parks will then be responsible for the actual monitoring).</li> </ul>
2.	<ul style="list-style-type: none"> <li>▪ Parks are responsible for the evaluation, but EQD uses those results to help develop a restoration plan. If there is an incident, EQD works with parks to establish the parameters that underpin condition assessments.</li> <li>▪ EQD is responsible for understanding what is needed to develop a strong legal case, but it must rely on park staff to determine the health of park resources.</li> </ul>
3.	<ul style="list-style-type: none"> <li>▪ EQD uses condition results prepared by scientists in environment-planning documents.</li> <li>▪ EQD functions as an expert in the environmental policy and planning process.</li> </ul>
4.	<ul style="list-style-type: none"> <li>▪ EQD’s planning documents are intended to help preserve resources.</li> <li>▪ EQD works to ensure that NPS’s incident response minimizes damage where there has already been injury to the resources.</li> </ul>
5.	<ul style="list-style-type: none"> <li>▪ EQD has a major role through USC 19JJ authority, in that it can bring civil liability cases against individuals and organizations that damage park resources).</li> <li>▪ EQD has very limited staff for this essential, far-reaching function.</li> <li>▪ The number of incidents each year varies considerably (some years have significant incidents such as large oil spills, while others have smaller incidents).</li> </ul>
<i>Geological Resources Division</i>	
1.	<ul style="list-style-type: none"> <li>▪ GRD has an active role in the cave and karst areas.</li> <li>▪ It works on the Soil Inventory and the Geologic Resource Inventory (funded through I&amp;M).</li> <li>▪ GRD inventories abandoned land mines.</li> <li>▪ It examines the impact of developing resources, such as minerals, oil, and gas.</li> </ul>
2.	<ul style="list-style-type: none"> <li>▪ As part of GRD’s I&amp;M work, it makes recommendations to parks or provides technical assistance to them.</li> <li>▪ It recently led a workshop on monitoring protocols for caves.</li> </ul>
3.	<ul style="list-style-type: none"> <li>▪ Integrating information into decision-making is one of the emphasis areas in the GRD Strategic Plan.</li> <li>▪ GRD works to make geological information available to the park planning process.</li> </ul>

Function	Select Activities and Role
4.	<ul style="list-style-type: none"> <li>▪ Most of GRD’s program areas work in some way to help parks implement conservation actions. For example, they may evaluate oil and gas sites to provide parks with recommendations for actions.</li> </ul>
5.	<ul style="list-style-type: none"> <li>▪ GRD responds to park questions about geological issues that arise after such events as wildfires and avalanches.</li> </ul>
<i>Inventory and Monitoring Division</i>	
1.	<ul style="list-style-type: none"> <li>▪ I&amp;M funds and delivers basic inventories to each I&amp;M park to provide basic natural resource information needed for management and planning.</li> <li>▪ I&amp;M networks have been established to monitor the status and trends in resource condition for the highest-priority resources identified by park managers and resource professionals.</li> <li>▪ Data managers and GIS professionals are shared by parks in each network to conduct data management, analysis, synthesis, and reporting of data.</li> <li>▪ Resource professionals at an I&amp;M network and national office levels conduct data analysis, synthesis, and modeling of data to turn “data into information.</li> </ul>
2.	<ul style="list-style-type: none"> <li>▪ Resource professionals at I&amp;M networks and national offices evaluate and report resource conditions through analysis, synthesis, and reporting of data and information.</li> <li>▪ I&amp;M data and staff are key contributors to the Natural Resource Condition Assessments and Resource Stewardship Strategies.</li> <li>▪ I&amp;M works to connect data to management through the planning process.</li> <li>▪ I&amp;M networks have started a “Natural Resource Condition Summary Table” for all I&amp;M parks to summarize resource conditions based on inventories and park vital signs.</li> </ul>
3.	<ul style="list-style-type: none"> <li>▪ I&amp;M data and information are a key source of scientific information for park planning.</li> <li>▪ Annual reports to Congress since 2001 have documented hundreds of examples of how parks have incorporated I&amp;M results into park decision-making, planning, and interpretation.</li> </ul>
4.	<ul style="list-style-type: none"> <li>▪ I&amp;M works to share information with park managers to help them make decisions that will benefit the natural resources.</li> <li>▪ I&amp;M has created short briefing papers available through the Internet on inventory and monitoring results.</li> <li>▪ Virtual Learning Centers and other website approaches have been funded by I&amp;M to share information on resource condition with park visitors and the general public.</li> </ul>
5.	<ul style="list-style-type: none"> <li>▪ I&amp;M has a fairly minor role in this function.</li> <li>▪ After Katrina, I&amp;M provided GIS services to NPS employees in the Gulf Coast that helped with safety issues.</li> <li>▪ Similar work was done at Mt. Rainier.</li> </ul>
<i>Social Science Division</i>	
1.	<ul style="list-style-type: none"> <li>▪ SSD has three ongoing survey programs (Visitor Services Project, Visitor Survey Card, and Comprehensive Survey of the American Public).</li> <li>▪ SSD’s efforts help understand peoples’ experiences in the parks, as well as how people impact natural resources.</li> </ul>

APPENDIX F

Function	Select Activities and Role
2.	<ul style="list-style-type: none"> <li>▪ SSD works to evaluate the conditions of park natural resources vis-à-vis the people who use them by, for example, conducting focus groups about interpretive displays.</li> </ul>
3.	<ul style="list-style-type: none"> <li>▪ The Visitor Services Project (VSP) is very park management focused. SSD works collaboratively with parks to ensure that the VSP will meet their management needs.</li> </ul>
4.	<ul style="list-style-type: none"> <li>▪ SSD provides parks with information about visitor demands and motivations that can help park managers design appropriate activities and determine necessary protective measures. This helps improve decision-making about park and visitor management.</li> </ul>
5.	<ul style="list-style-type: none"> <li>▪ SSD provides support to EQD on damage assessments that calculate losses to the public.</li> </ul>
<i>Water Resources Division</i>	
1.	<ul style="list-style-type: none"> <li>▪ WRD supports water quality monitoring and efforts to consolidate information about park water resources.</li> <li>▪ The Water Resources Inventory and the Baseline Water Quality Data Inventory are each fully integrated with vital signs monitoring.</li> <li>▪ WRD has developed a partnership with USGS for water resource assessment.</li> </ul>
2.	<ul style="list-style-type: none"> <li>▪ WRD’s Watershed Condition Assessment Program has helped parks synthesize information.</li> <li>▪ These assessments are evolving into broader “Natural Resource Condition Assessments” (established in 2003 through the Natural Resource Challenge) to synthesize information methodically about the condition of the resources, summarize it, and display it geospatially.</li> <li>▪ WRD provides a wide array of technical assistance, including help with the protection of park water rights.</li> </ul>
3.	<ul style="list-style-type: none"> <li>▪ WRD works with parks to incorporate water information into the planning process and in response to specific issues.</li> <li>▪ WRD has a significant role in planning and administrative hearings to protect park water rights (WRD examines laws and regulations that convey authority to NPS and develops a technically sound scientific basis to support NPS claims).</li> <li>▪ WRD helps incorporate sound science into fisheries management planning activities.</li> </ul>
4.	<ul style="list-style-type: none"> <li>▪ WRD’s activities help parks quantify and develop science and be positioned to protect their water rights.</li> <li>▪ WRD provides technical experts at administrative hearings on water rights.</li> <li>▪ WRD obtained funding to support 15 field-based professional positions (12 are in specific parks; one is in a monitoring network; one is in a regional office; and one is at USGS) that are intended to provide multi-park or region-wide assistance/expertise.</li> </ul>
5.	<ul style="list-style-type: none"> <li>▪ WRD conducts for parks analyses such as post-flood and post-wildfire assessments (for watershed condition).</li> <li>▪ WRD responds to water problems such as aquatic invasive species and viral outbreaks.</li> </ul>

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**APPENDIX G**  
**NPS'S PERFORMANCE ON NATURAL RESOURCE**  
**GPRA AND PART PERFORMANCE MEASURES**

**Table G-1**  
**Performance Measures for Improving Land Health and Aquatic Resources**  
**President's FY 2011 Budget Request**  
 (\* = met or exceeded goal)

Area	Measure	FY 2009 Planned & Actual <sup>92</sup>	Long-Term Target 2012
<i>End Outcome Measures</i>			
<i>Land Health</i>	For riparian areas, the percent of NPS managed stream channel and shoreline miles in desired condition	88.5% (planned) 87.6% (actual) *	88%
<i>Land Health</i>	Percent of NPS acres managed in a natural condition that are in desired condition	83% (planned) 83% (actual) *	84.1%
<i>Water Quality</i>	Completed park targeted work products and activities that protect, restore, and monitor water quality conditions in NPS-managed surface and ground water systems	553 (planned) 551 (actual)	795
<i>Water Quality (PART NR-9)</i>	Percentage of surface water stream miles in parks that meet state (EPA approved) water quality standards	99.1% (planned) 99.0% (actual)	99.1%
<i>Water Quality</i>	Percentage of surface water acres in parks that meet state (EPA approved) water quality standards	75.1% (planned) 74.2% (actual)	79%
<i>Water Quality</i>	Number of surface and ground water systems directly managed or influenced by NPS that will be protected and/or restored, as specified in management plans and by working with state and local resource managers, as appropriate, to meet human and ecological needs	105 (planned) 126 (actual) *	156
<i>Air Quality</i>	Air quality in NPS reporting park areas that has remained stable or improved	Not listed	Not listed
<i>Air Quality</i>	Visibility in NPS reporting parks that will remain stable or improve	97 % (planned) 95.5% (actual)	95%

<sup>92</sup> FY 2009 is the latest year for which both planned and actual data is available.

Area	Measure	FY 2009 Planned & Actual <sup>92</sup>	Long-Term Target 2012
<i>Air Quality</i>	Ozone in NPS reporting parks that will remain stable or improve	92.1% (planned) 100% (actual) *	89%
<i>Air Quality</i>	Atmospheric deposition in NPS reporting parks that will remain stable or improve	84.6% (planned) 92.5% (actual) *	79%
<i>Intermediate Outcome Measures &amp; Bureau/PART Measures</i>			
<i>Land Health</i>	Riparian (stream/shoreline) miles targeted in park areas for restoration that have been treated for restoration	0.74% (planned) 0.78% (actual)*	1.49%
<i>Land Health (PART NR-8)</i>	Percent of disturbed parkland acres targeted in a park plan for restoration that have been treated for restoration	3.18% (planned) 4.26% (actual) *	6.35%
<i>Land Contamination</i>	Percent of known contaminated sites remediated on NPS managed land	11.5% (planned) 12.99% (actual) *	22.4%
<i>PART Efficiency &amp; Other Outcome Measures</i>			
<i>Status and Trends (PART NR-6<sup>93</sup>)</i>	Percent of completed data sets of natural resource inventories	84.5% (planned 2008) TBD (actual)	TBD
<i>Status and Trends</i>	Percent of parks (with significant natural resources) that have identified their vital signs for natural resource monitoring	100% (planned) 100% (actual in 2007)	100%

<sup>93</sup> This was not reported in the FY 2011 Budget, but was the data reported in the FY 2010 Budget Justification. Other PART measures not reported included:  
 PART NR-2: Acres of disturbed park lands prepared for natural restoration each year  
 PART NR-3: Percent of Parks (with significant natural resources) that have identified their vital signs for natural resource monitoring  
 PART NR-4: Percent of park lands containing ecosystems in good or fair condition  
 PART NR-6: Natural Resource Inventories-Percent of completed data sets of natural resources inventories  
 PART NR-7: EPMT Average cost of treating an acre of land disturbed with exotic plants.

**Table G-2**  
**Performance Measures for Improving Plant and Animals Communities**  
**President's FY 2011 Budget Request**  
 (\* = met or exceeded goal)

Area	Measure	FY 2009 Planned & Actual <sup>94</sup>	Long-Term Target 2012
<i>End Outcome Measures</i>			
<i>Invasive Species</i>	Percentage of baseline acres infested with invasive plants that are controlled maintained as free of invasive plants	0.6% (planned) 0.71% (actual) *	0.85%
<i>Invasive Species</i>	Percentage of park populations of exotic (non-native) invasive animal species effectively controlled	13.85% (planned) 14.46% (actual) *	13.05%
<i>Intermediate Outcome Measures and Bureau/PART Measures</i>			
<i>Native Species</i>	Percentage of park populations of native species of management concern that are managed to desired condition	12.24% (planned) 13.58(actual)*	14.6%
<i>Federally Listed Species</i>	Percentage of park populations of federally listed species that occur or have occurred in parks making progress toward recovery	33.9% (planned) 35.1% (actual)*	36.8%
<i>PART Efficiency and Other Output Measures</i>			
<i>EMPT (PART NR-7<sup>95</sup>)</i>	Average cost of treating an acre of land disturbed with exotic plants	\$640 (planned 2008) TBD	TBD

<sup>94</sup> FY 2009 is the latest year for which both planned and actual data is available.

<sup>95</sup> This was not reported in the FY 2011 Budget Justifications, but this was the data reported in the FY 2010 Budget Justification.

**Table G-3**  
**Performance Measures for Protecting Historical and Natural Icons for Future Generations**  
**President's FY 2011 Budget Request**

Area	Measure	FY 2009 Planned & Actual <sup>96</sup>	Long-Term Target 2012
<i>End Outcome Measures</i>			
<i>Paleontological Localities</i>	Percent of paleontological localities in good condition	40.7% (planned) 42.8% (actual) *	49.5%

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<sup>96</sup> FY 2009 is the latest year for which both planned and actual data is available.



# CREDITS

Cover photos and associated park descriptions are courtesy of the National Park Service.

## **Grand Canyon National Park, Arizona** (Background)

A powerful and inspiring landscape, the Grand Canyon overwhelms our senses through its immense size; 277 river miles (446km) long, up to 18 miles (29km) wide, and a mile (1.6km) deep

## **Indiana Dunes National Lakeshore, Indiana**

Indiana Dunes National Lakeshore is a treasure of diverse natural resources located within an urban setting. The national lakeshore features communities that have both scientific and historic significance to the field of ecology.

## **Glacier National Park, Montana**

Come and experience Glacier's pristine forests, alpine meadows, rugged mountains, and spectacular lakes. With over 700 miles of trails, Glacier is a hiker's paradise for adventurous visitors seeking wilderness and solitude. Relive the days of old through historic chalets, lodges, transportation, and stories of Native Americans. Explore Glacier National Park and discover what awaits you.

## **Harpers Ferry National Historical Park, West Virginia**

A visit to this quaint, historic community, at the confluence of the Potomac and Shenandoah Rivers, is like stepping into the past. Stroll the picturesque streets, visit exhibits and museums, or hike our trails and battlefields. There's a wide variety of experiences for visitors of all ages, so come and discover Harpers Ferry.

## **Acadia National Park, Maine**

People have been drawn to the rugged coast of Maine throughout history. Awed by its beauty and diversity, early 20th-century visionaries donated the land that became Acadia National Park. The park is home to many plants and animals, and the tallest mountain on the U.S. Atlantic coast. Today visitors come to Acadia to hike granite peaks, bike historic carriage roads, or relax and enjoy the scenery.

## **Biscayne National Park, Florida**

Within sight of downtown Miami, yet worlds away, Biscayne protects a rare combination of aquamarine waters, emerald islands, and fish-bejeweled coral reefs. Here too is evidence of 10,000 years of human history, from pirates and shipwrecks to pineapple farmers and presidents. Outdoors enthusiasts can boat, snorkel, camp, watch wildlife...or simply relax in a rocking chair gazing out over the bay.

## **Hawai'i Volcanoes National Park, Hawai'i**

Hawai'i Volcanoes National Park displays the results of 70 million years of volcanism, migration, and evolution—processes that thrust a bare land from the sea and clothed it with unique ecosystems, and a distinct human culture. The park highlights two of the world's most active volcanoes, and offers insights on the birth of the Hawaiian Islands and views of dramatic volcanic landscapes.

## **Glacier Bay National Park and Preserve, Alaska**

The marine wilderness of Glacier Bay National Park and Preserve includes tidewater glaciers, snow-capped mountain ranges, ocean coastlines, deep fjords, and freshwater rivers and lakes.





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