Glen Canyon Dam Adaptive Management Work Group
Agenda Item Information
May 22-23, 2008

Agenda Item

Grand Canyon National Park Science and Resource Management Program

Action Requested

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

Presenters

Steve Martin, Superintendent, Grand Canyon National Park

Previous Action Taken

√ N/A

Relevant Science

√ The following describes the relevant research or monitoring on this subject:

The following documents can be found at www.nps.gov/grca/parkmgmt/planning.htm:

- 1995 General Management Plan
- 1997 Resource Management Plan
- 2006 Colorado River Management Plan

The 2006 NPS Management Policies can be found at www.nps.gov/policy/MP2006.pdf.

Background Information

Grand Canyon National Park Superintendent Steve Martin will present the National Park Service responsibilities in the area of research, resource management, and monitoring for resource values along the Colorado River. He will describe ongoing research and monitoring in relation to those responsibilities. Finally, he will discuss his recommendation for a shift in responsibility to the National Park Service for certain areas of GCDAMP research and monitoring.

Grand Canyon

U.S. Department of the Interior
National Park Service

Grand Canyon National Park

EXPERIENCE
YOUR
AMERICA

An Overview of

Science and Resource Management

Grand Canyon National Park

Steve Martin, Superintendent

Grand Canyon

U.S. Department of the Interior
National Park Service

Grand Canyon National Park

Science and Resource Management

(Stewardship Responsibilities)

Leadership & Management

- Oversight
- Tribal Consultation
- Interagency Coordination
- Critical Park Issues

Natural Resources

- Air Quality
- Earth Sciences
- Vegetation
- Wildlife

Socio-Cultural Resources

- Archaeology
- Wilderness
- Historic Preservation
- Visitor Experience
- Soundscape

Science Information & Education Services

- GIS/Data Mgmt
- Mapping
- Research/Permits
- Museum Collection
- Archives
- Outreach

Grand Canyon

U.S. Department of the Interior
National Park Service

Grand Canyon National Park

Legal Authorities

- Grand Canyon National Monument, 1908
- NPS Organic Act, 1916
- Grand Canyon National Park, 1919
- National Environmental Policy Act, 1969
- Grand Canyon Enlargement Act, 1975
- Redwoods Act, 1978

***Grand Canyon Protection Act, 1992**

Mandated Management Responsibilities

- NPS Management Policies 2006
- GCNP General Management Plan 1995

***GCPA 1992 -- GCD AMP 1996**

- GCNP Resource Management Plan 1997
- Colorado River Management Plan 2006

***Where AMP Goals align with GCNP Resource Management**

Grand Canyon

U.S. Department of the Interior
National Park Service

Grand Canyon National Park

NPS Mandated Responsibilities

NPS Organic Act of 1916

"The Service such established shall promote and regulate…**to conserve the scenery and the natural and historic objects and the wild life therein** and to provide for the enjoyment of the same **in such a manner and by such means as will leave them unimpaired** for the enjoyment of future generations."

Redwoods Act of 1978

"Congress further reaffirms, declares, and directs the promotion and regulation of the various areas of the National Park System…of the United States. The authorization of activities shall be construed and **the protection, management, and administration of these areas shall be conducted in light of the high public value and integrity of the National Park System** and **shall not be exercised in derogation of the values and purposes** for which these various areas have been established…directly and specifically provided by Congress."

NPS Management Policies 2006

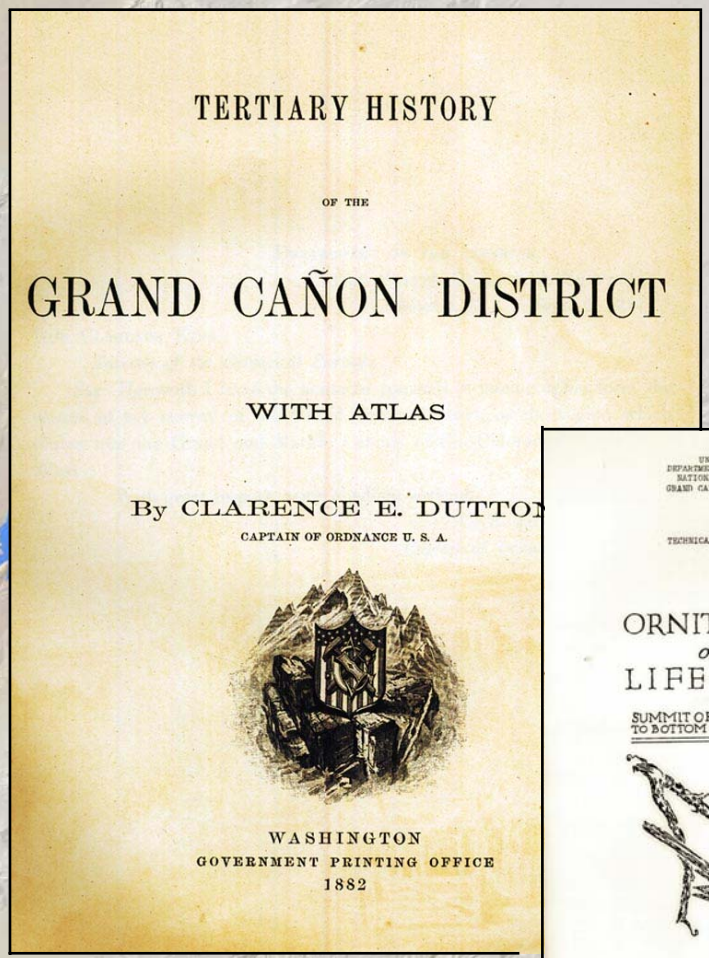
"**The Secretary has an absolute duty**, which is **not to be compromised, to fulfill the mandate of the NPS Organic Act of 1916** to take whatever actions and seek whatever relief as will safeguard the units of the national park system."

Grand Canyon

U.S. Department of the Interior
National Park Service

Grand Canyon National Park

Historical Examples of GCNP Research: 1880-1960


TERTIARY HISTORY

OF THE

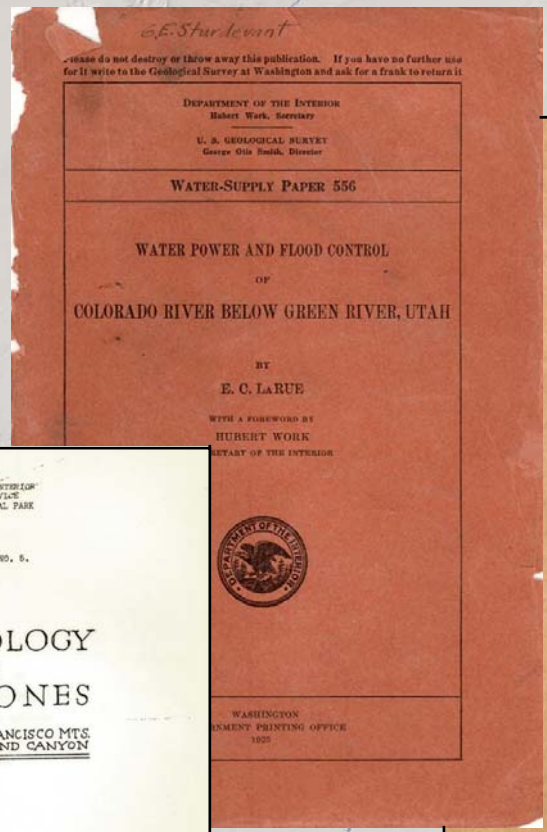
GRAND CAÑON DISTRICT

WITH ATLAS

By CLARENCE E. DUTTON

CAPTAIN OF ORDNANCE U. S. A.

WASHINGTON
GOVERNMENT PRINTING OFFICE
1882


C.E. Sturdevant

Please do not destroy or throw away this publication. If you have no further use for it write to the Geological Survey at Washington and ask for a frank to return it

DEPARTMENT OF THE INTERIOR
Hubert Work, Secretary

U. S. GEOLOGICAL SURVEY
George Otis Smith, Director

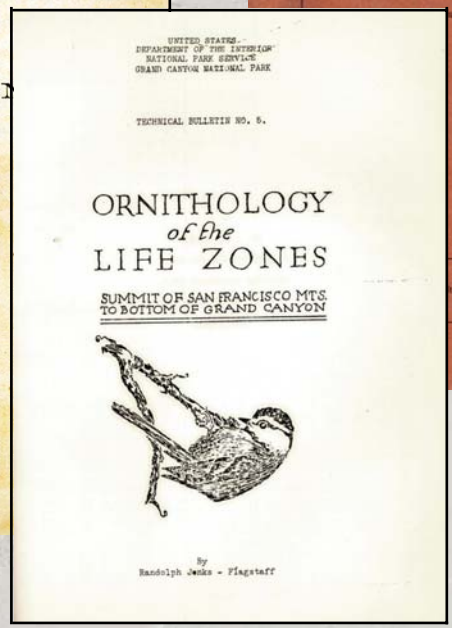
WATER-SUPPLY PAPER 556

WATER POWER AND FLOOD CONTROL
OF
COLORADO RIVER BELOW GREEN RIVER, UTAH

BY
E. C. LaRUE

WITH A FOREWORD BY
HUBERT WORK
SECRETARY OF THE INTERIOR

WASHINGTON
GOVERNMENT PRINTING OFFICE
1925

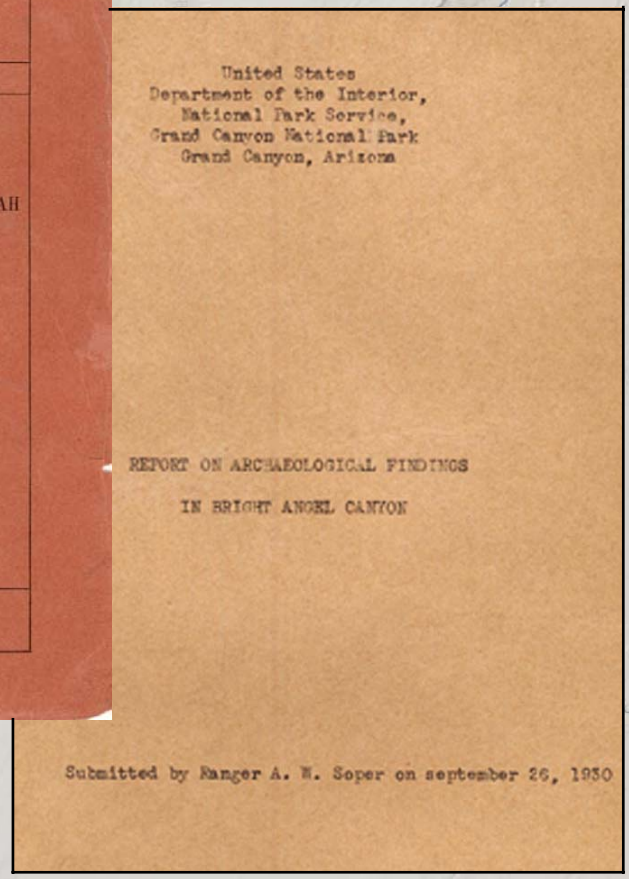

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
GRAND CANYON NATIONAL PARK

TECHNICAL BULLETIN NO. 5.

ORNITHOLOGY
of the
LIFE ZONES

SUMMIT OF SAN FRANCISCO MTS.
TO BOTTOM OF GRAND CANYON

By
Randolph Jenks - Flagstaff


United States
Department of the Interior,
National Park Service,
Grand Canyon National Park
Grand Canyon, Arizona

REPORT ON ARCHAEOLOGICAL FINDINGS

IN BRIGHT ANGEL CANYON

Submitted by Ranger A. M. Soper on september 26, 1930

Grand Canyon

U.S. Department of the Interior
National Park Service

Grand Canyon National Park

GCNP Colorado River Research Program: 1974–1977

Shelby, Bo and Joyce M. Nielson • Design and Method of the Sociological Research in Grand Canyon • Motors and Oars in the Grand Canyon • Use Levels and Crowding in the Grand Canyon • Private and Commercial Trips in the Grand Canyon

Suttkus, Royal D., Glenn H. Clemmer, Clyde Jones, and C. Robert Shoop •Survey of Fishes, Mammals and Heretofauna of the Colorado River in Grand Canyon

Czarnecki, David B., Dean W. Blinn, and Terrill Tompkins •Periphytic Microflora Analysis of the Colorado River and Major Tributaries in Grand Canyon and Vicinity

Howard, Alan D. and Robert Dolan • Alterations of Terrace Deposits and Beaches of the Colorado River in Grand Canyon

Cole, Gerald and Dennis M. Kubly • Limnologic Studies on the Colorado River from Lees Ferry to Diamond Creek

F. Yates Borden • User Carrying Capacity for River-Running the Colorado River in the Grand Canyon

Steven W. Carothers and others • An Ecological Survey of the Riparian Zone of the Colorado River Between Lees Ferry and Grand Wash Cliffs

Phillips, Robert A. and Cynthia S. Lych •Human Waste Disposal on Beaches of the Colorado River in Grand Canyon

Sommerfield, Milton R., Wayne M. Crayton, and Nancy L. Crane •Survey of Bacteria, Phytoplankton and Trace Chemistry of the Lower Colorado River and Tributaries in the Grand Canyon National Park

Laursen, Emmett M. and Elliot Silverson • Hydrology and Sedimentology of the Colorado River in Grand Canyon by Emmett M. Laursen and Elliot Silverston

Minckley, C.O. and Dean W. Blinn • Summer Distribution and Reproductive Status of Fish of the Colorado River and its Tributaries in Grand Canyon National Park and Vicinity During 1975

Deacon, James E. and John R. Baker • Aquatic Investigation on the Colorado River from Separation Canyon to the Grand Cliffs, Grand Canyon National Park

C.R. Michael Parent and F.E. Robeson • An Economic Analysis of the River Running Industry in Grand Canyon National Park

R. Roy Johnson • Synthesis and Management Implications of the Colorado River Research Program

D.N. Thompson, A.J. Rogers Jr., and F. Yates Borden • Sound-Level Evaluations of Motor Noise from Pontoon Rafts in the Grand Canyon

Grand Canyon

U.S. Department of the Interior
National Park Service

Grand Canyon National Park

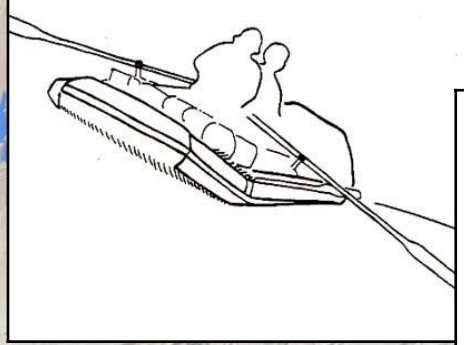
1980's (examples)

The Effect of Flows in the Colorado River on Reported and Observed Boating Accidents in Grand Canyon

Curtis A. Brown
US Bureau of Reclamation
Planning Technical Services
Engineering & Research Center
Denver, Colorado

Martha G. Hahn-O'Neill
National Park Service
Resources Management
Grand Canyon National Park
Grand Canyon, Arizona

January, 1987



The Glen Canyon Dam and current river-runing practices are adversely affecting the Colorado River ecosystem

Man's impact on the **Colorado River** in the Grand Canyon

by R. ROY JOHNSON, STEVEN W. CAROTHERS, ROBERT DOLAN, BRUCE P. HAYDEN & AL

IN THE OCTOBER 1976 issue of *National Parks & Conservation Magazine*, the article "Dilemma in Grand Canyon," by Steve Martin, discussed some of the controversy over the presence of motorboats on the Colorado River in Grand Canyon National Park. The article also touched on some of the other problems facing the National Park Service in managing this area in the most ecologically sound manner.

In the early 1970s National Park Service resource managers, responding to increasing river use, postulated that the carrying capacity of the Colorado River zone had been or would soon be reached. It was feared that environmental degradation due to overuse coupled with the impact of Glen Canyon Dam—completed in 1963—in altering the river regime might exceed the ecosystem's capacity to adjust.

Therefore, in 1973 the Park Service initiated a comprehensive Colorado River Research Program consisting of thirty individual investigations conducted under contract by educational institutions and a professional research firm to provide answers to these questions: How rapidly are the physical and biological resources of the riparian (streamside) zone adjusting to the new river regime? How is the increased
the riparian and
And what are t
fects of different
and patterns on
quality of the riv
ence?

The results o
tions are now be
tional Park Serv
agement personn
does not repres
Service policy.
rizes the findi
mendations of th
dividual researc
suggest ways of
broad recommen

Changed River Regime

Although Hoover Dam extended Lake Mead into the lower reaches of the Grand Canyon in the 1930s, the upper reaches of the canyon remained in a natural state until Glen Canyon Dam was completed at Page, Arizona, in 1963. Since then the dam has completely altered the flow of the Colorado River. Rather than a river charged with sediment "too thick to drink and too thin to plow," it is now a clear, cold "tidal" flow completely dependent upon the release of water from the Glen Canyon reservoir, and the resulting environ-
s have been rapid

the river below
periencing its
and scouring reg
the absence of n
former flood-st
being eroded w
placed; and in
former peak flo
debris deposited
floods of side ca
scoured away
larger. Consequ
rapids on the C
become much
more dangerous
even impassable
Before const
Canyon Dam, m
Colorado River
ecosystem was
lem for the Nati
the area approac
ness. It is also

former sediment
rado River is now
hind the dam, and
flow is nearly half
me. Consequently

1983
COLORADO RIVER
BEACH CAMPSITE INVENTORY

Grand Canyon National Park, Arizona

Nancy J. Brian
John R. Thomas
Division of Resources Management
Grand Canyon National Park, Arizona

May, 1984

TRENDS IN SELECTED HYDRAULIC VARIABLES FOR THE COLORADO RIVER AT LEES FERRY AND NEAR GRAND CANYON, ARIZONA---1922-1984
(FIRST DRAFT)

U. S. NATIONAL PARK SERVICE
CONTRACT NO. CX 8000-4-0014

DURL E. BURKHAM

AUGUST 22, 1986

Grand Canyon

U.S. Department of the Interior
National Park Service

Grand Canyon National Park

1990-2000 (examples)

Grand Canyon National Park and Grand Canyon National Park Foundation

Fall 2006 Report
Management & Control of Tamarisk and Other Invasive Vegetation
at Backcountry Seeps, Springs and Tributaries
in Grand Canyon National Park
(Phase II-A, First Year of Phase II of Comprehensive Project)

Arizona Water Protection Fund Contract Number 05-131WPF

Prepared by:

Lori J. Makarick and Kate Watters
Backcountry Vegetation Program
Grand Canyon National Park
823 North San Francisco, Suite B
Flagstaff, AZ 86001-3265

Phone: (928) 226-0165
Email: Lori_Makarick@nps.gov
Katherine_Watters@nps.gov

BRIDGING THE GAP:
TRANSITION MONITORING OF RIPARIAN VEGETATION
FROM GLEN CANYON DAM TO PEARCE FERRY

Final Report
Cooperative Agreement CA-1425-96-FC-81-05006

Michael J.C. Kearsley
Dept. of Biological Sciences
Northern Arizona University

John R. Spence
National Park Service
Glen Canyon National Recreation Area

Tina J. Ayers
Dept. of Biological Sciences
Northern Arizona University

Kerry M. Christensen
Department of Natural Resources
Hualapai Tribe

Peter Rowlands
and
Nancy Brian
National Park Service
Grand Canyon National Park

Arthur M. Phillips
SWCA Environmental Consultants

Submitted to:

U.S. Department of Interior
Grand Canyon Monitoring and Research Center
Flagstaff, AZ

31 December 1996

AERIAL PHOTOGRAPHS OF SOUTHWESTERN WILLOW FLYCATCHER NEST AND TERRITORY LOCATIONS ALONG THE VIRGIN AND LOWER COLORADO RIVER REGIONS, 2004

Contract # 03-CS-30-0093

Submitted to

U.S. BUREAU OF RECLAMATION
Lower Colorado Region
400 Railroad Avenue
Boulder City, NV 89005

Submitted by

Mary Anne McLeod
Thomas J. Koronkiewicz
Bryan T. Brown
Steven W. Carothers

/CA, INC., ENVIRONMENTAL CONSULTANTS
114 N. San Francisco St., Suite 100
Flagstaff, Arizona 86001
(928) 774-5500

February 24, 2005

Grand Canyon

U.S. Department of the Interior
National Park Service

Grand Canyon National Park

Current Park-wide Research & Monitoring

- Archaeology
- Vanishing Treasures
- Natural Sounds
- Air Quality
- Water Quality
- Vegetation
- Fire Restoration
- Wildlife
- Visitor Experience
- Wilderness
- Backcountry

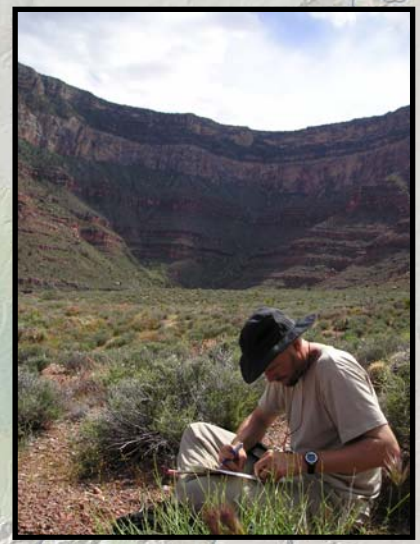
Grand Canyon

U.S. Department of the Interior
National Park Service

Grand Canyon National Park

System-wide Archaeological Inventory Program

- NPS funded ($850K) FY03–FY07
- Inventory by Western Archaeological and Conservation Center
- FY03–FY04 → Inventories for Fire and backcountry management plans (4,500 ac, 85 new sites)
- FY05 → Backcountry trails (2,700 ac, 77 new sites)
- FY06 → River corridor and backcountry

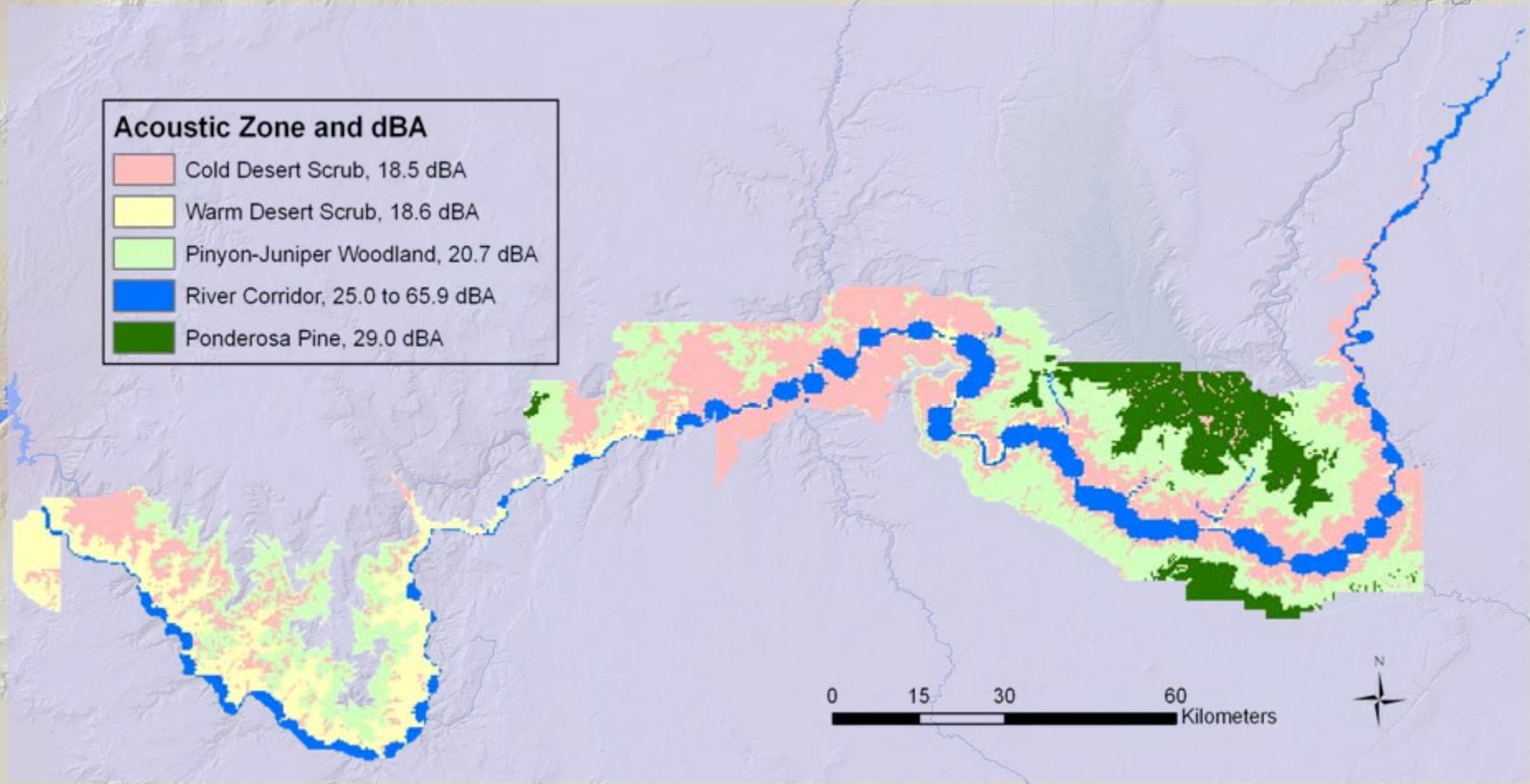


Grand Canyon

U.S. Department of the Interior
National Park Service

Grand Canyon National Park

Natural Ambient Sound Levels – Aircraft Overflights



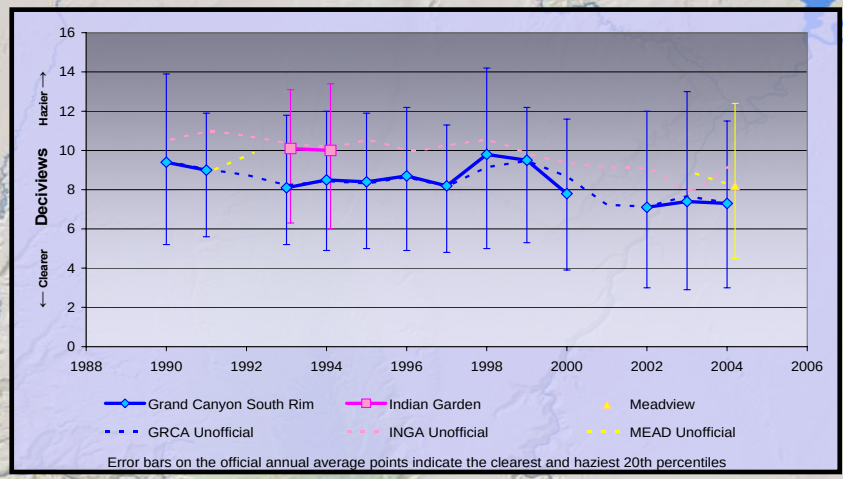
Grand Canyon

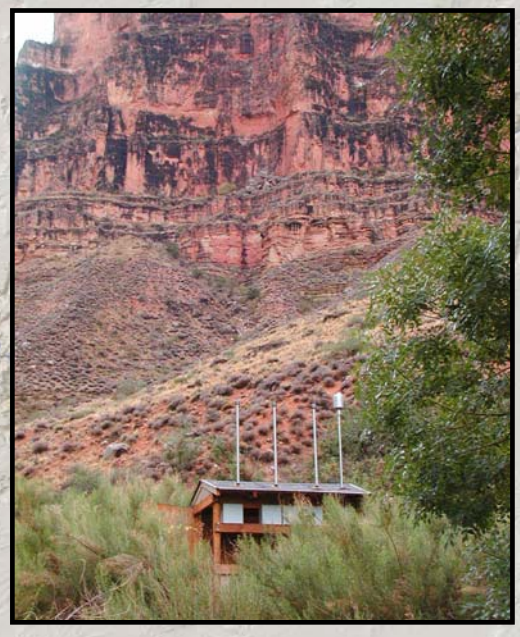
U.S. Department of the Interior
National Park Service

Grand Canyon National Park

Air Quality Program

- Monitor air quality, establish trends, reduce air pollution impacts from:
  - Smoke
  - Regional Haze
  - Ozone





Grand Canyon

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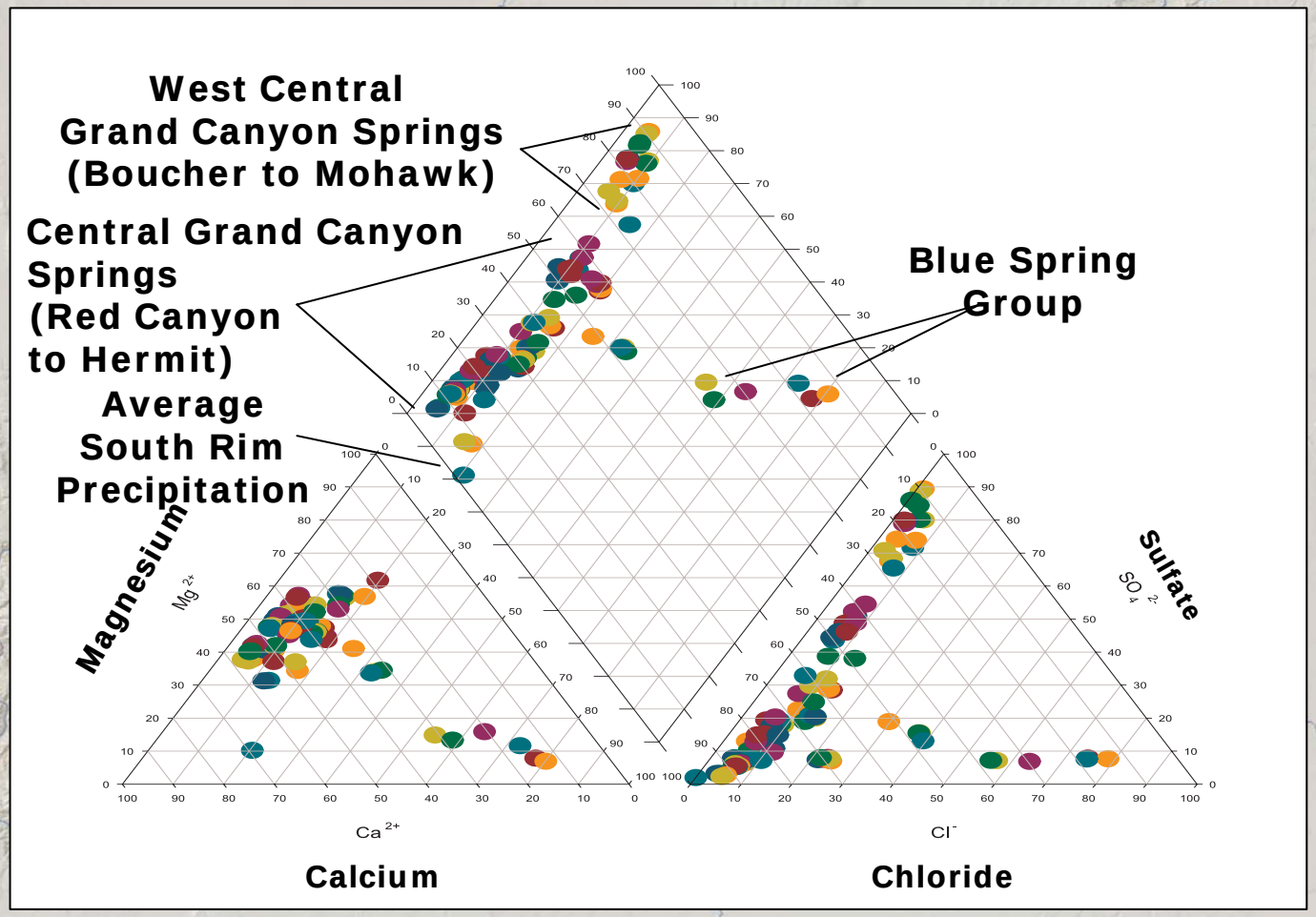
National Park Service

Grand Canyon National Park

Springs & Water Quality Research and Monitoring



Grand Canyon

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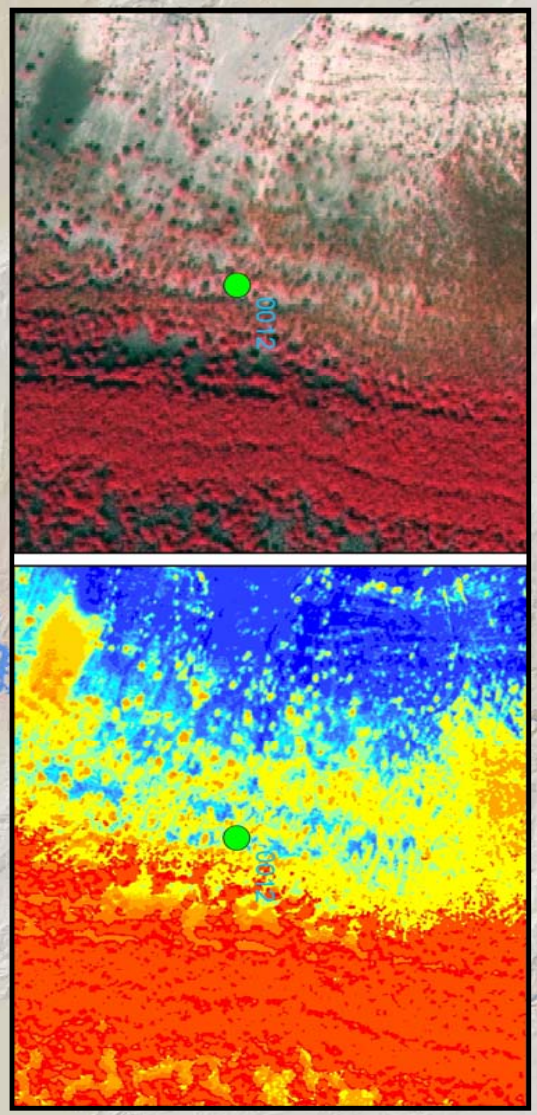
Grand Canyon National Park



Vegetation Classification from Digital Imagery

Grand Canyon

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National Park Service

Grand Canyon National Park

Tamarisk Management & Tributary Restoration

Phase I (2001-2003)

- Removed >134,000 trees from 70 areas
- 12% required follow-up treatment
- Volunteers donated >8,000 hours

- Phase IIa (2003-2005)
- Removed >45,000 trees in 35 areas
- Found 15 new plant species
- Published outreach materials

Phase IIb (2006-2007)

- Volunteers donated >20,000 hours
- Removed >150,000 trees in 163 areas

Grand Canyon

U.S. Department of the Interior
National Park Service

Grand Canyon National Park

GCNP Herbarium

- GCNP herbarium contains >10,000 specimens dating back to 1928
- First annual herbarium festival August 5-9, 2005 mounted over 1,100 specimens
- Staff is working with AZ botanists to get the park's herbarium on-line
- Staff is updating NPSpecies and will publish additions to park flora

Grand Canyon

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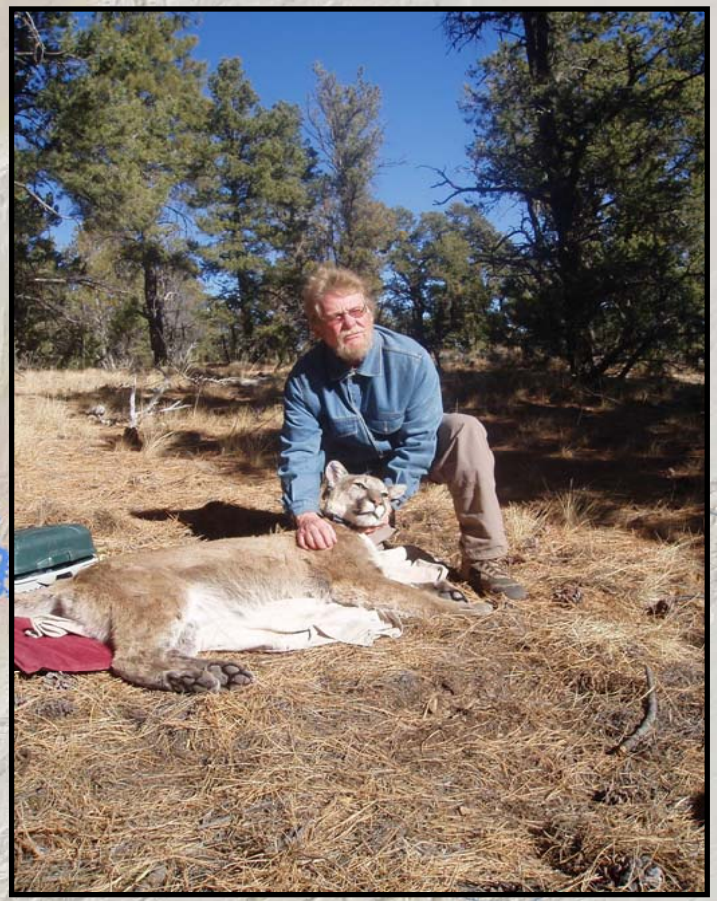
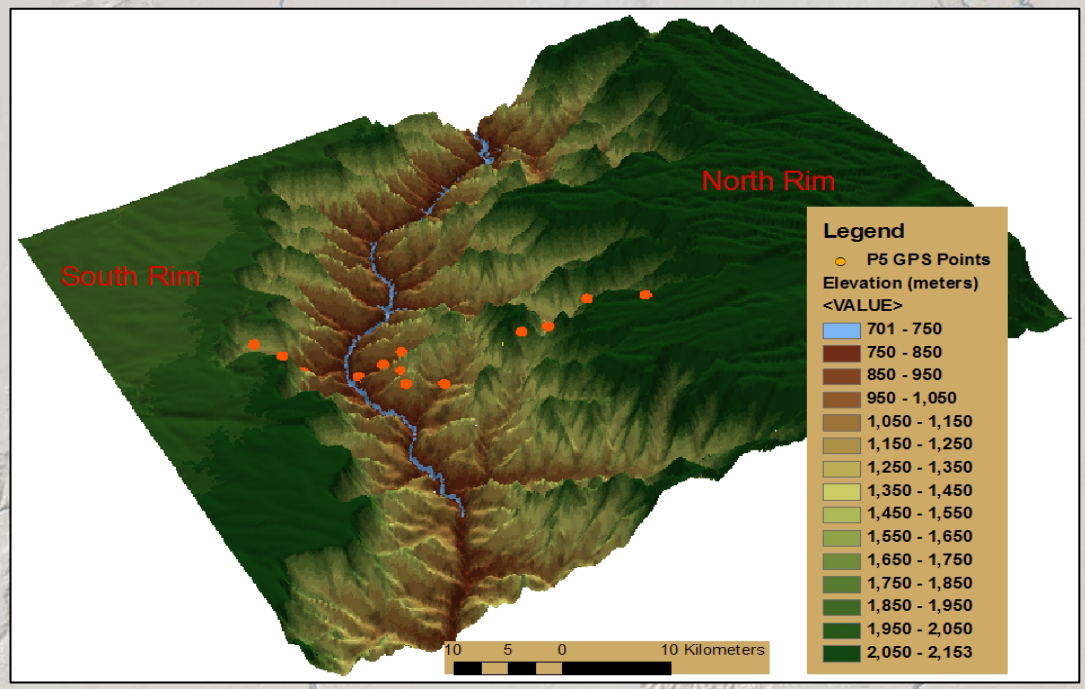
National Park Service

Grand Canyon National Park

Mountain Lion Research



P9 captured near Grandview in February 2006



GPS locations of P5 crossing Grand Canyon in April 2005

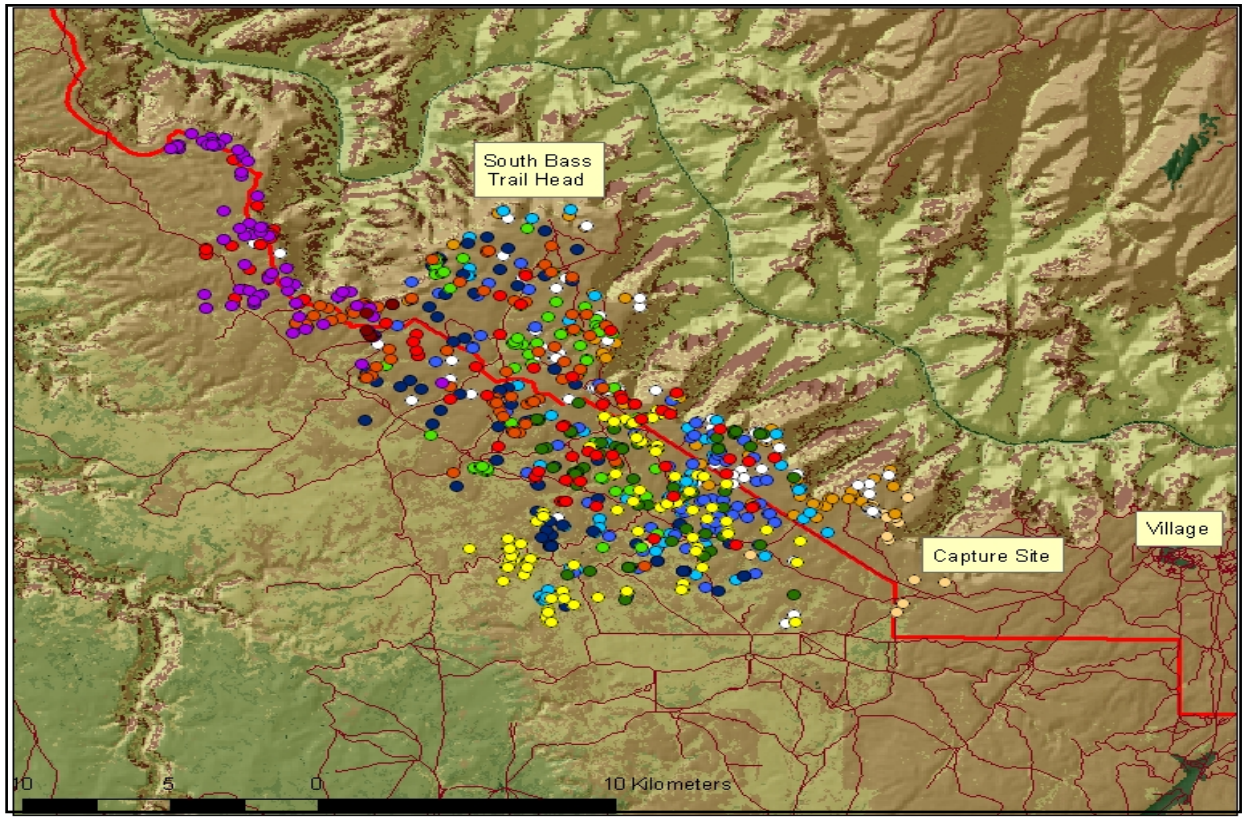
Grand Canyon

U.S. Department of the Interior
National Park Service

Grand Canyon National Park

Wildlife / Human Interactions - Puma

P3; Adult Female; GPS Points from 10/17/04 to 10/09/05



Legend

P3 GPS Points

VERTEX

- Oct 2004
- Nov 2004
- Dec 2004
- Jan 2005
- Feb 2005
- Mar 2005
- Apr 2005
- May 2005
- June 2005
- July 2005
- Aug 2005
- Sep 2005
- Oct 2005
- Roads
- Park Boundary

N W E S

Puma Project Data Map for NPS Science Center Use Only; Not for Distribution
Produced by Emily Garding on 12/5/2005 at 5:13:56 PM

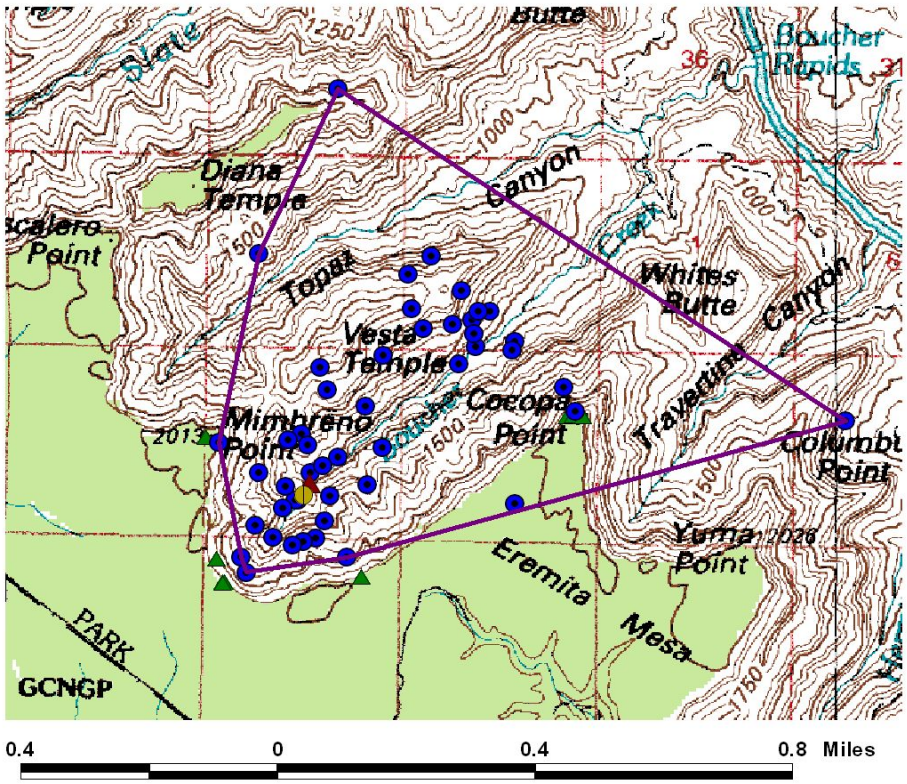
Grand Canyon

U.S. Department of the Interior
National Park Service

Grand Canyon National Park

Mexican Spotted Owl Radio Tracking

Boucher Minimum Convex Polygon
2705 acres



Boucher mcp1.shp
Boucher locations.shp
Boucher data.shp
Capture roost locations.dbf
Nest
Roost
Capture

N
W E
S

Grand Canyon

U.S. Department of the Interior
National Park Service

Grand Canyon National Park

GCNP Research Permits
Annual Average, 2002-2004

	GCMRC		Others	
	#	%	#	%
Research Permits	61	*41*	89	*59*
Investigators (principal and co-principal)	94	*47*	104	*53*
Trips (river, backcountry, overflights)	43	*65*	23	*35*
Participants	579	*86*	97	*14*
Minimum Requirement Analyses	34	*87*	5	*13*
2008 Permits	13		48	

Grand Canyon

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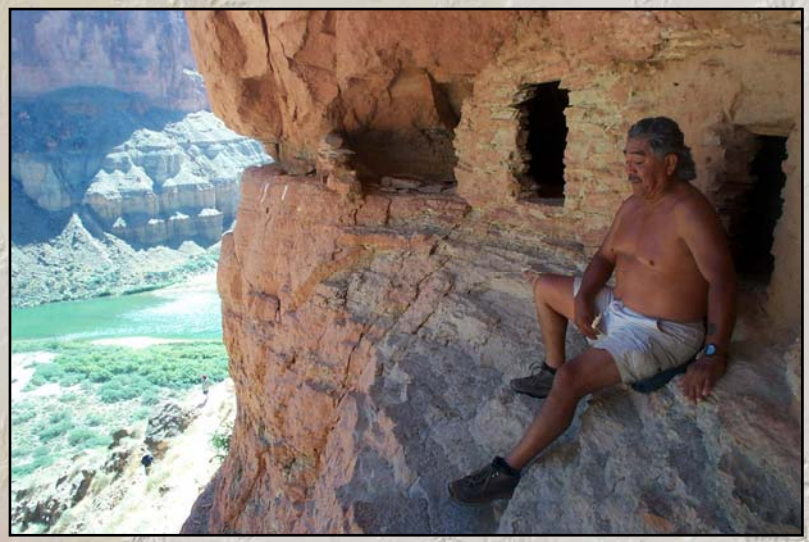
National Park Service

Grand Canyon National Park

Integration of Tribal Perspectives and Values into NPS Management



Grand Canyon

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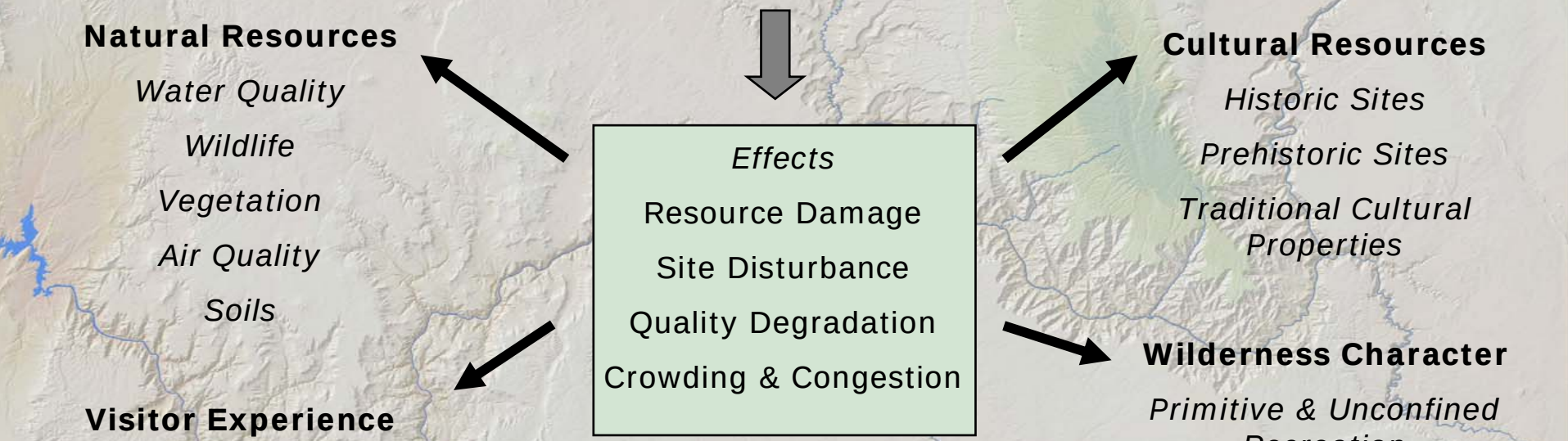
National Park Service

Grand Canyon National Park

Colorado River Resources Monitoring Program

How do administrative activities and river users affect park resources in the Colorado River Corridor?

(Stressors)



Natural Resources

Water Quality

Wildlife

Vegetation

Air Quality

Soils

Cultural Resources

Historic Sites

Prehistoric Sites

Traditional Cultural Properties

Visitor Experience

Quality of Recreation

Range of Services

Wilderness Character

Primitive & Unconfined Recreation

Non-Mechanized Use

Solitude

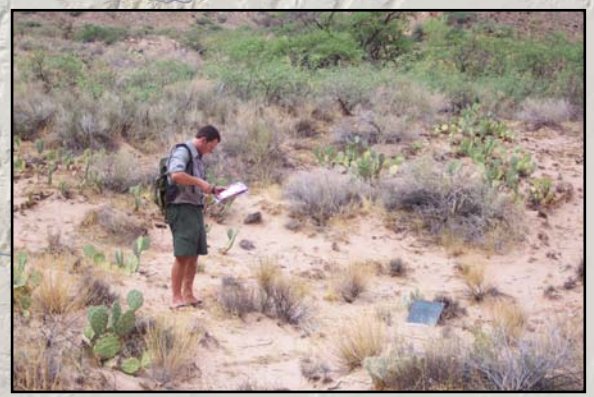
Grand Canyon

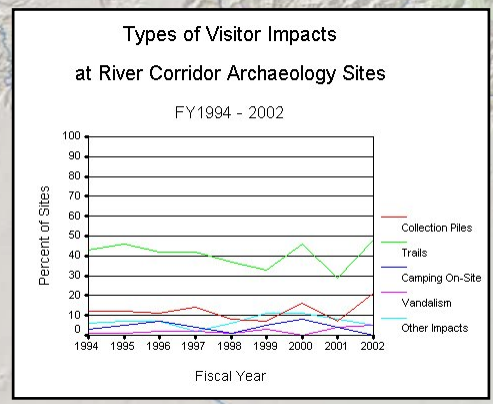
U.S. Department of the Interior
National Park Service

Grand Canyon National Park

GCNP Colorado River & Tributaries Research & Monitoring

- Trails Monitoring & Rehabilitation
- Vegetation Research, Monitoring, & Removal/Re-vegetation
- Campsite Monitoring
- Wildlife Research & Monitoring
- Cultural Resources Research, Inventory, Protection & Preservation (historic and prehistoric)
- Visitor Experience Research & Monitoring





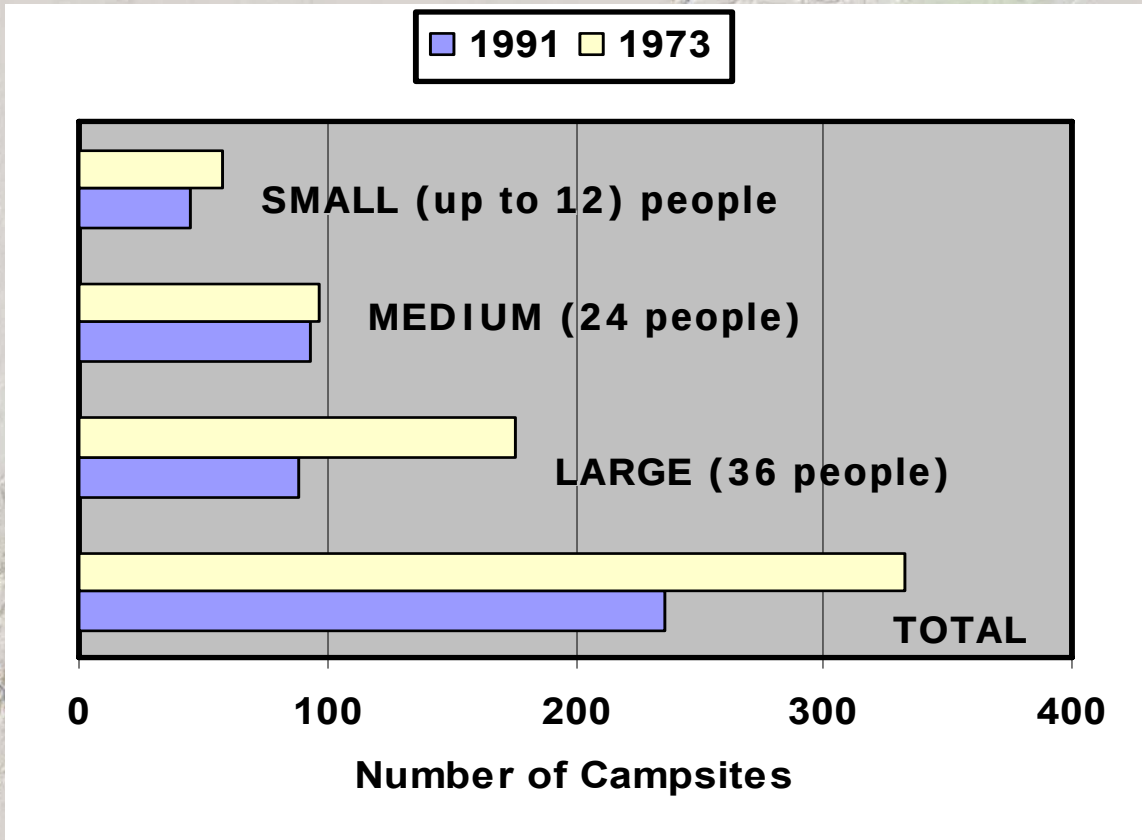
Grand Canyon

U.S. Department of the Interior
National Park Service

Grand Canyon National Park

Changing Campsite Condition

1973 -- 1991



Grand Canyon

U.S. Department of the Interior
National Park Service

Grand Canyon National Park

Visitor Experience Monitoring Program

- Quality of visitor experience (temporal & spatial)
- On site impacts: River encounters, attraction site encounters, campsite competition, hiking exchanges, launch/take-out congestion, safety
- Off-site impacts: permit system, use statistics, etc
- Develop new baseline conditions for new CRMP
- Help determine management actions needed to address unacceptable social conditions

Grand Canyon

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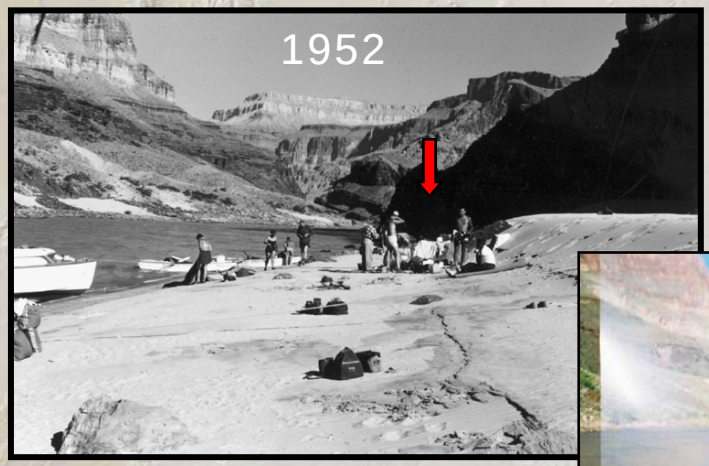
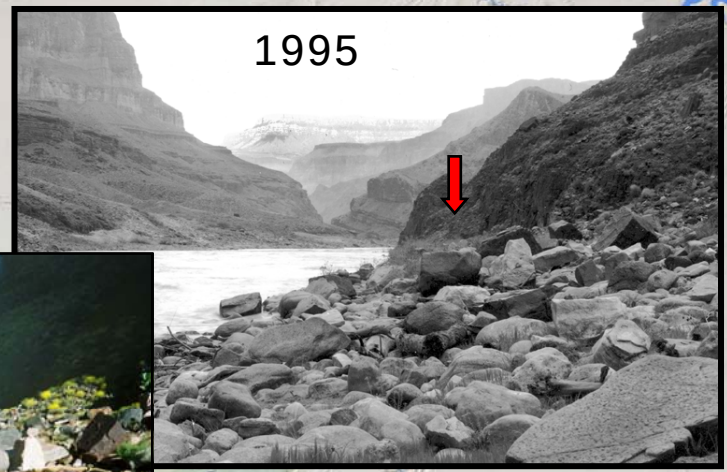
National Park Service

Grand Canyon National Park

Campsite Monitoring -- Lower Tapeats Camp RM 133.7





Grand Canyon

U.S. Department of the Interior
National Park Service

Grand Canyon National Park

Natural Resource Condition Assessments

- Determined through monitoring programs
- Impacts include: campsite proliferation in OHWZ, social trailing, vegetation damage, trail erosion, archeological site damage, etc.
- Treatments include: trail delineation & repair, revegetation of social trails and OHWZ campsites, archeological site mitigations, etc.

Grand Canyon

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National Park Service

Grand Canyon National Park

Integrated Bio-physical Monitoring Design

- Avifauna, Vegetation, Archeological Sites, Campsite Condition
- April (low use), September (high use)
- 45 sites per trip → 15 repeat + 30 rotation
- Develop new baseline conditions for new CRMP
- Help determine management actions needed to address unacceptable resource conditions

Grand Canyon

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Monitoring Wilderness Character

- Involves a collective assessment of resource conditions (affects of human use)
- Quality of visitor experience – opportunities for solitude or an unconfined type of recreation
- Considers impacts of administrative use and activities

Administrative River Trips
Annual Average for 2000-2003

	GCMRC		GCNP	
	#	%	#	%
River Trips	**43**	*69*	**19**	*31*
User Days	**6,695**	*61*	**4,315**	*39*
Participants	**579**	*64*	**327**	*36*

NPS Management Policies 2006

1. Improving Resource Conditions within the Parks

"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, or better than, the conditions that exist today. In particular, the Service will strive to restore the integrity of park resources that have been damaged or compromised in the past."

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1. Improving Resource Conditions within the Parks

AMP Goals/GCNPS Desired Future Conditions

- Maintain or attain viable populations of existing native fish, and prevent adverse modification to their habitat (including critical habitat).
- Establish water temperature, quality and flow dynamics to achieve GCDAMP ecosystem goals.
- Protect or improve the aquatic food base so that it will support viable populations of desired species at higher trophic levels.
- Protect or improve the biotic riparian and spring communities within the Colorado River ecosystem, including threatened and endangered species and their habitat.
- Maintain or attain levels of sediment storage within the main channel and along the shorelines to achieve GCDAMP ecosystem goals.

NPS Management Policies 2006

2. Protection and Preservation of Cultural Resources

"The National Park Service will employ the most effective concepts, techniques, and equipment to protect cultural resources against theft, fire, vandalism, overuse, deterioration, environmental impacts, and other threats without compromising the integrity of the resources."

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2. Protection and Preservation of Cultural Resources

AMP Goals/GCNPS Desired Future Conditions

• Preserve, protect, manage and treat cultural resources for the inspiration and benefit of past, present, and future generations.

NPS Management Policies 2006

3. Wilderness Resource Management

"All management decisions affecting wilderness must be consistent with the minimum requirement concept. This concept is a documented process used to determine if administrative actions, projects, or programs undertaken by the Service or its agents and affecting wilderness character, resources, or the visitor experience are necessary, and if so how to minimize impacts."

3. Wilderness Resource Management

AMP Goals/GCNPS Desired Future Conditions

- Maintain or improve the quality of recreational experiences for users of the Colorado River ecosystem, within the framework of GCDAMP ecosystem goals.

NPS Management Policies 2006

4. Management of Threatened or Endangered Plants and Animals

"The Service will survey for, protect, and strive to recover all species native to national park system units that are listed under the Endangered Species Act. The Service will fully meet its obligations under the NPS Organic Act and Endangered Species Act to both proactively conserve listed species and prevent detrimental effects on these species."

4. Management of Threatened or Endangered Plants and Animals

AMP Goals/GCNP Desired Future Conditions

- Maintain or attain viable populations of the Kanab ambersnail.
- Restore viable populations of extirpated species.
- Protect or improve the biotic riparian and spring communities within the Colorado River ecosystem, including threatened and endangered species and their habitat.

NPS Management Policies 2006

5. Management of Recreation Use

"Superintendents will develop and implement visitor use management plans and take action, as appropriate, to ensure that recreational uses and activities in the park are consistent with its authorizing legislation or proclamation and do not cause unacceptable impacts on park resources or values."

5. Management of Recreational Use

AMP Goals/GCNPS Desired Future Conditions

- Maintain recreational trout fishery at Lees Ferry.

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The Mission of the National Park Service is to

Conserve the Park Resources Unimpaired for Future Generations

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