

**Glen Canyon Dam Adaptive Management Work Group**  
**Agenda Item Information**  
**September 9-10, 2008**

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Agenda Item

National Park Service Resource Challenge

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Action Requested

√ Information item only. We will answer questions but no action is requested.

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Presenter

Steve Martin, Superintendent, Grand Canyon National Park

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Previous Action Taken

N/A

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Relevant Science

N/A

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Background Information

The National Park Service Resource Challenge (<http://www.nature.nps.gov/challenge/>) is an internal NPS program that has invested tens of millions of dollars in developing inventory and monitoring programs throughout the Service. The intent of the program is to be thoughtful about both what is being inventoried and monitored and how it is accomplished across the country. The purpose is to give the managers better tools for preserving the resource.

Superintendent Steve Martin will provide an overview of the program to AMWG members so they will have a better understanding of National Park Service (and Grand Canyon National Park) background and proficiency in both inventory and monitoring. He will discuss future opportunities for the park to assume some of the monitoring responsibility of the AMP where it overlaps with existing NPS Inventory and Monitoring programs. Benefits of such an arrangement could include saving AMP program dollars, increased efficiency and effectiveness, enhancing the amount of data available to the program, and providing integrated resource-based information for adaptive management decisions.

# Grand Canyon

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National Park Service

Grand Canyon National Park



“The Secretary has an absolute duty, which is not to be compromised, to fulfill the mandate of the NPS Organic Act of 1916 to take whatever actions and seek whatever relief as will safeguard the units of the national park system.”

*Steve Martin, Superintendent  
Grand Canyon National Park  
September 2008*

# Grand Canyon

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## National Parks Omnibus Management Act of 1998

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EXPERIENCE  
YOUR  
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“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.”

“The Secretary shall ... assure the full and proper utilization of the results of scientific studies for park management decisions.”



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## NPS Advisory Board Report:

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“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

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## 2006 NPS Management Policies

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The Service will:

- **identify, acquire, and interpret needed inventory, monitoring, and research**, including applicable traditional knowledge, to obtain information and data that will help park managers accomplish park management objectives provided for in law and planning documents;
- **define, assemble, and synthesize** comprehensive baseline inventory data describing the natural resources ... and identify processes that influence them;
- **use qualitative and quantitative techniques to monitor** key aspects of resources and processes at regular intervals;
- **analyze the resulting information to detect or predict changes** that may require management intervention and provide reference points for comparison;
- **use the resulting information** to maintain – and where necessary restore – the integrity of natural systems

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The National Park Service

## Inventory & Monitoring

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**Provide funding and technical support to parks with significant natural resources**

**LONG-TERM GOAL:** Implement ecological monitoring in all units of the NPS.

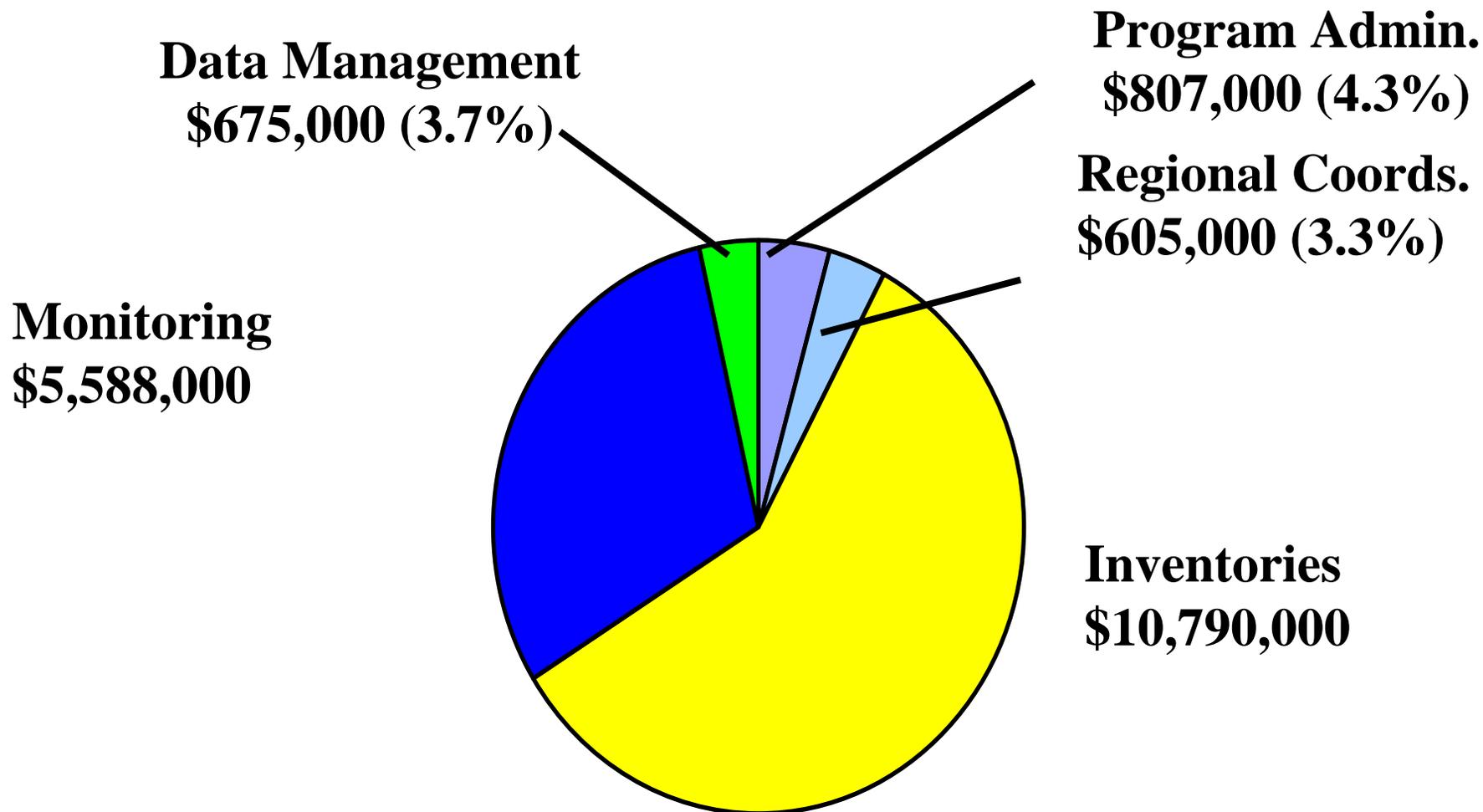
**SHORT-TERM GOALS (as of 1992):**

1. Complete baseline resource inventories.
2. Learn how to design and conduct monitoring programs.

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## FY 2001 I&M Program Expenditures



## 12 Basic Natural Resource Inventory Datasets

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Natural resource bibliography

### **Base cartographic data**

Geology map

Soils map

### **Weather data**

Air quality

Location of air quality monitoring stations

Water body location and classification

### **Water quality data**

### **Vegetation map**

**Species list of vertebrates and vascular plants**

**Species distribution and status of vertebrates and vascular plants of high priority to each park**

*Integrate data sets and make them more available to managers using GIS Theme Manager.*

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**270 Parks Grouped into  
32 Monitoring Networks**

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## PARK VITAL SIGNS MONITORING

*Taking the pulse of the national parks*

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- **1991 - NPS develops a comprehensive strategy based upon the “Vail Agenda”**
- **1992 - Inventory and Monitoring Committee’s Developed for each Region**
- **1993 - Program Design Begins with Prototypes established for:**
  - **Channel Islands National Park**
  - **Great Smoky Mountains National Park**
  - **Shenandoah National Park**
  - **Cape Cod National Seashore**
  - **Denali National Park**
  - **Great Plains Prairie Cluster**
  - **Virgin Islands/Southern Florida Cluster**
  - **Olympic National Park**
  - **North Cascades National Park Service Complex**
  - **Mammoth Cave National Park**
  - **Northern Colorado Plateau Cluster**
- **2002 – Vital Signs Monitoring Programs Implemented across the NPS**



## PARK VITAL SIGNS MONITORING WILL

“Focus on most significant indicators of long-term ecological trends and highest concerns among the parks in each network”

- Enable managers to make better informed management decisions;
- Provide early warning of abnormal conditions in time to develop effective mitigation measures;
- Provide data to convince other agencies and individuals to make decisions benefiting parks;
- Satisfy certain legal mandates;
- Provide a means of tracking resource condition and measuring performance.



## Core Vital Signs Organized within the NPS Ecological Monitoring Framework

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LEVEL 1	LEVEL 2	VITAL SIGN
Air and Climate	Air Quality	Air quality
	Weather and Climate	Climate conditions and soil moisture
Geology and Soils	Soil Quality	Soil stability and upland hydrologic function
	Geomorphology	Channel morphology
Water	Hydrology	Depth to groundwater
		Stream flow
	Water Quality	Water quality of streams and springs
		Aquatic macroinvertebrates
Biological Integrity	Focal Species or Communities	Spring, seep, and tinaja ecosystems
		Vegetation composition and structure (upland & riparian)
		Habitat-based bird communities
	Invasive Species	Ground-dwelling arthropods
		Invasive non-native plants
		Land use/land cover and landscape vegetation pattern
Ecosystem Pattern and Processes	Land Cover / Land Use	
	Fire	Vegetation condition and disturbance patterns
	Soundscape	Natural soundscape condition
	Viewscape	Night sky condition

# Grand Canyon

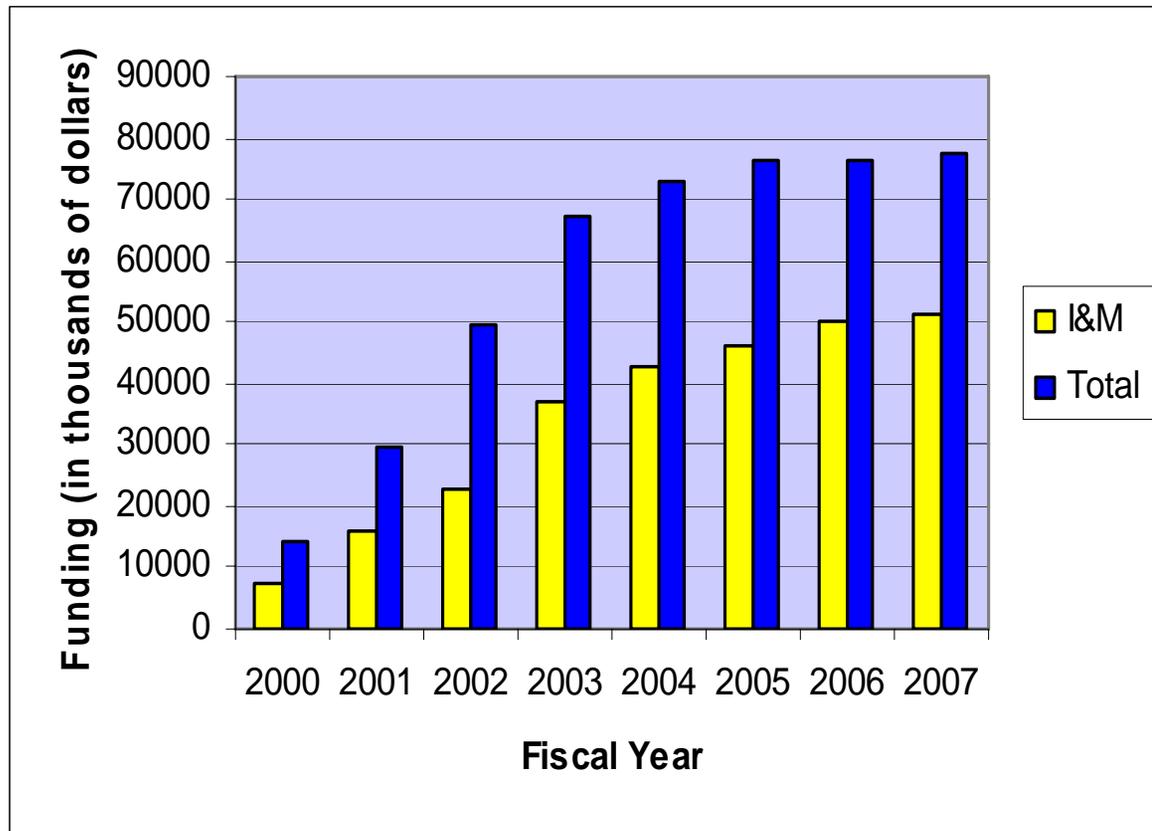
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Grand Canyon National Park



## Natural Resource Challenge Funding History

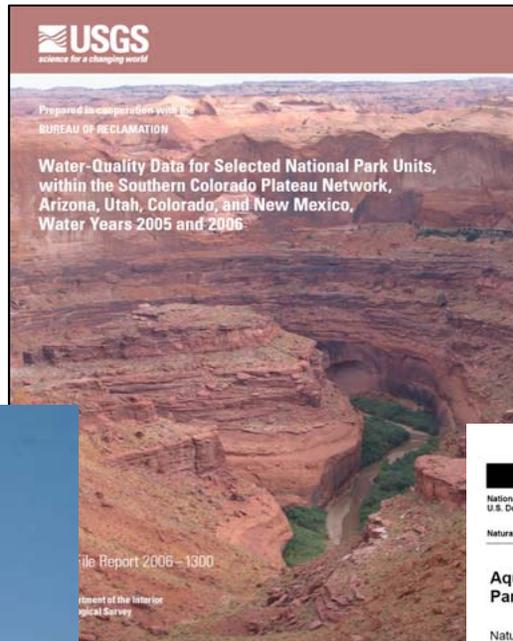
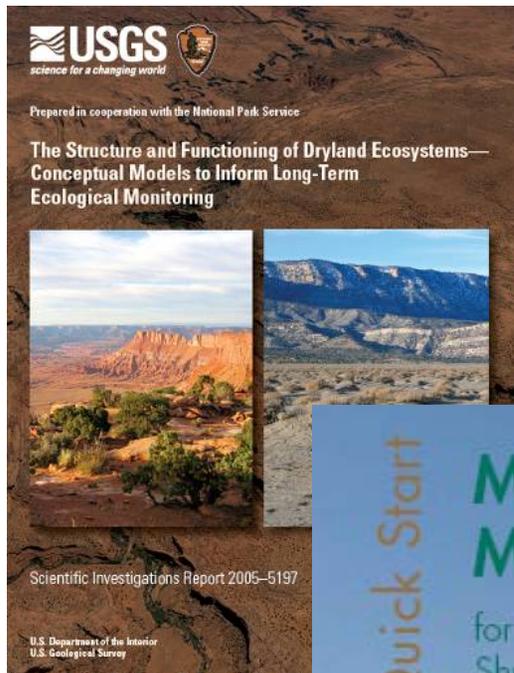
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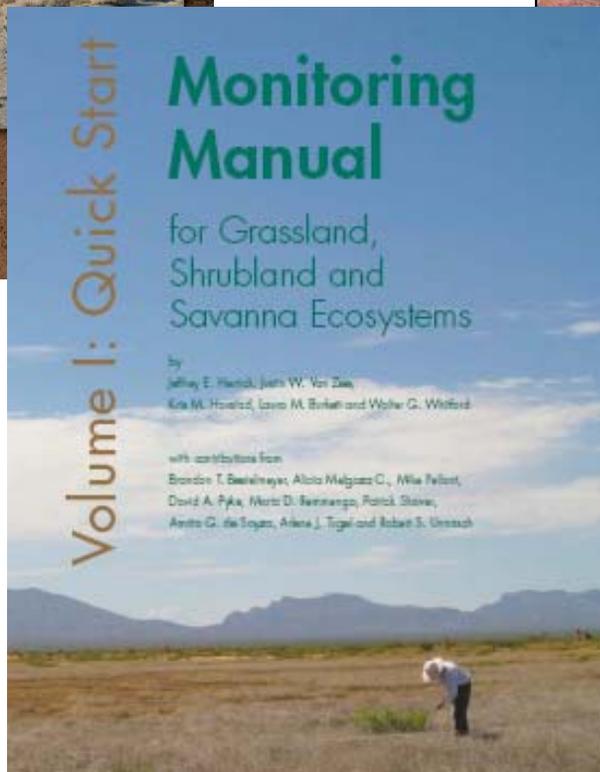
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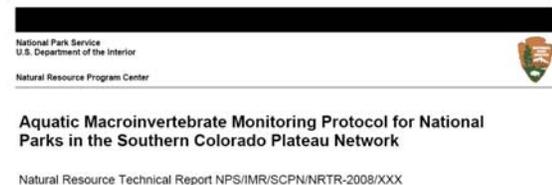
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NPS, USGS,  
FWS, Tribes  
& Cooperators  
together



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*“The National Park Service will protect, preserve, and foster appreciation of the cultural resources in its custody and demonstrate its respect for the peoples traditionally associated with those resources through appropriate programs of research, planning, and stewardship.” (Management Policies 2006)*

“The National Park Service will conduct a coordinated program of basic and applied research to support planning for and management of park cultural resources” (NPS Management Policies 2006)

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## National Historic Preservation Act of 1966 (as amended)

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“Section 110 of the National Historic Preservation Act requires park managers, in consultation with their SHPO’s, to establish programs to locate, inventory, and nominate to the National Register of Historic Places all properties that appear to qualify.”  
For archaeological resources, the Service’s systemwide archaeological inventory program establishes requirements, standards and priorities ...” (NPS 28)

“The effects of natural processes and human activities on archaeological resources are assessed and documented. A schedule to monitor the condition of affected resources is established and implemented.” (NPS-28)

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The Service's cultural resource management program involves

- **research** to identify, evaluate, document, register, and establish basic information about cultural resources and traditionally associated peoples;
- **planning** to ensure that management processes for making decisions and setting priorities integrate information about cultural resources and provide for consultation and collaboration with outside entities; and
- **stewardship** to ensure that cultural resources are preserved and protected, receive appropriate treatments (including maintenance) to achieve desired conditions, and are made available for public understanding and enjoyment.



## Basic Cultural Resource Inventory Datasets

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### **Servicewide Inventories and Databases**

- ❖ Cultural Landscape Inventory
- ❖ Cultural Sites Inventory –Archeology and Ethnography
  - Systemwide Archaeological Inventory Program
  - Archaeological Sites Management and Information System
  - Ethnographic Resource Inventory
- ❖ List of Classified Structures
- ❖ National Catalog of Museum Objects
- ❖ National Register of Historic Places

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Grand Canyon National Park



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**Inventory Total = 5.5% of the Park (65,176 acres)**

**Number of Sites Recorded = ~ 4300**

**Estimated Number of Sites in Park = 50,000**

**On-going program of data collection and documentation to support inventory, assessment, monitoring, and mitigation.**



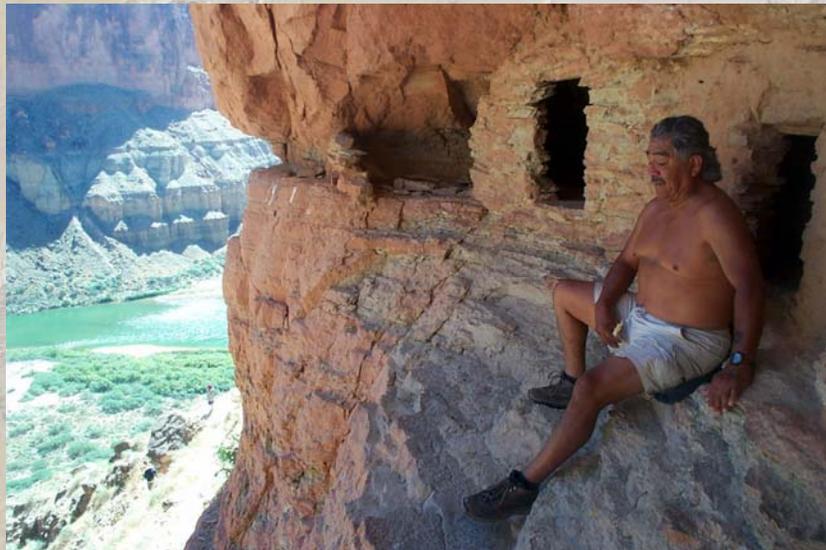
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Grand Canyon National Park



## Integration of Tribal Perspectives And Values into NPS Management





## VANISHING TREASURES: Managing architecture through preservation

Nowhere else in North America can you find such well preserved examples of ancient and historic architecture than in the arid Southwest. As a Vanishing Treasures park, Grand Canyon manages architectural remains through a program of preservation involving research, documentation and fabric treatment.

### Architecture as Artifact

is the concept that architectural remains provide tangible links to a rich cultural history that spans thousands of years. Architecture is cared for and treated like irreplaceable artifacts. Archaeologists at Grand Canyon are fortunate to work with a wide variety of architecture.



Taysan Ruin



Beamers Cabin



Sweatlodge



Nankoweap granaries

The Vanishing Treasures Program  
In 1997, the National Park Service envisioned an architecture preservation program that would provide funding for emergency stabilization projects and promote professional careers in archaeology.

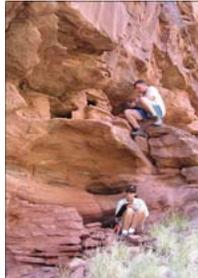
### Specialized Fields

- Archaeologists: research, documentation and treatment
- Exhibit specialists: documentation and conservation
- Masonry workers: test and apply preservation materials
- Structural engineer: maintenance of building systems
- Historical architect: preservation treatment applications

### Vanishing Treasures Projects

Grand Canyon receives funding for condition assessment, architectural documentation and stabilization projects.

Condition Assessments: collecting information on types of deterioration and solving preservation problems.



Architectural condition assessment

Architectural Documentation: collecting information on structure layout, design and building materials.



Architectural documentation



Preservation treatment

Preservation Treatments: repairing preservation problems with documentation, hands-on fabric treatments and education.

### Preservation Methods and Materials

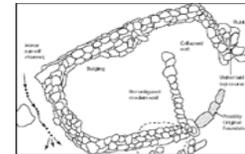
The methods used in architectural preservation are aimed at preventing rapid deterioration of intact original fabric.

Indirect Treatment: architectural documentation, controlling exterior drainage, redirecting access, placement of erosion control fabric and public education.

Direct Treatment: repairing eroded mortar joints, resetting loose wall stones and contouring floor surfaces for interior drainage.

### Digital Preservation Technology

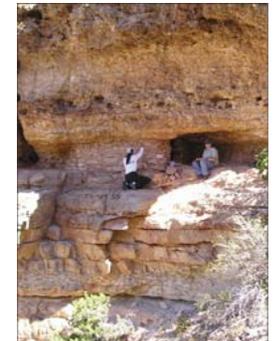
- Digital photography for scaled drawings
- Total station survey equipment for mapping
- Global positioning system for survey control
- 3D laser scanning for modeling and drawings
- Computer-aided design for scaled drawings



Planimetric map of small pueblo



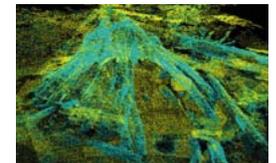
Preservation treatment and documentation



Architectural condition assessment



Architectural documentation with laser scanner



3D model from laser scanner

# Grand Canyon

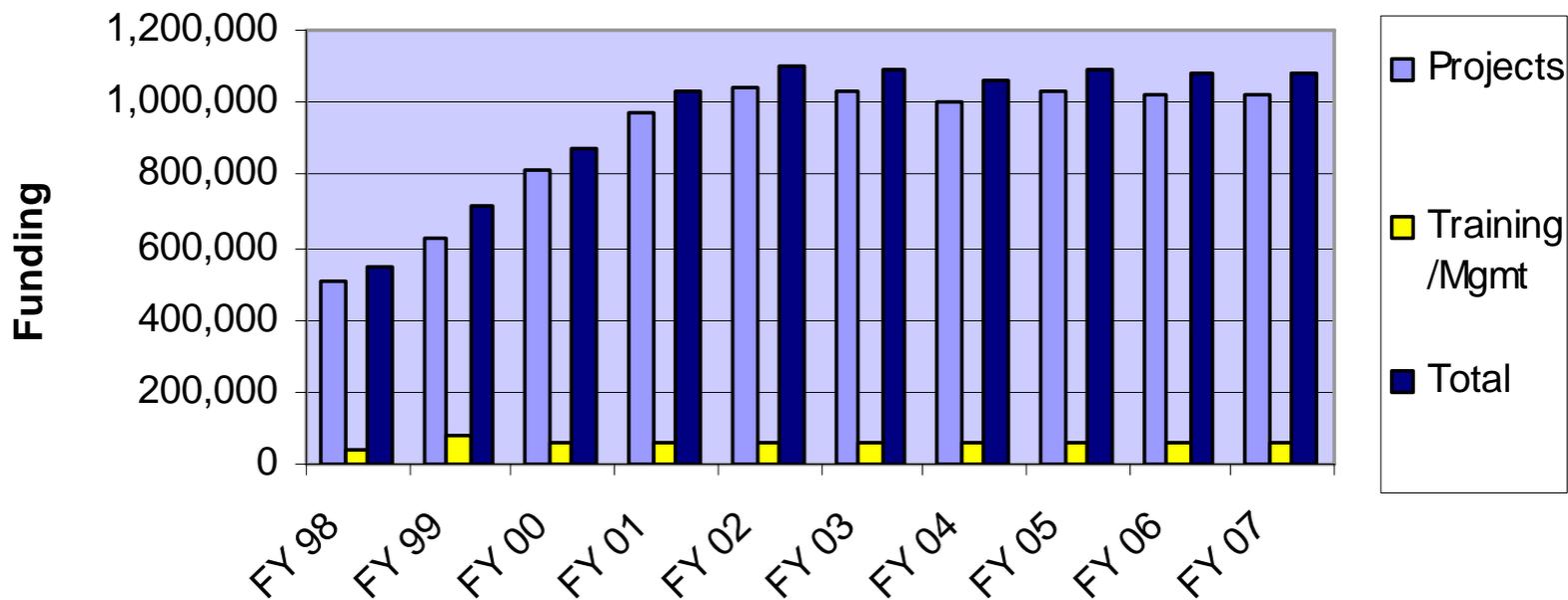
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## Vanishing Treasures Annual and Project Cumulative Funding



In addition, Permanent Base Funding for VT Parks has increased by \$3.7 million (61 base positions in 23 parks)

# Grand Canyon

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The National Park Service will conduct a coordinated program ...



# Grand Canyon

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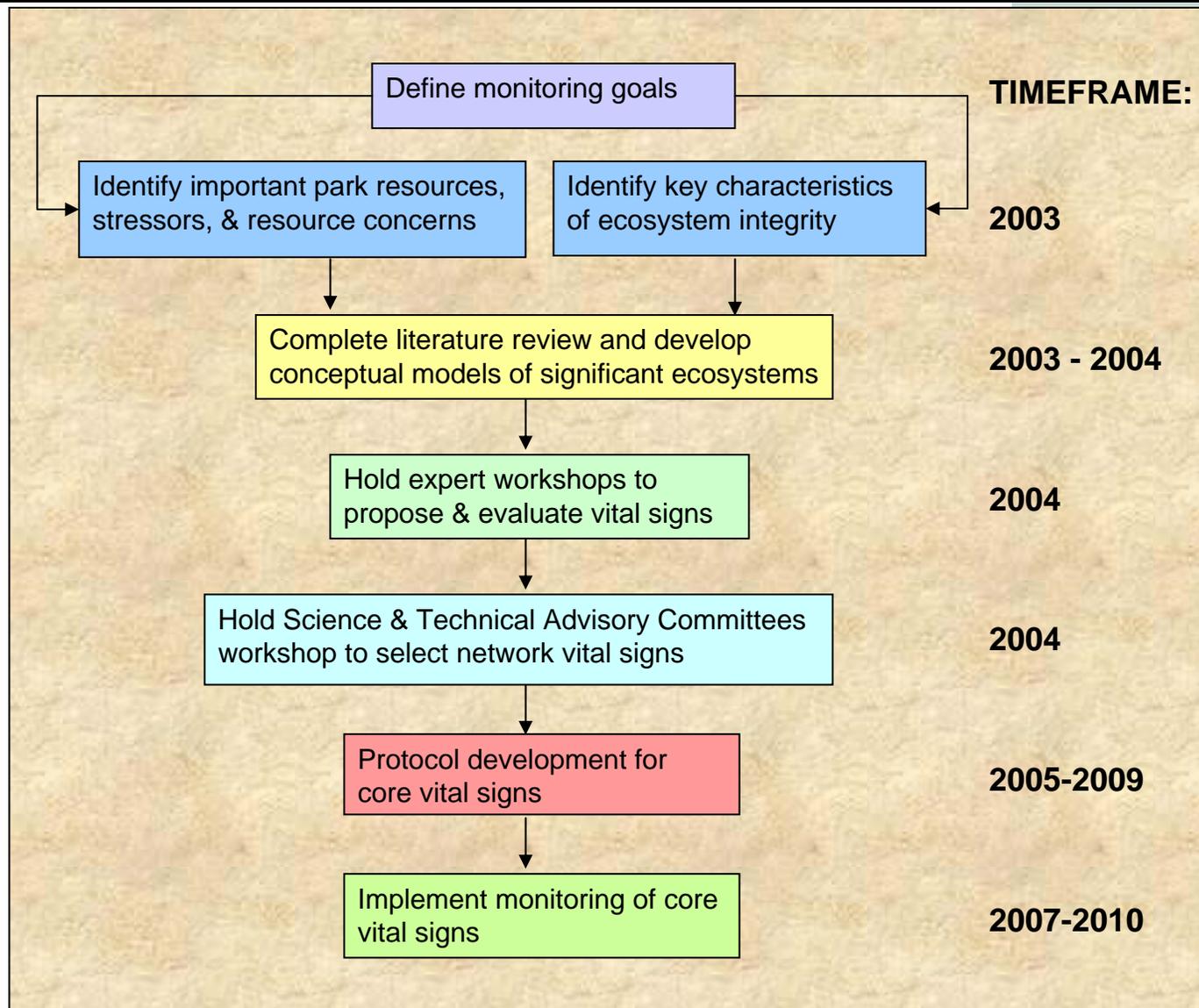


WHY?

WHAT IS  
MOST  
IMPORTANT  
TO MONITOR?

HOW?

WHO, WHEN  
AND WHERE?



# Grand Canyon

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## NPS Vital Signs and the AMP – How We Work Together

- **Build upon Existing Funded Programs;** in so doing, we save the AMP funding and create opportunities for enhanced project funding
- **Maintains the High Standard of Science the AMP and NPS require;** peer reviewed and established protocols that provide consistency with data collection and management
- **Helps the NPS meet the broad management objectives for Grand Canyon**

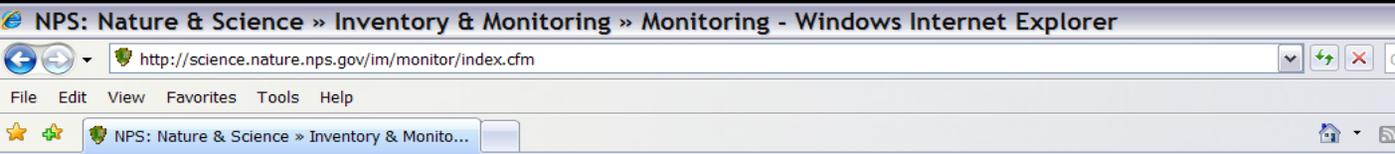
# Grand Canyon

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## National Park Service Nature & Science

National Park Service  
U.S. Department of the Interior

### Vital Signs Monitoring

Discovering and protecting America's natural heritage

NPS » Nature & Science » Inventory & Monitoring » Vital Signs Monitoring

- Monitoring
- I & M
- NPS.gov

**Nature & Science** »

**I&M Home** »

**Monitoring Home**

**Program Administration & Organization**

- Program Goals
- National Framework
- 3-Phase Approach
- Meeting Notes & Presentations
- PowerPoint Gallery

**Design & Technical Guidance**

- Goals & Objectives
- Conceptual Models
- Vital Signs
- Sampling Design
- Protocols
- Data Management
- Reporting
- Technical Guidance

**Other Important Links**

- Monitoring Plans
- Key Documents
- Literature Cited
- Glossary
- Monitoring Intranet
- Monitoring Contacts

**Monitoring Site Map**

**Parks: Nature & Science**

**Background Documents**

- Download "Monitoring the Condition of Natural Resources in US National Parks"
- Download Vital Signs Monitoring Brochure

**Program Administration & Organizational Framework**

- Justification for Integrated Natural Resource Monitoring
- Legislation and Policy
- Definition of Key Terms
  - Glossary of Terms as used by NPS I&M Program
- National Framework for I & M
  - National and Regional Oversight
  - Natural Resource Program Center & MTAG
  - Basic Resource Inventories
  - Prototype Monitoring Programs
  - Vital Signs Monitoring Networks
- Monitoring Planning & Design: The 3-Phase Approach
  - Monitoring Plan Outline
  - Monitoring Plan Checklist Memo
  - Ecological Monitoring Framework
  - Schedule - Network Due Dates for Phase 1, 2, 3
  - Peer Review and Approval Process

**Other Links & Documents**

- List of Coordinators, Data Managers and Ecologists
- Meeting Notes and Presentations
- Literature Cited and Extended Bibliography
- Download Documents for Designing a Monitoring Program
- Websites You Should Know About

**Monitoring Intranet (requires NPS computer)**

- Memos establishing policy & guidance

**Guidance for Designing an Integrated Monitoring Program**

- Introduction
- Integration: Ecological, Spatial, Temporal & Programmatic
- Establishing Monitoring Goals & Objectives
  - Examples of Specific, Measurable Monitoring Objectives
- Developing Conceptual Models of Ecosystem Components
- Prioritizing & Selecting Vital Signs - What Should be Monitored?
- Sampling Design Considerations - Where & When to Sample
- Monitoring Protocols
  - Required Content/Format of Protocols
  - Protocol Development Process
  - Guidance for Protocol Development Summaries
- Protocol Database**
  - Protocol Examples from Other Programs & Agencies
  - Download Example Protocol for Land Bird Monitoring
- Data Management and Analysis
- Reporting the Results of Monitoring
  - Recommended Style for Literature Cited in Monitoring Plans
- Technical Guidance on Specific Topics
  - Air Resources
  - Geologic Resources
  - Water Resources
    - WRD Guidance for Designing and Conducting Water
  - Quality Monitoring
    - Biological Resources
      - Invasive Species
      - Land Birds
    - Fire & Fuels Dynamics
      - Other fire links
    - Landscape Dynamics and Remote Sensing

**Network Monitoring Plans**