



Cultural Resources in the Colorado River Corridor

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Components of SCORE Chapter

- **Background & Previous Research**
- **Monitoring of Cultural Resources**
 - **Archeological Sites**
 - **Tribally Valued Cultural Resources**
- **Test Flow Impacts on Cultural Resources**
- **Role of Aeolian Sediment in Preserving Archaeological Sites**
- **Treatment of Archaeological Resources**
- **Discussion and Recommendations**

Defining Cultural Resources

- **Historic Properties**
 - Archaeological sites
 - Traditional cultural properties
 - Structures
 - Objects
 - Cultural landscapes
- **Tribally valued resources**
 - Ethnobotanical resources
 - Ethnozoological resources
 - Seeps, springs, marshes
 - Grand Canyon as a whole



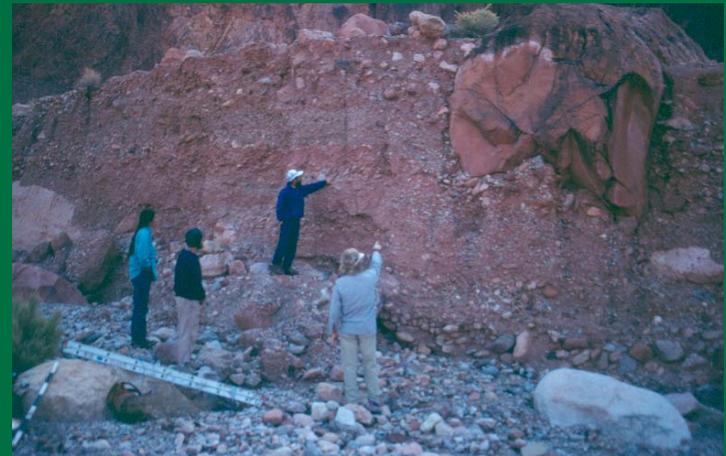
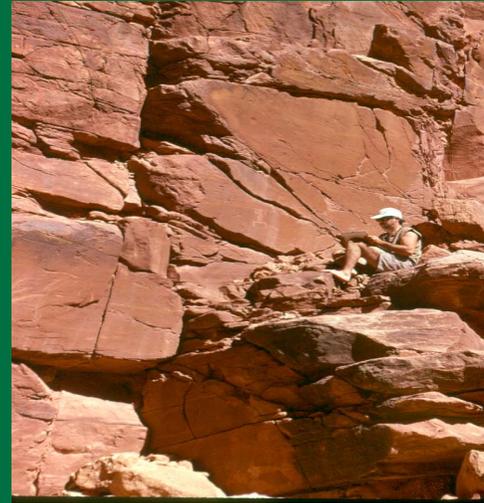
Previous Research in the River Corridor

- **late 1950s-early 1960s:** Initial archaeological reconnaissance in advance of Marble & Bridge Canyon Dam development
- **1967-1970:** Excavations by School of American Research focused on Bright Angel Site and Unkar Delta
- **1984:** NPS conducts partial excavations at five sites to mitigate visitor impacts and stabilize sites from erosion



Previous Research, continued

- **1990-1991:** BOR sponsors intensive archaeological inventory from Glen Canyon Dam to Lake Mead (255 miles, 475 sites) for EIS
- **1989-1995:** BOR sponsors geoarchaeological mapping and research by USGS (Holocene deposits at Lees Ferry, Nankoweap, Palisades- Tanner, and Granite Park)
- **1996-2002:** BOR sponsors several small-scale excavations by NPS



Outline of Human History in the CRE based on archaeological evidence

- Late Archaic (2500-1000 BC): campsites, petroglyphs, split twig figurine caches in caves
- Pre-ceramic Ancestral Puebloan (BM II, ~ 1000 BC to AD 500): campsites, agricultural fields?
- Ancestral Puebloan (AD 900-1250): habitation structures, granaries, irrigation features, vessel caches, petroglyphs
- Ancestral Pai and Paiute: (~AD 1250-1850+): campsites, tool caches, roasting pits, pictographs
- Historic Anglo (~AD 1850-1950): structures, objects, inscriptions



History of Monitoring Archaeological Sites in the CRE

- **Late 1970s:** NPS begins monitoring visitor impacts at most frequently visited archaeological sites
- **1982-1990:** NPS conducts annual monitoring at selected archaeological sites
- **1991:** BOR sponsors new archeological site monitoring program to document physical and visitor impacts in the CRE and decide future options for treatment of dam-related effects



Archaeological Site Monitoring: 1991-2004

- Post-1991 monitoring approach WAS designed to:
 - Track presence/absence of visitor impacts and physical erosion
 - Focus on most threatened sites
 - Assess need for future treatments
- Post-1991 monitoring program WAS NOT designed to:
 - assess resource condition trends system-wide
 - evaluate interactive relationships between impact categories
 - assess effects of varying dam operations on archaeological site condition
- Consequently, current monitoring data is not well suited for objectively assessing condition trends through time or evaluating role of dam operations in causing or contributing to degradation of archaeological resources

What current monitoring data allows us to say with certainty:

- Archaeological sites in the Colorado River corridor are continuing to deteriorate at an undetermined rate due to a combination of factors:
 - 1) continuing loss of sediment from system under ROD operations
 - 2) insufficient high elevation sediment-replenishment
 - 3) ongoing weather-induced erosion, and
 - 4) continuing visitor impacts (social trails, artifact loss, vegetation damage, soil compaction, etc.)



Tribal Monitoring Programs

- Southern Paiute Consortium: implemented a systematic monitoring program in 1996 (arch sites, TCPs, plants)
- Hualapai Tribe: ethnobotanical monitoring initiated at culturally important locations in 1996; additional cultural & terrestrial monitoring protocols piloted in 2001-2004
- Hopi Tribe conducted ethnobotanical inventory in 2001 (Loma'omvaya 2002). Hopi Tribe proposes to monitor tribal member perceptions about changing resource conditions using data from GCMRC terrestrial monitoring program, rather than monitoring resources directly (pilot study initiated in 2004)
- Pueblo of Zuni and Navajo Nation are contemplating developing formal monitoring programs in the near future

Preliminary conclusions from Southern Paiute and Hualapai monitoring programs

- River-based recreation impacts at archaeological sites and other culturally valued locations may be as or more detrimental than physical impacts related to dam operations
- Ethnobotanical resources in the OHWZ appear to be negatively impacted by dam operations due to insufficient high flows (i.e., insufficient watering of OHWZ plants, insufficient disturbance and renewal of vegetation from floods)



Evaluating Experimental High Flow Impacts to Cultural Resources

- Effects of 1996 BHBF were evaluated at 5 sites:
 - Effects shown to vary site-specifically.
 - Backfilling of arroyos demonstrated at 3 locations.
 - Repeat surveys demonstrated retention of BHBF sediment in arroyos for 4+ years following 1996 experiment
- Effects of 2004 Experiment on cultural sites are currently being evaluated in two different respects:
 - Sand bar building and retention near archaeological sites
 - Sand deposition in arroyo mouths (partial repeat of 1996 surveys)

Evaluating Effects of Aeolian Processes in Preserving Archaeological Resources

- Comparison of past and present role of aeolian sediment in forming and protecting archaeological sites
- Monitor sediment transport rates to model potential for aeolian sediment to help preserve archaeological sites
- Evaluate effects of 2004 experiment re: improving sediment supply (dry sand bars) for subsequent transport to archaeological site areas



Non-flow Treatment of Archaeological Sites

- Since 1995, NPS and Zuni Soil Conservation Program installed ~300 check dams at 29 sites
- Pederson and others (2003) studied check dam effectiveness and concluded that basket-weave check dams appeared to be most effective and least damaging
- NPS and BOR are developing formal treatment plans for sites in Glen Canyon and Grand Canyon to include additional erosion control, plus archaeological excavation of selected sites



Recommendations

- Redesign cultural resource monitoring programs to track status and trends in cultural resource condition system-wide
- Develop a geomorphic model to evaluate/quantify linkages between sediment supply, precipitation events, human impacts, and current dam operations on erosion rates and archeological site stability
- Continue to evaluate effectiveness of erosion control measures through systematic long term monitoring and experimentation
- BHBFs under sediment-enriched conditions appear to offer best option for restoring sediment to high elevation terraces through direct deposition and aeolian redistribution - but more work is needed to evaluate the effectiveness and sustainability of this approach for achieving system-wide mitigation of dam effects.

The End

