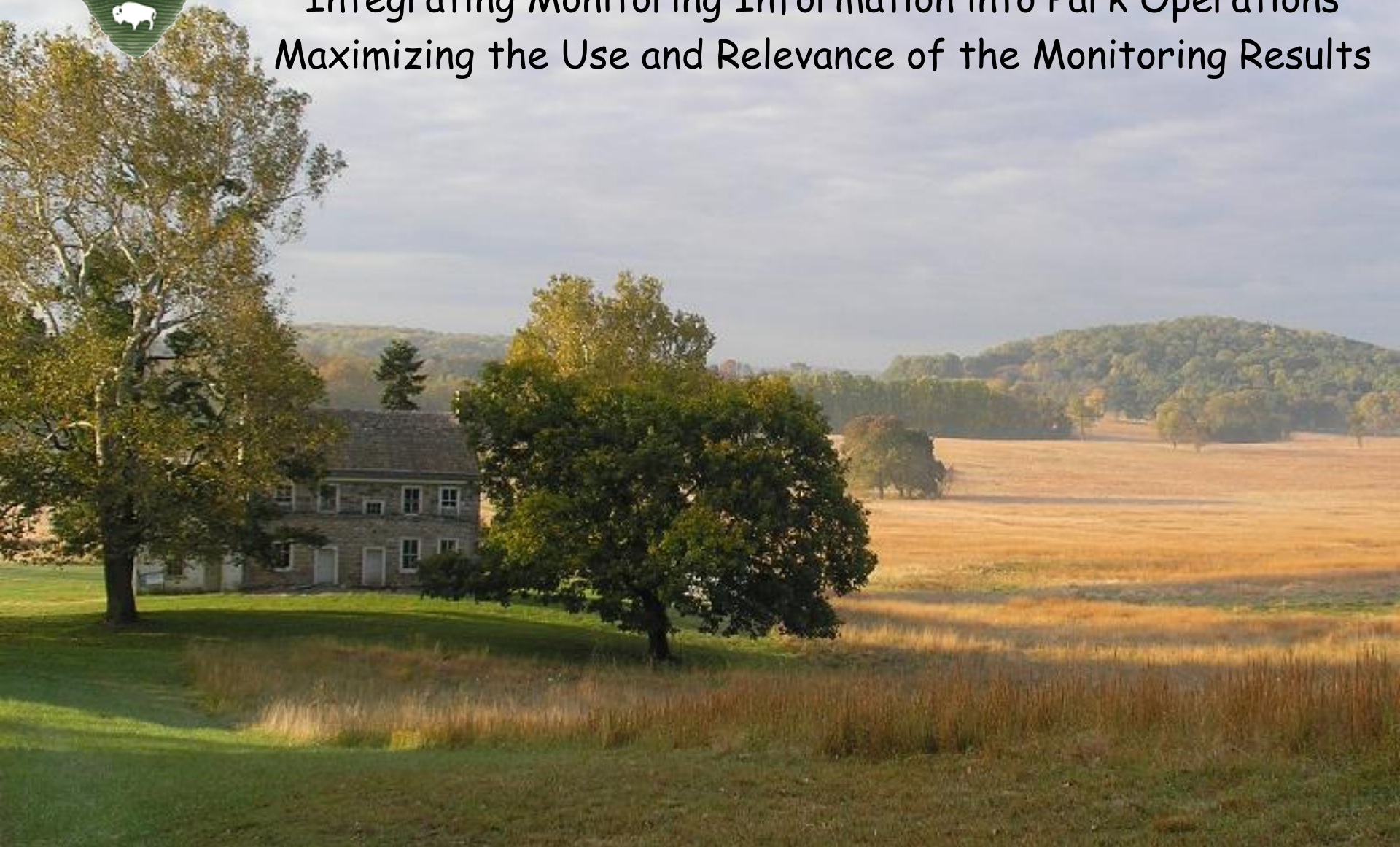




The Big Picture: What we are Doing and Why

Integrating Monitoring Information into Park Operations
Maximizing the Use and Relevance of the Monitoring Results





Condition-based Management

Conserve the resources “unimpaired for the enjoyment of future generations”

– 1916 NPS Organic Act

“The Service will also strive to ensure that park resources and values are passed on to future generations in a condition that is as good as, or better than, the conditions that exist today.” – NPS Management Policies

The Service will also strive to ensure that park resources and values are passed on to future generations in a condition that is as good as, or better than, the conditions that exist today.”

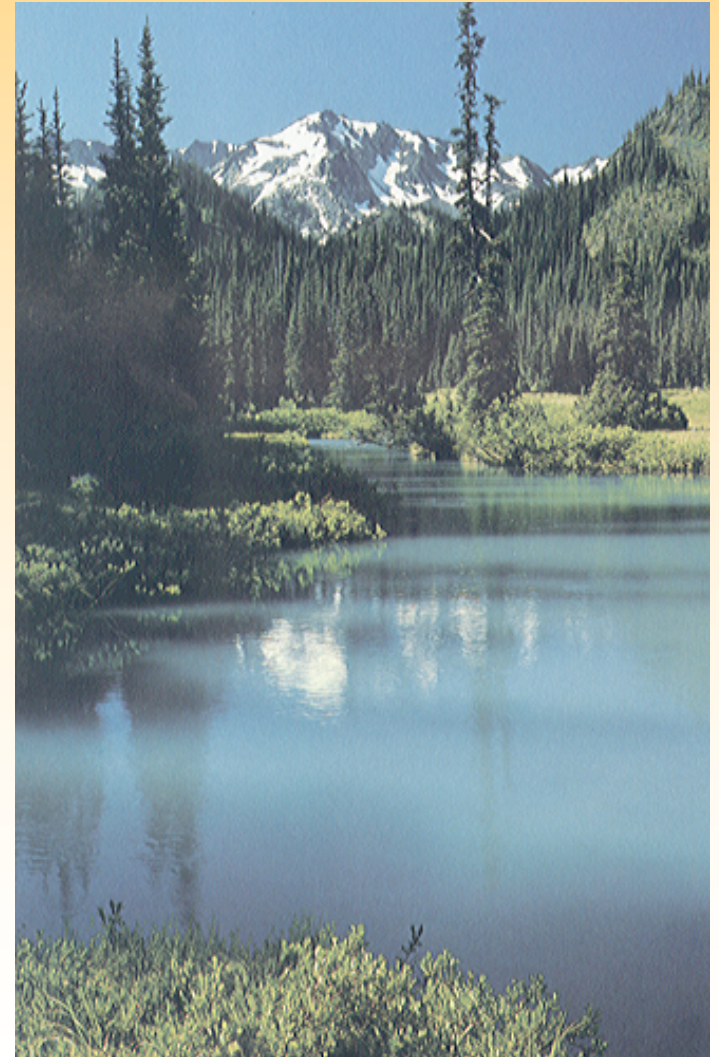
- We need to know the status & trend in condition for key resources and values in each park.
- Use the information about resource condition for management decision-making, planning, interpretation, and other management activities.
- Tell the American public, visitors, Congress about the State of the Park and how we're doing relative to the overarching management goal to maintain or improve resource condition.

Congress gave us funding to determine status & trend for selected natural resources, with very specific “marching orders” about what the funding is for.

Vision Statement of the Board of Directors, North Coast and Cascades Network

(Written in 2001 by Jon Jarvis et al.)

- The 7 parks will “work collaboratively to design and implement a Network Monitoring Program” ... that will provide “timely and relevant, scientifically credible information to Park managers and the public.”
- “Through these efforts we will be better able to understand, and explain to others, the status and trends in key components and indicators of Park ecosystems, and how they have and will respond over time to natural and human induced changes both from within and outside of Park boundaries.”
- “This comprehensive, integrated long-term ecological monitoring program provides for better protection, restoration and maintenance of the natural ecosystems under NPS management.”



National Parks Omnibus Management Act of 1998:



"The Secretary shall undertake a program of inventory and monitoring of National Park System resources to establish baseline information and to provide information on the long-term trends in the condition of National Park System resources."



Rethinking the National Parks for the 21st Century



“A sophisticated knowledge of resources and their condition is essential. The Service must gain this knowledge through extensive collaboration with other agencies and academia, and its findings must be communicated to the public. For it is the broader public that will decide the fate of these resources.”

Source: Rethinking the National Parks for the 21st Century. A Report of the National Park System Advisory Board, July 2001

The I&M Program

Park Management Informed by Scientific Information



Strategic, long-term program designed to:

Routinely collect, manage, analyze, and report data on the condition or “health” of a modest set of natural resources.

Provide some local scientific expertise to 270+ I&M parks through the use of shared positions.

Promote integration and cost-sharing across programs and disciplines through a flexible but coordinated approach.

Make data and information more available and useful by promoting good data management/analysis/reporting practices.

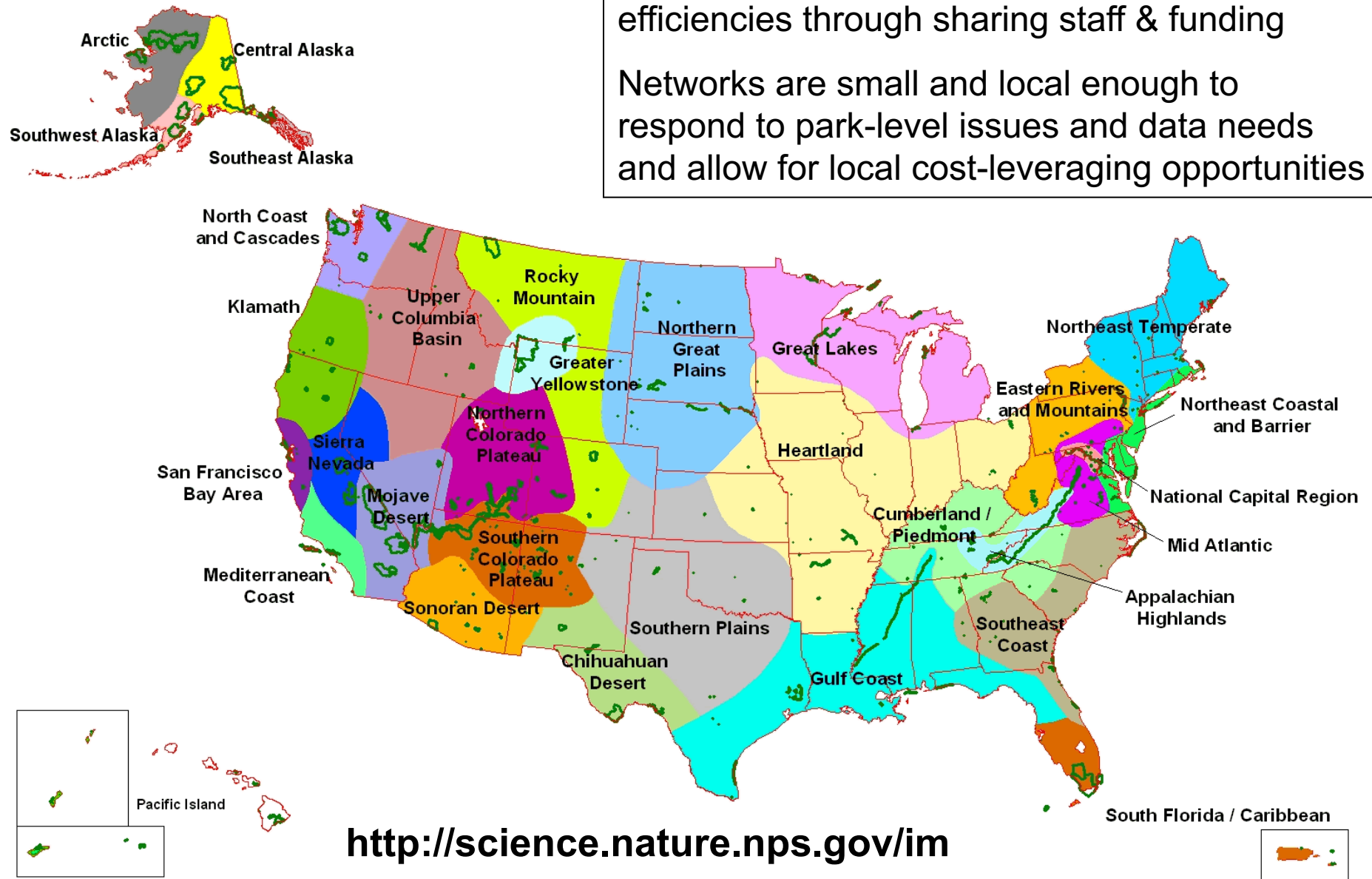
Primary Audience:

Park Managers and Planners at the local, park level

I&M Network Concept - It's Working!

The 32 park networks are large enough for efficiencies through sharing staff & funding

Networks are small and local enough to respond to park-level issues and data needs and allow for local cost-leveraging opportunities



<http://science.nature.nps.gov/im>

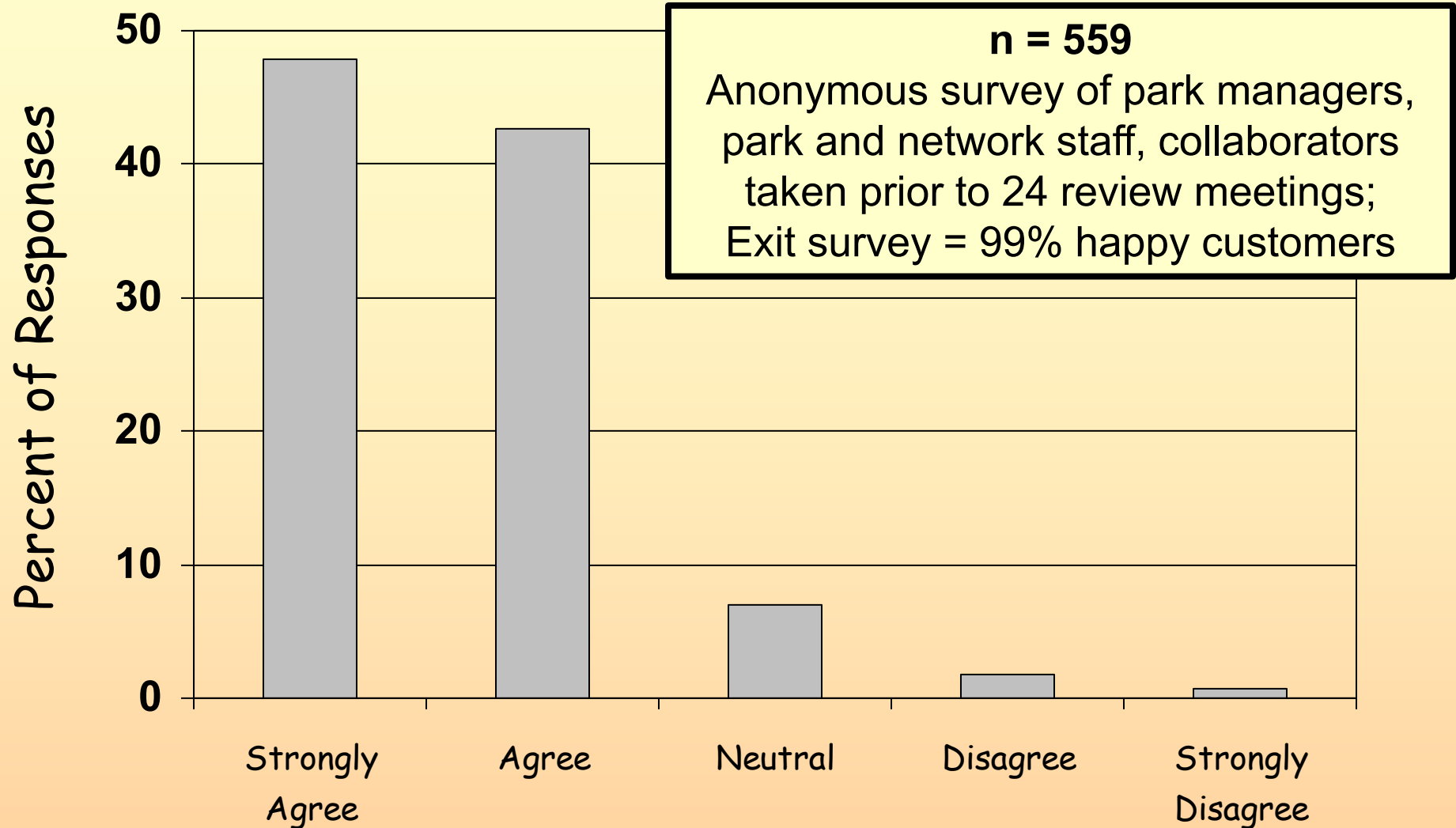


What the 32 I&M Networks provide:

- Inventory and monitoring data from “boots on the ground” data collection, analysis, and routine reporting
- Compilation, analysis, translation, and delivery of data collected by other programs and agencies (e.g., climate data, air quality, NPScape).
- Expertise: >350 scientific and technical staff, e.g., ecologists, botanists, physical scientists, data managers, science communication specialists.
- Connection/communication between land managers and scientists through network Board of Directors and Technical Advisory Committee.



Are you confident that your I&M network will deliver relevant, useful data and information that will help us to understand and manage park natural resources?



Core Duties of I&M Network Staff:



Using shared staff and funding to facilitate core inventories and do long-term monitoring of a modest set of vital signs:

1. **Determine status and trends in the condition of a few key natural resources for each park, and**
2. **Effectively deliver information to park managers, planners, interpreters, scientists, and other key audiences.**

**I&M is NOT a Stand-Alone Program
(parks wouldn't get as much if it were)**



A Logical Sequence as we integrate Scientific Data & Expertise into Park Planning and Operations:

12 Basic Natural Resource Inventories

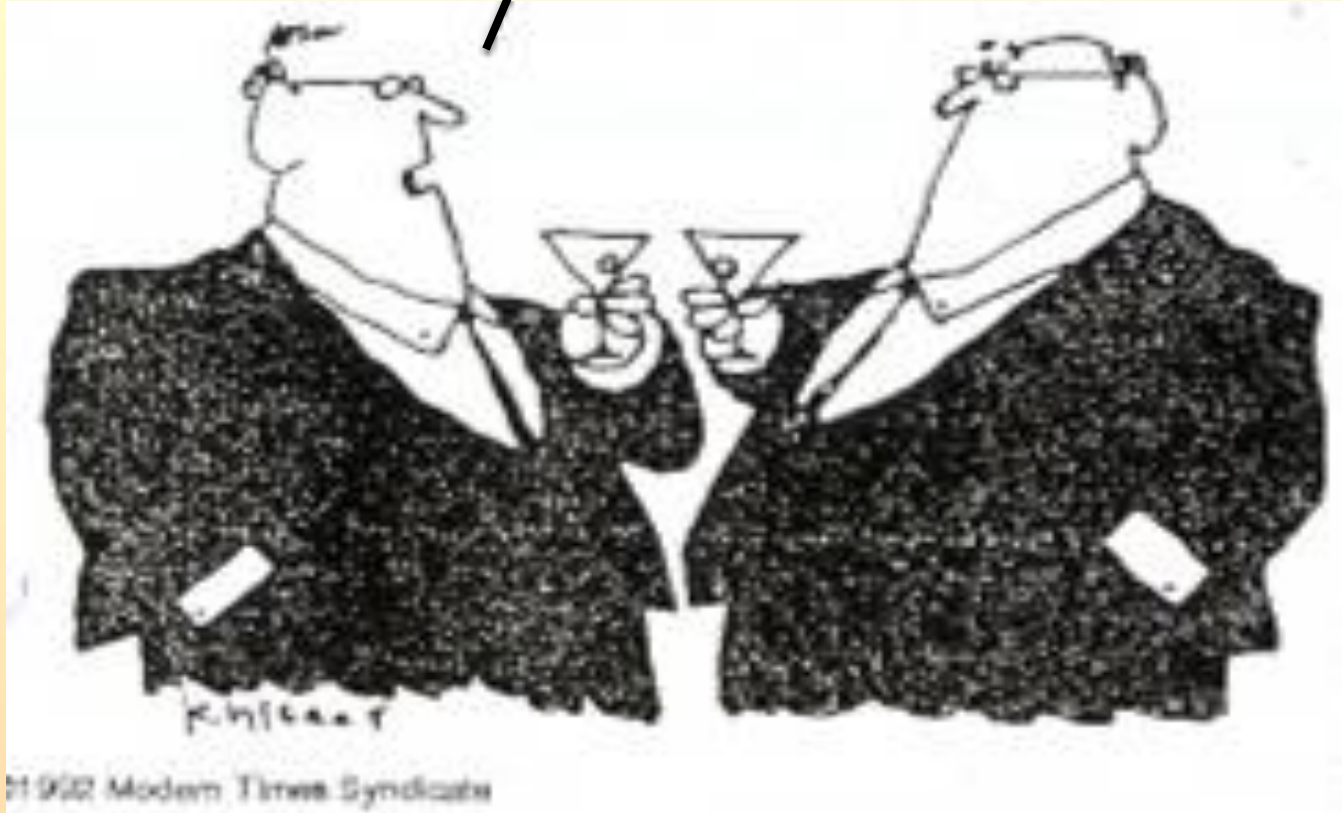
Establish Monitoring Networks; Build in-house Scientific Expertise

Natural Resource Condition Assessments

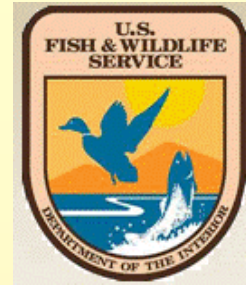
Resource Stewardship Strategy

State of the Park Report

Ecosystems... just the sound of it,
gives me the willies.



“Who is going to make sure that the protocols used and analyses completed are scientifically sound, and that the monitoring is practical for on the ground use and interpretation?”



NPS - USFWS Collaboration on I&M

“The Inventory and Monitoring program of the NWRS will look remarkably similar to the Inventory and Monitoring Program of the NPS” – Mark Chase, FWS

The FWS has co-located the national staff of their new National Wildlife Refuge System I&M Program with NPS national staff in Fort Collins, Colorado

NPS & FWS will be working closely together on inventories, monitoring, data synthesis and modeling, and integrated data system development



Yellowstone National Park

Superintendent's 2008 Report on Natural Resource Vital Signs



RARE AND SENSITIVE

Bald Eagles (YNP)

Bald eagles, which usually mate for life and may reuse a nest year after year, occupy territories near major rivers in Yellowstone and Grand Teton national parks. Juveniles migrate to warmer habitat in the fall but many adults stay year-round. Winter numbers are increased by the arrival of eagles that breed farther north. New territories in Grand Teton indicate population expansion in recent years. In 2005 a record number of nesting pairs was counted in both Yellowstone (34) and Grand Teton (14). Only 19 nesting pairs were counted in Yellowstone in 2008; however, this was considered an underestimate. Although a pair produces an average of two egg-yearlings, the number of eaglets that successfully fledge depends on weather. For example, the number of fledglings dropped in 2006 because of many nest failures that were attributed to wet weather and strong winds.

Bighorn Sheep (GYCC NYCWWG)

From the 1890s to the mid-1960s, the bighorn sheep population fluctuated between 100 and 400. The count had reached 487 in 1981, but a pinkeye epidemic caused by *Chlamydia* reduced the population by 60% the following winter. Counts did not increase significantly during the next 15 years and reached a low of 134 sheep following the severe winter of 1996–97. Since then, the overall trend has been upward to 353 sheep in 2001, but the count dropped to 7–11 lambs per 100 ewes during the winters of 1996–97 and 1997–98, but since then has fluctuated between 34 and 34 lambs per 100 ewes.

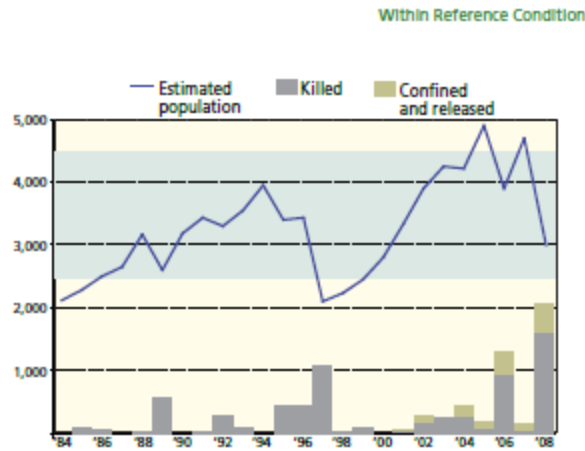
Gray Wolves (YNP)

In the first years after restoration, the wolf population increased 70% annually as the newly formed packs spread out to territories with sufficient prey, primarily elk. Official counts identified 124 wolves in 12 packs residing in Yellowstone in 2007; a 27% decrease from 2007 was likely caused by mange, dog and inter-pack fighting. It mirrors similar population declines in 1999 and 2005. The increasing mortalities from conflict and within packs and the instability of some packs may indicate that the park is reaching its ecological carrying capacity for wolves.

FOCAL RESOURCES

Bison (YNP)

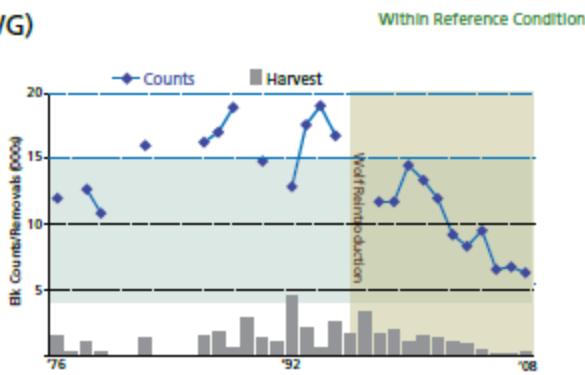
Although poaching reduced the park's bison population to less than 50 at the turn of the 20th century, it grew to more than 2,000 by the 1980s and began expanding its use of lower elevation winter range. The northern sub-population expanded westward along the Yellowstone River into the Gardiner Basin, the interior sub-population expanded into the upper Madison River Valley westward to Hebgen Lake, and part of it began migrating to the northern range. The number of mortalities that occur as part of boundary control operations near Gardiner and West Yellowstone, Montana, reflects annual fluctuations in winter bison movements out of the park. When the estimated 2007 summer population of 4,700 bison encountered a winter of heavy snowfall, hazing efforts along the north boundary became ineffective because of the large groups making repeated attempts to cross it. A total of 1,728 bison were removed from the population, including 166 that were taken by hunters outside the park and 112 calves that were sent to a quarantine project being carried out by the state of Montana and the U.S. Department of Agriculture. The bison population has fluctuated between 2,000 and 5,000 since 1980 and is currently around 3,000 animals divided evenly between the northern and central ranges of the park.



Estimated early winter bison population and boundary control operations, 1984–2008.

Elk on the northern range (GYCC NYCWWG)

Yellowstone's largest elk herd winters on range along and north of the park's Montana boundary. After decades of debate over whether this range was overgrazed by too many elk, public concern has shifted to whether wolf predation will leave too few elk. The winter elk count for the northern range, which was approximately 17,000 when wolves were reintroduced during 1995 and 1996, decreased to 11,000–12,000 in 1998 following a substantial winter-kill and hunting of >3,300 elk the preceding winter. Counts varied between 11,500 and 14,500 elk during 1999–2001, and decreased to approximately 6,200 elk during 2002–08. Predation by wolves and bears as well as hunting were the primary factors in the recent decline, though drought-related effects on pregnancy and survival contributed to an unknown extent during 1998–2004. Predictions about elk numbers range from maintenance at relatively low densities (i.e., <6,000–7,000 elk) to fluctuations around a mean of 10,000 elk with long-term oscillations.



Annual winter counts and hunting harvests of the northern elk herd in Yellowstone National Park and adjacent areas of Montana, 1976–2008, with reference condition (shaded horizontal band). Counts were not adjusted for sightability.

STRESSORS

Aquatic Nuisance Species (YNP/GRYN/GYCC)

In Yellowstone, three ANS are having a significant detrimental effect:

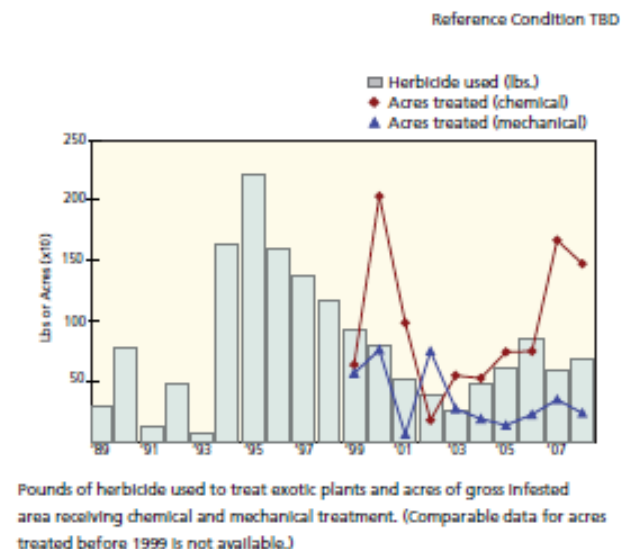
- Lake trout, illegally introduced in Yellowstone Lake where they feed on the native Yellowstone cutthroat trout. The gillnetting of almost 350,000 lake trout since 1994 has saved many more cutthroat trout and slowed the lake trout population growth, but whether this effort will keep the lake trout population suppressed remains uncertain.
- Confirmed in the park in 1998, *Myxobolus cerebralis*, a parasite that causes whirling disease in cutthroat trout and other species, appears most concentrated in the Yellowstone Lake watershed, where it has reduced the cutthroat trout in Pelican Creek. Whirling disease has also been found in the Firehole and Yellowstone rivers.
- First detected in the park in 1994, New Zealand mud snails, which form dense colonies and compete with native species, are now in all of the major watersheds.



Invasive Plants (YNP/GRYN/GYCC)

The full extent of nonnative plants in Yellowstone is not known, but the number of species that has been documented in the park has increased from 105 to 218 since 1986. (Yellowstone also has about 1,300 native plant species.) The increase in documented nonnative species is primarily a result of ongoing survey efforts, but it includes an unknown number of species that have arrived in the park during the last two decades.

Nonnative plant species in the park are prioritized according to the threat they pose to park resources and the prospects for successful treatment. Most of the 38 species targeted for treatment in 2008 (on about 1,700 acres) are listed by the states of Idaho, Montana, and/or Wyoming as "noxious weeds," which means that they are considered detrimental to agriculture, aquatic navigation, fish and wildlife, or public health. The 2008 priority list includes 10 species such as leafy spurge that infested less than one acre and can be eliminated if treated when the outbreak is still small. Some of the other targeted species such as spotted knapweed appear so frequently that stopping them from spreading is the primary goal. This strategy has helped prevent high priority invasive species from moving into backcountry areas where control is more difficult.





Yellowstone NP – Condition Summary Table

(source: Superintendent's 2008 Report on NR Vital Signs)

Resource Category	Vital Sign	Indicators	Current Condition (most recent data as of 2008)	Reference Condition (see next page for sources)	Within Reference Condition?
Landscape-scale Indicators	Air Quality	Ozone (W126) Nitrogen in precipitation Sulfur in precipitation	10.13 ppm-hr (2003–07 av.) 2.28 kg/ha/yr (2003–07 av.) 0.97 kg/ha/yr (2003–07 av.)	< 7 ppm-hr <1.4 kg/ha/yr <1 kg/ha/yr	no
	Amphibians	5-year analysis of # of sites with breeding habitat and % occupancy	TBD	TBD	TBD
	Water Quality	Temperature, dissolved oxygen, pH, specific conductance, turbidity, and total suspended solids	no exceedances	no exceedances of state standards attributed to human causes within the park	yes
Rare and Sensitive	Bald Eagles	Nesting pairs Fledglings	34 (2007 count) 26 (2007 count)	≥25 ≥15	yes
	Bighorn Sheep	Northern range winter count Lambs/100 ewes	353 34	300–500 22 (1992–2008 average)	yes
	Gray Wolves	Year-end wolf count in WY Year-end breeding pairs in WY	302 21	≥150 in WY ≥15 in WY	yes
	Grizzly Bears	Estimated GYE bear population >2-year-old female mortality	596 3.3% (2007), 9.5% (2008)	≥500 not to exceed 9% for 2 yrs	yes
	Pronghorn	Northern range spring count	290	300–600	no
	Trumpeter Swan	Resident adults summer count Nesting pairs count Fledglings count	6 2 2	≥20 (2000 baseline) ≥7 (2000 baseline) ≥2 (2000 baseline)	no
	Arctic Grayling (stream)	km of occupied historical habitat	0 km	TBD	TBD
	Westslope Cutthroat Trout (stream)	km of occupied historical habitat	<1% of 1,031 km	TBD	TBD
	Yellowstone Cutthroat Trout (lake)	Spawner count at Clear Creek	538 (2007 count)	20,000–30,000	no
	Aquatic Nuisance Species	TBD	TBD	TBD	TBD
Stressors	Invasive Plants	TBD	TBD	TBD	TBD
	Lake Trout in Yellowstone Lake	Catch per unit effort	4.63	0.5–1.0	no
	Land Use	TBD	TBD	TBD	TBD
	Mountain Goats	Estimated pop. in and near YNP	175–225	TBD	TBD
	Visitor Use	TBD	TBD	TBD	TBD
	Wildlife Diseases	TBD	TBD	TBD	TBD
Focal Resources	Bison	Estimated summer population	3,000	2,500–4,500	yes
	Elk (northern range)	Winter count	6,279	4,000–15,000	yes
	Effects of Oversnow Vehicles • air quality • soundscapes • wildlife	• West Entrance carbon monoxide; Old Faithful PM _{2.5} • % time OSVs are audible, 8AM–4PM • Movement response to OSVs	• ≤6.1 ppm; ≤9.5 PM _{2.5} (µg/m³) • 68% at Old Faithful, 53% at Madison Junction • 5 monitored species ≤23%	TBD	TBD
	Geothermal Systems	TBD	TBD	TBD	TBD
	Whitebark Pine	Blister rust infection (% of trees) Pine beetle infestation (acres)	20% (in the GYE) 29,805 (in the park)	TBD 0–36,837 (range 1983–2007)	TBD

Background color denotes the basis for the reference condition, see pg. 2.

federal and state standards or NEPA process

scientific opinion

range or average

to be determined

Greater Yellowstone Science Learning Center

CONNECTING PARKS, SCIENCE, AND PEOPLE

Topics

- BIOLOGICAL RESOURCES
- PHYSICAL RESOURCES
- LANDSCAPE PROCESSES
- HUMAN USE
- ARCHEOLOGY
- HISTORY
- ETHNOGRAPHY
- MUSEUMS & COLLECTIONS
- SCIENCE-BASED MANAGEMENT

Park Units

- BIGHORN CANYON
- GRAND TETON
- YELLOWSTONE

Get Involved

- RESEARCH
- FIELD INSTITUTES
- OUTREACH
- ABOUT US

Products

- RESOURCE BRIEFS
- ATLAS OF YELLOWSTONE
- YELLOWSTONE SCIENCE
- PHOTOS & MULTIMEDIA
- REFERENCES & LINKS
- NPS DATA STORE
- BOOKS MAPS & DVDS

Welcome



The Greater Yellowstone Science Learning Center is a portal to information about the natural and cultural resources of **Yellowstone** and **Grand Teton** (including John D. Rockefeller, Jr. Memorial Parkway) national parks and **Bighorn Canyon** National Recreation Area. By reporting on what has been learned from research and monitoring in these parks, we hope to increase public awareness of new findings and encourage studies that will help guide park management decisions. The National Park Service has set up **Research Learning Centers** as public-private partnerships that promote the sharing of scientific knowledge about the parks.

<http://www.greateryellowstonescience.org>

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*



NAPA Review of NR Directorate:



- Focused significantly on the I&M Program “because it is by far the Directorate’s largest program in dollar terms.”
- “NRSS is a highly regarded organization recognized across NPS as providing significant value as a source of independent, credible scientific expertise and technical information”.
- Some of the top ideas identified in NAPA's "online forum":
 - Expand the I&M inventory phase;
 - Build on and strengthen I&M networks;
 - Increase I&M’s role in climate change;
 - Maintain and improve comprehensive planning and monitoring efforts in the parks.
- Develop a framework with a small set of indicators to increase the public’s knowledge about the condition of natural resources in their national parks.



National Leadership Council consensus, February 2010:

“Bring a "State of the Park" reporting function back to NPS, learn from the Parks Canada model to step up and synthesize our monitoring efforts, and determine how to best meld those efforts with management plans”.

Recommendation from NAPA Review of NRSS, 2010:

“Develop a framework with a small set of indicators to increase the public’s knowledge about the condition of natural resources in their national parks”.



State of the Park Report

- Primarily a communication tool for each park to tell park visitors, the general public, park staff, Congress, others “how the park is doing” relative to the overarching management goal to maintain or improve condition of park resources & values.
- Provides a snapshot of the status & trend in the condition of selected park resources and values.
- Highlight park accomplishments to maintain or improve the state of the park since the last report.
- Sections summarizing: Natural Resources, Cultural Resources, Visitor Experience, Park Infrastructure









Inventory and Monitoring Program
Natural Resource Stewardship and Science












State of the Park Report Cabrillo National Monument

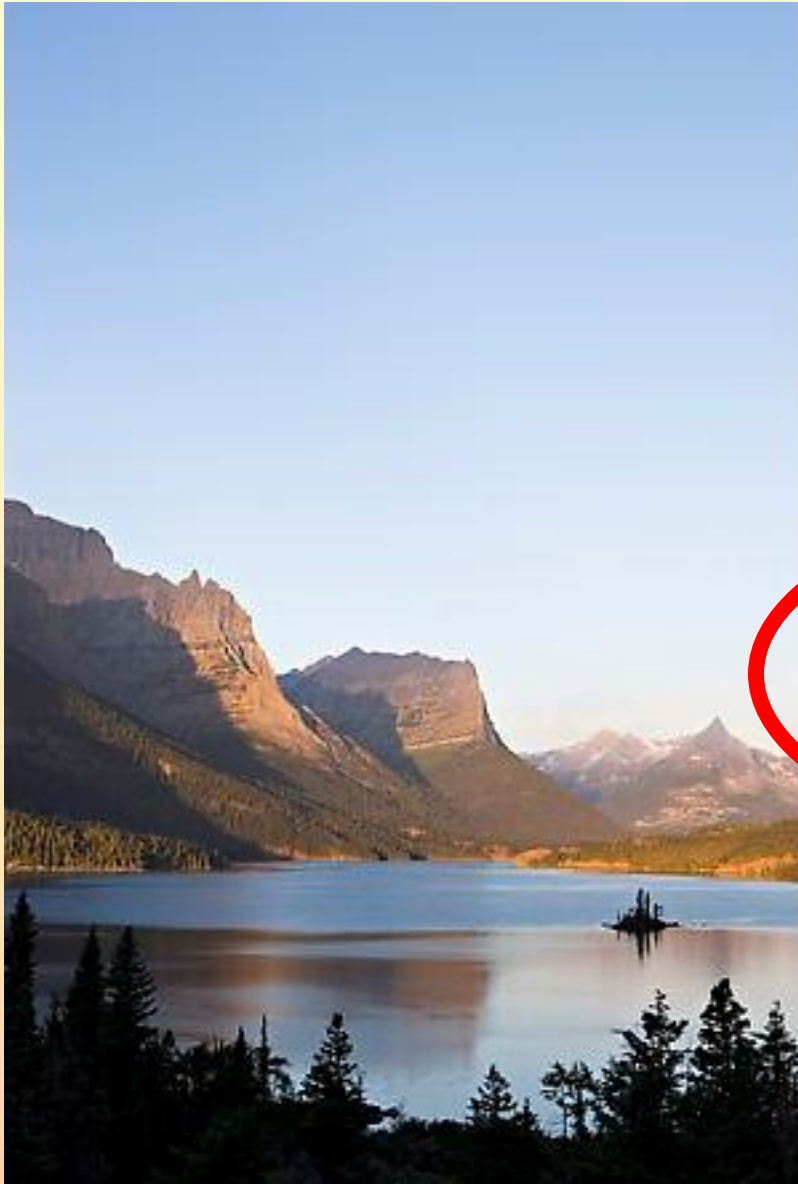
San Diego, California



Resource or Value	Condition Status/Trend	Rationale
Natural Resources		
Marine Water Quality		Extensive water quality monitoring of an adjacent waste water treatment plant suggests effluent does not reach Cabrillo. Several potential sources of pollution exist nearby in heavily urbanized San Diego Bay. Water quality from the bay seems acceptable.
Rocky Intertidal Communities		More than 100,000 people visit the rocky intertidal at Cabrillo annually. Black abalone and ochre seastars remain extirpated from the park. Mussels crashed in early 1990's and have not returned. The size of giant owl limpets has shown a slow, steady and significant decline for unknown reasons. Kelp and surf grass along with some other important organisms remain healthy.
Native Plant Communities		Mediterranean type ecosystem is the rarest in the world. Native plant populations have been increasing but are relatively small and isolated from other populations by urbanization. Some are very rare and threats from invasive species remain.
Invasive Plant Species		1 acre of invasive plants was removed last year. About 20 acres remain and have the constant potential to expand rapidly. Populations are at manageable levels, but funding and staffing uncertain.
Endangered/Threatened Plants and Animals		Populations of 5 federal or state listed threatened plant species remain stable, but their largest populations are within or immediately adjacent to Cabrillo and remain isolated due to urbanization. Low numbers mean a fire or disease could wipe them out suddenly.
Amphibians and Reptiles		Current species are stable and rare species have recently been sighted. However, 5 species remain extirpated and will probably require reintroductions by humans.
Cultural Resources		
Historic Structures		Of the 38 structures on the park's List of Classified Structures, 26 are in good condition, 10 in fair condition, and 2 are in poor condition. Only 1 of 5 detailed building condition inventories needed is complete.
Museum Objects		Good progress in cataloging museum collections since 2007. 99.86% of 82,486 items cataloged. 76.58% of applicable standards have been

Cultural Resources		
Historic Structures		Of the 38 structures on the park's List of Classified Structures, 26 are in good condition, 10 in fair condition, and 2 are in poor condition. Only 1 of 5 detailed building condition inventories needed is complete.
Museum Objects		Good progress in cataloging museum collections since 2007. 99.86% of 82,496 items cataloged. 76.58% of applicable standards have been met.
Visitor Experience		
Number of Visitors		The 767,687 visitors to the park in 2009 was 3.5% below the 5-year average of 795,914 visitors for 2004-2009.
Visitor Satisfaction		The 5-year average for visitor satisfaction was 97.8% for 2004-2009.
Park Infrastructure		
Facility Condition Index (FCI)		FCI measures the condition of physical infrastructure as a ratio of Deferred Maintenance costs divided by Current Replacement Value. DM decreased approximately 10%.
Critical Systems Condition Index		Measures the condition of the critical systems of the physical infrastructure. Deferred maintenance costs for critical systems increased by \$58,700 between 2009 and 2010, but the overall condition index is low.
Energy Usage [BTU/GSF]		Measure of the energy intensity at the park for buildings from the annual energy report. A 1.8% energy reduction was observed between 2008 and 2009, but this is less than the 3% required by EISA 2007.
Component Renewal and Recurring Maintenance Funded		Measures how much of the component renewal of infrastructure is funded. On average 70% of CABR cyclic need was funded in the last 3 years.
Park Carbon Footprint		The largest greenhouse gases emission sector for Cabrillo National Monument is transportation, totaling 194 metric tons of CO2 equivalent. The park currently has nine electric vehicles in use within the monument and plans to purchase at least two more.

Core Duties of I&M Network Staff:



Using shared staff and funding to facilitate core inventories and do long-term monitoring of a modest set of vital signs:

1. Determine status and trends in the condition of a few key natural resources for each park, and
2. Effectively deliver information to park managers, planners, interpreters, scientists, and other key audiences.

I&M is NOT a Stand-Alone Program
(parks wouldn't get as much if it were)

*Effective
communication*

Public Environment

Resource Briefs
Condition Summary Tables
State of the Park Report

Models,
Synthesis Reports,
Assessment Reports,
Integrated GIS Analyses

Data Summaries,
Technical Reports, Maps,
Trend Analyses,
Processed Data

Science Environment

*Sound
Science*

Databases, GIS Products, Spreadsheets
Metadata, Catalogs, NPS Data Store

Policy makers,
Non-Scientists



Partnerships with
others to help
communicate
scientific findings
to the public and
for policy and
decision-making

Scientists,
Field-level
Practitioners

I&M Network Staff need to develop and deliver products to parks at all levels of the pyramid; set aside adequate time and funding to make sure we provide park managers and planners with information, not just data.



Google™ Custom Search

Search This Site

Nature & Science

I & M Home

Explore This Network:

- MIDN Home
- About This Network »
- Inventories »
- Monitoring »
- Data Management
- Reports
- Outreach
- AT Photo Galleries
- MIDN Intranet (NPS only)
- MIDN Sharepoint (NPS only)

Monitoring Protocols:

- Air Quality
- Aquatic Macroinvertebrates
- Breeding Birds
- Fish Populations
- Forest Vegetation
- Water Quality and Quantity
- Weather and Climate
- White-Tailed Deer



Mid-Atlantic
Inventory & Monitoring
Network

NPS » Nature & Science » Inventory & Monitoring » Networks » Mid-Atlantic Network

Mid-Atlantic Network
Inventory and Monitoring Program

The Mid-Atlantic Network Inventory and Monitoring Program is part of an effort in the National Park Service to develop a stronger scientific basis for stewardship and management of natural resources across the National Park System.

The National Park Service Inventory and Monitoring Program was initiated in 1992 with a focus on completion of basic resource inventories for all parks with significant natural resources, and development of prototype monitoring programs in selected parks and park clusters.

The next step in program development came with the authorization of the National Parks Omnibus Management Act of 1998 that mandated the National Park Service “to establish baseline (resource) information and to provide information on the long-term trends in the condition of National Park System resources.” In response to this mandate, the National Park Service developed the Natural Resource Challenge – An Action Plan for Preserving Natural Resources. Under the Challenge, 32 networks of parks have been organized to support the development of

Parks in this Network

Please select a park

Click map for larger view

Quick Links

3 Year Review Meeting NEW!

Air Quality Resource Brief: 1999-2008 (540kb) NEW!

Weather and Climate Resource Brief: 2009 Results (787kb) NEW!

Breeding Birds 2009 Annual Report (2.0mb) NEW!

MIDN Monitoring Plan (9.5mb)

MIDN Data Management Plan (3.7mb)



Inventory & Monitoring Intranet

[InsideNPS](#) | [NRSS/NRPC directory](#) | [NR Intranet Home](#) | [phonebook](#)

[InsideNPS](#) » [NRSS](#) » [Inventory & Monitoring](#) » [Mid-Atlantic Network](#)

Mid-Atlantic Network

Inside NPS

[I&M Internet](#)

[Network Intranets](#)

Explore This Network

[MIDN Internet](#)

[Internal Reports & Meetings](#)

[Inventories \(internet\)](#)

[Monitoring \(internet\)](#)

[Contacts](#)

Vital Signs

[Air Quality \(internet\)](#)

[Aquatic Macroinvertebrates \(internet\)](#)

[Forest Vegetation \(internet\)](#)

[Water Quality \(internet\)](#)

[Weather and Climate \(internet\)](#)

Background

The **Inventory and Monitoring Program** is a major component of the National Park Service's strategy to improve park management through greater reliance on scientific information. Nationwide, 270 national parks have been grouped into 32 Vital Signs Networks linked by geographic similarities, common natural resources, and resource protection challenges. The network approach facilitates collaboration, information sharing, and economies of scale in natural resource monitoring. The Mid-Atlantic Network encompasses 10 park units in Pennsylvania and Virginia.

The goals of Inventory and Monitoring networks are:

- inventory the natural resources and park ecosystems under National Park Service stewardship to determine their nature and status;
- monitor park ecosystems to better understand their dynamic nature and condition, and to provide reference points for comparisons with other, altered environments;
- establish natural resource inventory and monitoring as a standard practice throughout the National Park system;
- integrate natural resource inventory and monitoring information into National Park Service planning, management, and decision making;
- share accomplishments and information with others and form partnerships for reaching common goals and objectives.

Parks in this Network

Please select a park



[Mid-Atlantic Network Map](#)

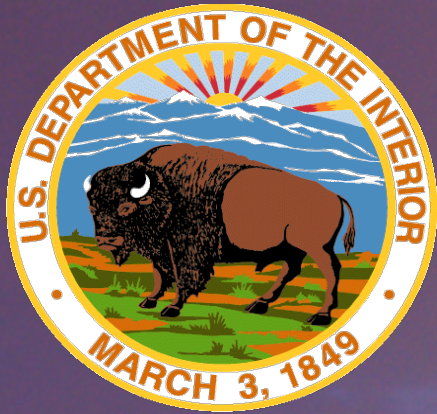
[National I & M Map](#)

Quick Links

[MIDN Fall 2009 Newsletter \(951kb\)](#)

[MIDN Monitoring Plan \(9.9mb\)](#)

[MIDN Data Management Plan \(3.7mb\)](#)



DOI Climate Change Task Force Data System Design Team

"Addressing climate change impacts will require a monumental effort by DOI"

"The data piece is probably the most important component of all of this"

David Hayes, Deputy Secretary of the Interior



Internal version: http://nrinfo

Natural Resource Information Portal

National Park Service
U.S. Department of the Interior

Natural Resource Program Center



[Home](#) [References](#) [Biology](#) [Geospatial](#) [Air & Climate](#) [Geology & Soils](#) [Water](#) [Landscapes](#) [Human Use](#) [Tools](#)



Welcome

Welcome to the Natural Resource Information Portal

To get started, click on one of the subject tabs above, or use the quick navigation below. Full access to data is available to NPS users accessing this site from their NPS domain network. A limited number of records are currently publicly available; however, this number will be steadily increasing.

Quick Navigation

[Search](#) for documents and datasets

[Search](#) for a Park-Species list

[Geographic search](#) for documents, datasets, and species lists



NRInfo News

- [NRInfo Portal weekly webinars](#)
- [About the NRInfo Portal](#)

- DOI asking us to build system for entire Department of Interior
- NPS internal and public versions now available
- Additional functionality and data added every few months
- Two Legacy I&M systems now retired; legacy NPSpecies retires this month
- More than 600,000 records available in system

Public Version: <http://nrinfo.nps.gov>

Natural Resource Information Portal

National Park Service
U.S. Department of the Interior

Natural Resource Program Center



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Welcome: Guest

Welcome

Welcome to the Natural Resource Information Portal

To get started, click on one of the subject tabs above, or use the quick navigation below. Full access to data is available to NPS users accessing this site from their NPS domain network. A limited number of records are currently publicly available; however, this number will be steadily increasing.

Quick Navigation

[Search](#) for documents and datasets

[Geographic search](#) for documents and datasets

NRInfo News

- [About the NRInfo Portal](#)

Best viewed in Internet Explorer

NRPC Internet

- Public (internet) version now available
- Non-sensitive data that was previously available through NPS Data Store plus NPScape files for each park available for partners
- Additional files undergoing review for sensitivity and quality before release
- Species information to be publically available by Summer 2011



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Search

Search » Results

Search Results

http://nrinfo



▲ Search Criteria Definition

Search Type: Quick
Reference Type: Document, Journal Article, Thesis, Book, Book Chapter, Conference Proceeding, Report, Map, Dataset, Multimedia, Picture, Movie, Collection
Data Source: All
Units
Containing: climate inventory

Download Options:

Text



Download...

Results

Type	Display Citation	Attached File	Attac
Report	Davey, C. A., K. T. Redmond and D. B. Simeral. 2006. Weather and Climate Inve...	2006_10_18_ncrninventory_final.pdf (0.87 Mb)	F
Report	Davey, C. A., K. T. Redmond and D. B. Simeral. 2006. Weather and climate inve...	2006_08_11_pacninventory_final.pdf (2.49 Mb)	F
Report	Davey, C. A., K. T. Redmond and D. B. Simeral. 2006. Weather and Climate Inve...	2006_09_11_ermninventory_final.pdf (2.24 Mb)	F
Report	Redmond, K. T. and D. B. Simeral. 2006. Weather and Climate Inventory, Nationa...	2006004_Redmond_CAKN_WeatherInventory...	F
Report	Davey, C. A., K. T. Redmond and D. B. Simeral. 2006. Weather and climate inve...	2006_08_07_ncpninventory_final.pdf (18.15 ...	F
Report	Davey, C. A., K. T. Redmond and D. B. Simeral. 2006. Weather and Climate Inve...	2006_09_21_ncbninventory_final.pdf (1.86 Mb)	F
Report	Davey, C. A., K. T. Redmond and D. B. Simeral. 2006. Weather and Climate Inve...	2006_11_27_ucbninventory_final.pdf (2.65 Mb)	F



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Reference Summary

Information current as of 2/25/2010

Davey, C. A., K. T. Redmond and D. B. Simeral. 2006. Weather and Climate Inventory, National Park Service, National Capital Region Network. National Park Service, Fort Collins, CO. NPS/NCRN/NRTR—2006/009

Report

Legacy System: NatureBib

Legacy ID: 643918

▲ Content Description

Climate drives many of the environmental processes in the park units of the National Capital Region Inventory and Monitoring Network (NCRN). Climate variations are responsible for short and long-term changes in ecosystem fluxes of energy and matter and they have profound effects on underlying biogeochemical processes. Future changes in climate will, in turn, have tremendous impacts on these processes. Monitoring climate facilitates interpretation of other vital sign measurements. The responses of the NCRN landscape to these climate variations highlight the region's sensitivity to possible future climate changes. Climate changes could also adversely affect the important cultural resources protected by NCRN park units. For these reasons, climate was identified as a high-priority vital sign for NCRN and climate is one of the 12 basic inventories to be completed for all Inventory and Monitoring Parks. Because of the importance of climate to almost every aspect of both ecology and park management, this project was initiated to inventory past and present climate monitoring efforts. The primary objective of climate and weather monitoring for the NCRN is to provide monthly and annual summaries of climate data, including precipitation and



Weather and Climate Inventory National Park Service National Capital Region Network

Natural Resource Technical Report NPS/NCRN/NRTR—2006/009



NRInfo Technology and Standards



- NRInfo is based on web services and common data exchange standards.
- The approach is based on widely-used industry standards.
- The approach is the OMB and DOI standard promoted for all federal agencies.
- Technology and standards allow us to integrate and share data among data systems.
 - Within NRSS and CRSS
 - Within NPS
 - With external partners and data sources
 - Data and documents application being set up for USFWS national wildlife refuge system.

Data Sharing and Integration – You don't need to use the web portal (this is the real power of our approach)

REST-style Searches (representational state transfer)

Example: link to fetch data and documents on elk in ROMO:

<http://services.nrinform.gov/reference/reference/list/romo/elk>

bibe/vegetation
sodn/water
arcn/permafrost

Embedding REST calls

nps.gov
(home)

☒ Search this park

☐ Search nps.gov

PARK HOME

PLAN YOUR VISIT

PHOTOS & MULTIMEDIA

HISTORY & CULTURE

NATURE & SCIENCE

Animals

Birds

Fish

Mammals

Beaver

Bighorn Sheep

Black Bear

Coyote

Elk

Marmot

Moose

Mountain Lion

Mule Deer

Pika

Snoeshoe Hare

Squirrels and Chipmunks

Amphibians and Reptiles

Butterflies

Insects

Rocky Mountain

National Park

view map

text size

Elk



NPS PHOTO
Bull Elk

North American elk, one of the Rocky Mountain National Park's most iconic mammals, have been intensively hunted since Americans settled the area. By 1890 few elk remained in the park. In 1913 and 1914, before the park was established, the Estes Valley United States Forest Service and Yellowstone National Park were the same time, an all-out effort to protect the elk from predators — including bears. The resulting decline hastened the recovery of Rocky's elk population.

Currently, the elk population in the park fluctuates dramatically from 3,200 elk in summer to 1,000 during winter. Concentrations of 3,200 elk in summer may dwindle to 1,000 during winter elevations and move to areas outside the park.

Accelerating development along the park boundary is diminishing opportunities for traditional migration routes, thus decreasing winter forage and habitat.

Elk research

Report	Andrews, T. 1991. A survey of Rocky Mountain National Park and surrounding areas of Arapaho and Roosevelt National Forests for wolverine and lynx, winter 1990-1991.
Conference Proceeding	Armstrong, D. M. 1985. Effects of the Lawn Lake flood on the local distribution of mammals. 56th Annual Meeting, Colorado-Wyoming Academy of Science. University of Denver, Center for Interdisciplinary Studies and University Museum, University of Colorado, Boulder, CO April 27, 1985.
Report	Armstrong, D. M. 1985. Effects of the Lawn Lake Flood on the local distribution of mammals: second annual report. Center for Interdisciplinary Studies and University Museum, University of Colorado-Boulder, Boulder, CO.
Report	Armstrong, D. M. 1986. A three-year study of the effects of the Lawn Lake Flood on the local distribution of mammals. Natural Science Program & University Museum, University of Colorado, Boulder, CO.
Report	Armstrong, D. M. 1988. The effects of the Lawn Lake Flood on the local distribution and abundance of mammals. Natural Science Program & University Museum, University of Colorado, Boulder, CO.
Journal Article	Baker, B. W. 2003. Beaver (<i>Castor canadensis</i>) in heavily browsed environments. <i>Lutra</i> . 46:173 - 181
Report	Baker, B. W., D. C. S. Mitchell, H. C. Ducharme, T. R. Stanley and H. R. Peinetti. n.d. Why aren't there more beaver in Rocky Mountain National Park?
Report	Baker, B. W., D. Cooper, C. Westbrook, K. Czarnowski, T. Johnson, R. Monello, H. R. Peinetti, T. Stanley and D. Mitchell. 2005. Declining beaver populations in Rocky Mountain National Park. <i>FORT</i> , Fort Collins, Colo. NRPP 99-04 (ROMO)
Report	Baker, B. W., H. C. Ducharme, D. C. S. Mitchell, T. R. Stanley and H. R. Peinetti. 2003. Interaction of beaver and elk herbivory suppresses standing crop in willow.
Report	Baker, B. W., H. C. Ducharme, D. S. Mitchell, T. R. Stanley and H. R. Peinetti. 2003. Interaction of beaver and elk herbivory suppresses compensatory growth in willow.
Report	Baker, B. W., H. R. Peinetti and M. B. Coughenour. 2005. Resilience of willow stems after release from intense elk browsing.
Journal Article	Baker, D. L. and N. T. Hobbs. 1982. Composition and Quality of Elk Summer Diets in Colorado. <i>Journal of Wildlife Management</i> . 46:694-703.
Report	Bender, L. C. and J. G. Cook. 2002. Condition and health of elk (<i>Cervus elaphus nelsoni</i>) in Rocky Mountain National Park with reference to elk-carrying capacity relations.
Journal Article	Bender, L. C. and J. G. Cook. 2005. NUTRITIONAL CONDITION OF ELK IN ROCKY MOUNTAIN NATIONAL PARK. <i>Western North American Naturalist</i> . 65:329 - 334
Thesis	Buttery, R. F. 1955. Range conditions and trends resulting from winter concentrations of elk in Rocky Mountain National Park. Thesis. Colorado State University, Fort Collins, CO Thesis.

Search code can be embedded in web pages; search is dynamically executed each time

"The 32 I&M networks are designing a system for scientific data collection, analysis, and reporting that is unprecedented in the history of the National Park Service"

Purpose of this Review

