

**1996 Summary Report:
Monitoring of Archaeological
Sites Along the Colorado River
Corridor in Grand Canyon National Park
(Cooperative Work Order 8005-8-002)**

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Table of Contents

Abstract.....	iv
List of Tables	v
List of Figures.....	vi
I. Introduction	1
II. Impacts to Cultural Resources	3
A. Summary of Impacts	3
B. Physical Impacts.....	4
C. Visitor-Related Impacts	9
D. Conclusions.....	12
III. Site Specific Results and Recommendations.....	13
IV. Management Actions Completed in FY96	80
A. Monitoring	80
Site Selection	80
Site Schedules.....	80
Field and Lab Methods	81
Photographic Documentation	82
B. Surface Analysis Units.....	83
C. Stationary Cameras	84
D. Total Station Mapping	85
E. Remedial Actions	86
Collections	86
Test Excavations for Eligibility.....	87
Data Recovery.....	88
Trail Work.....	88
Checkdam Installation	89
V. Management Recommendations for FY97	91
A. Measures to Reduce Site Impact.....	91
Obliterating Trails and Retrailing.....	91
Stabilization	91
Checkdams.....	91
Plant Vegetation.....	91
B. Measures to Protect Site Integrity.....	92

Data Recovery.....	92
C. Summary of Recommendations	92
D. FY97 Work Plan	95
Trip Dates and Site List	95
Remedial Actions.....	97
Monitor Form Updates.....	99
Data Archive	99
VI. References Cited.....	102
VII. Appendices	105
A. All Sites Monitored and Monitoring Schedule	106
B. FY96 Site Monitoring Form.....	109
C. C:13:010	110
D. Checkdam Site Maps	111

Abstract

This report summarizes archaeological monitoring and remedial action activities conducted during fiscal year 1996 (October 1, 1995 - September 30, 1996) as outlined by the Programmatic Agreement for the operations of Glen Canyon Dam. This work was conducted by a team of archaeologists and archaeological technicians from Grand Canyon National Park and Northern Arizona University. Physical (geologic forces related to dam operations or natural processes) and visitor-related (directly resulting from human visitation) impacts were observed and evaluated at sites previously identified along the Colorado River corridor within Grand Canyon National Park. Monitoring revealed that 95% of 142 sites visited during FY96 have some form of physical and/or visitor-related impact.

The monitoring results and subsequent recommendations are outlined for each archaeological site monitored in FY96. In addition to monitoring, the project incorporates total station mapping, stationary cameras, geographic information systems, repeat photography, and remedial actions. Remedial actions were implemented at twenty-seven separate locations. The FY97 work plan includes recommendations for additional remedial actions on a priority ranking basis, video and medium format photography, continued incorporation of the archaeological database with GIS information, and monitoring of selected sites.

List of Tables

1. Frequency of physical impact types.....	5
2. Frequency of increased impact episodes at sites monitored in FY96.....	8
3. Frequency of visitor-related impact types	10
4. Frequency of visitor-related impacts at various site features	12
5. Total station maps completed	86
6. Sites selected in FY96 for retrailing or trail obliteration.....	89
7. Recommended measures to reduce site impact	92
8. Recommendations and priority ranks resulting from the FY96 sites monitored	93
9. Sites scheduled to be monitored in FY97	96
10. Priority 1 sites recommended for protection measures.....	97
11. Priority 1 sites for reducing impacts.....	98

List of Figures

1. Relative frequency of physical impacts	6
2. Physical impact frequency to features.....	7
3. Collection pile at Unkar Delta	11
4. A:15:005: Human Trailing at Locus C	14
5. Rills impacting Feature 2 at A:15:037	18
6. A:16:180: Feature 1, fire-cracked rock and charcoal impacted by an active gully.....	25
7. B:14:105: A roasting feature impacted by on-site camping and trailing	31
8. C:02:096: Profile of exposed materials.....	35
9. C:02:096: Charcoal lens in arroyo	35
10. Graffiti at C:06:005	37
11. C:09:051: A side canyon flood removing a portion of feature 3	39
12. C:13:098: A photo comparison of changes to an artifact pile.....	48
13. C:13:291: A photo comparison of an eroding wall and structural post	52
14. C:13:349: An active arroyo exposing features and artifacts	58
15. C:13:349: The headcut of an active arroyo.....	59
16. C:13:389: A photo comparison of a structure impacted by visitors.....	67
17. G:03:003: A photo comparison of a trail before and after obliteration.....	69
18. G:03:055: Rodent burrowing which as the potential to impact fire-cracked rock and charcoal.	75
19. G:03:072: A photo comparison of the movement of fire-cracked rock in an active gully.....	78
20. Photographic documentation crew using a medium format camera and a tripod	82
21. B:10:230: Sandal collected and curated at Grand Canyon National Park	87

I. Introduction

From August 1990 through May 1991, the National Park Service (NPS) conducted an intensive archaeological survey along the Colorado River corridor from the base of Glen Canyon Dam to Separation Canyon. The impetus for this survey was the Bureau of Reclamation's (BOR) need to provide an environmental impact statement (EIS) on resources affected by operations of Glen Canyon Dam (BOR 1995). The survey and ensuing report (Fairley et al. 1994) identified 475 archaeological sites, 336 of which are located in areas potentially impacted by dam operations. This site information is the baseline database for the River Corridor Monitoring Project (RCMP).

In 1992, a monitoring program began to evaluate the on-going condition of the 336 sites affected by Dam operations through documentation of physical and visitor-related impacts. The closing of fiscal year 1996 (FY96) marks the completion of the fifth year of the RCMP. A total of 142 individual sites were visited during FY96, eight monitored twice for a total of 150 monitoring episodes.

In addition to regular monitoring activities, improvements were made in FY96 in both data and field management techniques. ArcView, a geographic information system (GIS) software has been added as a laboratory tool. This software enables the project to link the entire project site database with site maps and UTM coordinates. With this new technology, we have incorporated remedial actions such as stabilization or trail work onto existing topographic maps, and we are now able to view a time series of changes to sites. We can also view specific site features in conjunction with contours and Glen Canyon Environmental Studies (GCES) survey data points. Future plans include the addition of selected site photographs to the GIS database and the use of CD-Rom for archival purposes.

In the field, we have monitored, at least once, all but 24 of the 336 sites originally identified within the zone impacted by dam operations. In FY96, we completed our second year of implementing remedial actions. Stabilization focused on twenty-seven sites with severe erosional impacts. Though it remains too early to be certain, the success of these projects appears evident. Medium format photography continues to be utilized and techniques for successful repeat photography have improved. After several meetings in-house and consultation with the Programmatic Agreement representatives, the project is in the process of terminating the use of surface analysis units as a tool for quantifying change on-site. The utility of stationary cameras is also being discussed. GCES surveyors are participating in monitoring trips and continue to gather survey point, GPS, and total station mapping data. We have determined that total station maps will be generated for control group sites and at sites where remediation occurs, to document before and after conditions.

Various members of the RCMP participated in consultation trips during FY96. Two letters to the Colorado River Guides Newsletter were written by the Paiute Consortium and the Hualapai concerning certain locations on the river. Tribal and a Guides Training Trip along the river corridor utilized project consultation and expertise.

Fiscal year 1996 was the first year that Grand Canyon experienced a dam generated spike (or research) flow of water emitted from Glen Canyon Dam. In preparation for the research flow, the project participated in several remedial actions including data recovery at three locations, repeat photography of pre- and post-flow results, and the placement of semipermanent photo points. The Goodding Willow stabilization project at Granite Park Wash was directly related to research flow impacts. Aerial photographs and video taken during the research flow will be utilized by the project to better understand high water flow and its effects on landforms with cultural deposits along the river corridor. The results from the research flow are written in separate reports and will be sent to Programmatic Agreement members December 31, 1996.

Each year, we gain a better understanding of erosional processes along the Colorado River corridor and their relationships to archaeological sites. Our scope of work for FY96 includes monitoring, remedial actions, surface analysis units, stationary cameras, and total station mapping. The FY97 work plan outlined in Chapter VII includes continued monitoring of selected sites and remedial actions. Detailed mapping and additions to our GIS database are also discussed.

II. Impacts to Cultural Resources

A. Summary of Impacts

The River Corridor Monitoring Project identifies and monitors impacts on cultural resources both directly and indirectly related to Glen Canyon Dam operations. The existence of Glen Canyon Dam potentially threatens cultural resources along the Colorado River corridor because it is a sediment barrier, preventing replenishment of sand to beaches, dunes, and terraces. Natural cycles of deposition no longer occur in the magnitudes of pre-dam times. The lack of major periods of natural deposition result in the changing stability of landforms along the river, thus cultural resources stratified within or on unstable landforms are subject to ongoing erosion. Additionally, consistent river flows, as generated by dam operations, have led to a geometric increase in the number of humans visiting the river corridor. Increased visitation threatens resources as visitors hike and camp on or near cultural resources. River flows have a direct impact on accessibility and camping along the river corridor. This section outlines and evaluates these impacts.

The project utilizes two forms of exploratory data analysis (EDA) to view and present the monitoring dataset. The frequency tables are collapsed versions of the eight impact variables identified on the monitoring form. These tables display the presence and absence of impact types, and are a numeric representation of the dataset. Relative frequency pie charts are visual displays of the dataset. These charts display the occurrence of impacts or the relative percentage of impacts for all observations. The two methods of EDA are comparable and reveal the same results.

The majority of impacts are concentrated within Reach 5 and Reach 10. These Reaches also reflect the highest site densities in the project area. Reach 5 is the most open and alluviated stretch in Grand Canyon, meandering for 15.9 miles. Broad alluvial terraces and debris fans suitable for farming and settlements dominant the landscape. This Reach has the highest concentration of prehistoric structural sites, and several routes which descend to the river from both the south and north rim of the canyon. Multiple access means there is a historic component to the Reach with several historic structures throughout the area. Nearly 18% of sites identified during the survey are located in Reach 5, the highest site density in Grand Canyon.

Reach 10 is a 53.9 mile stretch of river consisting of alluvial debris fans. Pliocene and Pleistocene basalt flows dammed the river channel repeatedly forcing new channels around plugs, resulting in a much wider canyon. Several faults cross-cut the corridor in this region, thus several trails exist from river to rim. Roaster complexes and camps are the dominant site type and are seen at an average of 2.4 sites per mile, the second largest site density along the river corridor.

Wide open terraces, multiple access, and high site densities are ideal conditions for visitors exploring the canyon. This, accompanied by fragile soils and overall sediment depletion, contribute to site deterioration in Reaches 5 and 10.

B. Physical Impacts

The monitoring program which began in 1992 outlined impacts to cultural resources along the Colorado River corridor. With only slight modification since, eight key physical impacts have been identified and monitored. These impacts commonly occur in the canyon environment and can be easily identified by monitors. Physical impacts include erosional processes induced by rain, wind, river flow, gravity, dam operations, and animals. Impacts such as bank slumpage, gullyng, and arroyo cutting are more directly related to dam operations on the basis of drainage systems feeding into the river, actively working to achieve base-level with the river.

Physical impact categories include: surface erosion, gullyng, arroyo cutting, bank slumpage, eolian/alluvial erosion or deposition, side canyon erosion, animal-caused erosion, and an "other" category. Surface erosion includes channels, rills, or sheetwashing on the surface of the ground to a depth of ten centimeters. Gullies are channels or trenches cut into the surface from ten centimeters to one meter in depth. Arroyos are entrenched gullies, channeling deeper than one meter below the surface. Bank slumpage is sinking or collapsing terrain bordering the river or other prominent drainage systems. Eolian sediments are borne, deposited, or eroded by wind processes. Alluvial sediments are deposited or eroded by running water. Side canyon erosion includes rain-induced flash flooding and debris flows deriving from side canyons which drain into the Colorado River. Animal-caused erosion consists of digging, burrowing, nesting, or trailing into, across, or adjacent to cultural features. The "other" category includes unspecified impacts such as rock spall onto features or roots imbedding cultural deposits.

Monitoring data reveal the presence of active erosional processes at 89% of all FY96 sites monitored. This number has increased dramatically over previous years, 76% in FY95 and 77% in FY94. Surface erosion has consistently been the most commonly observed form of erosion. In FY96, 68% of the 150 monitoring episodes recorded the presence of surface erosion at cultural features. This number has increased since FY95 when surface erosion was observed in only 45% of the monitoring sample. Further data analysis is necessary to determine to what extent observer bias influences results. Analysis will reveal if results are a product of more consistency in monitoring protocols and personnel.

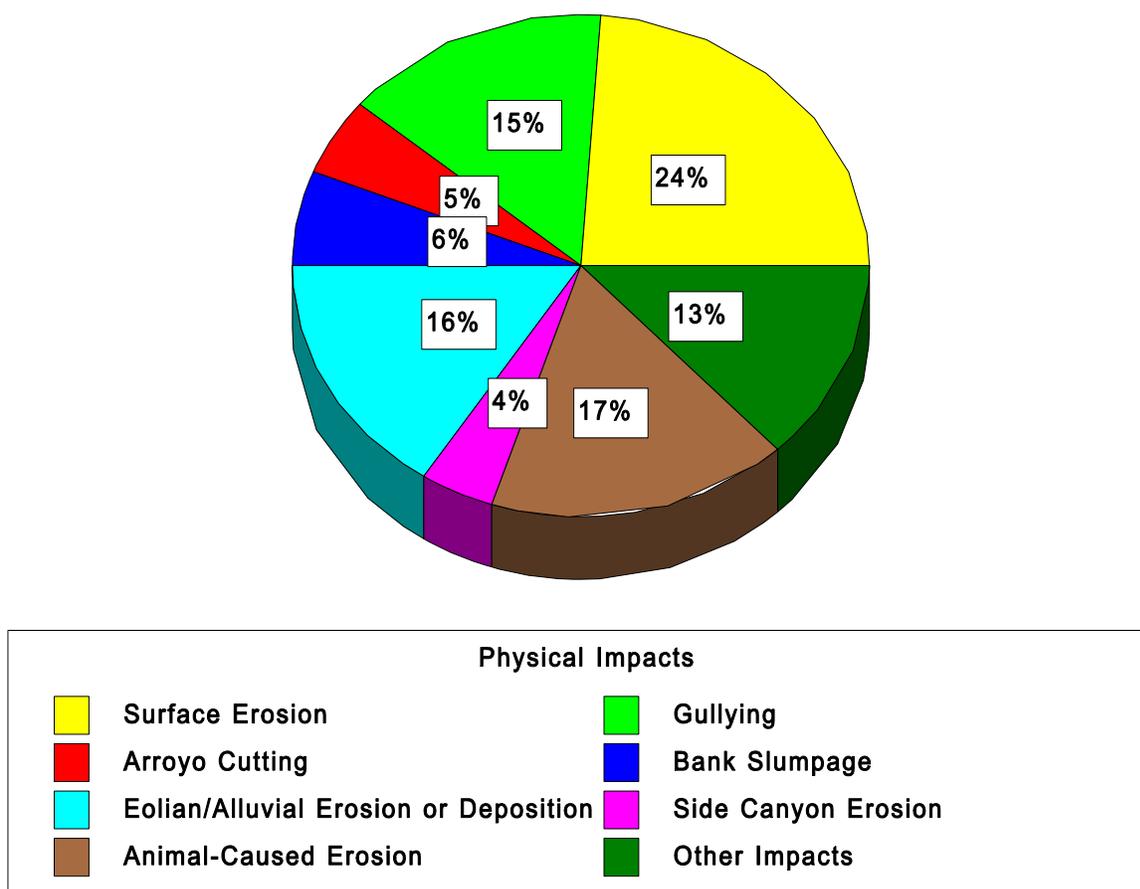
The remaining physical impacts observed in order of rank are: animal-caused erosion (53%), gullyng (48%), eolian/alluvial deposition or erosion (45%), "other" impacts (40%), bank slumpage (17%), arroyo cutting (14%), and side canyon erosion (14%). Table 1 outlines the frequencies and percentages of physical impact types.

**Table 1. Frequency of Physical Impact Types
(N = 150 Monitoring Episodes)**

Physical Impact Types	Present		Absent	
	Freq.	Percent	Freq.	Percent
Surface Erosion	102	68	48	32
Gullyng	72	48	78	52
Arroyo Cutting	21	14	129	86
Bank Slumpage	26	17	124	83
Eolian/Alluvial Erosion or Deposition	67	45	83	55
Side Canyon Erosion	21	14	129	86
Animal-Caused Erosion	80	53	70	47
Other	60	40	90	60

Figure 1 shows the relative frequency of physical impact observations (N = 851). The 851 observations are the number of times any physical impact was present during monitoring activities. This dataset is derived from the physical impact matrix on the monitoring form. It is important to note that sites oftentimes are affected by more than one impact type. For example, surface erosion, arroyo cutting, and animal-caused erosion may all be observable at one site. If and how these impacts are related, and developing a priority for remediation is all part of the proper management of river corridor cultural resources. This representation accounts for each individual occurrence of physical impact.

Figure 1. Relative Frequency of Physical Impacts

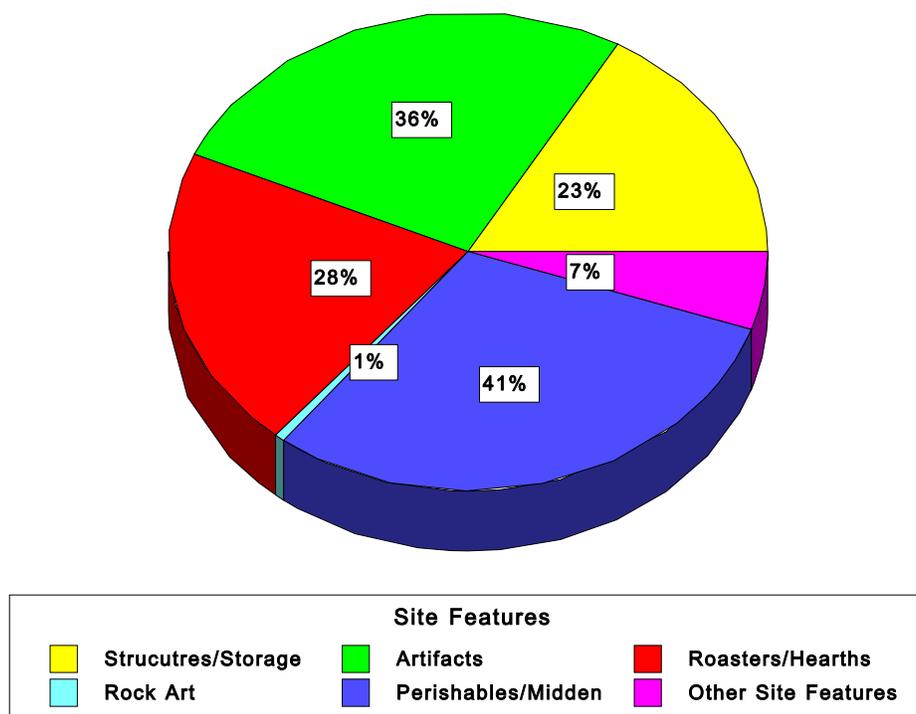


(N = 851 Observations)

The location of impacts on a site is crucial to understanding the nature and severity of the impacts. Locational data also aid managers in determining a ranking of impacts to select sites for remediation. Figure 2 shows the frequency of physical impacts to various cultural features. The highest frequencies of physical impacts occur at perishable/middens, artifact scatters, and roasters/hearths. These site types are not the most common to the river corridor but are the most vulnerable. Slight disturbances often result in observable impact to these fragile features.

Rock art has the least amount of physical impacts. Rock art sites are often located on boulders and canyon walls where erosional processes are not a source of impact. The most common impact to rock art sites is from visitor-related impacts (trailing, graffiti).

Figure 2. Physical Impact Frequency to Features



(N = 851 Observations)

The terminus of arroyos or gullies on-site is always noted by monitors. When water systems impacting site features drain into the river, it is assumed that lowering the river's base-level via dam operations directly effects the site. Hereford et al. (1993) state that any base-level lowering geometrically increases erosion in channels. River-based channels have the potential to directly effect site integrity. Forty sites (27%) monitored in FY96 have river-based drainage systems.

While it is easy to equate the presence of river-based systems with impacts from dam operations, terrace-based streams and channels should not be overlooked. Often, it is the terrace-based systems which have the potential for the greatest loss of crucial sediments, particularly as they work their way closer to the river in the process of becoming a river-based system (Hereford et al. 1993). Terrace-based systems are actively moving towards the river. In the absence of replenishing sediments, erosional impacts at these sites are also associated with the existence of Glen Canyon Dam.

Identification of physical and/or visitor-related impacts is the primary task of monitoring activities. This information is then used to initiate and implement management actions. What is to be done if previously identified impacts have increased in the period between monitoring episodes? These data alert cultural resource managers to increasing threats to sites. Knowing the location of increasing impacts and where on-site specific increases have been observed, aids managers in preservation and remediation decisions. Table 2 outlines the frequency of increased erosional episodes by physical impact category and on-site feature. The number of observations equals 211, and is a function of the subset of the total monitored sites with increased impacts. Artifact scatters and roasters/hearths receive the most impact from increased erosion with 135 (64%) of the 211 observations noted at these features.

**Table 2. Frequency of Increased Impact Episodes
at Sites Monitored in FY96
(N = 211 Observations)**

Physical Impact Types	Site Features						Total Row	Percent Row
	Structures /Storage	Artifacts	Roasters /Hearths	Perishables /Midden	Rock Art	Other		
Surface Erosion	14	21	18	2	0	6	61	29%
Gullying	6	11	14	3	0	3	37	18%
Arroyo Cutting	2	3	5	1	0	2	13	6%
Bank Slumpage	3	6	8	1	0	2	20	9%
Eolian/Alluvial Erosion or	12	14	10	0	0	2	38	18%

Deposition								
Side Canyon Erosion	0	1	0	0	0	0	1	1%
Animal-Caused Erosion	5	7	9	2	0	3	26	12%
Other Impacts	4	4	4	1	0	2	15	7%
Total Column	46	67	68	10	0	20	211	100%
Percent Column	22%	31%	32%	5%	0%	10%		

Forty-nine percent, or 73 sites with physical impacts have been impacted in the time since the previous monitoring episode. In other words, nearly one half of FY96 monitored sites now exhibit some new form of erosional impact since the last observation. Lack of rain and decreasing vegetation, coupled with an overall increase in river corridor visitation all are contributing factors in understanding the recent, rising occurrence of erosional processes in Grand Canyon.

There are 57 sites (38%) exhibiting increased erosion. Surface erosion, gullying, and eolian/alluvial erosion or deposition have increased the most. This observation is analogous to that of FY95. Reaches 5 (river mile 61.5 - 77.4) and 10 (river mile 160.0 - 213.9) continue to have the highest number of sites with increased erosional processes on-site. Sites in Reach 5 make up 47% of the sites with increased erosion on-site. Reach 10 sites comprise 25% of all sites with erosional impact increases.

C. Visitor-Related Impacts

Visitor-related impacts break down into five separately identifiable types. Impact types include trail development leading to or through archaeological sites, artifact displacement by creating collection piles, recreational camping on or near sites, vandalism (the intentional destruction, i.e. graffiti, or removal of artifacts or features) and an "other" category. These impacts have been identified as pervasive along the river corridor, and are indirectly a result of the existence of Glen Canyon Dam.

Seventy-six (51%) sites showed some form of visitor-related impact. Since 1992, trailing has consistently been the most frequently observed visitor-related impact (Coder et al. 1995, 1994, 1993, 1992). This year is no different, 63 (42%) of the 150 monitoring episodes recorded the presence of human-made trailing on or through archaeological features. This number is down 12% from FY95's documentation. The majority of trails are made by river-runner parties and scientific researchers. Monitoring human trails through sites is crucial to prevent further impact because trails oftentimes become entrenched, creating gullies and additional erosion. In addition to our findings, this type of occurrence has been thoroughly documented since the early 1980s by GRCA park-based monitoring programs.

Table 3 shows the frequency of visitor-related impacts. Aside from trailing, collection piles are the second most frequently observed impact (11%). Both on-site camping and criminal vandalism have increased in frequency during FY96. Camping was observed during 7% of monitoring episodes, a 2% increase from FY95. Vandalism occurred at 2% of monitoring episodes, a 1% increase from FY95.

**Table 3. Frequency of Visitor-Related Impact Types
(N = 150 Monitoring Episodes)**

Visitor-Related Impact Types	Present		Absent	
	Freq.	Percent	Freq.	Percent
Collection Piles	16	11	134	89
Trails	63	42	87	58
Camping on-site	11	7	139	93
Vandalism	3	2	147	98
Other	11	7	139	93

Sixty-eight percent of the archaeological sites with trailing present are located in Reaches 5 and 10. These two Reaches continue to be the loci of trail activity, as observed in FY95 and FY94. Both Reaches have popular river-runner camps located near archaeological sites. These reaches have the highest site density per reach of any other within the project area. Monitors observed increased trailing at seven sites: C:13:005, C:13:070, C:13:099, and C:13:100 in Reach 5, A:15:005 and G:03:026 in Reach 10, and B:14:105 in Reach 7.

Decreased trailing occurred at two sites: C:09:067 in Reach 4 and G:03:020 in Reach 10. The observed decreases are not a result of remediation work at these sites but rather natural vegetation growth and movement of sediments.

Eighty-eight percent of the collection piles observed occurred in Reaches 5 and 10. Collection piles are present on thirteen sites: seven in Reach 5, four in Reach 10, one in Reach 4, and one in Reach 11. There was an increase in piles at A:16:004 in Reach 10 and C:13:070 in Reach 5, and a dispersement of the collection pile of manos at A:15:017. Overall, the occurrence of collection piles has decreased 1% over FY95.

River corridor monitors are not responsible for the collection pile dispersal, yet, it is the policy of the project to disperse minor collection piles. Monitors have noticed that left undispersed, collection piles function as magnets. Visitors to sites with collection piles continuously add artifacts to the growing display. Figure 3 is one example of the potential results of unchecked collection piles.

Figure 3. Collection pile at Unkar Delta

Nine instances of on-site camping were observed by monitors during FY96. Seventy-three percent of the occurrences were located in Reach 5. The presence of camping was noted at six sites: Four in Reach 5, one in Reach 11, and one in Reach 10. Increased camping was observed at five sites: B:14:105 in Reach 7 and C:13:005, C:13:338, C:13:340, and C:13:389 in Reach 5. On-site camping has increased 2% since FY95.

Criminal vandalism occurred at three sites: C:02:094 in Reach 1, C:06:005 in Reach 2, and G:03:004 in Reach 10. These three sites are unique from the single occurrence of vandalism at C:02:098 observed during FY95. All criminal vandalism observed in FY96 was in the form of graffiti at sites with rock art.

Out of a total 150 monitoring episodes, 37 new visitor-related impacts were observed. This means that 25% of the visitor-related impacts occurred since the last monitoring visit. This number is roughly equivalent to previous years (25% in FY94 and 28% in FY95). Sixty-eight percent of the sites with new visitor-related impacts were located in Reaches 5 and 10.

The location of impacts on-site is an important component of data gathering. This information aids

managers in understanding the nature of the impacts and recognizing the best ways to reduce such impacts. Table 4 shows the location of visitor-related impacts on various site features. The highest frequency of impact occurs to artifacts, structures, and roasters. "Other", rock art and perishable features received the least amount of visitor-related impact. However these last three features are the least common along the Colorado River corridor.

**Table 4. Frequency of Visitor-Related Impacts at Various Site Features
(N = 150 Monitoring Episodes)**

Site Features	Present		Absent	
	Freq.	Percent	Freq.	Percent
Artifacts	31	21	119	79
Structures/Storage	18	12	132	88
Roasters/Hearths	17	11	133	89
Other	4	3	146	97
Perishables/ Middens	4	3	146	97
Rock Art	3	2	147	98

D. Conclusions

In FY96, a total of 150 monitoring episodes occurred. Ninety-five percent of sites monitored in FY96 show signs of physical and/or visitor-related disturbances. Physical impacts are more ubiquitous, occurring in 89% of the sites, while 51% of sites have some form of visitor-related impact. Fifty percent of the physical impacts observed were new since the previous monitoring episode. This phenomenon was observed in 25% of sites with visitor-related impacts. The overall increase is contingent upon several factors, i.e., interpretation, drought, less vegetation, more researchers, etc. The synthetic report will be written to address and explain long-term processes impacting river corridor cultural resources.

Artifact scatters and roasting features continue to experience the most damage from physical impacts such as surface erosion and visitor-related impacts like trailing. These features are oftentimes located in or on sand dunes or alluvial terraces, threatened by multiple trailing and surface runoff.

Artifact scatters and roasting features are horizontal features lying on the surface of the landscape. The nature of these features results in greater exposure to natural elements and human impact. The dune and terrace soil matrix is also loosely consolidated, making these landforms unstable. Slight changes to an area, such as increases in erosion or visitation, may result in severe impacts.

III. Site Specific Results and Recommendations

Section III describes the individual sites monitored in FY96, in alphanumeric order. Previous work conducted at each site is summarized, along with the frequency of monitoring. Finally, the current status of erosional and/or visitor-related impacts at the sites are included, and recommendations made for additional work. More detail concerning remedial work performed in FY96 can be found in Section IV, Management Actions Completed in FY96. Section V, Management Recommendations for FY97, describes site protection and impact reduction methods planned for selective sites along the river corridor.

A:15:003

A:15:003 is a roasting complex containing Virgin Anasazi, protohistoric Pai, and Paiute features and artifacts. The site is located at the mouth of a major side canyon which was a conduit for prehistoric travel across the river. This site is situated on a high alluvial terrace abutting local cliffs.

PREVIOUS WORK: The site was originally recorded in September, 1978 by Robert Euler. It was re-recorded by NPS survey personnel in November, 1990 and monitored in FY93, FY94, and FY96.

STATUS AND RECOMMENDATIONS: A:15:003 is currently stable with no active erosion. However, the site is located near an established river-runner's camp and is also susceptible to damage from extreme high water (in excess of 120,000 cfs) and side canyon flooding. Surface drainages located on A:15:003 generally disappear into the boulder fields before reaching the river. Some of the small gullies located on the downstream side of the site drain into the local side canyon wash periodically discharging into the river. The mouth of this canyon has developed a clay plug resulting from base-level lowering in the main river channel. The site was mapped in detail in FY95. It is recommended that A:15:003 be monitored biennially.

A:15:005

A:15:005 consists of several cleared areas located on a series of narrow benches and shallow rock shelters, special activity areas, artifact concentrations and an extensive pictograph panel. The site has Paiute and prehistoric Pai affinity as evidenced by sherds observed on the surface. The site is situated on a variety of landforms including: alluvial terrace, talus slope, cliff base, and cliff face.

PREVIOUS WORK: The site was initially recorded by Robert Euler in May, 1984 and was re-recorded in greater detail in January, 1991. A:15:005 was monitored in FY93, FY95, and FY96. The Southern Paiute Consortium also visited this location to conduct ethnographic interviews regarding the pictograph panel. This site was total station mapped in FY96.

STATUS AND RECOMMENDATIONS: The site is currently stable with regard to physical impacts. However human trailing has developed as a byproduct of visitation to the pictograph panel and this has created the potential to degrade the cultural materials located at Loci B and C.

Figure 4. A:15:005: Human trailing at Locus C

It will be difficult to curtail visitation to the pictograph panel so it is recommended that the trail be obliterated and relocated to a less sensitive spot such as the drainage bottom to avoid the fragile part of the site. Annual monitoring is recommended, including medium format photography of the pictographs.

A:15:017

A:15:017 is a rockshelter with associated lithic and ceramic materials indicating multiple occupations including a Puebloan, Southern Paiute, and an undetermined modern presence. Chipped stone and groundstone tools, and collected wood infer this was a preferred habitation to various people over the last millennium. A Jeddito Black-on-Yellow sherd suggests a protohistoric trade connection to Hopi. The site is located over 200 meters from the river and almost 50 vertical meters above the 28,000 cfs level.

PREVIOUS WORK: This site was located by Helen Fairley in October 1989 on a reconnaissance trip and revisited and recorded in greater detail by NPS survey personnel in November, 1990. The site was monitored in FY95 and FY96.

STATUS AND RECOMMENDATIONS: This site is currently stable. It will be monitored every three years as a "no impact" control group site.

A:15:018

This is a rockshelter site with groundstone, fire-cracked rock, flakes, and several associated pictograph panels. No ceramics have been observed on the surface. The pictograph panels are executed in hematite and limonite pigment and charcoal. The pigments were procured locally in the canyon possibly at site A:15:025, located two miles downstream from A:15:018. An additional element was executed in charcoal. The Southern Paiute Consortium has visited this site and conducted in-depth interviews establishing it as Paiute. The site is 40 meters from the river and six meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in November, 1990 and monitored for the first time in May, 1996.

STATUS AND RECOMMENDATIONS: It is recommended that this site be monitored on a five year schedule. It is further recommended that the pictographs be photographed in detail using a medium format camera during FY97.

A:15:022

The site consists of three distinct fire features, scattered fire-cracked rock and a surface assemblage of lithics and sherds. A single Desert Side-Notched point was located on the surface. Sherds represented by Southern Paiute, Cerbat (Hualapai), and formative Puebloan wares indicate multicomponent occupations. The site is located on a dune-covered basalt bench over 100 meters from the river 16 meters above the 28,000 cfs level .

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in January, 1991 and monitored for the first time in February, 1996.

STATUS AND RECOMMENDATIONS: The site is stable with respect to the operations of Glen Canyon Dam. Minor gullying on-site does reach the local drainage that empties into the river but it originates on a bedrock terrace so there is no effect on-site due to base-level changes in the system. Current channeling of runoff on-site does not effect cultural features. The greatest threat to A:15:022 is the combination of the long-term effect of wind deflation and locally intense rainfall. No human visitation was discernable. The current recommendation is to monitor the site on a five year interval with no remedial action warranted.

A:15:028

This site consists of three overlapping fire pits with scattered fire-cracked rock, ceramics, and

groundstone. The artifact assemblage is dominated by groundstone tools, and ceramic evidence suggests a late prehistoric - early historic Pai/Paiute occupation. The site is located on a stabilized dune underlain by locally derived debris flow deposits. Cryptogamic soil is well developed at this location and virtually covers the site.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in November, 1990 and monitored for the first time in February, 1996.

STATUS AND RECOMMENDATIONS: The site has remained stable since 1990. Feature 5 is situated in a low area that acts as a catchment for localized runoff. A small channel at this location shows no further downcutting. Two manos photographed during the survey have been moved slightly but there is no other evidence of human visitation. The soil and biotic crust on the surface is in such a fragile state that monitoring is the greatest impact. Monitoring every five years is recommended.

A:15:029

This site consists of a single roasting feature perched on a cutbank. The feature is being eroded across its entire width on the side facing the river. A game trail skirts the eastern edge. No artifacts were observed on the surface and cultural affiliation is unknown. The site is located on a dissected alluvial terrace, 40 meters from the river and approximately 13 meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in February, 1991 and monitored for the first time in February, 1996.

STATUS AND RECOMMENDATIONS: The site has remained relatively stable since the initial recording with only minor movement of rock down the slope of the cutbank. Presumably, the feature has been eroding away in incremental amounts for some time and although the year to year effect is negligible the cumulative result will be complete removal. Due to very thick vegetation and steeply inclined banks, access is difficult. Visiting the site to monitor causes impact. Monitoring every five years is recommended.

A:15:033

This site is a roaster complex situated on a stabilized dune. Artifacts reflect occupations by Puebloan and Pai (Cerbat) people. A few cans from the first half of the 20th century are also present on the surface. The closest feature is 40 meters from the river. The site ranges from 10 to 30 vertical meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in February, 1991 and monitored for the first time in February, 1996.

STATUS AND RECOMMENDATIONS: The site is generally stable due to increased vegetation since 1991. Some pedestalling of small rocks due to locally heavy rains was reported at Feature 2.

Feature 1 has a new rodent burrow. Trailing from the survey is still faintly visible on the surface. Cryptogamic soil is abundant across the site. Minor stabilization measures to the main gully near Feature 3 are recommended. This gully is currently not threatening the feature but there is a potential for impact. Monitoring the site every four years is recommended.

A:15:036

A single concentration of fire-cracked rock and an associated discard pile defines this site. A sandstone cobble mano was the only artifact observed on the surface. The site is located 45 meters from the river and nine meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in February, 1991 and monitored for the first time in May, 1996.

STATUS AND RECOMMENDATIONS: The site is stable and not being impacted by channeled runoff or directly threatened by dam operations. The only impact is from monitors disturbing the fragile soils. It is recommended that A:15:036 be placed on the inactive monitoring list.

A:15:037

This site contains four roasting features and a possible wickiup outline. Artifacts include: flakes, sherds (Hualapai, Paiute and Virgin), a biface midsection, an obsidian drill, and a crude chert point. The site is located on benches above the vegetation line at the mouth of a major side canyon over 85 meters from the river and 10 meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in April, 1991 and monitored for the first time in May, 1996.

STATUS AND RECOMMENDATIONS: A gully at the base of Feature 3 exists but is not yet incising. Small rills from local rains are present on the mounded fire-cracked rock of Feature 2. The rest of the site remains stable overall. There are no apparent increases in erosion since the survey. The only impact at this time is a faint trail from archaeological visits. It is recommended that A:15:037 be placed on the inactive monitoring list.

Figure 5. Rills impacting Feature 2 at A:15:037.

A:15:038

A single roasting feature and an artifact assemblage of Cerbat and Moapa sherds, a bead blank, an Archaic projectile point, lithic debris, and two flake tools represent this site. The site is situated on a high dune remnant 45 meters from the river and 15 meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in April, 1991 and monitored for the first time in May, 1996.

STATUS AND RECOMMENDATIONS: The up and downstream boundaries of the site are determined by mature arroyos, yet these drainages are not impacting the site. The site exhibits no discernable change since the time it was recorded over five years ago. Monitoring at five year intervals is recommended.

A:15:043

This site contains two roasting features, groundstone, lithic debris, and a cobble mano. No ceramics were observed. It is located on a dissected terrace situated on an old debris flow 26 meters from the river and eight meters above the 28,000 cfs.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in February, 1991 and monitored for the first time in May, 1996.

STATUS AND RECOMMENDATIONS: Feature 1 is located on a slope and suffers from sheetwash and gravity creep. It is also adjacent to a mature arroyo which drains into the Colorado River. The research flow of March, 1996 deposited large amounts of sand at the arroyo mouth draining the site area. It is recommended that the mouth of the arroyo be photographed in FY97 and the site be placed on the inactive monitoring list.

A:15:047

This site consists of a small isolated rockshelter 16 meters from the river containing groundstone and lithic debris. No ceramics were observed. The site is situated at the contact of a basalt flow and an

older consolidated river channel less than five meters above the 28,000 cfs level. The channel deposit is comprised of river cobbles in a clastic matrix. In 1994, several bedrock mortars were found on scoured ledges just below the site adjacent to the river. These mortars make use of natural concavities in the Muav Limestone.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in March, 1991 and monitored for the first time in May, 1996. The mortars were mapped and incorporated into the site file in October, 1994.

STATUS AND RECOMMENDATIONS: There is no evidence of erosion occurring on the floor of the rockshelter since it was recorded. Periodically, river cobbles dislodge from the roof of the shelter and fall onto the surface. The research flow of March, 1996 deposited sand on the lower ledges just upstream from the site. Monitoring the site every five years is recommended.

A:16:004

A:16:004 is an extensive area of shelters, fire features, structural alignments, and activity areas with a diverse assemblage of artifacts. There are three cultural affiliations present on site: Basketmaker III, Virgin Anasazi, and a Pai/Paiute component. The site is located on a variety of landforms, including: stabilized dunes, Tapeats rock ledges, and a flattened basalt outcrop.

PREVIOUS WORK: The site was initially recorded by Robert Euler in 1975 and recorded and mapped by NPS survey personnel in January, 1991. It was reported at this time that collection piles were observed in most of the rockshelters. The site was monitored in FY92, FY93, FY94, and FY96.

STATUS AND RECOMMENDATIONS: The bulk of the site is stable. Bighorn sheep trailing is impacting Feature 3. Feature 10 is currently stable and protected by new vegetation. Total station mapping was completed in FY95. It is recommended that only Features 7-10 be monitored biennially. Features 1-6 are located on bedrock ledges above the boundaries of the project and are unaffected by operations of the dam.

A:16:148

A:16:148 consists of a roasting feature and a sparse scatter of lithics. The site is located in the mesquite zone on a broad alluvial terrace.

PREVIOUS WORK: The site was initially recorded in November, 1990 by NPS survey personnel. The site was monitored in FY94 and FY96.

STATUS AND RECOMMENDATIONS: The site is currently stable and has developed a dense cover of grass. Minor trampling by bighorn sheep is the only impact observed. Surface runoff on

this site does not reach the river. It is recommended that A:16:148 be monitored biennially.

A:16:149

A five feature roaster complex with groundstone exists at this site. No chipped stone artifacts or sherds were observed on the surface. The site is located on a sand-covered alluvial terrace 50 meters from the river and 11 meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in November, 1990 and monitored for the first time in May, 1996.

STATUS AND RECOMMENDATIONS: Overall the site has remained stable since 1990. The gully adjacent to Feature 2 has entrenched slightly and incipient loss of sediment has occurred. Feature 1 is covered by vegetation and remains unaffected. The small drainage that separates Features 1 and 2 from Features 3, 4, and 5 was plugged at its juncture with sand from the research flow in March, 1996. Recommendations are to photograph the mouth of the local drainage, place checkdams in the gully at Locus A, and monitor the site every four years.

A:16:150

This site consists of a single concentration of fire-altered limestone cobbles adjacent to a local drainage. No artifacts are associated with the site. Cultural affiliation is unknown. The site is located 75 meters from the river and 14 meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in November, 1990 and monitored for the first time in February, 1996.

STATUS AND RECOMMENDATIONS: The feature remains intact. Local runoff is collecting on the surface, filtering through the feature and percolating out through the wall of the adjacent drainage in an erosional phenomenon known as piping and funneling. It is advised that rocks be placed in the piping to decrease erosion. Recommendations are to stabilize the piping holes and place the site on the inactive monitoring list.

A:16:153

A roaster complex with structural outlines defines this site. Artifacts include groundstone, formative grayware, Cerbat sherds, a lithic scatter, and burned bone. The site is located on an old river terrace over 75 meters from the river and 17 vertical meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in November, 1990 and monitored for the first time in May, 1996.

STATUS AND RECOMMENDATIONS: The site has remained unchanged since 1990. It is described by the monitoring team as "extremely stable." No visitation since the survey is evident.

The surface of the site is covered by a mature growth of cryptogamic soil so it is vulnerable to human trampling. The monitoring project is the greatest impact to the site. The recommendation is to place A:16:153 on the inactive monitoring list.

A:16:154

This site contains a large southeast-facing rockshelter situated in the Bright Angel Shale. Two distinct fire features and associated activity areas are present. Artifacts include Paiute indented and a single Jeddito Plainware sherd, a sandstone grinding slab, lithic debris, and an abundance of cracked bone. The site is located 18 meters from the river and eight meters above the 28,000 cfs level.

PREVIOUS WORK: This site was initially recorded by NPS survey personnel in November, 1990 and monitored for the first time in February, 1996.

STATUS AND RECOMMENDATIONS: The site has remained stable since the survey. Some minor small mammal burrowing was noted in the back of the rockshelter. The Jeddito sherd could not be relocated. Because of the stable nature of the site, the current recommendation is to monitor the site every five years.

A:16:156

This site consists of a temporary-use rockshelter with an associated flake scatter. No tools or sherds were observed. The site is situated in an outcrop of columnar basalt nearly 300 meters from the river and over 50 vertical meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in November, 1990 and monitored in FY95 and FY96.

STATUS AND RECOMMENDATIONS: The site is stable and located beyond the impact zone of dam operations. Monitoring will continue every three years as a control group site.

A:16:157

A small rockshelter with two roasting features represent this site. Artifacts are dominated by groundstone with lesser amounts of lithic debris and a few sherds (corrugated graywares and Cerbat Brownware). The site is located at the base of a Muav Limestone cliff and an adjacent talus slope. Feature 2 is the closest to the river at a distance of 45 meters and 14 meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded in December, 1990 and monitored for the first time in May, 1996.

STATUS AND RECOMMENDATIONS: The rockshelter is highly impacted by animal digging and burrowing, and is used as a carnivore den. Spall from the walls of the shelter is also occurring. The two roasting features are currently stable and are threatened only by gravity creep on the talus slope. The site is not affected by dam operations. The recommendation is to place A:16:157 on the inactive monitoring list.

A:16:159

A:16:159 consists of a rockshelter with an artifact assemblage of sherds, lithics, groundstone and hand tools in association with a small pictograph panel. Ceramic evidence indicates Pai affinity with a possible earlier Virgin Puebloan presence.

PREVIOUS WORK: This site was initially recorded in November, 1990. A:16:159 has been monitored at least annually since 1992.

STATUS AND RECOMMENDATIONS: The site is currently stable, but receives more visitation than previously. A Moapa spindle whorl observed during the survey has subsequently been hidden or removed. In FY95, a projectile point was found on the surface. Occasionally, trash is found on-site. It is recommended that the site be monitored annually and spot checked as often as is practical.

A:16:161

This site consists of two rock alignments, a light lithic scatter, biface fragments, and two bedrock mortars. The site is situated on a heavily vegetated terrace with some deposition of silty sand. It is located 25 meters from the river and eight meters above the 28,000 cfs level.

PREVIOUS WORK: The site was recorded in December, 1990 by NPS survey personnel and monitored for the first time in May, 1996.

STATUS AND RECOMMENDATIONS: Cryptogamic soil covers most of the terrace and the site is unchanged since 1990. A brittle bush at Feature 1 has died. The site is described as "extremely stable" by the monitoring team. The greatest threat to the site is currently the monitoring impact to the surface. It is recommended that A:16:161 be placed on the inactive monitoring list.

A:16:167

A:16:167 consists of five separate roasting features spread over about a half an acre of stabilized dune surface. Artifacts present on-site include: flakes, a ground slab, and a cobble hand tool. The assemblage indicates a Pai/Paiute occupation. Buried materials are probably present.

PREVIOUS WORK: This site was initially recorded in December, 1990 by NPS survey personnel and monitored in FY93, FY94, and FY96.

STATUS AND RECOMMENDATIONS: The site is presently stable. Some surface runoff reaches

the river by way of a side canyon drainage. It is recommended that the site be monitored biennially to avoid impacts from the project.

A:16:172

This site consists of two components, a prehistoric petroglyph panel and 20th century inscriptions (initials and dates) with artifacts dating to the 1930s. The site is located under adjacent overhangs 35 meters from the river and eight meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS personnel in December, 1990 and monitored for the first time in May, 1996.

STATUS AND RECOMMENDATIONS: The site is very stable. No changes in natural impacts were noted since 1990. The site is visited by river-runners, but this visitation has not affected the integrity of the panels or the surface. The Southern Paiute Consortium has recommended that the prehistoric panel be photographed in black-and-white and color film using medium format photography. It is recommended that the site be monitored every five years.

A:16:174

A:16:174 consists of two artifact concentrations, a large roasting feature, and scattered heat-treated rock. The site has Pai affinity and is situated on an alluvial terrace abutting steep slopes and local cliffs of conglomerate. Shallow overhangs provide some shelter.

PREVIOUS WORK: This site was initially recorded by NPS survey personnel in December, 1990 and monitored in FY93, FY94, and FY96.

STATUS AND RECOMMENDATIONS: Surface runoff at this location does not drain directly into the river. The small gully in front of the rockshelter remains unchanged since 1994. The roasting feature is stable due to a thick cover of vegetation at the base of the adjacent slope. Monitor this site biennially.

A:16:179

This site consists of six red (hematite) and yellow (limonite) vertical lines with some intersecting lines. The pictographs are associated with a small smoke-blackened rockshelter. No artifacts have been observed. The site is proximal to a large warm riverside spring. It is situated at the base of a Muav Limestone cliff in conjunction with an old debris flow. The vegetation is thick but there is access to the site via a trail beginning just beyond the bedrock at river level. The panel is located over 80 meters from the river and 12 meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded in April, 1991 and monitored for the first time in May, 1996. The Southern Paiute Consortium visited the site in September, 1994.

STATUS AND RECOMMENDATIONS: The site is currently stable. Visitation is evidenced by the presence of three geodes placed at the base of the Mauv Limestone and a well-travelled trail. The pictograph should be photographed using a medium format camera. This site is out of the zone of impact and will be discontinued from the river corridor monitoring program.

A:16:180

This site consists of two distinct roasting features and flakes. It is situated on a sandy terrace 25 meters from the river and 12 meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in January, 1991 and was monitored for the first time in May, 1996.

STATUS AND RECOMMENDATIONS: Feature 1 has been heavily impacted by surface erosion, gulying, and bank slumpage since 1991. Feature 2 is unchanged. Sand was deposited in the mouth of the drainage below the site during the research flow of 1996. It is recommended that this site be assessed for the feasibility of checkdams to curtail erosion at Feature 1 and data recovery. The mouth of the drainage should also be photographed. A carbon sample should be taken in FY97. Monitor this site biennially.

Figure 6. A:16:180: Feature 1, fire-cracked rock and charcoal impacted by an active gully.

A:16:184

This site is a 20th century hiking camp consisting of a single fire ring and artifacts including cans and a pickle jar with a note. The note reveals that the camp was used by a Mormon church group out of St. George, Utah and is dated April 23, 1948. The site is located on a sandy terrace over 70 meters from the river and 13 meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in January, 1991 and monitored for the first time in May, 1996.

STATUS AND RECOMMENDATIONS: The site is very stable. The jar remains intact. The only degradation observed is the partial disintegration of the note inside the jar. The site is located above the mesquite zone and not threatened by dam operations. It is recommended that A:16:184 be placed on the inactive monitoring list.

B:09:315

This site consists solely of the remnant of a dry-laid wall and a single flake. The wall is located on a limestone ledge 25 meters from the river and nine meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in February, 1991 and monitored for the first time in May, 1996. The site was tested for significance in 1994 and was determined to be ineligible for nomination to the National Register of Historic Places.

STATUS AND RECOMMENDATIONS: This site has been deemed ineligible by SHPO, due to a lack of deposition, and its location on bedrock. It is recommended that B:09:315 be removed from the monitoring program.

B:09:317

B:09:317 is located at the mouth of a major side canyon. The site consists of two separate loci, one on each side of the drainage. An intact fire feature, lithics, groundstone, and a projectile point were recorded during the survey. The site is situated on a bedrock bench where the cliffs meet the top of the talus. Runoff does not drain directly into the river.

PREVIOUS WORK: This site was initially recorded by Janet Balsom in 1986 and included the

upstream locus. The site was re-recorded in November, 1990. B:09:317 has been monitored at least annually since FY92.

STATUS AND CURRENT RECOMMENDATIONS: The site is currently stable concerning physical impacts. However, the surface is being adversely impacted from a steady stream of visitation. The site suffers to a greater extent because of its proximity to a highly-used camping beach. B:09:317 is located on Hualapai Tribal lands and therefore management actions need to be coordinated with the Hualapai Historic Preservation office. It is recommended that the trail be obliterated leading to the site and that monitoring take place biennially.

B:09:319

This site consists of three ephemeral walls and lithic artifacts. The site is located in a shallow limestone overhang 25 meters from the river and nine meters above the 28,000 cfs level. It has been scoured by flooding at some point prior to construction of the dam. Deposition on-site is marginal, only a few centimeters thick, and comprised of reworked river sand.

PREVIOUS WORK: The site was recorded by NPS survey personnel in February, 1991 and monitored for the first time in May, 1996. The site was tested for significance in March, 1994.

STATUS AND RECOMMENDATIONS: SHPO has made a determination of ineligibility for this site. It is recommended that B:09:319 be removed from the monitoring program.

B:10:111

B:10:111 is a group of three roasting features in various states of deterioration. No other materials are present on the surface. Cultural affiliation is unknown. Runoff drains directly into the river.

PREVIOUS WORK: This site was initially recorded by NPS survey personnel in October, 1990 and monitored in FY93, FY94, and FY96.

STATUS AND RECOMMENDATIONS: Natural slope creep, runoff, and localized channeled flow are slowly eroding the features downslope. B:10:111 is associated with a larger habitation site located in the same drainage, though out of the project area. It is recommended that this site be assessed for stabilization and possibly data recovery. Monitor this site biennially.

B:10:121

B:10:121 is a small structural site located in a major side canyon. The site consists of a slab-coursed set of three walls which make use of an isolated boulder to create a room. A single corrugated sherd and one Redwall chert flake were the only artifacts observed.

PREVIOUS WORK: This site was initially recorded in 1990 and monitored in FY95 and FY96.

STATUS AND RECOMMENDATIONS: The site is currently stable and shows no adverse impacts. B:10:121 belongs to the "N" group. Due to its fragility, recommend monitoring every three years as a control group site.

B:10:230

B:10:230 is a rockshelter/habitation with an intact midden and artifact assemblage including: cobble tools, a flake scraper, a projectile point, burned stone, bone, sherds, and a woven fiber sandal. The sherds indicate a Puebloan and a later Paiute occupation.

PREVIOUS WORK: This site was initially recorded by NPS personnel in March, 1991 and monitored in FY95 and FY96. In FY95, a complete yucca fiber sandal was observed eroding from the fill. It was photographed, sketched, and then reburied where it was found. In FY96, the sandal was collected and is curated at Grand Canyon National Park based upon the recommendations of the PA representatives.

STATUS AND RECOMMENDATIONS: The site is currently being impacted by wall spall, animal burrowing, minor surface erosion across the midden and slope creep. Some downslope movement of artifacts occurred on-site since it was recorded in 1991. It appears that nobody has been to this location since that time. Site B:10:230 will be monitored every three years as a control group site.

B:10:231

This is a sparse scatter of wood and metal fragments situated on the steep rocky slope below Deer Creek. The location is in the upper portions of the high water zone for the floods of the 1920s and 1950s.

PREVIOUS WORK: This site was initially recorded by NPS survey personnel in 1991 and monitored for the first time in February, 1996.

STATUS AND RECOMMENDATIONS: The scatter is unchanged in configuration since it was recorded, and no impacts were observed. It is recommended that B:10:231 be placed on the inactive monitoring list.

B:10:236

B:10:236 is a light-density lithic scatter with two fire features and several tools. Tools include, a side-notched projectile point, a biface, a chopping/pounding tool, and a chert core. No sherds were observed on the surface and the tools present indicate a possible Archaic affinity.

PREVIOUS WORK: This site was recorded in September, 1990 and monitored in FY95 and FY96.

STATUS AND RECOMMENDATIONS: The site is currently stable with no indication of visitation

since it was recorded. B:10:236 is above the 300,000 cfs level but will be monitored every three years as a control group site.

B:10:237

An open roaster complex with lithic debris and PII sherds defines this site. It is situated on a dune-covered debris flow at the mouth of a major side canyon. A route out of the inner canyon originates at this site. The site is located over 100 meters from the river and 14 meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS personnel in September, 1990 and monitored for the first time in February, 1996.

STATUS AND RECOMMENDATIONS: Feature 1 is perched on the edge of the drainage and is slowly eroding into the side canyon. The rest of the site is covered by a heavier growth of vegetation than in 1990 and is "very stable overall." The erosion at Feature 1 is the result of side canyon flooding and not oversteepening from changes in base-level elevations of the river channel. It is the recommendation of the project that B:10:237 be monitored every five years.

B:10:248

This site consists of a small rockshelter located in the Tapeats Sandstone. A limestone cobble handtool found in October, 1995 is the only artifact associated with the site. A seasonally active seep 25 meters from the shelter could have been the reason for its occasional occupation. The shelter is located 30 meters from the river and approximately seven meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in September, 1990 and monitored for the first time in October, 1995. A test unit was placed in the shelter in FY95 and no cultural materials were recovered. Bedrock was encountered at less than six cm below the surface.

STATUS AND RECOMMENDATIONS: SHPO made a determination of nonsignificance for this site. It is recommended that B:10:248 be removed from the river corridor monitoring program.

B:10:261

B:10:261 consists of several roasting features in variable states of dissolution and an associated artifact scatter including lithic debris, tools, groundstone, and Lino grayware. The site is located on a dune-covered terrace in the upper mesquite zone. Surface runoff is not channeled directly into the river.

PREVIOUS WORK: This site was initially recorded by NPS survey personnel in October, 1990 and monitored in FY92, FY93, FY94, and FY96.

STATUS AND RECOMMENDATIONS: The site is stable and unchanged since 1994. An increase in cryptogamic soils was noted on the surface. It is recommended that monitoring be done biennially to avoid annual trampling of the surface.

B:11:272

B:11:272 is an isolated roasting feature with no associated artifacts. The site is located on a small levelled area of a diabase bench.

PREVIOUS WORK: This site was initially recorded in February, 1991 and monitored at least annually since FY92. NPS personnel obliterated the trail west of the roasting feature in February, 1995 and this has proven to be very effective. Detailed mapping was completed in FY96.

STATUS AND RECOMMENDATIONS: Presently, B:11:272 is stable. Erosional scars from gullying and local rains in 1991 and 1992 have been obliterated by naturally occurring vegetation. In general, more vegetation is growing across the site. Biennial monitoring is recommended.

B:11:278

This is a single dry-laid wall set against the base of a Bass Limestone outcrop with a lone metate. The wall is located 25 meters from the river and 10 meters above the 28,000 cfs level. Deposition is only a few centimeters thick and is comprised of residual gravels and an eolian component.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in February, 1991 and monitored for the first time in May, 1996.

STATUS AND RECOMMENDATIONS: B:11:278 was tested for significance in March, 1994. The site was deemed eligible by SHPO. The site is very stable and it is recommended that it be monitored in five years.

B:11:284

This site consists of a pictograph and two stacked rock walls in a pour-over. No artifacts are associated with this site and cultural affiliation is unknown. The site is 30 meters from the river and seven meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in February, 1991 and monitored in FY93. Testing for significance was carried out in March, 1994, and additional testing requested by SHPO was completed in May, 1996.

STATUS AND RECOMMENDATIONS: During the second round of testing a single poorly defined pictograph was found on the cliff face adjacent to the site. The determination of eligibility is currently underway. It is assumed that the site will be determined significant under Criterion D. The pictograph should be photographed with a medium format camera. A monitoring schedule will be defined after eligibility is determined.

B:14:105

This site consists of a small rockshelter with a single course, unmodified sandstone wall. A sparse lithic and sherd scatter is found on the slope below the feature. Sherds indicate a Cohonina affiliation. The site is over 130 meters from the river and 19 meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in September, 1990 and monitored in FY92, FY93, FY94, and FY96.

STATUS AND RECOMMENDATIONS: On-site camping is a common problem. The delta on which B:14:105 is located receives a tremendous amount of impact from camping during the summer months. The side canyon adjacent to the site is a popular day hike for the river-running community. GCES researchers camping here during the research flow of March-April, 1996 had a very negative impact on the site. Rock elements of Feature 3 were used to make a tent site and Feature 1 was rearranged. Social trailing by the researchers and day hikers has created a web of short crosscut paths between the camps and the mouth of the canyon with the epicenter being B:14:105. Trail obliteration and biennial monitoring are recommended at B:14:105.

Figure 7. B:14:105: A roasting feature impacted by on-site camping and trailing. Rocks from Feature 1 were displaced and used to secure a tent.

B:14:107

B:14:107 is a small rockshelter located in a Tapeats Sandstone overhang and consists of flakes, a cobble mano, a corrugated sherd, and a wall segment. A crescent shaped concentration of fire-

cracked rock and stained soil is eroding out of the slope below the shelter.

PREVIOUS WORK: This site was recorded by NPS survey personnel in October, 1990 and monitored in FY95 and FY96.

STATUS AND RECOMMENDATIONS: A gully has developed adjacent to Feature 2. The drainages on-site have become slightly more entrenched since 1990. It is recommended that a checkdam be placed in the gully at Feature 2 and the site be considered for further stabilization. Monitor biennially.

B:15:121

B:15:121 is a lithic and charcoal scatter. No diagnostic artifacts or ceramics were observed on-site. It is located over 150 meters up a side canyon and 50 vertical meters above the 28,000 cfs level on bedrock ledges.

PREVIOUS WORK: This site was recorded in February, 1991 and monitored in FY95 and FY96.

STATUS AND RECOMMENDATIONS: The site will continue to be monitored every three years as a control group site.

B:15:126

B:15:126 is a large rockshelter containing several granaries, a walled structure, flakes, a single North Creek Grayware sherd, Tapeats Sandstone grinding slabs, charcoal, and the horn core of a Bighorn sheep. The site is located at the top of a talus slope over 70 feet above the 28,000 cfs level.

PREVIOUS WORK: This site was recorded in January, 1991 by NPS survey personnel and monitored in FY95 and FY96.

STATUS AND RECOMMENDATIONS: There is minimal animal trailing on the site and no evidence of human visitation. Minor changes have taken place at a few of the granaries since 1991 but this is due to the natural course of events not the dam, river, or human intervention. The only ongoing impacts perceptible on-site are compaction due to monitoring. The site is to be monitored every three years because of its designation as a control group site.

B:15:131

This site consists of a modern fire hearth situated on sandstone ledges in the recent high water zone. The benches have been scoured by flooding in 1983-1984 leaving the rock alignment with no fill or charcoal. The construction of the hearth is probably dated after 1960.

PREVIOUS WORK: The feature was recorded by H. Fairley in October, 1990 during the river corridor survey and monitored in FY92 and FY96.

STATUS AND RECOMMENDATIONS: The feature is located on barren bedrock with no fill or prehistoric materials in association. The recommendation is to remove this site from the river corridor monitoring program.

B:15:132

B:15:132 consists of several rock wall structures incorporated into large, locally occurring boulders. No prehistoric artifacts were observed on the surface. There were several historic cans found dating from 1900 to 1920. This is not surprising as William Bass' trail to Copper Canyon passes through this location. It is not known to what age the structures belong, but they appear older than the historic period. The site is located on bedrock outcrops 80 meters from the river and 30 vertical meters above the 28,000 cfs level.

PREVIOUS WORK: This site was recorded by NPS survey personnel in April, 1991 and monitored in FY95 and FY96.

STATUS AND RECOMMENDATIONS: No changes have taken place on the site since it was last visited in 1995. B:15:132 will be monitored every three years as a control group site.

B:15:135

B:15:135 consists of a rockshelter with a small artifact assemblage indicating a Pai occupation. The site is located on Tapeats Sandstone ledges.

PREVIOUS WORK: This site was initially recorded by NPS survey personnel in October, 1990 and has been monitored annually since FY93.

STATUS AND RECOMMENDATIONS: The site is currently stable. Minor fluctuations of eolian sand have taken place on the surface of the site since 1993. The greatest potential impact to the site is spalling from the overhang. Monitoring every five years is recommended.

B:15:143

B:15:143 is a shallow overhang with a sparse lithic scatter and two small concentrations of charcoal exposed on the surface. The site is situated on a stepped bench of Tapeats Sandstone. No sherds were observed on the site and cultural affiliation is unknown.

PREVIOUS WORK: This site was recorded by NPS survey personnel in December, 1990 and monitored in FY95 and FY96.

STATUS AND RECOMMENDATIONS: The site is currently being impacted by cliff spall and ongoing surface erosion from the dripline. The site belongs to the control group and will be monitored every three years.

C:02:094

This is the site of one of the old river crossings at Lees Ferry. It has elements on both banks of the river but the significant locus is a collection of pioneer names placed on a ledge on the left bank using axle grease and tar. The names belong to mostly Mormon immigrants travelling on the Honeymoon Trail between the outposts on the Little Colorado River and the temple in St. George, Utah. Dated names cluster from 1890 to 1898 and were executed on a rock while passengers waited for a ride across the river. The names are located on a bench within the Kaibab Limestone Formation proximal to the river and eight meters above the 28,000 cfs level.

PREVIOUS WORK: The site was formally recorded by NPS survey personnel in May, 1991 and monitored in FY92, FY93, and FY96. The project traditionally stops at this location to pick up fisherman's trash. On the river guides training trip in March, 1996, six 30 gallon bags of trash were collected from the general vicinity.

STATUS AND RECOMMENDATIONS: The ledges associated with the site are used as a camping spot by people who often place their names alongside their historic counterparts in charcoal or by scratching with knives. Examples include " Tamara 95, Candi and Leupp #2". In 1993 someone scratched "Danny Ray Horning was here", referring to the locally famous fugitive. Etchings like "Danny Ray" have now faded away. It is recommended the site be monitored annually and stabilized by removing graffiti as it occurs.

C:02:096

C:02:096 consists of two distinct areas of habitation located on a dissected alluvial terrace. A partial wall and some slight overhangs are utilized to create a modicum of shelter. Artifacts include a worked stick, lithic debris, corrugated sherds, and buried hearths with flakes *in situ*. The site is probably multicomponent.

PREVIOUS WORK: This site was documented in April 1991. Further materials uncovered during localized storms in the summer of 1991 discovered by GCES biologists, were recorded and added to the already existing site record. C-14 samples were taken from this location in February 1995. C-14 dates retrieved from this location range from 2307 - 2062 cal. yr BP, 2715 - 2384 cal. yr BP, 3919 - 3704 cal. yr BP, (approximately 1643-112 AD, 765-434 AD, 1969-1754 AD respectively) (O'Connor et al. 1994). The site was monitored in FY95 and FY96.

STATUS AND RECOMMENDATIONS: As is generally common throughout the Southwest, and in the Grand Canyon in particular, locations that have apparently been stable for generations or even centuries can destabilize and be altered in a moment if an erosional threshold is reached or an episode of severe weather strikes at the wrong time. This is the case at C:02:096. The gulying and arroyo formation that has taken place in the last few years affords the project the chance to witness first hand the dissection of a remnant alluvial terrace containing cultural materials at depth in the upper canyon. Access to the site needs to be done with care as the approaches are fragile, vertical

cuts in loosely consolidated alluvium. The research flow of March, 1996 reached the mouth of the arroyo which drains the site but it caused no discernable impact to the configuration of the drainage. It is recommended checkdams be installed in the upper portions of the site and monitoring occur annually.

Figure 8. C:02:096: Profile of exposed materials Figure 9. C:02:096: Charcoal lens in arroyo.

C:06:003

C:06:003 consists of a sherd and lithic scatter with two problematic wall alignments. The artifacts indicate a PII occupation. The site is situated on a reworked dune-covered terrace dominated by limestone boulders from a debris flow. Surface waters draining the site do not discharge directly

into the river.

PREVIOUS WORK: This site was originally recorded by Robert Euler in 1976 and subsequently monitored by the Park Archaeologist. The site was re-recorded in greater detail in September, 1990. The river corridor project has monitored this site at least annually since FY94. In 1996, the trail which bisected the site was obliterated and moved closer to the river.

STATUS AND RECOMMENDATIONS: There has been no increase in natural impacts to the site since the last visit. A new trail may be developing adjacent to the old one and this will need to be monitored closely in the next year. Installation of checkdams and annual monitoring are recommended. Total station maps will be completed documenting remediation.

C:06:005

C:06:005 consists of three petroglyph elements located on a Supai Sandstone ledge adjacent to the river, four meters above 28,000 cfs level.

PREVIOUS WORK: This site was initially recorded in 1979 by R. Euler, recorded in greater detail by NPS crews in 1989 and monitored annually since FY94. The Southern Paiute Consortium trip stopped here in September, 1994; Hopi and Zuni visited the site in 1995. The site, and thus the immediate area, has cultural significance to the Southern Paiute Consortium, Hopi, and Zuni people.

STATUS AND RECOMMENDATIONS: The site is presently stable. Impacts include the slow process of natural exfoliation and human visitation. The site is heavily visited due to its proximity to the popular Brown inscription (C:06:002). Because the panel is situated on the ground surface (bedrock ledge), inadvertent foot traffic treading on-site is now a problem. Over time, there may be erosional impacts. Some modern graffiti is present locally and should be removed as a form of stabilization. The site needs to be monitored annually. It is further suggested that the petroglyphs be photographed using medium format photography.

Figure 10. Graffiti at C:06:005.

C:06:008

This site consists of a single masonry structure situated on Supai Sandstone bedrock ledges adjacent to the river and four meters above the 28,000 cfs level. The room is within the modern flood zone and contains no other cultural materials. There is a deposit of less than 10 cm of sand within the structure.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in September, 1990 and monitored in FY92 and FY96.

STATUS AND RECOMMENDATIONS: It is recommended that the site be monitored every five years, or after flows in excess of 50,000 cfs.

C:09:050

C:09:050 originally consisted of a group of complete vessels eroding from a cutbank at the mouth of a large side canyon. The vessels are representative of PI-II Puebloan culture.

PREVIOUS WORK: This site was initially recorded by NPS survey personnel in September, 1990. Due to the sites proximity to a major river camp and the precarious nature of their depositional situation, the four vessels were subsequently removed to the South Rim at the discretion of the Park Archaeologist during the initial survey. The site was monitored in FY92 and has been monitored semiannually since FY93.

STATUS AND RECOMMENDATIONS: Since seasonal flooding in the local drainage during September, 1990, the site has remained stable. It is recommended that C:09:050 be monitored on a semiannual basis in case more cultural materials are revealed in the cutbank. It is further advised that the gully located one meter southwest from where the pots were removed be assessed for

checkdam installation.

C:09:051

C:09:051 is an extensive open site consisting of a roomblock, activity areas, midden, artifact concentrations, and fire-cracked rock. The site is located on stabilized reworked dunes at the mouth of a major side canyon. The site has PII Puebloan affiliation.

PREVIOUS WORK: This site was initially recorded by Janet Balsom in November, 1989 and included three loci. In September, 1990 NPS survey personnel added a fourth locus and further documented the site. C:09:051 has been monitored at least annually since FY92.

STATUS AND RECOMMENDATIONS: Retrailing in 1991 and follow-up work in FY96, has had a positive effect on the general area. Feature 3 continues to slowly erode into the local drainage as it has been doing for most of this century. In the spring of 1995, a major flood re-channelled the side canyon, removing some of Feature 3. The rest of the site is stable. Game trails continue to criss-cross this portion of the delta. A surface analysis unit will be removed from this site in FY97 as per discussions with PA representatives. Annual monitoring is recommended. It is further suggested that some form of stabilization be considered at Feature 3.

Figure 11. C:09:051: A side canyon flood removing a portion of Feature 3.

C:09:052

C:09:052 consists of an extensive PII occupation including structural outlines and a dense artifact scatter dominated by sherds and groundstone. The site is located within the upper mesquite zone on reworked riverside dunes.

PREVIOUS WORK: This site was initially recorded by Janet Balsom in November, 1989. NPS survey personnel photographed and mapped the site in greater detail in September, 1990. The site has been monitored at least annually since FY92. C:09:052 was partially mapped utilizing a total station, and will be completed in FY97.

STATUS AND RECOMMENDATIONS: The trail obliteration project of 1991 and follow-up work in FY96, has had a very positive effect on C:09:052. Prior to retrailing, heavy foot traffic from backpackers and river-runners was evident and numerous collectors piles existed on the surface. Animal trailing is currently the most notable impact to the surface, evidenced by trampling across the dunes. A surface analysis unit will be removed from this site in FY97 as per discussions with PA representatives. Biennial monitoring is recommended.

C:09:054

This is a Puebloan habitation site consisting of structural outlines, sherds and lithics, and possibly erosion control/agricultural features. The site is on top of a steep colluvial slope and the edge of a massive debris flow emanating from Nankoweap Creek. The river is particularly wide at this point and the site is positioned above the high water zone. The site is located over 100 meters from the river and eight meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially observed by R. Euler in the 1960s. The first official recording of the site was done by NPS survey personnel in October, 1990. The site was monitored for the first time in February, 1996.

STATUS AND RECOMMENDATIONS: The site is adjacent to a heavily used trail connecting the main river camp with a popular photo opportunity located above the site. The site, however, shows no impact from the foot traffic, as the hikers passing by are on a specific mission to another place and do not even notice or recognize this archaeological manifestation. The site has remained stable since its initial recording in 1990. Due to the site's physical location on a colluvial slope and debris flow it is beyond the parameters which define the monitoring project. It is therefore recommended C:09:054 be removed from the monitoring program.

C:09:058

This site consists of three 1 x 2 meter "cleared areas" under two large limestone boulders. Several broken cobbles described as "out of context" are associated on the surface. It is located on reworked colluvium and local debris flow erratics 150 meters from the river, above the mesquite zone.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in October, 1990 and monitored for the first time in April, 1996.

STATUS AND RECOMMENDATIONS: The site's cultural assignation is questionable. Furthermore, it is located out of the project area. It is recommended that the site be turned over to the backcountry archaeologists for future management.

C:09:059

This site consists of a sparse scatter of sherds and lithics with at least six associated rock alignments apparently used to check the erosion of local soil. The site is dated to the 11th century by ceramic evidence, and located in one of the largest side canyons along the river corridor. The site is situated on a sandy terrace resting on residual debris flow over 460 meters from the river and 30 meters vertically above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS personnel in October, 1990 and monitored for the first time in April, 1996.

STATUS AND RECOMMENDATIONS: The site is in stable condition. There is more vegetation at Feature 2 and the area immediately adjacent it. Feature 3 has lost minor amounts of sand by eolian deflation. The site is beyond the geographic parameters defining the project area, however, and should be discontinued from the river corridor monitoring program.

C:09:061

This is a habitation site with structures and an extensive artifact assemblage. Ceramic and groundstone evidence indicates an 11th century Puebloan occupation. It is situated on a sediment-covered debris flow at the mouth of a major side canyon 230 meters from the river and over 20 vertical meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded in October, 1990 by NPS survey personnel and monitored for the first time in April, 1996.

STATUS AND RECOMMENDATIONS: The site is described by the monitoring team as being "in excellent condition" and "stable." There is more vegetation apparent on the surface and no visitation discernable since the survey. Due to its location and stability it is recommended that C:09:061 be placed on the inactive monitoring list.

C:09:062

This site is a concentration of fire-cracked rock, a rock alignment, a scatter of lithics, and sherds indicating a Puebloan affinity. The site is located on a dune-covered bench overlooking the secondary channel of a major side canyon 80 meters from and seven meters above the river.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in October, 1990 and

monitored for the first time in 1996.

STATUS AND RECOMMENDATIONS: The site has remained stable since the survey. A game trail passes along the northern edge of the site, but does not affect the features. There is no evidence of visitation. Cryptogamic soil is present across the surface. Recommend monitoring on a five year schedule.

C:09:067

This is a structural habitation site with PII ceramics, a scatter of lithic debris and a single metate. The site is situated on a sloped alluvial terrace overlaying an old debris flow 205 meters from the river and 10 meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded in December, 1990 and monitored for the first time in April, 1996.

STATUS AND RECOMMENDATIONS: The site remains unchanged since 1990 and is in stable condition. There is no evidence of visitation since the survey and the site is described by the monitoring team as "difficult to find." Due to location and stability it is recommended C:09:067 be placed on the inactive monitoring list.

C:09:071

This is a structural habitation site with PII ceramics. The site is located at the base of a Pleistocene debris flow 110 meters from the river and nine vertical meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in October, 1990 and monitored for the first time in April, 1996.

STATUS AND RECOMMENDATIONS: The site is unchanged since 1990. There is no evidence of visitation since the survey. Due to location and stability it is recommended C:09:071 be removed from the river corridor monitoring program.

C:09:073

This site consists of three limestone cobble rubble piles and a single mano. The site is located on top of a debris flow 140 meters from the river and five meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in October, 1990 and was monitored for the first time in February, 1996.

STATUS AND RECOMMENDATIONS: The site has remained stable since the survey and is in a locality that is not visited. The site is underlain by a stabilized debris flow and not affected by the

operations of the dam. The recommendation is to remove C:09:073 from the river corridor monitoring program.

C:09:080

C:09:080 consists of two shallow adjacent overhangs, the possible remnants of two granaries, and an associated PII sherd scatter. Subsequent to the survey the monitoring crews noted some charcoal and a groundstone tool. The site is located at the base of the Bright Angel Shale within bedrock over 200 meters from the river.

PREVIOUS WORK: This site was initially recorded by NPS survey personnel in October, 1990. It was monitored in FY95 and FY96.

STATUS AND RECOMMENDATIONS: This site is assigned to the control group. It will be monitored every three years.

C:09:082

C:09:082 consists of two distinct activity areas dominated by fire-cracked rock, sherds and groundstone. Feature 1 contains groundstone, Tsegi Orange Ware, and lithic debris. Feature 2, a fire-cracked rock concentration, contains PII ceramics and a single Southern Paiute sherd. The site is located in reworked dunes within the lower mesquite zone.

PREVIOUS WORK: This site was initially recorded by NPS survey personnel in October, 1990 and monitored at least annually since FY92.

STATUS AND RECOMMENDATIONS: The site is in stable condition. The dominant impact to the area is the presence of deer and coyote. Secondary impact to the immediate area is caused by the monitoring project. A surface analysis unit will be removed from this site in FY97 as per discussions with PA representatives. It is recommended that C:09:082 be monitored every three years to lessen the projects impact to the fragile surface of the dune field.

C:09:084

A marginal site consisting of two corrugated sherds, a corncob, and several manuported cobbles. The site is located at the base of a Bright Angel Shale and travertine cliff which affords partial shelter. The site is 60 meters from the river and five meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded in October, 1990 by NPS survey personnel and monitored for the first time in April, 1996.

STATUS AND RECOMMENDATIONS: Since the survey, the sherds have moved 50 cm downslope, the corncob has broken in two, and two additional flakes were found. A small gully has formed along the dripline on the northwest corner of the site. No artifacts or cultural features are

exposed or are being directly impacted by this erosion. It is recommended that small checks or a rock lining be placed in the gully and the site monitored in two years to reassess the monitoring schedule.

C:13:005

C:13:005 is an extensive site consisting of at least nine features with associated artifacts. The features include a small rockshelter and numerous roasting/hearth features. Sherds indicate a PII affiliation and a later, Hopi presence. The site is situated on riverside dunes and an adjacent structural bench.

PREVIOUS WORK: This site was initially recorded by Robert Euler in 1962 with updates in 1976 and 1989. The site was mapped in greater detail by NPS survey personnel in March, 1991. Due to the nearly constant backpacker traffic at this location and daily use by the river-running community as a camp and scouting location, impacts are unavoidably heavy. Retrailing has not been enough to curtail impacts. The site has been monitored many times by GRCA Park programs. The river corridor project monitored this site in FY95 and FY96.

STATUS AND RECOMMENDATIONS: Because of the impacts mentioned above, the site is not in good condition. Due to the site's location on a large dune, stability is an ongoing problem. An out of control toilet paper fire on the morning of May 3, 1995, further impacted Features 7, 8, and 9 while completely compromising an adjacent historical property. Trail obliteration was completed in FY96. Human traffic through the site remains heavy and because of the fire and subsequent surface work, Features 7, 8, and 9 cannot be relocated. The fire of last year has caused the backpackers to discontinue the practice of burning refuse and hence the surface is punctuated with tufts of toilet paper. It is recommended the backcountry office be more stringent in advocating camping closer to the river. A composting toilet should be installed and the newly developing trails should be checked before further entrenchment takes place. Annual monitoring is recommended.

C:13:006

C:13:006 consists of a PII habitation with a rich assemblage of artifacts including: ceramics, lithic debris, shaped stone, ashy soil, and intact groundstone. The site is eroding out of a reworked dune at the mouth of a major side canyon.

PREVIOUS WORK: This site has had comparatively a lot of attention paid to it: Schwartz in the early 1960s, Euler and Taylor in 1965, Balsom and Fairley in 1984, and again in 1990. Euler collected some complete manos in 1965. The site has been described as "badly eroded." The river corridor project has monitored the site at least annually since FY92. A surface analysis unit will be removed from this site in FY97 as per discussions with PA representatives. The stationary camera removed from C:13:359 was relocated to C:13:006 in FY95. Twelve checkdams were placed at this location and trail obliteration occurred in February, 1996.

STATUS AND RECOMMENDATIONS: Although the site has been "badly eroded," much of the intact, buried material may remain. Outlines of room blocks are still clearly discernable on the lip of

the slope. The entire surface is continuing to move downslope into the local drainage. It is recommended that vegetation be planted in this area. The site should be monitored annually though with no more than two monitors per visit. Total station mapping of the site will take place in FY97.

C:13:010

C:13:010 is the large complex habitation site known as Furnace Flats. The site which was initially recorded in 1965 by Euler and Taylor has seen a lot of work done over the years including minor excavation in 1984. The site is closed to the public due to its fragile character and archaeological significance.

PREVIOUS WORK: Extensive work has been done at this location by Jones and Balsom in 1984. See Jones' 1986 Excavation Report. The river corridor project monitored this site in FY95 and FY96. In FY96, the features were plotted on R. Hereford's 1:2,000 topographic map.

STATUS AND RECOMMENDATIONS: As mentioned above, access to the site is strictly limited and any archaeological work done must be well considered before remedial action takes place. C:13:010 is currently experiencing site wide erosion on a large scale. Headward erosion of the local drainages located on the heavily dissected alluvial terrace is ongoing and ultimately will remove the remaining sediment and associated cultural features. Stabilization and data recovery should be considered. Impacts at this location are pervasive. For a detailed account see Appendix C. Annual monitoring is recommended.

C:13:033

A three-sided stacked stone structure situated on a colluvial fan represents this site. No artifacts have been found. The site is located over 110 meters from the river and approximately nine meters above the 28,000 cfs level.

PREVIOUS WORK: C:13:033 was initially recorded and mapped by Euler and Powers in 1962, and again by Balsom and Fairley in 1984. It was re-recorded during the 1990-1991 survey by NPS personnel. The site was monitored for the first time in 1996.

STATUS AND RECOMMENDATIONS: The site is currently stable. The greatest potential for impact is from runoff directed by the sandstone ledges behind the structure. There is no sediment associated with the site to warrant concern about buried materials. The structure is not subject to impacts from dam operations. This site is scheduled to be monitored on a three to five year interval.

C:13:069

C:13:069 is a large open habitation site containing six structural and hearth features with a sparse artifact assemblage indicating a PII occupation. The site is located on an old sand-covered river terrace within the upper mesquite zone.

PREVIOUS WORK: This site was mapped in detail in September, 1990 and monitored in FY93, FY95, and FY96. Trail obliteration, revegetation and stabilization of minor drainages was done at this location in 1992 under the NPS rehabilitation program.

STATUS AND RECOMMENDATIONS: This site is at particular risk due to the adjacent river camp which is highly used during the May to October season. The area is also used by backpackers throughout the year and a major trail cuts directly through the site. The work carried out in 1992 has had a positive affect on the site. Locally active gullying still poses an ongoing threat to Features 1 and 2. Annual monitoring is recommended. Checkdams should be placed where needed.

C:13:070

C:13:070 consists of artifact concentrations and a probable buried structure indicating an ancestral Puebloan occupation. The site is situated on a highly dissected structural terrace. Near the edge of the terrace, two complete rectangular manos reside side by side vertically into the surface. The manos are 90% exposed and remain tenuously upright in the position they were placed by the last person to use them. These two artifacts represent a true moment frozen in time. A single visitor or local rain could cause them to fall.

PREVIOUS WORK: This site was initially recorded by Robert Euler and Walter Taylor in 1973, and described as a "masonry pueblo and sherd area." No photographs were taken and there is no mention of the upright manos or complete metate. This site has been monitored at least annually since FY93.

STATUS AND RECOMMENDATIONS: There has been increased surface erosion due to deflation and bank slumpage, and increased gullying at Locus D. A lack of free sand available in the system to protect this site is noticeable. Total station mapping was completed in May, 1995. One of the upright manos has tilted significantly and a trail onto the fragile terrace has developed at the only access point to the site. A surface analysis unit will be removed in FY97 as per discussions with PA representatives. Installing checkdams or conducting some form of stabilization in the active gullies is recommended. Trail obliteration is recommended between Loci A & B. Annual monitoring will continue.

C:13:092

C:13:092 is a turn-of-the-century historic camp belonging to the prospector/trapper, Felix Lantier. Structural outlines and artifacts are still present on the surface. A sparse scatter of prehistoric ceramics and lithic debris in the immediate vicinity also indicates a PII Puebloan presence.

PREVIOUS WORK: This site was initially recorded by Robert Euler in 1976. NPS survey personnel recorded the property in greater detail in September, 1990. GRCA staff have monitored this site many times in the past. The site has been monitored annually by the river corridor project since FY93.

STATUS AND RECOMMENDATIONS: The site is currently stable. Occasional visits by tourists from the river camp located 70 meters upstream is evidenced by minor movement of artifacts from year to year. Large amounts of sand were deposited out in the eddy upstream of the site during the research flow of 1996. Annual monitoring is recommended.

C:13:098

C:13:098 is an early 19th century historic habitation and mine. Referred to as the M^cCormick Mine, the site is well known and highly visited.

PREVIOUS WORK: This site was initially recorded by Euler and Jones in 1978. NPS survey personnel recorded the site in greater detail in September, 1990. This site has been monitored semiannually since FY93.

STATUS AND RECOMMENDATIONS: Two separate erosional channels have headcut to within one meter of the cabin. Stabilization of the small headcuts adjacent to the foundation of the old structure to check further erosion is recommended. Visitation is heavy at this location due to backpackers and visits from the river-running community. It is also suggested that retrailing and trail obliteration occur, which may involve planting vegetation. Monitor the site semiannually.

03/30/95

04/27/96

Figure 12. C:13:098: A photo comparison of changes to an artifact pile.

C:13:099

C:13:099 consists of two loci of collapsed masonry structures and numerous artifacts including: ceramics, lithics, groundstone, and charcoal. The site is a PII habitation located within the historic high water zone. Channeled runoff flows directly into the Colorado River.

PREVIOUS WORK: This site was initially recorded by Euler and Jones in 1978 and described as "highly eroded." The site was recorded in greater detail by NPS survey personnel in September, 1990 and has been monitored semiannually since FY93. Total station mapping began in April 1994 and was completed in FY95. This site was included in the stabilization project on Palisades Delta in September, 1995.

STATUS AND RECOMMENDATIONS: C:13:099 remains "highly eroded" today. Vegetation has blown into the arroyos associated with the site and the checkdams are acting as traps. Where the walls of the drainages are continuing to slump and erode naturally, the sediment remains in place making the checkdams even more effective. The research flow of 1996 deposited out large amounts of sediment and debris above the level of the first several checkdams proximal to the river. The added deposition should add to the positive influence of the checkdams positioned on-site. Semiannual monitoring is recommended, along with maintenance to the checkdams as needed. It is further recommended that trail obliteration through revegetation be conducted.

C:13:100

C:13:100 is a PII habitation with features and a rich artifact assemblage including: ceramics, lithics, hammerstones, manos, metates, and charcoal. The site is located on a highly eroded dune-covered terrace only five meters above 28,000 cfs level. Drainages at this location deposit directly into the Colorado River.

PREVIOUS WORK: This site was initially recorded by Euler and Jones in 1978. The site was recorded in greater detail by NPS survey personnel in September, 1990, monitored in FY92, and monitored semiannually since FY93. C:13:100 has been total station mapped and was part of the stabilization project on Palisades Delta in September, 1995.

STATUS AND RECOMMENDATIONS: Ongoing erosion at C:13:100 is presently effecting the site in the form of two localized gullies and minor trailing from the adjacent river camp. It is hoped that the intensive stabilization program and the sediment deposited by the research flow of 1996 will curtail this erosion to a large extent. The lack of rain since last Fall has not yet tested the efficacy of the checkdams. The work has had a minor, positive affect in the same fashion as at C:13:099 which is located adjacent to this site. Semiannual monitoring and maintenance of the checkdams is recommended.

C:13:101

C:13:101 is a PII habitation including a structural outline, numerous cist features, and artifacts. The site is located in the predam high water zone, three meters above the 28,000 cfs level.

PREVIOUS WORK: This site was initially recorded by Euler and Jones in 1978 and recorded in greater detail by NPS survey personnel in 1990. It was noted in 1978 that a hiker had used slabs

from a cist for a modern fire pit. The site has been monitored annually since FY93.

STATUS AND RECOMMENDATIONS: The NPS trail crew obliterated the hiking trail that passed through the site in 1993. This has had a very positive effect on the area in general and on the site specifically. The site is in overall stable condition. General deflation of loose sediment across the surface of the site will continue as long as the dam causes a lack of free sand in the system. No new impacts were observed since the last visit. Monitoring every five years is recommended.

C:13:132

C:13:132 consists of a single wall alignment and boulders nearly covered in petroglyphs. A single Moenkopi corrugated sherd was found in 1978. The site is located on a rocky talus slope and ridge outside the parameters of the project area.

PREVIOUS WORK: The site was originally recorded by Euler and Jones in 1978. The wall was recorded by Balsom in 1987, as a separate site. In 1990, NPS survey personnel consolidated the wall and boulders under a single site number and documented the rock art. The site has been monitored in FY94 and FY96.

STATUS AND RECOMMENDATIONS: The site is presently stable. C:13:132 is a highly visited location with a well-defined trail coursing directly through the site. Cigarette butts and trash have commonly been found on-site. It is recommended that C:13:132 be removed from the monitoring program.

C:13:272

C:13:272 is a multicomponent site consisting of structures, features, and artifact concentrations. Ceramics indicate a PII occupation and two of the features appear to be protohistoric in origin. The site is located in riverside dunes partially anchored by a mesquite thicket.

PREVIOUS WORK: This site was originally documented by Balsom and Fairley in 1984 and recorded in greater detail by NPS survey personnel in 1990. The site has been monitored at least annually since FY92. This site should experience some positive effect by geographic association with the sites stabilized on Palisades Delta in September, 1995.

STATUS AND RECOMMENDATIONS: The site is in overall stable condition. A gully near Feature 3 needs to be watched for any further expansion. The only evidence of human visitation is from the mapping team that just conducted work here in FY96. Biennial monitoring is recommended.

C:13:273

C:13:273 is a special use area consisting of five fire and storage features with two artifact

concentrations. The sherds on the surface indicate a PII occupation. The site is situated on a set of stabilized dunes 65 meters from the river.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in September, 1990 and has been monitored in FY93, FY95, and FY96. Retrailing was completed in February, 1995. Prior to the trail work, archaeological clearance was carried out by project staff in November, 1994 by testing for subsurface materials in the impact areas.

STATUS AND RECOMMENDATIONS: Several boulders have fallen into the arroyo since 1990. Feature 3 is eroding faster relative to the rest of the site and will be assessed for stabilization. Annual monitoring is recommended.

C:13:274

C:13:274 is an enigmatic series of rock alignments with an associated flake scatter and a single fire feature located over 200 meters from the Colorado River. No sherds were seen on the surface and cultural affiliation is unknown.

PREVIOUS WORK: This site was initially recorded by NPS survey personnel in September, 1990 and monitored in FY95 and FY96.

STATUS AND RECOMMENDATIONS: The site is in overall stable condition and will be placed on the inactive monitoring list.

C:13:291

C:13:291 consists of several exposed walls and features with associated artifacts of PII affinity. The site is located on a highly dissected alluvial terrace at the base of Dox Sandstone cliffs. Water eroding the surface drains directly into the Colorado River.

PREVIOUS WORK: This site was initially recorded in 1988 and mapped in greater detail by NPS survey personnel in October, 1990. The site has been monitored at least annually since FY92. Elevation markers were placed at this location in February, 1996 in anticipation of the research flood. The site was assessed for stabilization by Park Service and Zuni experts and deemed beyond the scope of practical stabilization.

STATUS AND RECOMMENDATIONS: C:13:291 is presently eroding across the entire site with particular emphasis on the gullies at Features 1 and 4. A standing structural post at Feature 4 could yield a good date. The riverbank below the site was partially truncated by the effects of a large eddy created during the higher releases of the research flow. This removal of sediment had no direct impact on the site. There is a trail that should be relocated below the site to reduce compaction of the riverbank. Data recovery and annual monitoring at C:13:291 are recommended.

July, 1989

02/20/96

Figure 13. C:13:291: A photo comparison of an eroding wall and structural post. The arrows point to Feature 1.

C:13:321

C:13:321 consists of five fire features and an enigmatic pile of Dox Sandstone slabs. These slabs were probably put here by Felix Lantier, a prospector that lived adjacent to this site at the turn of the century. The site is situated on a large stabilized dune at the mouth of a major drainage.

PREVIOUS WORK: This site was initially recorded by J. Balsom and H. Fairley in 1989, in greater detail in 1990, and monitored annually since FY93. The site was tested for depth and extent prior to the research flow of 1996. More details will be available in the mitigation report to be completed December 31, 1996.

STATUS AND RECOMMENDATIONS: The site is in stable condition. Wind is constantly rearranging the loose sand on the dune. Not much sand is gained or lost from the inner swales of the dune complex. A river camp is located on the adjacent beach and there appears to be some artifact movement aided by the human hand. Near Feature 4, people have made a little stone circle. Artifacts and rocks have been unevenly and uncharacteristically displaced, indicating that a person probably picked them up and set them back down. Feature 5 is the most at risk and should be watched carefully. Due to its proximity to a utilized camp, it is recommended that C:13:321 be monitored annually.

C:13:322

C:13:322 consists of a rock art panel located on a vertical Dox Sandstone block, facing the river. The panel contains Anasazi as well as historic/modern elements. A fire feature and some lithic debris are also present.

PREVIOUS WORK: The rock art was initially recorded by NPS personnel in 1989. NPS survey archaeologists discovered a fire feature and lithics in September, 1990. The site was monitored in FY94 and FY96.

STATUS AND RECOMMENDATIONS: C:13:322 is presently stable. It is recommended that monitoring occur biennially.

C:13:324

This site consisted of three areas of fire-cracked rock, a lithic concentration, and a single sandstone grinding slab. It is located on a high sand dune at the mouth of a major side canyon 35 meters from the river and 15 meters above the 28,000 cfs level. The entire dune is underlain by a debris flow.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in September, 1990 and monitored for the first time in February, 1996. Trail obliteration and realignment in November, 1991, covered the site with jute mat to enhance plant growth.

STATUS AND RECOMMENDATIONS: The site is now completely covered by the matting and vegetation so it is effectively no longer present to view on the surface. C:13:324 should be discontinued from the river corridor monitoring program and turned over to the backcountry monitoring program.

C:13:327

This is an open camp site consisting of several fire features, concentrations of lithic debris, bone, and a single Moenkopi corrugated sherd. The site is situated on the edge of a high alluvial cutbank over 100 meters from the river and 14 meters above the 28,000 cfs level. It is also adjacent to the Hance-Tanner Trail.

PREVIOUS WORK: This site was initially recorded by NPS survey personnel in September, 1990 and monitored for the first time in February, 1996. Test excavations were conducted by NPS personnel during 1992 in conjunction with trail work. Carbon samples taken at this time had dates of late Archaic age through the 16th century indicating extensive use.

STATUS AND RECOMMENDATIONS: Deflation of surface sand is occurring across the site. Feature 3 has been destroyed by the headward erosion of a local arroyo since 1992. This is the result of local runoff and not dam-related. It is advised that checkdams be placed in the active arroyo. If checkdams do not slow down the deterioration of Feature 3, the feature should be excavated. There is more vegetation present than in 1990. Retrailing took place during FY96 and obliteration of the old trail is scheduled for FY97. Biennial monitoring is recommended.

C:13:336

C:13:336 is a Puebloan occupation site located within the predam highwater zone adjacent to the Beamer Trail. The site is situated less than four meters above the current 28,000 cfs level.

PREVIOUS WORK: This site was initially recorded in 1986 and subsequently mapped and recorded in greater detail by NPS survey personnel in September, 1990. The site was monitored in FY92, FY94, and FY96.

STATUS AND RECOMMENDATIONS: The site is currently stable and not being threatened by channeled runoff. The site is mostly impacted by the lack of available sand in the system as protective cover, typical of many cultural resources in this section of the river corridor. Monitoring biennially is recommended to lessen the impacts.

C:13:338

This is an open camp consisting of roasting features, a small rubble pile of sandstone, and a slab-lined cist. The site is devoid of artifacts and cultural affiliation is unknown. The site is located on a dissected alluvial terrace 55 meters from the river and 12 meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded in September, 1990 and monitored for the first time in February, 1996.

STATUS AND RECOMMENDATIONS: Minor rock movement has occurred on the surface since

1990. Bank slumpage is impacting Feature 3 due to a terraced-based drainage. Data recovery is recommended. There has also been increased growth of grasses on-site. Retrailing will occur under the Park's supervision near Features 1 and 2. Biennial monitoring is recommended.

C:13:339

C:13:339 consists of a PII habitation comprised of at least six features appearing on the surface and an associated artifact scatter. Two historic hearths are also present. The site is situated on a mesquite-covered alluvial terrace.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in September, 1990, and monitored in FY93, FY95, and FY96. Retrailing and total station mapping were completed in February, 1995.

STATUS AND RECOMMENDATIONS: The site is situated on a steep and actively eroding terrace. Features 1, 2, 3, 5, and 6 are exposed in gullies or steep-sided bank cuts which pose ongoing impacts to the site. The retrailing work conducted in 1995 to lessen the impact from hikers has proved successful thus far. It is recommended that the site be monitored annually and also be assessed for revegetation.

C:13:340

This is an open camp consisting of a fire feature, an upright slab feature, lithics, and sherds. The site is situated on a gravel-strewn terrace within the upper mesquite zone over 110 meters from the river and 16 meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in September, 1990 and monitored for the first time in February, 1996.

STATUS AND RECOMMENDATIONS: The condition of the site is stable since 1990 with no evidence of human visitation or disturbance even though a major hiking trail passes close by. Retrailing occurred in February, 1996. Trail obliteration is scheduled for the fall of 1996. Monitoring every three years is recommended.

C:13:344

This is a concentration of fire-cracked rock, a small scatter of sandstone slabs, and less than 25 locally procured chert flakes. The site is located on an eroded terrace at the base of the Dox Sandstone formation over 210 meters from the river and nine meters above the 28,000 cfs level.

PREVIOUS WORK: The site was originally recorded by NPS survey personnel in September, 1990 and monitored for the first time in April, 1996.

STATUS AND RECOMMENDATIONS: Due to this site's ephemeral nature, it is a low work

priority. This site will be placed on the inactive monitoring list.

C:13:345

This is an open site in dunes adjacent to the river. During the initial recording, naturally occurring liniments of rock and vertical slabs of sandstone exposed in a debris flow were mistakenly construed as cultural. A few flakes were found on the slope of the dune.

PREVIOUS WORK: The site was initially recorded in September, 1990, and monitored for the first time in February, 1996.

STATUS AND RECOMMENDATIONS: Portions of the debris flow and dune have been covered over or fallen into the arroyo that bisects the immediate area. The site should be tested and placed on the inactive monitoring list.

C:13:346

This is a storage site and associated artifact scatter consisting of four slab-lined cists, over 100 PII sherds, and less than 100 flakes. The site is located on an old river-cut terrace over 240 meters from the river and seven meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in September, 1990 and monitored for the first time in April, 1996.

STATUS AND RECOMMENDATIONS: Surface erosion of Features 1, 2, and 3 along with the artifact scatter has occurred since 1990. A small gully is cutting Feature 3 and affecting the artifact scatter. This erosion is due to locally determined slope runoff. No human visitation is evident since the survey. It is recommended that checkdams be placed in the gully cutting Feature 3 and the site monitored every three years.

C:13:347

C:13:347 consists of a partial masonry wall exposed in a steep arroyo cut within 17 meters of the river and five feet above the 28,000 cfs level. During October, 1995, a large newly exposed Black Mesa Black-on-white sherd was found in the cutbank above the stacked rock wall. A ground, polished, and incised serpentine pipe bowl fragment was also found proximal to the sherd.

PREVIOUS WORK: This site was initially recorded by NPS survey personnel in September, 1990, and monitored in FY92, FY93, FY95, and FY96. Total station mapping will be completed at this location in FY97.

STATUS AND RECOMMENDATIONS: The arroyo in which the site is located has become slightly more entrenched since 1993 with increased potential to wash out. Due to the proximity of

the site to the river and the discovery of the pipe fragment in October, 1995, it is recommended that C:13:347 be monitored semiannually. If after assessment, the site is considered to be impractical for checkdams or stabilization, data recovery will be the next option.

C:13:348

This site consists of a sherd, lithic, and groundstone scatter with concentrations of jacal fragments suggesting buried structural remains. The site is located in old riverine deposits over 200 meters from the river and only eight meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded in September, 1990 by NPS survey personnel and monitored for the first time in April, 1996.

STATUS AND RECOMMENDATIONS: Overall the site has been depleted of surface sediment since 1990 due to eolian deflation. Northern portions of the site show increased eolian deposition. A shallow gully running down the eastern border of the site poses the greatest potential threat to stability. It is suggested that this gully be rock lined to curtail further downcutting, and that the site be monitored biennially.

C:13:349

C:13:349 is a multicomponent site consisting of a historic habitation and an artifact assemblage indicating a PI-II presence. The site is located in mesquite anchored dunes 100 meters from the river.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in September, 1990 and monitored annually since FY93.

STATUS AND RECOMMENDATIONS: Features 2, 3, and 4, are currently eroding downslope due to slump and deflation. A complete metate between Features 1 and 2 recently disappeared under the collapsed bank of an arroyo. Feature 5 has been completely lost into the arroyo. Erosion is ongoing and pervasive and too advanced to correct. New artifacts can be expected to erode out of the main arroyo. The arroyo may be too large for stabilization. If this option is not feasible, data recovery is advised. Continue monitoring this site on an annual basis.

Figure 14. C:13:349: An active arroyo exposing features and artifacts. The features are indicated by the arrow.

Figure 15. C:13:349: The headcut of an active arroyo.

C:13:351

This site consists of a 1.5 x 5 meter concentration of sherds and lithic debris. The artifacts represent a Puebloan affinity. The site is located in an extensive dune field over 180 meters from the river and nine meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in September, 1990 and monitored for the first time in February, 1996.

STATUS AND RECOMMENDATIONS: The site is currently stable with no direct impact from dam operations. Due to camera and processing problems during the survey, the photographs currently archived for C:13:351 are inadequate as a point of reference for a single episode of monitoring. It is recommended that the site be monitored again during the spring of 1997 in order to create another set of photographs. After obtaining a set of comparison photographs, a decision regarding monitoring frequency can be made.

C:13:352

This is an open Puebloan habitation and special activity site with a dense assemblage of sherds, several manos, a grinding slab, and a light scatter of lithic debris. The site is located in an open dune field cut and rearranged by wide shallow seasonal runoff channels and low volume lobate debris flows originating in the cliffs abutting the dunes to the south. C:13:352 is over 200 meters from the river but only seven meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded in September, 1990 by NPS survey personnel and monitored for the first time in February, 1996.

STATUS AND RECOMMENDATIONS: The site has remained stable since 1990. Some minor movement of sand has taken place, a standard occurrence in dune fields. Some pedestalling of smaller artifacts due to locally heavy rain has occurred at Locus A. There are still palm-sized sherds and decorated wares on the surface indicating that visitation during the 20th century has been virtually nonexistent or that the artifacts were uncovered recently due to the lack of available sand in the system. Locus C is situated in a small debris flow and is not a contiguous part of the site, retaining none of its original integrity. Discontinue photographing Locus C and monitor the remainder of this site every five years.

C:13:353

This is a single-walled rock structure situated under a ledge in the Tapeats Sandstone at the mouth of an unnamed tributary near the confluence of the Little Colorado River. A corrugated sherd, a flake, and a corn cob fragment were recorded within the structure. The site is 40 meters from the river and only four meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded in September, 1990 by NPS survey personnel and monitored for the first time in February, 1996. The monitor crew observed a second sherd and flake tool within the structure.

STATUS AND RECOMMENDATIONS. The site remains in stable condition since 1990. Monitoring every five years is recommended.

C:13:356

C:13:356 consists of the remnants of a structural wall and a burned beam situated in the cutbank of an arroyo. No artifacts were observed. The site is located 75 meters from the river and seven meters above the 28,000 cfs level. Runoff from the arroyo is channeled directly into the Colorado River.

PREVIOUS WORK: This site was initially recorded by NPS survey personnel in September, 1990 and mapped using a total station in FY94. The site was monitored in FY93, FY94, and FY96.

STATUS AND RECOMMENDATIONS: Arroyo cutting and bank slumpage are ongoing at this location. It is, however, a steady state problem. The site was established during a period of sediment accumulation in the river corridor. The river is now in a degradational phase (downcutting) enhanced by the dam. The site, due to its location in an arroyo bottom, is doomed to erode further. The drainage in which the site exists is too large to manipulate by checkdams. This site is recommended for data recovery. Monitor this site every four years to document any changes.

C:13:357

C:13:357 consists of a buried cist, a burned rock feature with associated sherds, lithics, and groundstone. The assemblage indicates a Pueblo II occupation. The site is located on a sediment-covered Dox Sandstone bench just above the mesquite zone. The Tanner Trail passes through the site. Surface runoff from this location does not flow directly into the river, but dies out in the thick mesquite and tamarisk grove adjacent to the river.

PREVIOUS WORK: This site was initially recorded in September, 1990 by NPS survey personnel. The site was monitored in FY94 and FY96.

STATUS AND RECOMMENDATIONS: There are no apparent changes to the site since 1994. The entire surface of the site is subject to sheet washing. The features present on the surface are marginal. The recommendation is to remove this site from the river corridor monitoring program and place it under the backcountry monitoring program.

C:13:358

This is an uprooted fire feature with several complete and partial sandstone slabs. Three PII sherds were also observed. The site is located in a very dense stand of old growth mesquite over 60 meters from the river and six meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in September, 1990 and monitored for the first time in April, 1996.

STATUS AND RECOMMENDATIONS: The site consists of a 2 x 4 meter area between large fallen mesquite and lacks original integrity due to complete disruption from root growth and the collapse of trees. The site has been subject to flooding prior to construction of the dam and is situated on the margins of a backwater overflow channel from the Colorado River. Waters from

floods in excess of 100,000 cfs could reach this zone and probably did so in the 1880s and possibly the 1920s and 1950s. There has been no change to this site since 1990. It is recommended that this site be placed on the inactive monitoring list.

C:13:359

C:13:359 is PII habitation with structural outlines and associated artifacts. The site is located on a dune-covered terrace abutting a local cliff face. Surface runoff drains into the Colorado River.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in March, 1991 and monitored annually since FY92. A stationary camera was placed opposite this site in 1992 but was moved to a more productive location in FY95.

STATUS AND RECOMMENDATIONS: The site is experiencing minor erosion across the entire surface and minor downslope movement is ongoing at Feature 3. The gully bisecting Feature 2 is unchanged since early 1994. A single storm over the site could change Feature 2 dramatically. It is recommended that C:13:359 be monitored annually. It is further suggested that data recovery be performed at Feature 2.

C:13:362

This is a small structural site with associated fire features and an artifact assemblage indicating a Puebloan affinity. The site is situated on an alluvial terrace 35 meters from the river and seven meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded in March, 1991 by NPS survey personnel and monitored for the first time in February, 1996.

STATUS AND RECOMMENDATIONS: The site is overall in stable condition. There is recent small mammal burrowing in Feature 3, and minor animal trailing at Features 4 and 5. There is also a lot of social trailing across the site as a result of too much human foot traffic. Trail obliteration is recommended and monitoring on a three to five year interval.

C:13:364

C:13:364 consists of a single room outline constructed of local Dox Sandstone and one Tusayan corrugated sherd. The site is situated on a Dox ledge six meters above the 28,000 cfs level.

PREVIOUS WORK: This site was initially recorded by NPS survey personnel in March, 1991 and monitored in FY94 and FY96.

STATUS AND RECOMMENDATIONS: The site is presently stable. There has been no evidence of visitation or ongoing erosion since the site was recorded. It is recommended that C:13:364 be

placed on the inactive monitoring list.

C:13:367

C:13:367 is a small rockshelter with a stacked rock wall and a few chert flakes. No cultural affiliation has been assigned. The site is located 250 meters up a major side canyon and nearly 50 vertical meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in October, 1990 and monitored in FY95 and FY96.

STATUS AND RECOMMENDATIONS: The site is well protected by a large boulder and is very stable. C:13:367 is a control group site and will be monitored every three years.

C:13:370

This is a small rockshelter situated in a travertine deposit 80 meters from the river and eight meters above the 28,000 cfs. A trough metate located in the shelter infers a Puebloan affinity. No sherds have been observed on the site.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in October, 1990 and monitored for the first time in February, 1996.

STATUS AND RECOMMENDATIONS: Minor amounts of runoff are directed through the porous travertine and channeled across the floor of the shelter causing surface rills. Sediment brought into the shelter by the runoff covered an exposed area noted during the survey. There is also wall deterioration and basal erosion on the exterior north wall. Minor wall repair is advised. The most prevalent form of impact to the site is from small animals: packrats, ringtails, mice, and lion ants. No visitation to the site has occurred since the survey. The recommendation is to monitor the site on a five year schedule.

C:13:371

C:13:371 is an extensive PII habitation with seven features currently exposed and eroding including: walls, storage, fire-cracked rock, and structural outlines. The artifact assemblage is dominated by ceramics, but lithic debris, a projectile point, and complete groundstone are also present. The site is located at the mouth of an unnamed drainage on older colluvial debris and a dissected alluvial terrace.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in October, 1990 and monitored semiannually since 1992. A stationary camera was placed here in March, 1992. The site has been mapped in detail using a total station. Checkdams were installed on-site at Feature 3 by a joint Zuni Conservation and Park Service team in February, 1996. Radiocarbon samples were

taken from Features 2 and 4 in FY96. Results will be available in the mitigation report scheduled for completion December 31, 1996.

STATUS AND RECOMMENDATIONS: A side canyon flood during September, 1990, did extensive damage to this site exposing previously buried materials. Surface runoff drains directly into the Colorado River. Ongoing erosion is present across the site with particular emphasis at Features 2, 3, and 4, and, less evident impacts at Features 1, 5, 6, and 7. Increased animal trailing is also evident. The site should be monitored semiannually. Further stabilization work through planting vegetation may be warranted.

C:13:372

A solitary roasting feature and its associated discard pile defines this site. A few flakes were observed on the surface. No sherds were noted. The site is located over 40 meters from the river and 11 meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in October, 1990 and monitored for the first time in February, 1996.

STATUS AND RECOMMENDATIONS: The site is very stable and in a discreet location not prone to human visitation. There is a notable increase in the amount of vegetation present on the surface since 1990. The recommendation is to place C:13:372 on the inactive monitoring list.

C:13:377

This is a 15 x 45 meter artifact scatter situated in a riverside dune field eight meters above the 28,000 cfs level. Artifacts present indicate a Puebloan occupation and include: corrugated grayware, groundstone, flakes, and a cobble tool.

PREVIOUS WORK: The site was initially recorded in March, 1991 by NPS survey personnel and monitored for the first time in February, 1996.

STATUS AND RECOMMENDATIONS: The site is very stable, affected only by minor localized episodes of eolian erosion and deposition. Monitoring every five years is recommended.

C:13:379

C:13:379 is an extensive habitation site comprised of five features and an extensive assemblage of artifacts including: Pueblo II ceramics, chipped stone tools, complete groundstone, shell, and charcoal. This site is located on dune-blanketed alluvial terraces. Runoff from this location does not flow directly into the Colorado River.

PREVIOUS WORK: Although this site has been known about for several years, it was not officially

recorded until March, 1991. The site was monitored in FY92, FY93, FY94, and FY96.

STATUS AND RECOMMENDATIONS: Overall the site is stable. However, extensive gullying on this terrace makes the site prone to radical erosion from a single storm. This is inevitable at some point in time. Feature 3 has experienced some downcutting since 1994. The site should be assessed for stabilization and monitored every five years. Monitors should watch for evidence of localized storms in this Reach on a trip to trip basis.

C:13:381

C:13:381 consists of an almost completely eroded fire feature, two chipped stone tools, and burned artiodactyla bone. Cultural affiliation is not known. The site is located on an eroding sandy alluvial terrace 35 meters from the river and five meters above the 28,000 cfs level. Surface runoff dies out in the vegetation line before entering the Colorado River.

PREVIOUS WORK: This particular site was reported by visitors to the park in 1981. However, it was not recorded until March, 1991 by NPS project personnel. The site was monitored in FY92, FY93, FY94, and FY96.

STATUS AND RECOMMENDATIONS: The site is presently in poor condition and barely discernable. Enough carbon is present to secure a date otherwise there is not a lot of potential at this location for data recovery. A permanent backpackers camp located here has little effect on what is left of the site. This site should be assessed for stabilization in the form of checkdams, and monitored every five years.

C:13:386

C:13:386 consists of a single slab-lined cist eroding out of a dune. No artifacts have been observed. More extensive materials could still be covered by the eolian sands. Surface runoff from the site does reach the Colorado River.

PREVIOUS WORK: This site was initially recorded by NPS survey personnel in October, 1991 and monitored in FY93, FY94, and FY96.

STATUS AND RECOMMENDATIONS: C:13:386 is currently stable although the potential exists for a single storm to remove the entire downslope wall. Presently, a four-wing salt bush is growing in an interior corner pushing out one of the slabs. There is also an ant colony in residence. Slight movement of the downslope slab was observed this year. Biennial monitoring to reduce the negative affect of annual visitation is recommended.

C:13:387

This is a small structure with associated artifacts located on an alluvial terrace 100 meters from the

river and nine meters above the 28,000 cfs level. Ceramic evidence and the formal groundstone found on-site indicate a Puebloan occupation.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in October, 1991 and monitored for the first time in October, 1995.

STATUS AND RECOMMENDATIONS: Features 1 and 3 are impacted by animal burrowing. The metates are moving downslope from their recorded positions in 1990. Features 2 and 4 are stable and more vegetation is present than in 1991. There is significant change in the area south of Feature 6. The area has been completely blown out from flooding in the river-based arroyo that runs through the site. The sherd scatter associated with Feature 6 is completely gone. The recommendation is to monitor overall site stability and photograph the metates annually. The area where the metates are located will be assessed for some form of stabilization.

C:13:389

This site contains a rockshelter with crude wall alignments, two roasting features, and an associated artifact scatter. PII grayware and a single Southern Paiute utility ware sherd were found on the site. Additional rock and logs have been added to the walls since 1991 by campers. The site is located in bedrock ledges overlooking a major rapid in Reach 5. The site is 22 meters from the river and eight meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in April, 1991 and monitored for the first time in April, 1996.

STATUS AND RECOMMENDATIONS: Minor gullying is occurring adjacent to Feature 1 and a hiking trail has developed that crosses Feature 3 and passes below Feature 2. Campers have contributed additional courses to existing walls inside the shelter since the survey took place. The site is proximal to a camp that is highly used in the summertime particularly in emergency situations. It is evident that people are camping here and seeking shelter from the elements as needed. It is recommended that retrailing take place and the gully at Feature 3 be rock lined. The site should be monitored annually.

04/18/91

04/30/96

Figure 16. C:13:389: A photo comparison of a structure impacted by visitors.

C:13:392

This site consists of two distinct roasting features and an associated lithic scatter. Artifacts include PII sherds, lithic debris, Utah obsidian, and bone fragments. The site is situated on a sand and alluvium-covered granite bench over 110 meters from the river and 15 meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in April, 1991 and monitored for the first time in April, 1996.

STATUS AND RECOMMENDATIONS: The site is highly impacted from camping and hikers. The main trail from the south rim to Hance Rapid passes through the site and is the scene of heavy foot travel from the river and the rim. The site is adjacent to John Hance's original tourist camp and probably was suffering from compaction in the late 19th century. A fire swept the area in May, 1995, further compromising the surface. Monitors observed that "toilet paper is everywhere" since the fire. It is recommended that the social trailing be obliterated and that the backcountry office (ranger) be informed of the human impacts at this site. Monitor the site on an annual basis.

C:13:393

This is an artifact scatter eroding from a high sand dune. Artifacts include PII sherds, lithic debris, groundstone and bone. A green soapstone pendant was found on the surface during the survey and collected. The site is located at the mouth of a major side canyon 65 meters from the river and 12 meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in April, 1991 and monitored for the first time in April, 1996.

STATUS AND RECOMMENDATIONS: The site is stable. Surficial amounts of sand have rearranged themselves since the survey, exposing new artifacts and covering others. Backpackers camp in low spots in this same dune 40 meters toward the river but do not seem to be aware of this archaeological site. A piece of toilet paper was found on the site during monitoring. Monitor the site every five years.

G:03:003

This is a multicomponent rockshelter with an extensive midden and a group of roasting features stretching out below it. The artifact assemblage includes: chipped stone tools, broken groundstone, lithic debris, hand tools, carbon, and sherds belonging to ancestral Puebloan, Hualapai, Cohonina, and Southern Paiute groups. The shelter is located in the Bright Angel Shale and the adjacent sand dunes. Some of the surface runoff flows into the Colorado River via Granite Park Wash. Most runoff disappears directly into the dune.

PREVIOUS WORK: This site was initially recorded by R. Euler and G. Gumerman in 1969. Sherds were collected and an analysis was conducted. Field notes state that the condition of the site was "undisturbed" and the potential for a rewarding excavation was "excellent." The site was visited again in 1981 by Euler and Jones. More sherds were collected and a simple sketch map was made. G:03:003 was recorded in detail by NPS survey personnel in January, 1991, and monitored annually since FY92. Trail obliteration, retrailing, and checkdams were completed in March, 1996, to eradicate the system of multiple trails that had developed as a result of heavy scientific research on the delta and heightened interest by the river-running community since the survey. Total station mapping was completed in FY96.

STATUS AND RECOMMENDATIONS: The bulk of the site is presently stable. The trail project has had a positive affect, and vegetation has already begun to grow in the old trails. Because of the extensive trail work, monitors only looked around the perimeters of the site for new trailing. No new trailing was observed so on-site monitoring was not conducted. Semiannual monitoring is recommended.

04/06/94

03/03/96

Figure 17. G:03:003, A photo comparison of a trail before and after obliteration.

G:03:004

This is an extensive multicomponent rockshelter with an associated group of roasting features. The artifact assemblage indicates a presence dominated by Virgin Branch Puebloan, Southern Paiute, and Hualapai peoples. Kayenta Branch and Hopi trade wares were also present. Numerous sherds, chipped stone and hand tools, rock art, and historic materials are present. Some runoff drains into the local side canyon which flows over a bedrock falls directly into the Colorado River while other areas of the site retain the surface waters within the dune.

PREVIOUS WORK: The site was initially recorded by R. Euler in 1972. Sherds were collected and analyzed and a few notes were taken. The site was revisited several more times in the 1970s. No further descriptive work or mapping was completed, but on each occasion more sherds were collected and typed. The site was recorded by NPS survey personnel in March, 1991. The site has been monitored at least annually since FY93. The site was mapped using a total station in FY95. Retrailing and obliteration took place in November, 1995.

STATUS AND RECOMMENDATIONS: The site is currently stable and not being adversely affected by natural impacts. The trail work has had a positive affect although this summer will probably see more visitation on-site and more trail work may be needed over the next year. Minor movement of the historic jars at the shelter was noted. Increased disturbance from the local packrat community was also observed. Annual monitoring is recommended.

G:03:019

This is a multicomponent site consisting of a rockshelter, a midden, several activity areas, a roasting feature, and associated artifacts. Sherds on the surface indicate PII, Pai, and Paiute affiliations and a trade connection to Hopi as is evidenced by the presence of Jeddito Wares. The site is located on talus and bedrock ledges over 200 meters from the river and 35 meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in April, 1991 and monitored in FY95 and FY96.

STATUS AND RECOMMENDATIONS: The site is in stable condition. A faint trail exists that was used by the survey team and is probably occasionally used by hikers on river trips. This trail was possibly here prehistorically and has been maintained over time by game. The only noticeable ongoing impact to the site is rodent burrowing. The site will be monitored every three years as a control group site.

G:03:020

This is a seven feature habitation site containing structural outlines, chipped stone, and hand tools as well as groundstone and carbon. No sherds were observed. The site is situated on stabilized dunes on both sides of a major side canyon drainage. The bulk of surface runoff disappears into the dune

sands before reaching the Colorado River.

PREVIOUS WORK: This site was initially recorded by R. Euler in 1978. Three features and chert flakes were noted, but no ceramics were observed. The site was recorded in greater detail by NPS survey personnel in February, 1991. The site has been monitored annually since FY92. Total station mapping was completed in FY95.

STATUS AND RECOMMENDATIONS: Overall the site has remained stable since 1995. A minor increase in surface erosion was observed at Feature 1. Vegetation growth and eolian movement have occurred across the site. The recommendation is to discontinue monitoring Locus A, but continue annual monitoring of Locus B.

G:03:026

G:03:026 is a roaster complex consisting of eight surface features and artifacts including chipped stone tools, groundstone, Pai, Cohonina, and Virgin Branch ceramics, and historic, late 19th century Hualapai artifacts. The site is located on a dune-covered alluvial terrace bordering a major side canyon drainage. The bulk of surface runoff is channeled into the local side canyon arroyo which flows directly into the Colorado River.

PREVIOUS WORK: This site was initially recorded by NPS survey personnel in January, 1991 and monitored annually since FY92. Trail obliteration, retrailing, and checkdam installation occurred in March, 1996. Total station mapping was completed in FY96.

STATUS AND RECOMMENDATIONS: Incipient gullying is present across the site but only encroaches on cultural materials on the west side of Feature 3. Trailing from tourists and researchers is evident everywhere and the problem is compounded by Bighorn sheep living in the area. It is recommended that monitoring occur annually.

G:03:030

This is a roasting complex with seven roasting or hearth features and flakes. The site is located on a dune-covered terrace split by a side canyon drainage. It is located over 90 meters from the river and 16 meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in February, 1991 and monitored for the first time in May, 1996.

STATUS AND RECOMMENDATIONS: The site is in stable condition with increased vegetation locally and eolian deposition occurring at Feature 5. Rodent burrowing is evident at Feature 3. A gully near Feature 2 is currently inactive but it does flow into the main drainage that bisects the site. The recommendation is to install checkdams at the nick points in the gully near Feature 2 and to monitor the site biennially.

G:03:033

This site consists entirely of a stone circle two meters in diameter. There are no associated artifacts and no apparent heat-altered rocks. There is a concentration of modern charcoal six meters northeast of the circle. The site is located on an alluvial terrace adjacent to a granite cliff and dissected by a major side canyon drainage. It is situated 70 meters from the river and 10 meters above the 28,000 cfs level.

PREVIOUS WORK: The site was recorded by NPS survey personnel in March, 1991 and monitored for the first time in March, 1996. Trail work in November, 1995, removed and obliterated the social trail that had developed and diverted any future foot traffic into the local drainage and onto the cobble bar.

STATUS AND RECOMMENDATIONS: Due to the realignment of the trail, traffic through the area has dropped off almost completely in the period between November, 1995, and the most recent monitoring. It is suggested that this site be monitored in two years to check on human impact and make a further monitoring determination at that time.

G:03:038

A roaster complex with three features and three sherds (PII and Southern Paiute) makes up this site. It is situated on a stabilized dune 60 meters from the river and eight meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in March, 1991 and monitored for the first time in March, 1996.

STATUS AND RECOMMENDATIONS: Feature 1 is located on the edge of a cutbank with fire-cracked rock eroding into the drainage. It may be possible to stabilize this area. There is gullying, minor surface erosion, and eolian deposition occurring on-site but not specifically associated with any features. There are no preexisting photographs of this site. It is recommended that the site be assessed for stabilization and monitored biennially.

G:03:040

This site consists of a roasting complex divided into two separate loci of seven features. Artifacts include bifacial and hand tools, groundstone, charcoal, and lithic debris. The site is located on a residual terrace bounded by two arroyos.

PREVIOUS WORK: This site was initially recorded by NPS survey personnel in March, 1991 and monitored annually since FY94. Total station mapping was completed in FY96.

STATUS AND RECOMMENDATIONS: The site is generally stable but situated in a precarious position due to its location between two mature arroyos. The potential for major physical impacts

due to localized rain or side canyon flooding is high. Surface runoff is channeled into the Colorado River. Stabilization assessments and data recovery are recommended. Monitor this site on an annual basis.

G:03:041

This is a roaster complex located on a sandy riverside terrace. The surface is covered by cryptogamic soil and dissected by six small gullies. A sparse lithic scatter and single Pai sherd were observed on the surface. The site is 75 meters from the river and 10 meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded in March, 1991 and monitored for the first time in February, 1996.

STATUS AND RECOMMENDATIONS: Features 1 and 3 are proximal to inactive gullies. Feature 2 is stable. Biennial monitoring is recommended. The gullies should be stabilized below their nick points to curtail further downcutting.

G:03:044

The site consists of a habitation and roaster divided into two loci. Locus A is a series of five cleared and modified rockshelters located in bedrock ledges over 35 meters above river level. Locus B consists of two roasting features eroding into an arroyo. Chipped stone tools and some grayware pottery occur on-site. During 1994, an unfired .44 caliber (19th century) cartridge was found amongst the boulders on the sandy bench at Locus B.

PREVIOUS WORK: This site was initially recorded by NPS survey personnel in March, 1991 and monitored annually since FY92.

STATUS AND RECOMMENDATIONS: Locus A is presently stable but impacted by rodent burrowing and roof spall. Locus B is in a state of incremental ongoing erosion. Locus B should be assessed for checkdams in the arroyos, and monitored annually.

G:03:052

This is a roaster complex with an associated lithic scatter. A single sherd of Moapa Brownware was observed on the surface. The site is situated on a dune-covered sandstone bench 65 meters from the river and 18 meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded in March, 1991 by NPS survey personnel and monitored for the first time in March, 1996.

STATUS AND RECOMMENDATIONS: Minor surface erosion and extensive burrowing are

present adjacent to Feature 1. A small gully is forming above Feature 2 although there is no impact at this time. The site is presently suffering from multiple trailing. It is suggested that these trails be obliterated and a new trail be established closer to the river, directing foot traffic away from the site. The gully could also be stabilized at crucial points. Biennial monitoring is recommended.

G:03:054

A single deflated roaster with a few flakes and two cobble hand tools define this site. It is located between outcrops of granite 60 meters from the river and 13 meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in March, 1991 and monitored for the first time in May, 1996.

STATUS AND RECOMMENDATIONS: The site is currently stable. Vegetation in the vicinity is not as verdant as in 1991, probably due to the recent drought. There has been no change apparent on the surface since the survey. Sediment has been deposited out at the river level in front of the site as a result of the research flow of 1996. Even though there is a camp located in the area there is no evidence of visitation on-site. Due to the sites location on bedrock, and the lack of buried cultural materials, it is recommended that G:03:054 be tested for depth before being placed on the inactive monitoring list.

G:03:055

This is a roaster complex with a light lithic scatter and a few hand tools. A single brownware sherd was observed during the survey. The site is located on a sand-covered terrace over 70 meters from the river and seven meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded in March, 1991 by NPS survey personnel and monitored for the first time in March, 1996.

STATUS AND RECOMMENDATIONS: Minor surface erosion, gullying, the positive and negative effects of the wind, and animal burrowing are present on-site but not currently impacting any of the features. A large river-based arroyo runs adjacent to the northeast edge of the site. A thick growth of vegetation covers most of the site acting as protection. Monitor this site in three years to document any expansion of the arroyo and any changes to the surface. It is recommended that the arroyo be assessed for stabilization.

Figure 18. G:03:055; Rodent burrowing which has the potential to impact fire-cracked rock and charcoal.

G:03:058

G:03:058 consists of a single roasting feature and a fragmented mano. The site is located on a light dune-covered terrace 89 meters from the river and 13.5 meters above the 28,000 cfs level. Runoff from this location does not flow directly into the Colorado River.

PREVIOUS WORK: This site was initially recorded by NPS survey personnel in March, 1991 and monitored in FY94 and FY96.

STATUS AND RECOMMENDATIONS: The site is presently impacted by the growth of an arroyo into the feature. The site is bounded by arroyos and erosional channels. A river camp is located below the site and trails lead directly to the site. These trails should be obliterated and vegetation should be planted to discourage further visitation. Assess for the feasibility of stabilizing the drainage. Monitor the site biennially.

G:03:061

This site consists of a rockshelter with a hearth, 20-30 flakes, burned bone fragments, and four quids. The quids are evidence of agave gathering and processing indicating a Southern Paiute and/or Hualapai occupation. The site is located within the Tapeats Sandstone above the high water zone.

PREVIOUS WORK: This site was initially recorded by NPS survey personnel in March, 1991 and has been monitored annually since FY92.

STATUS AND RECOMMENDATIONS: Impacts are due to animal use as evidenced by the presence of mammal scat and owl pellets. Due to the site's location above the high water zone, the

recommendation is to discontinue river corridor monitoring.

G:03:062

This is an historic artifact scatter which includes: square and wire nails, a Levi button, a fork, wire, a clothespin spring, a can, a metal ring, a comb, a piece of a 1932 newspaper, and wooden slats probably from a wooden box or crate. The site is located on a granite bedrock bench, 20 meters from the river and nine meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in March, 1991 and monitored for the first time in March, 1996.

STATUS AND RECOMMENDATIONS: Minor movement of the artifacts has occurred since 1991 from river-runners visiting the site. A trail leads from a local river camp to the artifact scatter. Trail obliteration will be considered to avoid further visitor impacts. It is recommended that G:03:062 be monitored in three years.

G:03:064

The site is a roaster complex situated on an alluvial terrace directly above the mesquite line adjacent to the river. The sediment comprising the terrace is poorly consolidated and easily eroded. Over thirteen archaeological features are present and are dominated by the distinct mounds of fire-cracked rock. The entire terrace system has been eroding since at least 1965 and is currently expanding at an undetermined rate. Due to the protective caps of fire-cracked rock, erosion is occurring differentially, cutting channels around the roasters, and creating peninsulas as the drainages carve out the loose and unprotected sediments. Ultimately the archaeological features will be isolated, pedestalled and brought down to base-level with the rest of the terrace. Near Feature 8, a large metate is eroding from the cutbank at a depth of 2.9 meters below the modern surface. This indicates an earlier and probably extensive occupation in addition to the Hualapai presence on the surface.

PREVIOUS WORK: The USGS is particularly interested in this location as a recent phenomenon of unique quality to the river corridor and has been studying the arroyo system in detail since 1992. C-14 samples were taken from buried cutbank deposits by the NPS in 1993, revealing a suite of dates ranging from 1880 +/- 70 BP to 2870 +/- 60 BP. The river corridor project has monitored the site at least annually since FY94. Total station mapping was completed in FY95.

STATUS AND RECOMMENDATIONS: This office is currently in consultation with the Hualapai Tribe on the condition and future of this property. It is recommended that G:03:064 be monitored annually. It is further recommended that if the erosion is determined to be too pervasive to effectively curtail with checkdams or other stabilization, testing and data recovery should be initiated.

G:03:066

G:03:066 consists of an intact fire feature and a single grinding slick on a detached boulder. No artifacts were observed on the surface. The site is located on a shallow dune-covered granite bench at the mouth of a major side canyon drainage.

PREVIOUS WORK: This site was initially recorded by NPS survey personnel in March, 1991 and monitored in FY92, FY93, FY94, and FY96.

STATUS AND RECOMMENDATIONS: The site is presently stable and in pristine condition. The only impacts at this site are trailing and trampling from the monitoring project. It is recommended that G:03:066 be put on the inactive list of sites.

G:03:072

G:03:072 is a large roaster complex situated on a sand-covered river terrace in the upper mesquite zone. Artifacts include; sherds, lithics, and groundstone. The sherds indicate a multiple occupation of the Virgin Branch and protohistoric to late historic Pai/Paiute.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in April, 1991. It has been monitored in FY93, FY95, and FY96.

STATUS AND RECOMMENDATIONS: Overall the site is stable. Cryptogamic soil has begun to develop on the minor trailing created during recording in 1991. Features 11, 12, and 14 are subject to erosion from two active gullies. It is suggested that the gullies be stabilized with checkdams. The site should be monitored annually.

11/19/94

05/08/96

Figure 19. G:03:072, A photo comparison of the movement of fire-cracked rock in an active gully.

G:03:073

This is a roaster complex with an artifact scatter and an overlay of early 20th century trash. Ceramics indicate a Puebloan and protohistoric Pai presence. The site is located on a very old river terrace underlain by Tapeats Sandstone 33 meters from the river and 16 meters above the 28,000 cfs

level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in April, 1991 and monitored for the first time in October, 1995.

STATUS AND RECOMMENDATIONS: The site is currently very stable. Thick vegetation obscures the visibility of the features. The site should be photographed in February, 1997, when the vegetation is not so dominant. Monitor the site in four years.

G:03:076

This site consists of the deflated remains of a single roaster partitioned into three segments by local runoff and vegetation. A single cobble mano is located on the surface. No diagnostic materials were observed. The site is situated on the remnant face of a dune, abutting a rock-strewn talus slope. It is 30 meters from and 14 meters above the 28,000 cfs level.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in March, 1991 and monitored for the first time in February, 1996.

STATUS AND RECOMMENDATIONS: The site is not being impacted by operations of Glen Canyon Dam due to its location on a talus slope underlain by bedrock. Erosion at this location is gravity controlled, however, stabilization is warranted. Monitoring every three years is recommended.

G:03:080

This is a large habitation site located at the mouth of a major side canyon, consisting of several features and associated artifacts. An extensive pictograph panel is located on the wall of a long narrow rockshelter on the upstream side of the site. Sherds indicate a prehistoric Pai occupation and the pictographs have a dual affinity belonging to Pai and Southern Paiute cultures.

PREVIOUS WORK: This site was initially recorded by NPS survey personnel in April, 1991. It has been monitored in FY92, FY93, FY95, and FY96. G:03:080 has also been visited and documented by the Southern Paiute Consortium as an important site to their people.

STATUS AND RECOMMENDATIONS: The site is in stable condition. Some wall fall occurred at the rock art panel and a new feature was discovered in March, 1995. Due to the high potential for visitation, it is recommended that G:03:080 be monitored annually. It is further recommended that the pictograph panel be photographed using medium format photography.

IV. Management Actions Completed in FY96

Management actions include all activities designed to aid the RCMP and the NPS in protecting and preserving river corridor cultural resources. In FY96, management actions included regular

monitoring activities, the tracking of artifact movement via surface analysis units, time-lapse photography utilizing stationary cameras at selected sites, total station mapping, and remedial actions.

Recommended actions for next fiscal year are included in Section V, Management Recommendations for FY97.

A. Monitoring

Site Selection

The archaeological sites monitored along the river corridor are derived from the original group of 475 sites, inventoried during the 1990-91 survey. They are a combination of Glen Canyon National Recreation Area (GLCA) and Grand Canyon National Park (GRCA) sites. A total of 336 sites comprise the number of properties that are either impacted or potentially impacted by river flows (identified as the "I" group). Forty-two of these sites are located in GLCA and are addressed in a separate report. What remains are 294 "I" group sites in GRCA. Within this "I" group, 230 sites are located on reworked alluvial deposits such as dunes or terraces and subject to erosion (identified as the "SI" group). Monitoring of the 230 "SI" sites was completed this fiscal year. The remaining "I" sites (24) will be visited by the end of FY97. This will complete the monitoring of the 294 sites potentially or directly impacted by Glen Canyon Dam within Grand Canyon.

There are 130 sites in GRCA that are classified as the "N" group, having no impact. These sites are considered unaffected, either directly or indirectly, by flows from Glen Canyon Dam. A 10% sample (13 sites) was chosen as a control group in FY94. After post-survey field observation, it was discovered that some of the originally categorized "N" sites were in fact located on alluvium and within the zone of potential impact. These sites were subsequently removed from the control group, placed in the potential impact category, and replaced by sites outside the impact zone. These control sites will be monitored every three years, beginning October, 1996. The remaining 117 sites are currently not on the active monitoring list.

During the three river trips conducted in FY96, 142 unique sites were monitored. Eight sites were monitored twice (semiannuals) for a total of 150 monitoring episodes. The impact categories included 13 "N", 11 "I", and 118 "SI" sites. Sixty-seven sites were visited for the first time since the survey.

Site Schedules

Monitoring schedules are based on the degree of impacts (whether visitor-related and/or physical) occurring at sites and their rate of change. For FY97 there will be six categories to choose from when selecting the appropriate site schedule, as apposed to the five choices used the past four years.

A new category, "inactive" will be used and is discussed further in section VI. C. Monitoring Form Updates. Listed below are the site schedules and how the field staff defines them. Appendix A summarizes all sites monitored to-date, with their assigned monitoring schedule.

Semiannual: These sites demonstrate extreme erosive conditions and are monitored in the fall and spring. Changes are very obvious to regular monitors even before photographs are used to make

comparisons.

Annual: These sites exhibit moderate erosion and are monitored in the fall. It is effortless to identify physical and/or visitor-related impacts using previous photographs. Several, if not all of these sites have received, or will receive remediation.

Biennial: Sites illustrating erosion that is fairly difficult to detect, yet noticeable when comparing photographs. These sites are monitored every-other-year.

3 - 5 Years: Sites located in an area susceptible to erosion, yet no change can be detected using photographs. The sites are located in fairly stable environments. Whether a 3, 4, or 5 year schedule is recommended is dependent on the unique conditions at each site.

Inactive Monitoring: Sites that are in stable condition but are located in areas where there could be a slight potential for change, yet unlikely. These sites are usually in pristine condition, located within the area of the 300,000 cfs level, and covered by healthy cryptogamic soils. These sites will be monitored on an as needed basis, i.e. after severe weather disturbances, heavy visitation, or at the request of the tribes.

Discontinue: These sites are located above the 300,000 cfs level. They are situated on Pleistocene or older talus, extremely old debris flows, or bedrock. These sites are outside the parameters of the river corridor monitoring program. Sites recommended in the past four years for discontinuing will be reassessed and possibly placed on the inactive monitoring list if they meet the criteria.

Field and Lab Methods

Three river monitoring trips were completed in FY96, ranging from 18 to 21 days in length. All trips launched from Lee's Ferry, AZ with takeouts 225 miles downstream at Diamond Creek Wash. Field personnel consisted of at least one project archaeologist and one to two archaeological technicians. Individual trip reports were prepared and sent to all PA signatories in a timely fashion.

Archaeological site monitoring is the in-field evaluation of site condition and the completion of a monitoring form. The completed site monitoring form is a compilation of quantitative and qualitative observations designed to represent current site conditions (Appendix B). Project archaeologists record physical and/or visitor-related impacts observed and make site-specific management assessments and recommendations. Locations of impacted features or structures are noted on both the monitoring form and the site maps. Comparisons of current conditions with previous monitoring forms is key to understanding change through time and eventually, to identifying impact trends.

The data compiled on monitoring forms is entered into Paradox, a relational database program, and analyzed using both Paradox and SYSTAT (statistical analysis) software. The raw data and associated graphics are available for each fiscal year in the project office. Final copies of monitoring forms are printed and filed in the project office, and duplicate copies are supplied to the Science Center at Grand Canyon National Park.

Photographic Documentation

Photographic documentation is the comparison of previous site photos with current site conditions. When changes are observed, monitors reproduce previous photographs for future comparisons. Attempting to produce near to exact photo replicas is an intricate process involving the synthesis of cameras, crew, time, and environmental conditions. Monitors are confined by time, and therefore precise replication is oftentimes impossible. Photographic information is entered into Dbase 3+, a database program, and archived in the project office.

Over 1,200 photographic images were developed and archived in FY96. Project images include 3 x 5 in black-and-white prints, archival artifact photographs, medium format prints, 35 mm color slides, and 8 mm video. Pentax Zoom 105-R, Pentax 90WR and Olympus Twin cameras are used with black-and-white Kodak Plus-Xpan 125 film. Medium format 6 x 7 cm negative prints are taken at selected sites with extreme impacts to supplement 35 mm prints.

Figure 20. Photographic documentation: crew using a medium format camera and a tripod.

Color slides also complement the photographic database. On average, 10 rolls of 36 exposure film are shot during each monitoring trip. All photographs are mounted onto cards which contain site numbers, dates, descriptions, and directional information. Negatives are archived in polypropylene sleeves, filed in acid-free binders, and stored in a fire-proof filing cabinet in the project office.

B. Surface Analysis Units

At the request of various representatives for the signatories of the PA, a series of surface analysis

units were placed on sites within the project area during the spring of 1994. The units are two dimensional 1x1 meter squares laid out on the surface. A total of 11 units on 10 sites have been monitored. Results from the first two years of monitoring the analysis units can be reviewed in Coder et al. 1994, 1995.

In general, observation of the units has led to the conclusion that three situations characterize artifacts located on the surface: certain objects change location during the period of observation, certain other objects do not change location, and still other objects disappear only to reappear again at another time and place. The mechanisms for this movement (or lack thereof) are occasionally obvious, for example trampling by wildlife, gravitational movement downslope, or covering by eolian sand. More often however, the reasons are obscure.

For several years the archaeological profession has "emphasize(d) intrasite spatial analysis when identifying non-random distribution of artifacts" (Rick 1976:133). Archaeologists believe that inferences can be made regarding patterns of human behavior by scrutinizing the patterns of artifacts found in the archaeological record. It is also widely recognized that post-depositional processes can alter the landscape such that the original patterns of human behavior are obscured (Rick 1976).

The concept of entropy, which is the foundation of thought in the physical sciences, can be applied to the cultural realm as well. Ascher (1968) suggests that "time's arrow" effectively consumes the past, and the farther back one goes in the pursuit of knowledge the more shadowy the picture becomes (Schiffer, 1983).

A concept employed by paleontologists known as "the top of the stack" illustrates the same notion. The younger a rock formation, the more widely exposed that formation is on the surface. Hence it is more widely studied and the fossils available to the researcher are more common and better preserved. This axiom as used by geologists addresses the same difficulty encountered in understanding archaeological environments of deposition and preservation (Raup & Stanley 1971:8-20).

More thought than actual study has been dedicated to the life of an artifact assemblage. The literature supports a variety of opinions and data on the subject, from taphonomic processes (Behrensmeyer & Hill 1980) to the regional distribution of cultural materials (Camilli 1988). Foremost is the need for more intensive scientific study concerning the mechanics of movement. It is universally acknowledged that movement occurs and often the forces at work are obvious and locally determined (Baker 1978; Bowers et al. 1983; Camilli 1988; Rick 1976). Bowers expands on this theme to warn other researchers,

Another related aspect of this problem that warrants consideration is the degree of accuracy that we are able to achieve in our interpretations. We emphasize here the distinction between the concepts of precision and accuracy as they apply to archaeological measurements (Bowers 1983:568).

With an understanding of the scientific definitions of these terms (precision and accuracy) it is possible to make very precise measurements and still be inaccurate regarding what Bowers calls "the reality of the situation" (1983:569). Bowers goes on to state, "What we do emphasize is that our ability to interpret the data may be limited by (our incomplete understanding of) non-cultural processes" (1983:569).

The surface analysis units placed on sites in the river corridor are only capable of dealing with spatial relationships as simple distances not as functions of the more complex phenomenon of mechanics or erosional processes. Firstly the concern of the project is with the utility of such an exercise. Field time is expensive and there must be a practical return on the investment in the form of useful information which pertains to the project specifically. This is not happening. How does this exercise direct or enhance the management of the whole system better? The analysis units are telling us facts about the environment that we already know, i.e. the wind blows, objects tend to move downslope.

Secondly, scrutinizing these units is an invasive procedure. In several cases it has caused an adverse impact to the surface from repeat visitation at a specific location. One lesson the field teams have learned from the units is that monitors can be the greatest impact to a site.

A third point concerning the project staff is why are we doing this? If it is to make our work appear to be more scientific that has not been the case. There is a curious tendency within the profession to equate the attachment of a number to a thing as scientific when in fact it is mere numerology. Scientific method tells us to either stop the impractical use of surface analysis units or invest a lot more time and money into the effort. Is that not what adaptive management is all about? If an idea does not work then it can be culled from the system before the exercise becomes a tradition that in the future everyone can rationalize but nobody living can explain.

Dr. Christian Downum (NAU Principal Investigator) stated at the SAA meetings in New Orleans this past spring, "Rigorous tracking of the movement or disappearance of surface artifacts is a VERY complicated endeavor....In all probability this method is far too expensive and methodologically problematic for widespread use." Considering the real world constraints of field time and budgets it is the contention of the project that the time and money allotted to the monitoring program can be utilized more effectively. It is therefore recommended that surface analysis units be removed from the program.

C. Stationary Cameras

Since March, 1992, stationary cameras have been used on sites identified with moderate to extensive erosion. The cameras are automated to take daily black-and-white photographs, 36 exposure, of areas characterized as highly erosive, in an attempt to document when, and if, changes occur.

Installing stationary cameras is a very difficult task, mainly because they need to be placed in areas close enough to the site so that changes can be detected, but also hidden from view so that boaters do not see and remove them. The cameras are located at three sites in FY96: C:13:003, C:13:006, and C:13:371. Results indicate that, with the exception of the 45,000 cfs research flow, no physical

changes were observed. It is recommended that the cameras be removed at the three sites because the results indicate that no information can be obtained through daily photography unless it is catastrophic, in which case we can identify the event during regular monitoring activities.

D. Total Station Mapping

Total station mapping serves as a form of detailed archaeological information that can doubly be used as a site management tool. The maps display .25 meter contour intervals which may discern minor changes in erosional impacts, growth of trails or gullies and arroyos, dissolution of features, and artifact movement.

Sites within the control group and those receiving intrusive remediation are mapped with the total station. Instrument mapping will not occur if remedial actions only involve brushing over trails. Over time, mapping will produce detailed examples of a short life-span of each site, shedding light on such questions as:

- a. If the site is changing, what is the rate and degree of change?
- b. Have the preservation efforts decreased or increased erosion?
- c. What other attributes are involved with the stability or instability of a site?
What are the repercussions to the ecosystem in the immediate area, i.e., slope, soil and rock type, animals, vegetation?
- d. Is there an increase or decrease in trailing over time? This information may assist the NPS when devising a strategy for visitation in the canyon, via boat or on foot.

Reclamation has generated total station maps for the river corridor sites as part of the Programmatic Agreement on Glen Canyon Dam operations since April, 1994. In FY96 these responsibilities were transferred to the GCES surveyors because it is more cost efficient and logistically practical. The only setback from this change of responsibility is that the maps completed by the Reclamation in FY95 do not exhibit the level of detail necessary for tracking erosion. Some of these sites will be re-mapped. A total of 27 sites have been mapped with a total station.

Table 5. Total Station Maps Completed

Fiscal Year 95	Fiscal Year 96
A:15:003	A:15:005

A:15:021	A:15:031
A:15:030	A:15:032
A:16:004	C:13:010
C:13:070	G:03:002
C:13:099	G:03:003
C:13:100	G:03:024
C:13:273	G:03:025
C:13:339	G:03:026
C:13:371	G:03:027
G:02:100	G:03:028
G:03:004	G:03:040
G:03:020	G:03:059
G:03:064	

Mapping will continue in August, 1996, with priority given to the 37 sites that will either receive remediation this spring or belong to the control group. Some sites will be mapped on several USGS generated topographic maps of a 1:2,000 m scale. This will expedite plotting cultural features on the larger deltas.

E. Remedial Actions

Remedial actions were introduced in FY95 and consisted of the installation of checkdams at Palisades Delta and trail work activities. In FY96, collections, testing, data recovery, trail work and checkdam installations were the types of work completed. All work was conducted under the supervision of the project archaeologists.

Collections

B:10:230

In March, 1995, a sandal was discovered at B:10:230 in a very active packrat midden. At the request of the signatories to the Programmatic Agreement and with special consent from the Southern Paiute Consortium, the sandal was collected in February, 1996. Prior to collection, the sandal was described and photographed *in situ*. Currently curated at Grand Canyon National Park, the sandal measures 18.2 cm in length, 7.5 cm in width, and 1.2 cm in thickness. It is made of yucca strands, possibly two strands, and exhibits a twining weave technique.

Figure 21. B:10:230; Sandal collected and curated at Grand Canyon National Park.

Test Excavations for Eligibility

B:11:284

As part of the Determination of Eligibility process for sites within the Grand Canyon River corridor, NPS conducted a test excavation at site B:11:284. The project was designed to identify the presence of subsurface cultural materials, determine site integrity, and make recommendations to the State Historic Preservation Officer (SHPO) regarding the eligibility for listing on the National Register of Historic Places.

The site consists entirely of two rock walls situated perpendicular to the cliff base, forming a rectangular space about 3 x 2 m. No artifacts are in association. A small pour-over has eroded or covered part of the architecture and possibly washed away any artifacts that would have been present. Cultural affiliation is unknown.

On May 5, 1996, a 0.50 m sq test unit was placed at the site by a crew of two archaeologists. Excavation terminated at sterile soil, which was approximately 0.50 m below the present ground surface. No cultural materials were encountered on the surface or in the subsurface, yet charcoal flecks were lightly dispersed throughout the levels. A red pictograph, measuring 0.20 x 0.20 m, in the form of a zoomorph, was discovered for the first time on the Bass Limestone above the unit.

B:11:284 should be considered eligible for National Register listing under Criterion D of the Criteria for Evaluation. The site retains integrity through the presence of rock art and integrity of location,

and therefore has the potential to yield information important in prehistory, region wide and river corridor specific (Leap 1996a).

Data Recovery

C:13:371

Site C:13:371, a mid to late PII habitation site, was recommended for testing on the 96-1 monitoring trip. In February, 1996, two charcoal samples were taken at Features 2 and 4 as part of the mitigation plan for the 45,000 cfs research flow. Both features exhibit much deterioration and exposure, and are in the position where preservation is impractical. The charcoal was sent away for radiocarbon analysis and the results will be included in the Mitigation Report, due December 31, 1996.

Trail Work

Retrailing and obliterating trails are the most commonly recommended methods of reducing site impact. Some trails are not created with the intention of visiting a site, because many sites are difficult to detect. They are usually formed by commercial and private boaters hiking the side canyons. Together with the obvious impacts of human trailing on-sites, i.e., soil compaction, artifact collection and movement, trails may become entrenched, making shallow to deep gullies. In some circumstances, they can connect to river-based or terrace-based drainages.

Trail obliteration is recommended when archaeologists want to prohibit access on, or near the site, in places such as Granite Park Delta. However, at several sites, no matter how determined the NPS is to obliterate trails, visitors are equally determined to hike in these areas. In such cases, like Nankoweap, retrailing is advised. These trails are well-marked and usually located several meters away from the site. Listed in Table 6 are the 15 sites where trail obliteration and/or retrailing occurred in FY96.

All the trail work was completed under the supervision of GRCA Resource Specialist, Kim Crumbo, during regularly scheduled NPS rehabilitation trips, in November and February. Beginning in FY97 much of the trail work responsibility will be delegated to this program, though assessments with GRCA resource specialists will be necessary. It is the intention of the field staff that more trail work will be accomplished during the upcoming fiscal year in conjunction with the regular monitoring.

Table 6. Sites Selected in FY96 for Retrailing or Trail Obliteration

Site Number	Retrail	Trail Obliteration
C:02:097	X	
C:02:098		X
C:06:003	X	X

C:09:051	X	X
C:09:052		X
C:13:005		X
C:13:006		X
G:03:002		X
G:03:003		X
G:03:004	X	X
G:03:024		X
G:03:025		X
G:03:026		X
G:03:028		X
G:03:067		X

Checkdam Installation

The basic objective for building a checkdam is to capture sediment from channelled runoff. The idea is not to stop erosion, but to decrease water velocity and increase sediment deposition, thus slowing the erosive process. The standard sediment catchment construction utilized was surface checks. Simply stated, this means checks built on the surface. Five types were built: rock and log checks, horseshoe checks, rock lining, and basket weave checks.

All checkdams were constructed under the supervision of the Zuni Conservation Team -- Gabriel Yuselew, Daniel Seoutewa and Albert Chopito. The checks were built with the natural resources in the vicinity. They were placed in the most active drainages, to lessen or curtail headward erosion. All checks were described, measured, and photographed in detail. The checks have also been mapped into the GIS system for future reference and field use. See the summaries of the checkdam distributions below. Appendix D has the appropriate site maps. Also refer to the following reports for detailed checkdam descriptions (Leap and Coder 1995; Leap 1996b)

Palisades

This work was actually completed in September, Fiscal Year 1995, but was not incorporated into the annual report. Seventy checkdams were completed in four days with the help of 28 people from various federal and state agencies, and tribal representatives. Refer to the following report and supplemental video for more detailed information (Leap and Coder 1995).

C:13:098 and C:13:099

There is one river-based arroyo that impacts both sites. Forty-four checks were placed throughout the arroyo system.

C:13:100

Twenty-six checks were placed in the river-based arroyo that bisects the site.

60 Mile Canyon**C:13:006**

In February, 1996 checks were completed in one day by personnel from the NPS science center and volunteer commercial guides, and supervised by two Zuni conservators. A total of 15 checks were constructed in two river-based drainages. These streams drain into 60 Mile Wash which drains into the river.

Crash Canyon**C:13:371**

Checks were constructed in a half day, in February, 1996, with the same crew from the 60 Mile project. Three checkdams were constructed high up a river-based drainage near Feature 3.

Granite Park

In March, 1996, several agendas were planned for two and one half days at the Granite Park delta. These included mapping in the features with a total station, obliterating trails, and constructing checkdams. With the same crew as 60 Mile and Crash, a total of 14 checks were built at four sites.

G:03:003

Checks were placed in an active terrace-based drainage (fingers out into a cobble bar) that bisects Feature 5 from the rest of the site. The work involved placing six checks directly below active headcuts.

G:03:026

This site contains one major river-based drainage (drains into Granite Park Wash) with five large headcuts. Five checks were constructed directly below each headcut.

G:03:025 and G:03:028

A terrace-based stream drains between these two sites and has the potential to impact features from either site. The drainage is small in length but has two major headcuts. Three checks were placed in this drainage, two at the headcuts and one just below the headcuts.

V. Management Recommendations for FY97

The long-term monitoring program was established to implement management assessments and recommendations that are advised from field inspection. This section summarizes the management recommendations made at all the sites visited in FY96. The recommendations are based on the degrees of various impacts to a site as illustrated during field observation and photo comparisons. Each site can receive one or more recommendation(s) in the best interest of site preservation and/or data recovery. The general categories of management actions include measures to reduce site impact and measures to protect site integrity.

A. Measures to Reduce Site Impact

Options for preserving sites consist of closing the site to visitors, retrailing and obliterating trails, planting vegetation, installing checkdams, and stabilizing. (The term "stabilizing" is used to include practices of site preservation other than the ones mentioned above). When these measures are recommended, it usually means that the impacts observed have the potential to be reversed. See Table 7 for the number of recommendations made in FY96 to reduce site impact. No sites were advised for site closure, yet C:13:010 continues to be closed to visitors since 1985.

Obliterating Trails and Retrailing

Retrailing and/or obliterating trails was recommended for 26 sites. This is the second most common recommendation for obvious reasons. As long as the Grand Canyon exists, people will continue exploring the area at will.

In areas where multiple trailing is impacting a site, they are obliterated using such materials as dead brush and branches, cacti, and jute mat to mask existing trails. In some situations, other well-defined trails are made far away from the site to deter people from the site. Retrailing is performed by lining the trail with large rocks or dead logs and building cairns, or trail markers.

Stabilization

Twenty-nine sites have been advised for some type of stabilization. As viewed in previous remedial actions, the recommendation "stabilization" has evolved to define a form of checkdam construction because most of the preservation work needed involves gully and/or arroyo treatment.

Checkdams

Checkdam construction, advised at 18 sites, has been the most efficient form of decreasing erosion. It has also proven to be very unobtrusive to the canyon environment.

Plant Vegetation

Planting vegetation to decrease erosion was recommended at six sites. In the past, planting vegetation has been used in conjunction with trail work, but it is also seen as a way of decreasing deflation and bank slumpage.

Table 7. Recommended Measures to Reduce Site Impact

Measures to Reduce Site Impacts	Number of Sites
Retrail	9
Obliterate Trail	17
Plant Vegetation	6
Checkdam	18
Stabilize	29
TOTAL	79

B. Measures to Protect Site Integrity

Methods to protect a site's integrity are recommended when disturbances, whether physical or visitor-related, have the potential to strip the site of cultural information, and all methods to reduce site impact have failed or are impractical. The four measures suggested to protect site integrity are: testing, surface collection of the entire site, testing or surface collection, and data recovery. No sites were recommended for testing or surface collection.

Data Recovery

It has come to the field staff's attention that only specific features at a site should be excavated, not the entire site. Many, if not all, impacts observed are area specific. This being the case, 19 sites were advised for data recovery. These site features will be excavated in their entirety, with full collection, upon field assessment and concurrence among the PA signatories.

C. Summary of Recommendations

As seen above, several recommendations to protect and preserve site information are made. Yet, due to field logistics and various site conditions, it is crucial to prioritize the needs of each site dependent on the degree of impact. Four priority ranks are used to categorize the extent of the impact(s): extensive, moderate, minor, and no action.

A priority rank of one is recommended when there are extensive impacts, and remedial actions should be completed within the following fiscal year. Moderate impacts are given a priority rank of two. These sites are not endangered by any immediate impact, therefore remedial actions should be implemented within the following two years. A priority rank of three is recommended when very minor impacts are evident. For this rank, remedial action should occur within the following three years. A priority rank of zero is suggested when no remedial action will occur until enough evidence is provided to justify the action, or when work has already been completed.

Table 8 summarizes FY96 sites that received remedial action recommendations, the types of impacts observed, and priority rank. In some cases, more than one priority rank was given for multiple recommendations.

Table 8. Recommendations and Priority Ranks Resulting from the FY96 Sites Monitored (N = 65 Sites)

Site No.	Schedule	Impacts	Recommend	Rank
A:15:005	Annual	Trailing	Obliterate Trails, Retrail	1
A:15:033	3-5 Years	Gullyng	Stabilize	3
A:16:149	3-5 Years	Gullyng	Checkdams	2
A:16:150	Inactive	Piping	Stabilize	3
A:16:180	Biennial	Gullyng	Data Recv., Checkdams	1
B:09:317	Biennial	Trailing	Obliterate Trails	1
B:10:111	Biennial	Side Canyon Erosion	Stabilize, Data Recovery	2
B:10:230	Control Group	Sandal	Collect	0
B:10:237	3-5 Years	Side Canyon Erosion	Stabilize, Data Recovery	2
B:14:105	Biennial	Trailing	Obliterate Trails	1
B:14:107	Biennial	Gullyng	Checkdams, Stabilize	3
C:02:094	Annual	Graffiti	Stabilize	1
C:02:096	Annual	Arroyo Cutting	Checkdams	1
C:06:003	Annual	Gullyng	Checkdams	0
C:06:005	Annual	Graffiti	Stabilize	3
C:09:050	Semiannual	Gullyng	Checkdams	2
C:09:051	Annual	Side Canyon Erosion	Stabilize	2
C:09:058	Discontinue	? Cultural Integrity	Test, Stabilize	1
C:09:084	Biennial	Gullyng	Checkdams	3
C:13:005	Annual	Trailing	Obliterate Trails	0
C:13:006	Annual	Bank Slumpage	Plant Vegetation	1
C:13:010	Annual	Arroyo Cutting	Stabilize, Data Recovery	12
C:13:069	Annual	Gullyng	Checkdams	2
C:13:070	Annual	Trails, Gullyng, Arroyos	Obliterate Trails, Stabilize, Checkdams, Data Recovery	1, 1, 1, 2
C:13:098	Semiannual	Trailing, Surface Erosion	Plant Vegetation, Stabilize, Checkdams	1, 1, 1
C:13:099	Semiannual	Trailing, Surface Erosion	Obliterate Trails, Plant Vegetation	1, 1
C:13:100	Semiannual	Trailing	Obliterate Trails	0
C:13:273	Annual	Arroyo Cutting	Stabilize, Data Recov	1
C:13:291	Annual	Trailing	Data Recovery, Retrail	1
C:13:327	Biennial	Trailing, Gullyng and	Obliterate Trails, Retrail,	1, 1, 1,

D. FY97 Work Plan

The work plan for fiscal year 1997 includes continued monitoring of selective sites and implementation of the highest priority remedial actions. Within the following monitoring section is a discussion of the proposed river trip dates and site list, the revised monitor form, and data archiving procedures.

Trip Dates and Site List

The work plan for FY97 will incorporate regular monitoring and remedial actions. It is proposed that half the trips be monitoring and assessment trips and the remaining half be used for implementing remedial actions. The proposed trip dates for Fiscal Year 1997 are as follows:

October 2 -18, 1996 Monitoring and Assessments
November 5 - 21, 1996 Monitoring and Assessments
February 25 - March 14, 1997 Monitoring and Remedial Action
April 8 - 25, 1997 Remedial Action

Table 9 is a listing of the sites scheduled to be monitored in FY97. Currently, 109 sites are scheduled. The table is an alphanumeric listing of the FY97 schedule.

**Table 9. Sites Scheduled to be Monitored in FY97
(N = 109 Sites)**

A:15:005	B:10:121	C:02:085	C:13:005	G:02:009
A:15:030	B:10:249	C:02:094	C:13:006	G:03:002
A:15:031	B:11:280	C:02:096	C:13:007	G:03:003
A:15:032	B:11:282	C:02:097	C:13:009	G:03:004
A:15:035	B:13:001	C:02:098	C:13:010	G:03:020
A:16:159	B:14:108	C:02:101	C:13:069	G:03:024
A:16:162	B:15:097	C:05:031	C:13:070	G:03:025
A:16:175	B:15:120	C:05:039	C:13:092	G:03:026
A:16:176	B:15:122	C:06:003	C:13:098	G:03:028
	B:15:123	C:06:005	C:13:099	G:03:034
	B:15:126	C:06:006	C:13:100	G:03:037
	B:15:128	C:09:005	C:13:273	G:03:040
	B:15:134	C:09:030	C:13:274	G:03:044
	B:15:139	C:09:034	C:13:291	G:03:046
	B:15:143	C:09:050	C:13:321	G:03:049
	B:16:003	C:09:051	C:13:329	G:03:053
	B:16:258	C:09:053	C:13:337	G:03:057
	B:16:364	C:09:056	C:13:339	G:03:059
		C:09:065	C:13:342	G:03:063
		C:09:068	C:13:343	G:03:064
		C:09:069	C:13:347	G:03:067
		C:09:088	C:13:349	G:03:071
			C:13:350	G:03:072
			C:13:359	G:03:078
			C:13:360	G:03:080
			C:13:361	G:03:083
			C:13:363	
			C:13:365	
			C:13:371	
			C:13:373	
			C:13:384	
			C:13:387	
			C:13:389	

			C:13:392	
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Remedial Actions

FY96 marks the second year the long-term monitoring and remedial action plan has been implemented. Fifty-one site protection measures have been recommended to date. Of that total, 67% have been completed, some of which were not advised for remedial actions during a second assessment. The goal for FY97 year is to assess and complete all protection recommendations with a priority rank of 1.

Table 10 lists the Priority 1 sites recommended for protection measures in FY96. These sites will be visited during the scheduled FY97 monitoring trips and assessed. The specific protection measures recommended are included in the table. All sites scheduled for remediation will be total station mapped prior to and following the remedial action. A field assessment and work plan will be completed for each site prior to any data recovery.

**Table 10. Priority 1 Sites Recommended for Protection Measures
(N = 7 Sites)**

Site Number	Recommendation
A:15:030	Data recovery
A:16:180	Data recovery
C:02:098	Data recovery
C:13:273	Data recovery
C:13:338	Data recovery
C:13:349	Data recovery
C:13:359	Data recovery

Only 25 (28%) of the 90 remedial actions suggested to reduce site impacts have been completed. The emphasis in FY97 year will be to complete all the trail work (approximately 21 sites) with a priority rank of 1. Prior to the trail work a scope of work in the form of a memorandum will be sent to the signatory members of the Programmatic Agreement. Prior to other remedial actions, preliminary assessments will be made by an archaeologist and if needed, a resource specialist. If actions are warranted, a proposal will be written describing the remedial actions and it will be sent to members of the Programmatic Agreement with the allotted 30 days for a response. A second field assessment is not necessary for sites that the field staff are familiar with.

Table 11 lists all Priority 1 sites scheduled for impact reduction in FY97. These sites will be visited

during scheduled monitoring trips and assessed based on FY96 recommendations and in-field observations. Trail work, however, will be performed without further assessments. All sites scheduled for remediation will be total station mapped prior to and following the remedial action.

**Table 11. Priority 1 Sites for Reducing Impacts
(N = 34 Sites)**

Site Number	Recommendation(s)
A:15:005	Retrail and obliterate trails
A:16:151	Obliterate trails
A:16:160	Obliterate trails
A:16:180	Install checkdams
B:09:317	Obliterate trails
B:14:105	Obliterate trails
C:02:094	Stabilization
C:02:096	Install checkdams
C:02:101	Install checkdams
C:09:031	Retrail and obliterate trails
C:09:034	Retrail and obliterate trails, plant vegetation
C:09:051	Stabilize
C:09:083	Obliterate trails
C:13:006	Plant vegetation
C:13:010	Stabilization
C:13:070	Obliterate trails, install checkdams, and stabilize
C:13:098	Retrail and obliterate trails, plant vegetation, install checkdams and stabilize
C:13:099	Obliterate trails and plant vegetation
C:13:131	Retrail and obliterate trails
C:13:273	Stabilization and data recovery
C:13:327	Obliterate trails, install checkdams
C:13:338	Retrail and obliterate trails
C:13:340	Obliterate trails
C:13:346	Install checkdams
C:13:349	Stabilization
C:13:359	Install Checkdams
C:13:362	Obliterate trails
C:13:381	Install checkdams, stabilize
C:13:389	Retrail and stabilize

C:13:392	Obliterate trails
G:03:052	Retrail and obliterate trails, stabilize
G:03:058	Obliterate trails, plant vegetation, and stabilize
G:03:062	Obliterate trails
G:03:072	Install checkdams

Monitoring Form Updates

Three changes to the monitoring form have been recommended concerning the "Management Assessment and Recommendation" section. The first suggestion is to remove "stationary camera" as an option for observing change on a site. As previously mentioned, there are very few, if any, ideal locations to place a stationary camera and thus far the benefits of stationary cameras are questionable. Furthermore, this option is so infrequently chosen that it could simply be written in the comment section if so desired.

A second change that has been recommended is the substitution of the phrase "excavate entire site" for "data recovery." It has come to our attention that the sites we visit experience isolated impacts. It is extremely rare to find the entire site damaged. Currently, none of the 303 sites visited have exhibited this condition. Therefore, we would like to use the term "data recovery" to refer to excavation of specific cultural features that are beyond any means of preservation.

The third change is the addition of a sixth type of monitoring schedule. As mentioned previously, this term would be called "inactive." It implies that, although the site is situated on alluvial terraces and is relatively near or above the 300,000 cfs level, it is in pristine condition and in no harm of deterioration from visitor-related or physical impacts. The actual monitoring of these sites will be on an as-needed basis. For example, these sites would be visited if there are weather disturbances such as flash flooding, rock slides, and/or heavy visitor use in specific areas, or upon tribal requests.

Data Archive

An archive is a place where public, historical, and scientific records and documents are preserved. The purpose of an archive is to preserve records and documents over a long period of time. Preservation includes keeping data in a safe place, free from disintegration or decay. Data collected as part of the River Corridor Monitoring Project have tremendous value to a wide variety of individuals and agencies. These include the Bureau of Reclamation, National Park Service, and all the Signatories to the Programmatic Agreement. Outside of the legal requirement for a data archive, there is a responsibility to collect, archive, and manage project data for current and future users: resource managers, scientists, government agencies, regulators, historians, Native American tribes, archaeologists, and the public.

This section describes the various classes of data collected, curated, and managed by this project, including historical information held at the Grand Canyon Science Center. Current archival methods are discussed, along with recommendations to upgrade to new technology which offers better long-term storage and integration of the various data classes. Finally, the need to coordinate with, and incorporate into, the emerging Grand Canyon Monitoring and Research Center (BOR) is elaborated.

Data from the RCMP fall into four classes: 1) paper documents; 2) electronic (computerized) data, 3) visual media (photographs, slides, negatives, and video); and 4) artifact collections. Each class of data has its own archival requirements.

1. Paper documents include: site, monitoring, surface analysis unit, and testing/excavation forms; ceramic and lithic analysis data sheets from the 1990-91 inventory survey; maps (topographic quadrangle maps with archaeological site locations plotted on them and the original hand-drafted site maps from the inventory survey); and correspondence, reports, manuals, computer documentation, and publications in the project files and library. Paper documents have the greatest volume of all the classes of data. Upon completion of the project, it is recommended that the paper documents be reviewed and any redundant or insignificant data disposed of. As newer technology, such as GIS and Global Positioning Systems are increasingly incorporated in project fieldwork, the maps will become obsolete. They will be kept in the project archive as the original field notes and documentation from the inventory survey.

2. Electronic (computerized) data include archaeological site, monitoring, photographic, mapping, and geographic information system databases. Because this information is stored electronically it takes up very little space. There are currently 35 separate databases which contain the survey, monitoring, and photographic data. These are accessed using DBase3 and Paradox database software. Electronically scanned site maps are currently stored as .tif files and manipulated using PhotoStyler image editing software. The GIS data are housed at the office of the GCNP Geographic Information Specialist and manipulated using ArcView, a GIS software. It is recommended that project personnel receive training in ArcView, purchase the software for the project office, and perform all GIS-related functions themselves.

3. Visual media include photographs, photocards, negatives, duplicate prints, color slides, historic photographs, aerial photographs with site locations plotted on them, and videotape. Visual media are second in terms of the amount of space required for storage. There are currently over 6,000 black-and-white photographs in the project collection.

4. Artifact collections, such as ceramics, lithics, and perishables, are curated at Grand Canyon National Park. Most of the artifacts collected are from the inventory survey and amount to one box of materials combined. These artifacts are archived in the Park's curation facility under appropriate temperature and humidity conditions.

In addition to housing the artifact collections, the GCNP Cultural Resources Branch has copies of all RCMP site and monitoring forms. These RCMP forms are maintained as a subset of the larger cultural resources database housed at the Park, and are an additional backup of site records. The Cultural Resources Branch also has records, photographs, and maps dating back to the 1960s on selective river corridor archaeology sites. These records are an important historic reference for current and future researchers.

Current archival methods focus on the electronic (computerized) databases and the photographic negatives. The reason for this is that most of the important paper documentation could be generated from the computerized information in the event of a fire. Electronic data are stored on magnetic tape, with copies kept at the project office and off-site. The same holds true for the photographic information. If the photographs were to burn in a fire, they could be duplicated from project

negatives which are stored in a fire-proof cabinet. Project negatives are also kept in acid free envelopes and polypropylene negative sleeves. They are stored in acid free archival-quality binders and protected from light, dust, and extreme temperatures.

Even with the current archival methods, the need exists for better long-term storage of project data. Not all classes of data are being properly archived, and those that are could use improvement. It is recommended that the project investigate CD-ROM technology for storage of records, photographs, and maps. More information could be stored on CD-ROM and the disks are more durable over the long term. Project data must also be integrated with the other environmental information housed at the newly formed Monitoring and Research Center. It is recommended that funds be set aside to bring project archival methods up to state-of-the-art standards. Some extra cost will be involved to organize and replicate project data for integration with the Monitoring and Research Center. This will include the removal of culturally sensitive information from any records or databases supplied to the Center.

Data security is a primary concern of project staff. We recognize that culturally sensitive information should not be released to unauthorized individuals. It is a policy of this office that no archaeological site location information be given to any individual or agency without verification. Therefore, access to site location information, UTM's, GIS coordinates, and river mile and bank locations is restricted. Additionally, information regarding the nature or contents of a particular archaeological site will be kept confidential at the request of the Signatory Tribes. Culturally sensitive records housed at the project office include site forms with locational information, computerized databases with locational information, and both topographic quadrangle maps and aerial photographs with site locations plotted on them.

In summary, the RCMP archive contains a variety of data important to the PA Signatories in fulfillment of legal obligations for cultural resource protection and preservation along the Colorado River corridor. The classes of data include paper documents and maps, visual media such as photographs and video, electronic databases, and artifact collections. The RCMP archive is up-to-date and well-organized, with proper safeguards in place in the event of a disaster. Appropriate security measures are utilized so that no culturally sensitive material is released to unauthorized individuals. There is room for improvement, however, in the project archival methods. It is recommended that additional funds be set aside for upgrading long-term storage and the application of state-of-the-art technology.

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VII. Appendices

A: All Sites Monitored and Monitoring Schedules

Sites Monitored and Monitoring Schedules

Control Group

A:15:017	A:16:156	B:10:121	B:10:230	B:10:236	B:15:091
B:15:121	B:15:126	B:15:132	B:15:143	C:09:080	C:13:367
G:03:019					

Semiannual

C:09:050	C:13:098	C:13:099	C:13:100	C:13:347	C:13:371
G:03:003					

Annual

A:15:005	A:16:159	C:02:094	C:02:096	C:02:097	C:02:098
C:06:003	C:06:005	C:09:051	C:13:005	C:13:006	C:13:010
C:13:069	C:13:070	C:13:092	C:13:273	C:13:291	C:13:321
C:13:339	C:13:349	C:13:359	C:13:387	C:13:389	C:13:392
G:02:009	G:03:004	G:03:020	G:03:026	G:03:040	G:03:044
G:03:064	G:03:072	G:03:080			

Biennial

A:15:003	A:15:030	A:16:004	A:16:148	A:16:167	A:16:174
A:16:180	B:09:317	B:10:111	B:10:261	B:11:272	B:11:282
B:14:105	B:14:107	B:16:003	C:02:085	C:02:101	C:05:031
C:06:006	C:09:034	C:09:052	C:09:053	C:09:084	C:09:088
C:13:007	C:13:009	C:13:272	C:13:322	C:13:327	C:13:329
C:13:336	C:13:338	C:13:342	C:13:343	C:13:348	C:13:386
G:03:002	G:03:024	G:03:025	G:03:028	G:03:030	G:03:033
G:03:034	G:03:038	G:03:041	G:03:052	G:03:058	G:03:067

3-5 Years

A:15:004	A:15:018	A:15:020	A:15:021	A:15:022	A:15:026
A:15:027	A:15:028	A:15:029	A:15:033	A:15:035	A:15:038
A:15:039	A:15:040	A:15:042	A:15:044	A:15:047	A:15:048
A:15:051	A:16:149	A:16:151	A:16:154	A:16:155	A:16:158
A:16:160	A:16:162	A:16:163	A:16:171	A:16:172	A:16:173
A:16:185	B:09:314	B:09:316	B:10:224	B:10:225	B:10:237
B:11:271	B:11:275	B:11:277	B:11:278	B:11:281	B:14:093
B:14:095	B:14:108	B:15:119	B:15:120	B:15:123	B:15:127
B:15:135	B:16:259	B:16:364	C:02:089	C:02:092	C:05:004
C:05:037	C:06:002	C:06:008	C:06:010	C:09:030	C:09:031
C:09:062	C:09:068	C:09:069	C:09:072	C:09:082	C:09:083
C:13:033	C:13:101	C:13:323	C:13:325	C:13:333	C:13:334
C:13:335	C:13:340	C:13:346	C:13:350	C:13:352	C:13:353
C:13:354	C:13:355	C:13:356	C:13:362	C:13:370	C:13:377
C:13:379	C:13:381	C:13:384	C:13:385	C:13:393	G:02:100
G:02:101	G:02:108	G:03:006	G:03:032	G:03:042	G:03:043
G:03:048	G:03:055	G:03:060	G:03:062	G:03:065	G:03:073
G:03:076	G:03:077	G:03:085			

Inactive

A:15:025	A:15:031	A:15:032	A:15:036	A:15:037	A:15:043
A:16:150	A:16:153	A:16:157	A:16:161	A:16:175	A:16:176
A:16:184	B:10:227	B:10:229	B:10:231	B:10:260	B:10:262
B:11:280	B:11:283	B:13:002	B:15:096	B:15:124	B:16:257
B:16:261	B:16:262	C:05:007	C:05:009	C:05:035	C:06:004
C:09:032	C:09:061	C:09:067	C:13:008	C:13:131	C:13:274
C:13:326	C:13:344	C:13:345	C:13:358	C:13:364	C:13:365
C:13:368	C:13:372	G:02:001	G:02:102	G:02:103	G:02:105
G:02:106	G:02:107	G:03:027	G:03:029	G:03:046	G:03:054
G:03:056	G:03:059	G:03:063	G:03:066	G:03:082	

Discontinue

A:15:001	A:16:001	A:16:002	A:16:003	A:16:179	B:09:315
B:09:319	B:09:320	B:10:248	B:11:279	B:15:001	B:15:118
B:15:131	B:16:001	B:16:365	C:02:050	C:09:001	C:09:004
C:09:028	C:09:054	C:09:058	C:09:059	C:09:071	C:09:073
C:13:001	C:13:003	C:13:132	C:13:324	C:13:357	C:13:374
G:02:032	G:03:001	G:03:023	G:03:061	G:03:069	G:03:079

B. FY96 Site Monitoring Form

C. C:13:010

D. Checkdam Site Maps