1998 Summary Report: Archaeological Site Monitoring and Management Along the Colorado River Corridor Below Glen Canyon Dam

Submitted by
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Table of Contents

Abstract v

List of Tables vi

List of Figures vii

Introduction 1

Section 1 3

I. Impacts to Cultural Resources 4
- A. Physical Impacts 4
- B. Visitor-related Impacts 8
- C. Summary 11

II. Site Specific Results and Recommendations 12

III. Management Actions Completed in FY98 53
- A. Monitoring
  - Site Selection and Scheduling Criteria 53
  - Field and Lab Methods 54
  - Photographic Documentation 56
- B. Total Station Mapping 57
- C. Remedial Actions 57
  - Total Station Mapping 58
  - Checkdam Maintenance 58
  - Data Recovery 58

IV. Management Recommendations 59
- A. Preservation Options 59
  - Trail Obliteration and Retrailing 59
  - Planting Vegetation 59
  - Checkdam Construction 60
  - Other Preservation Options 60
- B. Recovery Options 60
  - Test 60
  - Data Recovery 60
  - Other Recovery Options 61

C. Summary of Recommendations 61

D. FY99 Work Plan 64
Trip Dates and Site List 64
Remedial Actions 65

Section II 68

V. Impacts to Cultural Resources 69
A. Physical Impact 69
B. Visitor-related Impacts 72
C. Summary 72

VI. Site Specific Results and Recommendations 73

VII. Management Actions Completed in FY98 95
A. Monitoring 95
Site Selection 95
Site Schedules 95
Field and Lab Methods 95

B. Total Station Mapping 97

Remedial Actions 99
Trail Work 99
Revegetation 100
Checkdam Construction 100
Pre-Stabilization Assessments 102
ARPA Damage Assessment 106

VIII. Management Recommendations 108
A. Preservation Options 108
Trail Obliteration and Retrailing 108
Checkdam Construction 108
Other Preservation Options 108

B. Recovery Options 108
Data Recovery 108
Testing 108

C. Summary of Recommendations 109

D. FY99 Work Plan 109
Trip Dates and Site List 109
Remedial Actions 110

IX. References Cited 112

X. Appendices 116

Abstract

The 1998 Summary Report outlines archaeological site monitoring, impact assessment, management recommendations and remedial actions completed during the fiscal year 1998 (October 1, 1997 – September 30, 1998). The River Corridor Monitoring Project identifies and assesses physical and visitor-related impacts to cultural resources located along the Colorado River corridor as a result of Glen Canyon Dam operations. When impacts have the potential to cause adverse affects to the cultural resources, management recommendations are made and remedial actions completed to curtail the loss of cultural resource information.

The results of monitoring, impact assessment and recommendations are outlined for each of the 141 unique sites monitored in FY98. Management recommendations based on this data led to the completion of new remedial work and maintenance of existing work at several sites. Total station mapping and repeat photography were also important activities conducted or directed through the project this fiscal year.

The FY99 work plan summarizes the schedule and field season for the next year. A prioritized outline of recommendations and remediation measures, continued data recovery and monitoring are also detailed.

List of Tables

1. Frequency of Physical Impact Types 5
2. Frequency of Physical Impact Types 9
3. Summary of the FY98 Data Recovery Recommendations 62
4. FY98 Summary of the Preservation Recommendations 63
5. Sites Scheduled for Monitoring in FY99 65
6. Priority 1 Recovery Measures Proposed for FY99 66
7. Priority 1 Preservation Measures Proposed for FY99 67
8. Sites on Navajo Nation that are Monitored by Glen Canyon NRA 68
9. Physical Impacts versus Stream Type within Glen Canyon NRA in FY98 72
10. Sites Recommended for Total Station Maps within Glen Canyon NRA 97
11. Remedial Actions Recommended at Priority 1 Sites. 98
12. Remedial Actions Recommended at Priority 2 and 3 Sites 99
13. Summary of Checkdam Construction with Glen Canyon NRA, FY98 101
14. Sites Scheduled to be Monitored in FY99 in Glen Canyon NRA 109
15. Summary of FY98 Management Recommendations 111

List of Figures

1. Relative frequency of physical impact types 6
2. Physical impacts to features in FY98.....7
3. Visitor-related impacts to features in FY98.....10
4. Bert Loper's Boat, visitor-related impacts.....
5. Bert Loper's Boat, visitor-related impacts.....
6. Basketweave checkdam at C:13:099 .....
7. Overview of Structure 9, C:13:010.....
8. Frequency of physical impact types within Glen Canyon NRA in FY98.....70
9. Frequency of physical impact types within Glen Canyon NRA in FY98.....71

Introduction

September 30, 1998 marks the end of the seventh year of the monitoring and remedial actions to cultural resources threatened by Glen Canyon Dam operations along the Colorado River Corridor. The River Corridor Monitoring Project (RCMP) is a joint project between the National Park Service (NPS) and Northern Arizona University (NAU) in Grand Canyon National Park. The fifteen miles below Glen Canyon Dam are managed by Glen Canyon National Recreation Area. The river corridor is divided into two separate project areas because of it's location in both Grand Canyon National Park and Glen Canyon National Recreation Area. This report is a requirement of the Programmatic Agreement on Cultural Resources (1994) and the Historic Preservation Plan for Cultural Resources Affected by Glen Canyon Dam Operations (Draft final June, 1997).

Beginning in 1992, project archaeologists have observed physical and visitor-related impacts to a sample of the 475 archaeological sites first recorded during the 1990-91 cultural resource inventory (Fairley et al. 1994). Presently, 336 sites eligible for the National Register of Historic Places are being impacted or have the potential to be impacted by dam operations. These 336 sites comprise the monitoring sample set and include Glen Canyon National Recreation Area and Grand Canyon National Park river corridor cultural resources. Monitoring schedules have been assigned to all the sites within the sample based on present-day condition and degree of impact. Sites with severe impacts or those that are subject to ongoing damage are visited more frequently than those with only the potential for future impacts. In FY98, monitoring occurred at 141 sites.

The Grand Canyon project area monitored 99 unique sites. Six sites were assigned a semi-annual monitoring schedule for a total of 105 monitoring episodes this fiscal year. The field work was completed on four river trips in October and November, 1997 and February and April of 1998. Chapter I discusses the impacts observed during these visits and Chapter II outlines the specific site descriptions, previous work and recommendations made this year.

Glen Canyon National Recreation Area (Glen Canyon NRA) staff monitored 42 unique sites on 13 day trips. Chapter V discusses impacts observed and Chapter VI outlines site specific descriptions, previous work and recommendations made in FY98.

At sites with adverse or ongoing impacts, remedial actions were conducted to curtail further loss of cultural resource information. Mitigative measures fall into two distinct categories, preservation options and recovery options. Preservation options refer to actions designed to reduce impacts or improve overall site preservation. These options include building checkdams, planting vegetation, obliterating human trailing or retrailing around cultural remains. Recovery options refer to measures to protect site integrity or recover information before a complete loss of data occurs. These actions include surface collection, subsurface testing and data recovery. See Chapters III and VII for detailed descriptions of all remedial work completed in FY98.

The survey department staff from the Grand Canyon Monitoring and Research Center (GCMRC) under the direction of Chris Brod, continued total station mapping at select sites within the project area. To date, seventy-five sites including those sites from the control group, semi-annual and annual schedules plus sites scheduled to receive remedial action work have been mapped with a total station instrument within the Grand Canyon project area. Seventeen sites within the Glen Canyon NRA have been mapped with a total station instrument.

Several Programmatic Agreement (PA) representatives accompanied the RCMP staff on river trips, participating in monitoring, remedial action and data recovery activities. Representatives from the Hopi Tribe, Zuni Pueblo, Western Area Power Administration and the GCMRC were among the trip participants. The RCMP greatly appreciates the assistance and direction from the Zuni Conservation Team with erosion control projects.

Project staff members participated in a variety of professional and public outreach events during FY98. A poster session at the 62nd annual Society for American Archaeology meetings in Seattle WA was submitted, and staff were on-hand to answer questions at the 1998 Arizona Archaeology Expo in Phoenix, Arizona. NAU forestry students were educated on identification and impact avoidance to cultural resources along the Colorado Plateau in November, 1997.

The scope of work for FY99 includes monitoring, remedial work, total station mapping and continued data recovery projects. 118 sites will be monitored in FY99.

Section 1

Grand Canyon National Park

I. Impacts to Cultural Resources

The existence of Glen Canyon Dam directly and indirectly threatens cultural resources located within the historic high water line (300,000 cfs). The sediment trapped behind the dam, 66 million tons annually (Collier et al. 1996), results in a reduction of deposition downstream of Glen Canyon Dam compared to predam times. The lack of beach building floods and sediment deposition creates erosional variables much different than before the emplacement of the dam. Erosion along old alluvial terraces, where many cultural remains are concentrated, has accelerated in two distinct ways. Sediment-laden floods no longer fill in ephemeral drainage systems along the predam alluvial terraces. The lowered baselevel of the main channel of the river, causes drainage systems to downcut to the new baselevel as they travel to the river. Now, drainage systems that may have been seasonally filled in are remaining exposed and are vertically downcutting through alluvial terraces. Consistent river flows allow for increased visitation via commercial river-running trips. Over 20,000 people annually participate in commercial river trips (U. S. Department of Interior, Draft 1998).

Monitors working on the RCMP collect data related to physical and visitor-related impacts. Degree of impact is qualitatively assessed through repeat observation (monitoring) and categorized as "active" or "inactive". Sites exhibiting active erosion are assigned a more frequent monitoring schedule, and are candidates for remedial work. Sites where erosional processes are currently inactive receive less frequent monitoring. In FY98, 99 unique sites were monitored, six of which were on a semiannual schedule for a total of 105 monitoring episodes. Eighty-three percent of these monitoring episodes revealed the presence of physical and/or visitor-related impacts.

The RCMP utilizes two forms of exploratory data analysis to view and present this fiscal year's monitoring dataset based on seven physical and five visitor-related variables identified on the monitoring form (Appendix A). Frequency tables display the presence and absence of impact types as a numerical representation of the dataset in the following sections.

A. Physical Impacts

The RCMP identifies seven key physical impacts that are active, or have the potential to diminish the integrity of cultural resources located along the Colorado River corridor. Physical impacts refer to erosional processes induced by dam operations, river flows, rain, wind and gravity. Impacts that may be directly related to Glen Canyon Dam operations include surface erosion, gullying, arroyo cutting and bank slump in areas where the drainage networks are actively seeking the lowered river baselevel.

Physical impact categories include the following: surface erosion, gullying, arroyo cutting, bank slump, eolian/alluvial erosion or deposition, side canyon erosion and "other". Surface erosion consists of any and all sheetwashing, channeling or rilling from the modern surface level to a depth of ten centimeters. Gullies are channels or trenches which extend ten centimeters to one meter below the modern ground surface. Entrenched gullies can become arroyos which channel more than one meter below the surface. Bank

slump refers to the deflation or collapse of alluvial sediments along gullies, arroyos or the river itself. Eolian sediments erode or are deposited by wind action. Running water directs alluvial processes. Side canyon erosion includes rain-induced flooding and debris flows from canyons draining onto terraces or into the Colorado River. Some headward movement may also be associated with side canyon erosion. The "other" category is reserved for the identification of impacts not previously defined or regularly identified by monitors such as animal caused erosion, rock spall onto features or vegetation growth unearthing cultural remains.

Eighty-one percent of the sites monitored in FY98 showed some kind of physical erosion. Active erosional processes were identified at 46% of the sites. Since FY94, surface erosion remains the most frequently observed form of physical impact. Fifty-five percent of the sites monitored showed the presence of surface erosion. The remaining physical impacts in rank order are: Gullying (47%), eolian/alluvial erosion or deposition (38%), "other" (38%), arroyo cutting (19%), side canyon erosion (12%) and bank slump (2%). Table 1 outlines the frequencies and percentages of physical impact types.

Table 1. Frequency of Physical Impact Types.
N = 105

Physical Impact Types	Present		Absent	
	Frequency	Percent	Frequency	Percent
Surface Erosion	58	55	47	45
Gullying	49	47	56	53
Arroyo Cutting	20	19	85	81
Bank Slumpage	21	20	84	80
Eolian/Alluvial Erosion/Deposition	40	38	65	62
Side Canyon Erosion	13	12	92	88
Other	40	38	65	62

Figure 1 shows the relative frequency of physical impacts (N = 456 observations). The 456 observations refer to the number of times monitors identified any form of physical impact, or each individual occurrence recorded during FY98. It is important to understand that more than one type of physical impact may be occurring simultaneously within a site boundary or to the same cultural feature. Remedial action assessments and recommendations for treatment are grounded in the identification and understanding of how multiple physical impacts may be related.

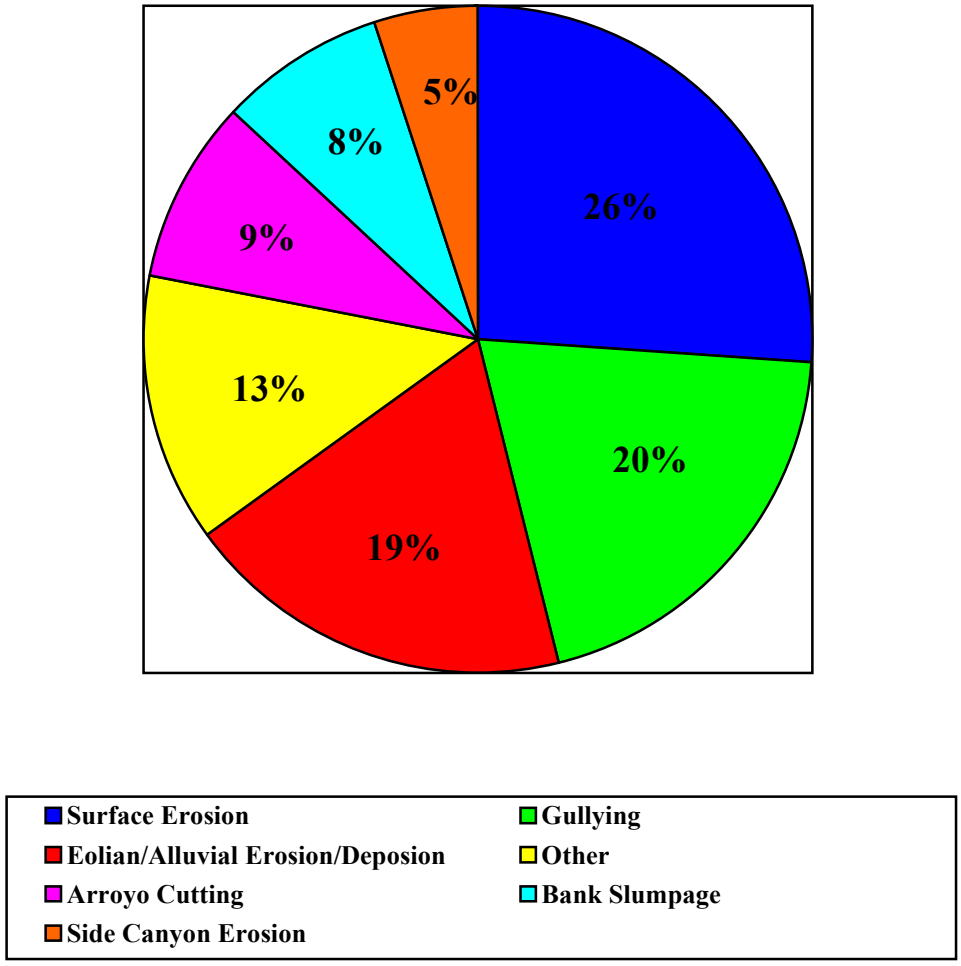

Figure 1. Relative frequency of physical impacts in FY98.
(N = 456 Observations)

Identification of impacts on-site aids monitors in understanding the nature and severity of the observed impacts. Locational data leads to the formulation of a ranking of impacts at sites which have been selected for remediation. Figure 2 shows the relative frequency of physical impacts to specific cultural features on-site. The highest frequency of physical impact occurs at roasters/hearths, artifacts and structure/storage features. These features are also the most common cultural feature observed along the river corridor in Grand Canyon.

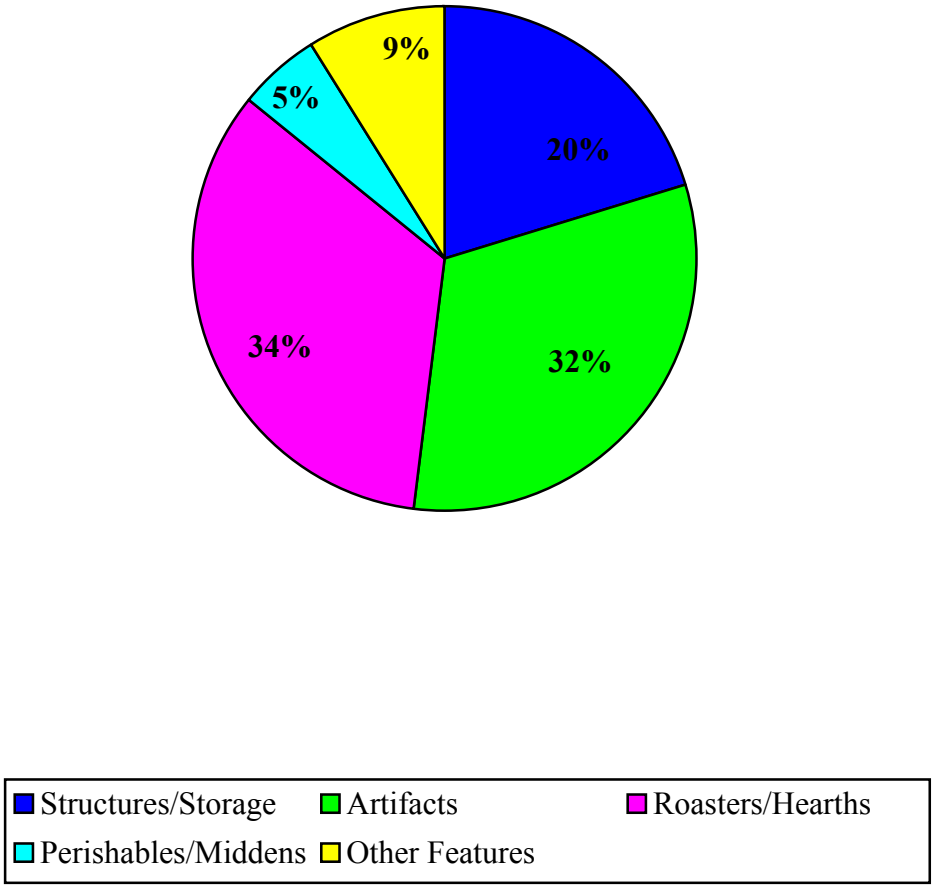

Figure 2. Physical impacts to features in FY98.
(N = 456 observations)

Along with understanding where on-site impacts are occurring, the RCMP also identifies concentrations of impacts along the river corridor. Understanding the relationship between the location of cultural resources and the magnitude of impacts is a complex endeavor for a number of reasons. The majority of impacts observed in FY98 were identified at sites located within Reaches 5 and 10. While these locations are known to have the highest site densities along the river corridor, there are other mechanisms at work that may be exacerbating the presence of physical impacts in these locations.

Reach 5 (Furnace Flats) and Reach 10 (Lower Canyon) consistently contain the highest concentrations of physical impacts along the river corridor. Reach 5 is the most open and alluviated portion of Grand Canyon. Several trails traverse from river to rim along both sides of the canyon. 17.9 % of all the sites recorded by the project are found in this Reach.

Reach 10 consists of several faults cross-cutting the river corridor. These faults led to a higher degree of access to the river corridor. Cultural remains can be found at nearly

every side canyon drainage with an alluvial debris fan (Fairley et al. 1994). Roasters dominate the site type in this Reach.

Reaches 5 and 10 contain the highest site densities along the project area. This should be expected given the environmental conditions dictated by past geomorphic processes. Alluvial terraces afford the best conditions for horticultural activities and in locations where access to these conditions is viable, site types should cluster in these locations. Unfortunately, due to the fragile nature of alluvial sediments, these site types are also the most vulnerable to impact. We see the greatest amount of physical impacts in Reaches 5 and 10. It is in these locations that we have been concentrating our management recommendations and remedial actions.

The lowered baselevel of the Colorado River has geometrically increased erosion in arroyos and gullies that drain to the river (Hereford et al. 1993). When these river-based drainages impact cultural remains on their way toward the river, it is assumed that the lowered river baselevel directly affects the cultural resource. River-based drainages currently are or have the potential to directly impact the integrity of cultural resources along the river corridor. Forty-four (42%) of the sites monitored in FY98 have river-based drainage systems.

Monitors record the presence of physical impacts and note whether impacts are currently active or inactive. This observation is achieved by looking closely at the drainage systems on-site for signs of recent run-off, water transport or active flow. The observation of active impacts may be a result of the time of year we are monitoring specific sites, or indicators of constant impact which would in turn implement remedial actions in these locations.

Active drainages may not always signal adverse effects. When sediment is transported along a drainage system, the resulting deposition may improve resources located within the drainage by increasing deposition on-site. The active designation does not infer active adverse impact. Further assessment of active impacts is necessary before remediation measures may be recommended to slow or stop further resource destruction.

Active impacts are also closely linked to the occurrence of new impacts since the last monitoring episodes. If new impacts occur, this signals active erosional processes. Fifty-one (49%) of the sites monitored in FY98 experienced new physical impacts since last monitored.

B. Visitor-Related Impacts

Approximately five million people visit the Canyon every year, 22,000 raft the Colorado River, and 15,000 backcountry permits are issued (U. S. Department of Interior, Draft 1998). Those who partake in a backcountry wilderness experience will most likely wander upon or intentionally visit at least one archaeological site. Some may even camp within a site due to the optimum topographic location or simply for shelter. A lack of archaeological education, curiosity, or malice, is the cause of disturbance to many sites.

The project has defined these intentional or incidental disturbances as Visitor-related impacts. Specifically, these impacts are defined as trails, collection piles, on-site camping, criminal vandalism, and an "other" category.

The frequency of visitor-related impacts is presented in Table 2. Forty-five (43%) of the 105 monitoring episodes recorded the presence of one or more visitor-related impacts, a seven percent reduction from FY97. Twenty-four new sites received some form of visitor-related disturbance this year. Trailing remains the most frequently identified impact with 39 occurrences in FY98. The entrenchment of trails, causing compaction, removal of vegetation and the development of rills and gullies is of concern to monitors. Monitoring comments addressing trailing often identified the presence of trails and the success of previous trail obliteration.

Table 2. Frequency of Visitor-Related Impact Types in FY98.
N = 105

Visitor-Related Impact Types	Present		Absent	
	Freq.	Percent	Freq.	Percent
Collection Piles	8	8	97	92
Trails	39	37	66	63
Camping on-site	1	1	104	99
Vandalism	1	1	104	99
Other	6	6	99	94

Figure 3. illustrates the relative frequency of visitor-related impacts at various features. As in past years, artifact scatters (42%), roasters/hearths (27%) and, structure/storage (19%) features receive the highest number of visitor-related disturbances. One occurrence of rock art vandalism occurred at C:02:094, where new graffiti was discovered by monitors. The new graffiti is most likely from fishermen due to the associated trash and proximity to Lees Ferry.

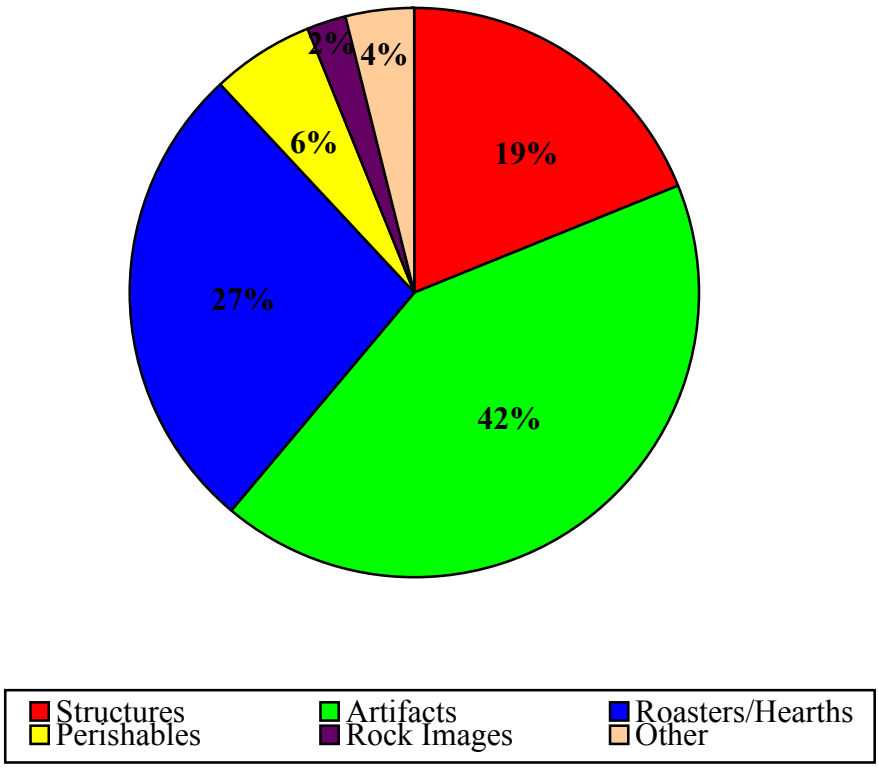

Figure 3. Visitor-related impacts to features in FY98.
(N = 48 Observations)

22,000 people raft the Colorado River annually, camping on beaches that are in proximity to archaeological sites. Sites in Reaches 5 and 10 continue to contain the highest frequency of visitor-related impacts (69%). In addition to these Reaches containing 45% of the sites along the river corridor, they are easily accessible from a network of backcountry trails.

Long-term replication of early photographs often depicts the methodical destruction of sites through time. Figures 4 and 5 are replications illustrating 27 years of visitor-related impacts to site AZ C:09:034. Although weathering is a factor, time series photographs have recorded the gradual dismantling of Bert Loper's boat. This location is a popular stop for many river trips as evidenced by a heavily traveled trail.

Figure 4. 1969 Photograph of Bert Loper's boat.

Figure 5. 1996 Photograph of Bert Loper's boat.

The desire to collect a piece of the past or simply visit archaeological sites is evidenced by the above data. The solution to ending visitor-related disturbance is complicated at best. As cliché as it may be, education is the answer. Continued involvement with the Guides Training Trips and educational programs will pay off. When people begin to understand that archaeological sites are truly nonrenewable resources, then perhaps they will develop a sense of respect and preservation.

C. Summary of Impacts

FY98 Physical and Visitor-related impacts decreased in occurrence by nearly 8% since FY97. Physical impacts were observed at 81% of the sites monitored in FY98. New physical impacts were observed at 49% of the sites. Active erosion was noted in 46% of the monitoring episodes this year. As in the past, surface erosion and gullying continue to be the most frequently recorded physical impacts. Structures/Storage, Artifacts, and Roasters/Hearths received the highest frequency of Physical and Visitor-related disturbance.

Visitor-related impacts were recorded during 43% of the FY98 monitoring episodes. Twenty-four new sites received some form of visitor-related disturbance. Trailing continues to be the most frequently occurring impact.

Reaches 5 and 10 continue to contain the highest frequency of all types of impacts. These reaches are highly alluviated, open, and accessible. Due to these factors, they also comprise the highest site densities along the project area.

The combination of entrenched trails and formation of gullies is of concern to monitors. Sites such C:02:098 and B:14:105 are experiencing channel initiation within heavily traveled foot paths. Due to the compaction of soil and obliteration of vegetation, surface flow is being channeled through the network of trails intersecting the site and leading to the river. As this trail/gully develops and seeks baselevel, the potential for a river-based drainage inevitable.

II. Site Specific Results and Recommendations

This sections outlines all individual sites monitored during FY98, listed in alphanumeric order. Impacts observed, previous work conducted on-site, monitoring schedules and recommendations are all discussed. A detailed description of remedial actions conducted in FY98 can be found in Chapter III, Management Actions Completed.

A:15:003 Roaster Complex
SITE DESCRIPTION: This site consists of nine roasting features along an alluvial terrace at the mouth of a major side canyon drainage. There is also a historic component to this site, consisting of an overhang and activity area containing historic artifacts.

PREVIOUS WORK: The site was originally recorded by R. Euler in 1978 and incorporated into the river corridor sample in 1990. The site has been monitored in FY93, FY94, FY96 and FY98.

STATUS AND RECOMMENDATIONS: The site is currently stable with some positive changes to Feature 1 with minor increase in sediment deposition. The trails present are probably old burro trails, though humans are walking around the site. The site will continue to be monitored biennially due to two gully systems that could impact the site in the future. It is crucial to continue monitoring these gullies to insure future preservation of the site.

A:15:004 Artifact Scatter
SITE DESCRIPTION: The site contains two loci, A and B. Locus A consists of several sparse scatters of fire-cracked rock situated in and around a dense mesquite thicket. Locus B consists of a pot break and lithic scatter along a Muav Limestone bench at the mouth of a major side canyon.

PREVIOUS WORK: The site was first recorded by river corridor surveyors in 1991.
The project has monitored this site in FY93, FY94 and FY98.

STATUS AND RECOMMENDATIONS: No physical or visitor-related impacts were observed during monitoring activities. The site is in good, stable condition with no impacts threatening the site. It is advised that this site be moved from a four year schedule to the inactive monitoring list due to its stable condition.

A:15:005 Small Structures
SITE DESCRIPTION: Three loci define this site. Locus A consists of hematite pictographs on fallen limestone boulders. Locus B contains two single-coursed walls against a cliff base with lithics and groundstone. Charcoal concentrations are also identifiable on the surface. Locus C contains two roasting features and sparsely scattered artifacts. This site may be associated with late prehistoric-early historic Pai or Paiute use.

PREVIOUS WORK: It was originally recorded in 1984 though the pictographs had been well known by river runners since the mid 1970s. The site was monitored in FY93, FY95, FY96 and FY98. A total station map of Locus C was completed and trail work was conducted in FY97. The hematite elements were photographed with a medium format camera in FY97.

STATUS AND RECOMMENDATIONS: Recent heavy rains are evident due to the presence of several nick points in a previously obliterated trail. Surface erosion on-site is extremely active. The gully nearest to Feature 2 also ran and possibly created more nick points and a larger headcut. This gully has reached the dune field less than five meters from the river. It is the largest increase in gully expansion since the beginning of the monitoring program. Only one set of footprints was observed, and the trails obliterated last year have not been used. Annual maintenance of the trails will continue because people do frequent the area. Furthermore, the surface erosion and gullying that has occurred near Feature 2 may soon become something more detrimental, in which case an assessment will be made for remedial work in the next two years. Additionally, this gully will be remapped with the total station to track the rate of erosion. Annual monitoring will continue.

A:15:020 Roaster Complex

SITE DESCRIPTION: The site consists of 13 distinct roasting features with several concentrations of fire-cracked rock dispersed throughout the site boundary. There is also an overhang rock shelter with a large midden below it.

PREVIOUS WORK: The site was originally recorded during the river corridor survey and monitored in FY93, FY94 and FY98.

STATUS AND RECOMMENDATIONS: Only a few photographic comparisons could be made due to the lack of previous photographs available. Based on the limited number of photographs and on-site observation, the site appears stable. No visitor-related disturbances were observed. Photographs were taken of all the features. The site will continue to be monitored on a four year schedule. During the next monitoring episode, the new photographs will aid in better observations. Unless something catastrophic occurs the site will probably be placed on the inactive monitoring list after the next monitoring episode in FY2002.

A:15:026 Roaster Complex

SITE DESCRIPTION: This site consists of two roasting features. No artifacts have been observed on the surface. The site is located on stable dune deposits overlaying high water and colluvial debris. Grasses cover the site, making it virtually unrecognizable at first glance.

PREVIOUS WORK: The site was originally recorded in 1991 and has been monitored in FY92, FY93, FY94 and FY98.

STATUS AND RECOMMENDATIONS: The site is very stable and in good condition. The only observations recorded included bighorn sheep trails, minor rodent burrowing and increased vegetation, all of which have not impacted the features. No visitor-related disturbances were observed. This site is presently on a three year schedule. Upon further assessment, it is advised that the schedule be changed to every five years due to the site's current stable condition. The site will not be placed on the inactive list until it is determined that animal and rodent activities will not uncover additional cultural information.

A:15:044 Artifact Scatter and Roaster

SITE DESCRIPTION: This site is located in a shallow rockshelter and contains groundstone, sherds and a biface fragment. A small roasting feature is also present with charcoal visible on the surface.

PREVIOUS WORK: The site was originally recorded in 1991 and has been monitored in FY94 and FY98.

STATUS AND RECOMMENDATIONS: A gully is present near Feature 1 but currently it is inactive. Human visitation was not observed. The site appears stable since last visited in 1994. It is also located outside of the project area; therefore, it is recommended that the site be handed over to the backcountry monitoring program so that they can monitor the activity or inactivity of the gully.

A:15:048 Roaster Complex

SITE DESCRIPTION: This site contains a cluster of roasting features. Only a few artifacts were recorded during the survey including a basalt mano and historic trash.

PREVIOUS WORK: The site was recorded in 1991 and monitored in FY94 and FY98.

STATUS AND RECOMMENDATIONS: This site has not been monitored for the last three years. During that time, the gully near Feature 1 has deepened and become an arroyo, and sheet wash is apparent throughout the site. No visitor-related disturbances were observed. The drainage system adjacent to Feature 1 is very active and is beginning to pedestal the feature. Preserving this feature may cause more harm than good, therefore it is recommended that the feature be excavated. After excavation, the area will be stabilized in the best manner to prevent future erosion. A total station map will be completed prior to any archaeological site disturbance. Currently the site is monitored every three years.

A:16:004 Roaster Complex

SITE DESCRIPTION: This is a large site containing shelters, roasters, fire features, structural alignments, and activity areas with several different types of artifacts. The topography includes stabilized dunes, Tapeats Sandstone rock ledges and a basalt outcrop.

PREVIOUS WORK: The site was originally recorded by R. Euler in 1975. During the river corridor survey in 1991, collection piles were noted on-site. The site was monitored in FY92, FY93, FY94, FY96 and FY98.

STATUS AND RECOMMENDATIONS: The only noticeable impact was at Feature 7, where it appears to be eroding downslope, into the side canyon. All the other features in the dune area are stable. The features in the shelter exhibited eolian deposition and drip-line surface erosion. Human disturbance was observed in the shelter/midden areas. There were several collection piles with impressive artifacts (i.e., diagnostic points and decorated pottery sherds). The other human impacts were trails through Feature 7 and 10. The trail near Feature 10 is likely to become a gully, therefore, trail obliteration and minor transplanting will be performed during the next monitoring visit. The site will be monitored biennially.

A:16:148 Roaster Complex

SITE DESCRIPTION: This site consists of a concentration of fire-cracked rock. No artifacts were associated with the site.

PREVIOUS WORK: The site was originally recorded in 1990 and monitored in FY96 and FY98.

STATUS AND RECOMMENDATIONS: No physical impacts were observed. A terrace-based drainage is present on-site but currently it appears stable. No visitor-related disturbances were noted. Site monitoring is recommended for every four years, paying particular attention to the terrace-based drainage. This site could also be used as a good sample for the geomorphic studies.

A:16:151 Artifact Scatter and Roaster

SITE DESCRIPTION: This site consists of one large roasting feature and a rockshelter with a few artifacts.

PREVIOUS WORK: The site was originally recorded in 1990 and was monitored semiannually in FY93 and FY94. In FY95, the monitoring schedule was changed to every three to five years. Trail obliteration work was conducted here in February 1997.

STATUS AND RECOMMENDATIONS: The site appears to be in stable condition, and trail obliteration has been successful. No visitor-related disturbances were observed.

It is recommended that the site continue to be monitored every four years due to the potential for human visitation. The site is located on the same delta as a very popular boat beach.

A:16:155 Ephemeral Structure
SITE DESCRIPTION: This site consists of a small rockshelter with a few brownware sherds at the base of the Bright Angel Shale.

PREVIOUS WORK: The site was initially recorded in 1990 and monitored in FY94 and FY98.

STATUS AND RECOMMENDATIONS: There is minor animal burrowing in the overhang. There is also a gully present on the upstream side of the overhang, but is not included within the site boundary. No visitor-related impacts were observed. The site is well protected by the overhang and is recommended for the inactive monitoring list. Previously it was placed on a three to five year schedule.

A:16:159 Camp
SITE DESCRIPTION: This site consists of an overhang with sherds, lithics, tools, and pictographs. The only discernable elements are two hematite anthropomorphs located three meters above the shelter floor. Other elements were once present though they have deteriorated leaving only traces of red pigment.

PREVIOUS WORK: The site was originally recorded in 1990 when a ceramic spindle whorl was identified. The site was monitored annually in FY92 and FY93 and the spindle whorl was never relocated. In FY94 the site was monitored three times and recommended for closure to visitors. Site closure never occurred and beginning in FY95 semiannual monitoring was conducted. The results of semiannual monitoring demonstrated fewer to no impacts and annual monitoring was recommended for FY96. In FY97 medium format photographs were taken of the hematite images.

STATUS AND RECOMMENDATIONS: The site showed no new physical impacts. In the future, spalling and animal burrowing may play a role in site deterioration. No visitor-related disturbances were recorded, but this too may pick up again. No management measures are recommended at this time. This year, monitors recommended that the site be visited every three years due to the site's stable condition represented in the past two years.

A:16:160 Roaster Complex
SITE DESCRIPTION: This site consists of a cluster of fire features and associated artifacts. Thick vegetation covers the site deterring erosional processes and human visitation.

PREVIOUS WORK: The site was originally recorded in 1990 and monitored in FY94 and FY98. Trail obliteration work was completed in FY96.

STATUS AND RECOMMENDATIONS: Trail obliteration took place near the artifacts in November, 1995 and now the old trail is a path for water, thus, turning it into a small surface erosion channel. The trail work looks good, however, maintenance work needs to be conducted annually, especially where the trail cuts near the mano and metate. It is recommended that trail work be conducted with some transplanting to keep hikers off the site. This work could be conducted by the trail crew in conjunction with the work they do on the boat camp beach below the site. It is recommended that the monitoring schedule be changed from three to five years to inactive because the features are in excellent and stable condition.

A:16:163 Small Structures

SITE DESCRIPTION: This site consists of five separate loci. Locus A is located along the base of a Bright Angel Shale cliff and contains several structural elements and pictographs. Locus B consists solely of pictographs along a rock overhang. Locus C is a lithic scatter. Loci D and E are both rock outlined structures. Together, these five loci combine to form a habitation and activity area along a major side canyon drainage.

PREVIOUS WORK: The site was originally recorded in 1990 and monitored in FY94 and FY98. Medium format photographs were taken of Locus B in FY97.

STATUS AND RECOMMENDATIONS: No physical impacts were observed. No sign of human visitation was observed, yet there is a popular boat beach just downstream of the site. In the past campers have cleared areas for tent locations but evidence of this no longer exists. No remedial measures are recommended. The site is in excellent condition and should be monitored in five years to determine if human impact could be a significant problem as noted in the past. After this visit the site will be reassessed and possibly put on the inactive monitoring list if no evidential impacts are observed.

A:16:167 Roaster Complex

SITE DESCRIPTION: This site consists of five roasting features along a stabilized dune. Flakes, a ground slab, and one cobble hand tool were all identified on-site.

PREVIOUS WORK: The site was initially recorded in 1990 and monitored in FY93, FY94, FY96 and FY98.

STATUS AND RECOMMENDATIONS: Game trails are impacting Features 3 and 4 causing deflation of the features. A continuation of this erosion could result in additional cultural materials surfacing. The other features are stable. A camping beach is located upstream of the site. A trail leads from the beach through Features 3 and 4, to the drainage. The impacts that have occurred at Features 3 and 4 are caused by animals and campers using the animal trail to get to the downstream side canyon drainage. Retrailing

should occur during the next monitoring visit near these features. Biennial monitoring will continue.

A:16:171 Roaster Complex
SITE DESCRIPTION: This site consists of two roasting features and artifacts. A single Polacca polychrome sherd was also identified on-site.

PREVIOUS WORK: This site was originally recorded in 1991 and monitored in FY94 and FY98.

STATUS AND RECOMMENDATIONS: The site is covered with abundant cryptogamic soils, and no physical impacts were identified. No visitor-related disturbances were observed. Because the site is in stable condition and is not threatened by any future disturbances it is recommended that the site be placed on the inactive list.

A:16:173 Roaster Complex
SITE DESCRIPTION: This site consists of three concentrations of fire-cracked rock and associated artifacts. No formal tools or ceramics were observed.

PREVIOUS WORK: The site was originally recorded in 1990 and monitored in FY94 and FY98.

STATUS AND RECOMMENDATIONS: Several of the features are located on a very high and steep dune. As a result of their location, there is a lot of eolian erosion and deposition that occurs. Game trails are impacting the features, exposing additional fire-cracked rock and artifacts. Visitor-related disturbances were not detected. Generally, this site is in good condition and it is located above the 300,000 cfs level. It is recommended that this project discontinue monitoring this site. The park based backcountry archaeological monitoring program should continue monitoring for newly exposed material to aid in the interpretation of the site.

A:16:174 Roaster Complex
SITE DESCRIPTION: The site is comprised of a large roasting feature and scattered fire-cracked rock.

PREVIOUS WORK: The site was originally recorded in 1990 and monitored in FY93, FY94, FY96 and FY98.

STATUS AND RECOMMENDATIONS: The main areas of concern are the drainages below artifact scatters A and B. These gullies are active and deep, bone fragments and a mano fragment are newly exposed. The bone fragments should be analyzed to determine if they are animal. The other areas are in stable condition. No visitor-related disturbance

was observed. The gullies will be assessed for some type of remedial action in FY99. Also it is recommended that the monitoring schedule change from every three to five years to biennial due to the increased erosional activities.

A:16:180 Roaster Complex
SITE DESCRIPTION: This site consists of two roasting features and lithics.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored in FY96 and FY98. A data recovery project (Yeatts 1998 in progress) was implemented here in FY97 to curtail the loss of information at one of the roasting features. After data recovery, six checkdams were constructed in the main drainage (Leap 1997a).

STATUS AND RECOMMENDATIONS: Slope wash is increasing in the slope west of the checkdams near the artifact scatter. There is an active gully upstream of the checkdams, but there were no photographs to compare. The arroyo with the checkdams has filled in some since the spring of 1997, yet this slope is unstable and very active. A trail is present on the slope as a result of the checkdam work and mapping that was completed this past spring. The trail is recovering slowly on its own, so maybe some annual grass seed could be spread throughout the area. A biennial monitoring schedule will continue, paying close attention to the eroding dune where the artifacts are surfacing.

B:09:314 Ephemeral Structure
SITE DESCRIPTION: This site consists of a single-coursed structure built against the base of a Muav Limestone cliff overhang. A core, two limestone flakes and charcoal are present on the surface.

PREVIOUS WORK: The site was originally recorded in 1991. The site was monitored for the first time in FY98.

STATUS AND RECOMMENDATIONS: This is a very stable site with no new signs of physical impact. No visitor-related impacts were observed. No management recommendations have been made at this time due to the site's stable condition. The site will be monitored in five years and if it remains stable, it will be placed on the inactive list.

B:09:316 Small Structure
SITE DESCRIPTION: This site consists of several one course high rock alignments. Groundstone, ceramics and lithics are present on the surface.

PREVIOUS WORK: The site was originally recorded in 1991 and has been monitored in FY92, FY93, FY94 and FY98.

STATUS AND RECOMMENDATIONS: This site is in very stable condition. No visitor-related disturbances were noted. No actions are recommended because the site is in stable condition. A three to five year monitoring schedule will continue because the site is easily accessible to visitors thus having the potential to be disturbed.

B:09:317 Isolated Thermal Feature

SITE DESCRIPTION: This site consists of two loci. Locus A is located on the upstream side of a major side canyon drainage overlooking the river and includes a large roasting pit with flakes and a complete projectile point. Locus B, located downstream of the drainage, is a thermal feature at the base of a Muav Limestone cliff.

PREVIOUS WORK: J. Balsom originally recorded the site in 1986. The site has been monitored in FY93, FY94, FY95, FY96, and FY98. Trail work was completed in FY97 and has successfully deterred visitation.

STATUS AND RECOMMENDATIONS: There is only one access route to Locus A and this was obliterated last November. Since then, there has been no sign of visitation, which was the only problem at this site. The site was not officially monitored because the archaeologists did not want to disturb the trail work. Biennial monitoring will continue to assure that the trail obliteration is successful.

B:10:225 Small Structure

SITE DESCRIPTION: This site consists of two small structures along an overhang wall. A midden associated with the structures contains groundstone fragments, sherds and lithics.

PREVIOUS WORK: The site was originally recorded in 1990 and monitored in FY93, FY94 and FY98.

STATUS AND RECOMMENDATIONS: Minor rock movement on the northwest wall of Feature 1 was noted. No visitor-related disturbances were observed. This site will be monitored in five years due to the minor rock movement. Monitoring the site too frequently may result in damage or trailing by the archaeologists.

B:10:261 Roaster Complex

SITE DESCRIPTION: This site consists of several roasting features and an associated artifact scatter with lithic debris, tools, groundstone and Lino Grayware pottery.

PREVIOUS WORK: The site was originally recorded in 1990 and has been monitored in FY92, FY93, FY94, FY96 and FY98.

STATUS AND RECOMMENDATIONS: No physical or visitor-related impacts were observed. The site is in no danger of active erosion or visitation. The site should be placed on the inactive list because during all five monitoring visits the site was recorded as being in stable condition with minor eolian deposition and erosion.

B:11:272 Isolated Thermal Feature

SITE DESCRIPTION: This site consists of a single isolated roasting feature with no associated artifacts.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored at least annually through FY96. In FY96, trail obliteration near the feature was completed and the monitoring schedule was changed to biennial due to its success. A total station map of this site was also completed in FY96.

STATUS AND RECOMMENDATIONS: No physical or visitor-related disturbances were observed. The trail obliteration work has successfully deterred human visitation on-site. Biennial monitoring will continue due to a gully system cutting the side of the roaster. This gully is inactive, but it could run in the future, possibly uncovering additional artifacts that could give us additional site information.

B:11:275 Ephemeral Structure

SITE DESCRIPTION: This site consists of two partial walls in a rockshelter at the base of the Bass Limestone. No artifacts are associated with this site.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored in FY95 and FY98.

STATUS AND RECOMMENDATIONS: No physical or visitor-related disturbances were noted during monitoring activities. The site is in very stable condition with no potential impacts threatening the site. It is advised that the monitoring schedule change from every three to five years to inactive.

B:14:093 Roaster Complex

SITE DESCRIPTION: This site consists of two roasting features. Only one flake was identified on the surface during the initial recording.

PREVIOUS WORK: The site was originally recorded in 1990 and monitored in FY92, FY93, FY94 and FY98.

STATUS AND RECOMMENDATIONS: Feature 1 shows increased eolian erosion, exposing up to 50% more rock. Feature 2 shows no change since 1994. No visitor-related impacts were observed. Monitoring will increase to biennially. The activity

observed at Feature 1 might create future management actions in the form of data recovery. Currently, more fire-cracked rock is exposed, but the feature itself remains stable.

B:14:105 Ephemeral Structure

SITE DESCRIPTION: This site consists of a small rockshelter with a single course wall. Adjacent to the wall is a light scatter of lithics and sherds. Three roasting features are present below the shelter as is a single course wall two meters long.

PREVIOUS WORK: The site was originally recorded in 1990 and monitored in FY92, FY93, FY94, FY96 and FY98. Scientists during the 1996 research flow used the camp below this site. The dune has not recovered from severe trampling during that time. Trail obliteration work was completed in FY97.

STATUS AND RECOMMENDATIONS: The southern site boundary is experiencing active erosion. Several of the trails that were obliterated last year have nick points and are now defined drainage routes (rills and gullies). Sheet washing has also occurred as a result of the trampling of cryptogamic soils in the spring of 1996, particularly through and near Features 3 and 4. On the north wall of Feature 1, near the center, there is a narrow, deep rill running through the wall. This may have caused one rock to fall. Minor rodent and ant burrowing was also observed at Feature 1. Human trails are present, though it does not appear that they have recently been used. Because of the general surface erosion and gullying, it would be beneficial to transplant along the lower terrace, encouraging vegetation growth within the trails. The Zuni Conservation Team recommends the placement of seedlings and plants on-site in FY99. Biennial monitoring and trail maintenance will continue.

B:14:107 Ephemeral Structure

SITE DESCRIPTION: This site consists of a small rockshelter with a single coursed wall in a Tapeats Sandstone overhang. Adjacent to the wall are groundstone and ceramic artifacts. A concentration of fire-cracked rock and stained soils are eroding out of the slope above the shelter area.

PREVIOUS WORK: This site was originally recorded in 1990 and monitored in FY95 and FY96. In April, 1997, a water diversion structure was placed above the site to deter runoff from Feature 2. During this past February trip, Zuni team members extended the water diversion bar by 1.5 meters to increase its effectiveness, now it extends to a length of four meters (Leap 1998a).

STATUS AND RECOMMENDATIONS: There is a gully east-northeast of Feature 2, but it could not be determined if it is active. This was not the gully where the water diversion structure is located. The water diversion structure looks good, and appears to be holding back some sediment. No visitor-related disturbances were observed. It is recommended that the site be monitored every three years.

B:15:119 Artifact Scatter
SITE DESCRIPTION: This site consists of a sparse scatter of Redwall Chert lithic tools and debitage, ceramics and charcoal. The artifacts are concentrated along the dripline of a shallow, sheltered area at the base of the Tapeats Sandstone.

PREVIOUS WORK: The site was originally recorded in 1990 and monitored in FY94 and FY98.

STATUS AND RECOMMENDATIONS: Surface erosion and game trails are present. No visitor-related disturbances were observed. Monitors should visit the site in five years to assess the impacts caused by surface erosion and game trails. These activities could expose additional artifacts.

B:15:138 Isolated Thermal Feature
SITE DESCRIPTION: This site consists of two concentrations of fire-cracked rock and a sparse scatter of lithics and sherds. Multiple trails are on or near the site due to it's proximity to a popular side canyon hiked by visitors.

PREVIOUS WORK: NPS river corridor monitors originally recorded the site in 1997. The trail directly below the site was obliterated at the time the site was recorded but visitors destroyed the work the following summer. In September, 1997 a total station map was completed of the site.

STATUS AND RECOMMENDATIONS: There is a deep nick point in the gully below Feature 1, and the gully at Feature 2 is compacted, due to trailing. Though the trail work was destroyed, a second round of obliteration was conducted in October, 1998. Camping is adjacent to the site but not within the defined site boundary. It may be difficult to keep visitation diverted from the site. Additional trail work will be completed and vegetation (seeding with the aid of jute mat) will be planted along the slope. Annual monitoring will continue.

C:02:089 Ephemeral Structure
SITE DESCRIPTION: The site consists of a rockshelter with two walls, lithic debris and burned bone. No diagnostic artifacts were present on-site.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored in FY94 and FY98.

STATUS AND RECOMMENDATIONS: No physical impacts have been observed since 1994. No human visitation was observed in FY98. This site is located outside the project area, furthermore, it is located in a well-protected area, sheltered by natural elements. People can hike down the canyon from the Lees Ferry road, but they do not appear to be visiting this site. Site monitoring will be discontinued by this project.

C:02:094 Historic Inscription
SITE DESCRIPTION: This site consists of a dugway used to cross lower Lees Ferry on the left bank of the river and a panel of names recorded in tar on the rock surface and four carved initials.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored in FY92, FY93, FY96 and FY98. Graffiti associated with the panel was removed in 1996. Medium format photography documented the inscriptions in FY97 as part of the medium format data collection of photographs.

STATUS AND RECOMMENDATIONS: No physical impacts were observed. Charcoal and incised markings have been made on the panel, and there is abundant trash throughout and below the shelter. Day hikers and fishermen with access to the site via a defined trail are responsible for the trash. Graffiti removal will occur within this fiscal year. It may be beneficial to place a sign at the top of the trailhead, but prior to that, we would have to consult the Navajo Nation. Two Tusayan corrugated sherds and five lithics were located below the historic panel. This information was not noted when the site was first recorded, indicating that new artifacts are eroding, and that a prehistoric component exists at this site. Annual monitoring will continue. There is potential for additional prehistoric artifacts to erode from the surface and continued visitor disturbance.

C:02:096 Ephemeral Structure
SITE DESCRIPTION: This site consists of two sheltered areas. Locus A is a shallow overhang with an ephemeral wall with lithics and groundstone. Locus B is a deep arroyo cut with several profiles of charcoal, lithics and features exposed.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored in FY95, FY96, FY97, and FY98. In FY97, this area was assessed for checkdam installation and data recovery. A total station map was also completed in FY97.

STATUS AND RECOMMENDATIONS: A large arroyo was defined upstream of Locus A. Although it is not directly impacting the locus, it is worthy of monitoring in the future to track its direction. At Locus B, the arroyo system has been moderately active and new channel initiation has occurred at several locations. Artifacts and features are still present in the arroyo walls but also washing downslope. Undercutting and bank slump are visible in the upstream fork of the arroyo. On the downstream fork, near the intersection, surface erosion is obvious and may continue to cut down, breaking off a large part of the main arroyo. No visitor-related impacts were observed this fiscal year. It is

recommended that data recovery occur within the next fiscal year to supplement past research. Annual monitoring will continue for newly exposed materials.

C:02:097 Ephemeral Structure
SITE DESCRIPTION: This site consists of two rockshelters and diverse artifacts within the shelters and along the slope below. Shelter 1 contains lithic tools, groundstone and one sherd. There is also a historic firepit with rusted cans and other historic trash. Shelter 2 is smaller with a possible one-course wall.

PREVIOUS WORK: The site was recorded in 1991 and monitored in FY95, FY97 and FY98. The NPS trail crew in FY96 performed retrailing and trail obliteration work.

STATUS AND RECOMMENDATIONS: It is apparent that during heavy rains water flows through the overhang, filtering down from above the site. The rainfall does not threaten the site's integrity. This is an obvious day hiker's area used to fish, to sit in the shade and drink beer as seen by the trash left behind. Based on the past monitoring information, and the site's current status, it is recommended that the site be monitored biennially instead of annually concentrating on newly exposed artifacts brought out by visitation. Additionally exposed artifacts could shed more information on site interpretation.

C:02:098 Artifact Scatter
SITE DESCRIPTION: This site consists of an overhang with a charcoal scatter, lithics and sherds.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored in FY95, FY97 and FY98. Recent trash and charcoal have been observed at one end of the overhang. Visitors have dug in the site and moved rocks. Sherds identified during the survey are no longer present on-site. Trail obliteration was completed by the NPS trail crew in FY96. A total station map was completed this summer in the anticipation of data recovery in FY99 and preservation actions (checkdams) in FY00.

STATUS AND RECOMMENDATIONS: Channel initiation with several nick points has started throughout all the old obliterated trails. One of the old trails has become a gully and it is at a very critical stage. No foot prints were observed because they were probably washed away by the very heavy rains the night before the site was monitored. Some trash was found in the overhangs. With the evidence of channel runoff, it is very important to conduct data recovery in the critical areas that cannot be preserved, and to build some structures in the next couple years. Trail maintenance should continue on an as needed basis. Annual monitoring will continue.

C:02:101 Isolated Thermal Feature
SITE DESCRIPTION: This site consists of a cluster of fire-cracked rock and charcoal.

PREVIOUS WORK: The site was originally recorded in 1990 and monitored in FY92, FY93, FY94, FY97 and FY98. In February 1997, 14 checkdams were constructed in two active gullies and a total station map was completed for the entire site (Leap 1997a). The main gully was remapped in FY98 to identify the rate of erosion.

STATUS AND RECOMMENDATIONS: No impacts were observed at the feature. The checkdams that were built in two gullies on either side of the feature, however, showed much change. As a result of the heavy rains this summer, several of the checkdams have accumulated sediment on the upstream side, but formed new nick points just below the checkdams. Eventually, after substantial rains, these two drainages could connect below the feature and drain to the river. At the present time, the downstream drainage system is more active than the upstream one. Human visitation has not been a problem at this site. The Zuni Conservation Team assessed the changes to the checkdams in the drainages and suggested that jute mat be used to line the drainage and that several checkdams should be reconstructed. It was also suggested that the river-based drainage be lined with rock and brush up to the 1983 sands. This work will be conducted in November of 1998. There are no artifacts associated with the feature and with the activity that the gullies have illustrated, though it is possible that artifacts could be exposed to the surface, thus, giving more insight to the site's age and function. Because of the activity recorded at this site, it is recommended that the schedule change from every three years to biennially.

C:05:004 Historic Artifacts

SITE DESCRIPTION: This site is the cache of a 19th century trapper or prospector. The site is located inside a small cave and contains traps, tools and kitchen objects.

PREVIOUS WORK: Members of a USGS trip took the first photograph of this site in 1923. This photograph was published in *National Geographic* in 1924. The NPS officially recorded the site in 1990. The river corridor monitoring project has monitored the site in FY92, FY93, FY94 and FY98. In October of 1997, an inventory was taken of the artifacts.

STATUS AND RECOMMENDATIONS: No physical changes were observed on the FY98 monitoring trip. Artifacts have been moved to the southeast side of the cave. No management recommendations were advised. Furthermore, the archaeological information at this site is exhausted due to a complete artifact inventory and a lack of subsurface deposition. It is recommended that this site be placed on the inactive monitoring list and monitored only before and after experimental flows of over 45,000 cfs.

C:05:039 Isolated Pot Cache

SITE DESCRIPTION: This site consists of a North Creek Corrugated jar cached into a Redwall Limestone solution "cavern". The jar was broken by a large piece of fallen limestone so the jar is presently in four large pieces.

PREVIOUS WORK: The site was originally recorded in 1990 and monitored in FY97 and FY98.

STATUS AND RECOMMENDATIONS: No physical impacts have been observed at this site since it was first photographed in 1990. No visitor-related disturbances were observed. The pot is properly documented and the archaeological information potential is exhausted. It is recommended that river patrol personnel familiar with our program monitor this site during the summer months because it is easily accessible to human visitation. It will be monitored by project staff members before and after experimental flows of over 45,000 cfs.

C:06:003 Artifact Scatter

SITE DESCRIPTION: This site consists of two loci, A and B. Locus A includes flakes, tools, shell and ceramics with a hearth in the artifact cluster. A rock alignment is eroding out of the dune terrace. More artifacts and animal bones have been observed eroding from a portion of the site since it's original recording. Locus B contains flakes, groundstone, sherds and an ash deposit.

PREVIOUS WORK: The site was originally recorded in 1976 and has been monitored at least annually since FY94. In FY96, NPS personnel conducted extensive trail obliteration and retrailing work.

STATUS AND RECOMMENDATIONS: The gully on the upstream side of Locus A flashed recently prior to our monitoring. This recent activity has resulted in new nick points, bank slump, and channel widening. New surface erosion has also occurred below the intact hearth. Minor rilling and surface erosion are present near the boulder area; these impacts appear to be exposing additional artifacts (a possible Rose Spring point was located in the area). Trail obliteration completed two years ago needs minor maintenance. Several minor nick points have formed as a result of the heavy rains that occurred this summer. Due to the presence of surface erosion and gullying, smaller rocks and vegetation should be placed in the trails instead of large rocks. The gully in Locus A should be considered for checkdam construction. The work, however, should not be completed by our project. Upon further observation by the archaeologists and geomorphologist, Kate Thompson, it appears that the site is located outside the area of potential effect. The active gully in Locus A drains into the side canyon before reaching the alluvial terraces. Therefore, this site will be turned over to the park based archaeologist for continued site management.

C:06:005 Rock Image

SITE DESCRIPTION: This site consists of a rock image of three pecked figures on a Supai Sandstone bedrock ledge. An anthropomorph, a pecked line, and "U" shaped element comprise the figures. The elements have experienced only minimal wind and water erosion, making the figures less defined.

PREVIOUS WORK: The site was originally recorded in 1979 and has been monitored annually since FY94. In FY97 the elements were photographed with a medium format camera and the inscribed "X" located on the boulder was diminished with a sand/water fill (Leap 1996a).

STATUS AND RECOMMENDATIONS: No physical impacts were observed. The "X" symbol that was removed last year by the staff, is still slightly visible. No new visitor-related disturbances were noted. More graffiti removal will be conducted on the "X", but the site will be placed on the inactive monitoring list because all the archaeological information has been recorded and throughout the last several years, no disturbances have been noted on the petroglyph. This site will be visited periodically during the summer months by river patrol informing us of any vandalism that may occur.

C:09:050 Small Structure

SITE DESCRIPTION: This site was initially recorded as a single complete Tusayan Black-on-Red pitcher eroding from a cutbank and a cobble alignment. The site was then stabilized and the pitcher and other vessels were collected by J. Balsom and curated at the South Rim. A light concentration of fire-cracked rock and a possible structure are also present.

PREVIOUS WORK: This site was originally recorded in 1990 and has been monitored at least annually since FY92. In FY97 an extensive water diversion structure was constructed at the base of the cutbank to curtail further erosion from side canyon flooding and bank slump (Leap 1997b). Upon completion of the stabilization, a total station map was completed of the entire site.

STATUS AND RECOMMENDATIONS: The slope where the pots surfaced appears stable, with only minor erosion on the south side of the slope. This area of surface erosion is of concern because it is fed by a gully on the terrace above. The steep slope with the possible structure has been slightly active. This was evidenced by one of the rocks from the structure moving downslope approximately two meters. The water diversion structure is unchanged. No visitor-related disturbances were noted. This site will continue to be monitored semiannually because of the high potential of more artifacts eroding from the slope. Furthermore, the possible structure should be tested for cultural material. The alignment could likely be a result of a debris or side creek flow.

C:09:051 Pueblo

SITE DESCRIPTION: This site consists of a large Pueblo II camp consisting of four loci. Locus A contains an L-shaped roomblock of four to six rooms constructed of

cobbles. Wall fall, clay daub, ash, ceramics and a midden are present. Locus B is a concentration of fire-cracked rock with a broken mano and sherds. Locus C is an artifact concentration of cobbles, ceramics and lithics. Locus D contains charcoal, ceramics and fire-cracked rock eroding out of a cutbank. A possible roomblock was also present in Locus D until Nankoweap creek flooded in March of 1995, wiping out the alignment.

PREVIOUS WORK: The site was originally recorded in 1989 and monitored at least annually since FY92. Prior to 1992, NPS personnel worked extensively to curtail trailing through the cultural remains. In FY96, the river corridor project conducted further trail work. A total station map was completed for this site in 1997 and a portion of Feature 4 was excavated at this time. The results of the excavation will be submitted upon completion of the carbon analyses.

STATUS AND RECOMMENDATIONS: Generally, all the features are in stable condition. Factors that threaten the site include a trail leading to Feature 1 (Locus A) that shows signs of channel initiation. This could lead to further surface erosion and gullying. The other concern at the site is at Locus D, because of its location adjacent to Nankoweap Creek. As seen with Feature 3, it is highly likely this creek can flash again, thus exposing additional materials. It is recommended that, as additional features erode from the bank of Locus D, excavation occur on an as needed basis. It is unrealistic to attempt to prevent the side canyon from impacting this site when it flashes. The cost of the excavations would be shared with this project and the park based program. The trailing leading from Locus D to Feature 1 is the only evidence of human disturbance. Annual monitoring will continue.

C:09:052 Small Structure

SITE DESCRIPTION: This site consists of an occupation area with structural outlines and a concentration of artifacts, predominately ceramics and groundstone.

PREVIOUS WORK: The site was originally recorded in 1989 and has been monitored at least annually from FY92 through FY96 and then again in FY98. Collection piles were observed in FY96.

STATUS AND RECOMMENDATIONS: There is very little impact to the site. Impacts include eolian deposition and rodent burrowing. The same collection piles mentioned in 1996 are still present and do not appear changed. Only one set of footprints was observed. The site remains in good condition, and the monitoring schedule will continue as biennial due to the likelihood of visitation.

C:09:072 Small Structure

SITE DESCRIPTION: This site consists of a ceramic scatter and a cluster of rocks. The cluster may be a structure or terracing.

PREVIOUS WORK: The site was originally recorded in 1990 and monitored in FY94 and FY98.

STATUS AND RECOMMENDATIONS: No physical impacts were observed at this site. The trail that was mentioned in 1994 has recovered somewhat and is now very faint. The trail is not an impact to the site. The site is very stable and is anchored by several mesquite and cryptogamic soils. The site will be visited in five years at which time it will be reassessed and possibly placed on the inactive list.

C:09:083 Historic Structure

SITE DESCRIPTION: This site consists of an abandoned BOR camp. Reclamation employees used the camp during the testing period of 1941-1950 in Marble Canyon.

PREVIOUS WORK: The site was originally recorded in 1990 and monitored in FY94 and FY98. In April of 1997, minor trail obliteration was conducted.

STATUS AND RECOMMENDATIONS: This site is located outside of the project area, so monitoring will be discontinued. It is recommended that park archaeologists monitor the site and maintain trail work because it receives human visitation during the summer.

C:09:084 Sherd Scatter

SITE DESCRIPTION: This site consists of corrugated sherds, manuported cobbles and a corncob. The site is located at the base of a Bright Angel Shale cliff, resulting in a somewhat sheltered location.

PREVIOUS WORK: The site was originally recorded in 1990 and monitored in FY96 and FY98.

STATUS AND RECOMMENDATIONS: Sheet washing is present throughout the site. Water runs off into a shallow basin area and then empties into a gully below the site. No visitor-related disturbances were observed. It is advised that the monitoring schedule change from biennial to every three years due to the site's stable condition represented in the last two monitoring episodes. In FY96 monitors recommended checkdam construction in one of the gullies, but upon further monitoring, any preservation measures will be put on hold until the site becomes more active.

C:13:005 Roaster Complex

SITE DESCRIPTION: This site consists of eight roasting features with associated charcoal stains and one small rockshelter. Artifacts include lithic debris, core scrapers, a hammerstone, utilized flakes and ceramics.

PREVIOUS WORK: The site was originally recorded in 1962 and revisited by NPS archaeologists in 1976 and 1989. The NPS has monitored this site several times before

turning over the responsibility to the river corridor project in FY95. The site has been monitored annually since FY95. Extensive trailing exists on-site due to the location of the roasters along a major rapid scout trail. The NPS trail crew has worked in the area prior to 1995 and again with the river corridor project in FY96.

STATUS AND RECOMMENDATIONS: This site is located just outside of the project area and will be discontinued, once again, turning it back over to the Park. It is recommended that park archaeologists incorporate this site into their annual backcountry monitoring program, and that the trail crew continue trail maintenance.

C:13:006 Small Structures

SITE DESCRIPTION: This site consists of four to five possible rooms with ceramic and lithic artifact concentrations eroding from a dune face. Fire-cracked rock and a cobble-strewn ashy midden are also present. Since it's initial recording, walls have been discovered eroding from gullies and an additional roasting feature was identified.

PREVIOUS WORK: The site was originally recorded in 1960 and visited by NPS personnel in 1965, 1984 and 1990. The river corridor project has monitored the site at least annually since FY92. In FY96, checkdams were built, trail obliteration was conducted, and the site was mapped with a total station instrument. In FY97 additional checkdam work was performed and jute mat and vegetation were placed in deflated dune areas (Leap 1997b, 1996c).

STATUS AND RECOMMENDATIONS: Generally, the site looks stable. The wet summer allowed for growth of many grasses. Surface erosion (sheet washing) was noted on the bank adjacent to the side canyon. The gullies with the checkdams on the west end show much sediment deposition. The checkdams near the east boundary show no change. Sixty-Mile Canyon flashed prior to our visit, making a new cutbank of about one meter. The channel north of the site has a few new nick points and shows moderate runoff. This gully should be monitored in the future to identify if it will cut toward or away from the site. If the gully diverts toward the site, checkdams should be installed. The increased sediment deposition demonstrated at this site, resulting from the checkdam construction, is currently one of the projects success stories. It is recommended that additional seedlings are planted in the jute mat area to supplement the previous work, and only minor checkdam maintenance be conducted. No visitor-related disturbances were noted. Annual monitoring will continue.

C:13:007 Small Structure

SITE DESCRIPTION: This site is an occupation site consisting of possibly four structural outlines ranging from L-shaped to rectangular in design. Fire-cracked rock, sherds, lithics and ashy soils are also present.

PREVIOUS WORK: This site was known about in the early 1960s but not recorded until 1965. The NPS monitored the site until the river corridor project began monitoring

activities in FY93. The site has been monitored in FY93, FY94, FY95, FY97 and FY98. In 1992, the NPS trail crew stabilized a portion of the site by constructing a retaining wall and placing jute mat across the site's surface. Heavy rains in 1993 blew out the retaining wall but the wall was repaired in 1994.

STATUS AND RECOMMENDATIONS: There are no physical impacts to the features. However, there is an active arroyo near Feature 5 that has the potential to impact the feature. The trail obliteration work has proven to be a great success. No human visitation was observed. It is recommended that the schedule be changed from annual to biennial due to the site's stable condition.

C:13:010 Pueblo

SITE DESCRIPTION: This site is a large, multi-component habitation site divided into three "locales". Each locale contains several different features and artifacts including roomblocks, slab-lined cists, slab-lined hearths, and wall alignments.

PREVIOUS WORK: Extensive research and some data recovery were conducted at this site in 1984 (Jones 1986) as a result of high dam releases inundating cultural remains along the river. The site has been closed to visitors since 1985 due to the fragility of the surface terrain. A topographic map was completed in 1993 (Hereford et al. 1993). The site has been monitored at least annually since FY95. During the 1996 research flows, supplemental monitoring efforts were conducted at this site (Burchett et al. 1996). In April, 1998 the river corridor monitoring staff implemented a data recovery project and a separate report detailing this work will be completed upon completion of the analyses.

STATUS AND RECOMMENDATIONS: Overall, there is an increase in gullying and bank slump. Surface erosion and some arroyo cutting were also noted as physical impacts to the features. No visitor-related impacts were noted. Aside from continued data recovery, no further recommendations have been made. Monitoring will continue annually.

C:13:070 Small Structure

SITE DESCRIPTION: This site consists of four loci containing dense artifact scatters, charcoal, charred logs and a small masonry structure. Sherds and lithics are concentrated at the base of the structure. Small mammal bones and a basalt axe fragment have been identified since the original recording of the site.

PREVIOUS WORK: The site was originally recorded in 1973 and then again in 1991 by river corridor survey personnel. The river corridor project has monitored the site at least annually since FY93. A total station map of Loci B, C and D was completed in September, 1997.

STATUS AND RECOMMENDATIONS: All four loci appear unchanged since last monitored. The arroyos and gullies throughout the site also show no change. At Locus A

there are 10 rocks in a circle, a possible tent ring. It's difficult to determine if this was new because there were no previous photographs available of the area. Annual monitoring will continue and data recovery is suggested on an as needed basis; several of the drainage systems are large enough that checkdam installation would not be practical. Yet, near the headcuts of these arroyos and gullies checkdams could be beneficial. They will not be ruled out during future site management recommendations.

C:13:098 Historic Structure and Prehistoric Artifacts

SITE DESCRIPTION: This site consists of two loci. Each locus is a separate activity area associated with historic mining activities including the mine and a cabin site. Artifacts include a wooden bed frame, a log "fence" and several metal artifacts dating from 1900 to 1920 and the mid 1930s.

PREVIOUS WORK: This site was originally recorded in 1978. The river corridor project has monitored the site semiannually since FY93. A topographic map was completed for the entire site area in 1996 (Hereford 1996) and a total station map was completed in FY97.

STATUS AND RECOMMENDATIONS: The only potential for physical impact to the site is the surface erosion on the upstream side of the cabin. But, currently, this area is inactive. Visitors have moved around artifacts. During the 2nd monitoring episode for the fiscal year, archaeologists discovered a new cist-type feature approximately 30 meters southwest of the cabin. In the past, the site was monitored semiannually due to artifact movement. After further assessment, it is recommended that the site be monitored annually, with emphasis on the surface erosion. It is also recommended that trail maintenance occur in order to keep visitors from creating multiple trails to the cabin. The gullies near the site with the checkdams will be monitored annually in conjunction with C:13:099. If there are signs of the gullies moving toward the cabin, then the management of this site can be reassessed.

C:13:099 Small Structure

SITE DESCRIPTION: This site contains two loci of fire-cracked rock, buried and collapsed structures and artifacts. Several charcoal lenses, burned rock features and artifact concentrations have been identified. Many of the features are eroding out of the coppice dunes, which have been inundated by a highly active drainage system.

PREVIOUS WORK: The site was originally recorded in 1978 and has been monitored by the river corridor staff semiannually since FY93. In FY95, trail obliteration work was completed along the Beamer Trail, and this is the first location of Zuni constructed checkdams (Leap and Coder 1995). A photogrammetric map (Hereford et al. 1993) was used for recording prior to completion of a total station map in FY97. Additional monitoring efforts were conducted during the research flow of 1996 (Burchett et al. 1996) and several checkdam maintenance projects have been completed in FY97 and FY98 (Leap 1997b; 1998b).

Of the previously existing 44 checkdams, 32 have had minor to major maintenance performed. Most of the work involved lowering the center of the checkdam and armoring the sidewalls. Three new checkdams were built in the process. Major reconstruction occurred at only one location. The original checkdam (#15) was a basket weave structure. It was determined that this structure was too fortified to allow for the flow of water and entrapment of sediments in the drainage. The basket weave was disassembled and a "vortex" type structure was built in its place. The vortex structure is angled like a horseshoe checkdam though it is curved downstream and has less rock. The NPS hydrologist John Rhis supervised the construction of the vortex checkdam (Leap 1998b).

STATUS AND RECOMMENDATIONS: This site is actively eroding. All four features (1, 3, 4, and 7) adjacent to the main arroyo have experienced some degree of degradation through channel cutting and/or bank slump. The summer rains impacted all checkdams. Several of the checkdams demonstrated pooling and breaching. Presently, it seems impossible to save any of the features adjacent to this active system. Fresh footprints were noted throughout the site and a mano was placed in a different location. There are still multiple trails throughout the site, but this takes a back seat to the real problem, arroyo cutting. It is recommended that data recovery be performed at the features adjacent to the drainage system before further information is lost. Despite all the effort expended building checkdams in these locations erosion continues to occur. It is apparent through monitoring of the checkdams that before the area begins to stabilize itself, much erosion of the features will occur through bank slump. Semiannual monitoring will continue due to the likelihood of additional cultural materials eroding from the arroyo.

C:13:100 Pueblo

SITE DESCRIPTION: This site consists of an open habitation site of rectangular rooms, slab-lined cists and charcoal. Lithics and ceramics are scattered across the site boundary. Groundstone tools include manos, metates, and hammerstones.

PREVIOUS WORK: The site was originally recorded in 1978 and monitored by NPS archaeologists until FY92 when it was turned over to the river corridor project. The site has been monitored semiannually since FY93. In FY95, trail work was conducted on-site as was checkdam installation in two of the river-based drainages on the delta (Leap and Coder 1995). The area received further trail obliteration work in FY97 and a total station map was completed at this site in June, 1997. Prior to completion of the total station map, a photogrammetric topography map (Hereford 1996) was used to plot additional features. This site also received additional monitoring during the research flow of 1996 (Burchett et al. 1996). Check maintenance was performed in February, 1998.

STATUS AND RECOMMENDATIONS: Physical impacts to this site occur in the form of surface erosion, gullying and alluvial and eolian erosion and deposition. These impacts, however, verge on minimal impacts to the site features. There are trails present

throughout the site, but they have not been in use since last monitored in October 1997. It is recommended that Features 5, 6 and 11 be excavated next year because they are in very poor condition. Once again, Features 5 and 6 were already impacted prior to the implementation of checkdams, while Feature 11 is in the vicinity of Features 5 and 6 and could soon degrade rapidly. It is also recommended that Feature 9 be tested to determine if it is really a cultural manifestation. This work could be conducted next spring and will continue on an annual or as needed basis (Leap 1998b). We recommend that the monitoring schedule be changed from semiannual to annual. Once excavation of Features 5, 6, 9, and 11 is completed, there will be no need to visit the site twice a year.

C:13:273 Roaster Complex

SITE DESCRIPTION: This site consists of four roasting features, a slab-lined cist and two artifact concentrations. The roasting features all contain fire-cracked rock and charcoal. The artifact concentrations consist primarily of lithics and ceramics.

PREVIOUS WORK: The site was originally recorded in 1990 and has been monitored in FY93, FY95, FY96, FY97 and FY98. In FY95 archaeological clearance work was conducted prior to an NPS trail crew retrailing project (Leap 1994). In FY97 the site was mapped with a total station instrument and Feature 5 was excavated (Yeatts 1998).

STATUS AND RECOMMENDATIONS: Feature 3, a roasting feature adjacent to an arroyo, was the only feature that showed increased surface erosion. The remaining three features were in stable condition. The Beamer Trail runs through a small section of Feature 1, but it is not impacting the feature. It is suggested that Feature 3 be excavated because it will erode into the active drainage adjacent to it eventually. It would be beneficial for us to obtain archaeological information from this feature before it erodes. Monitoring will continue annually, due to several active gullies within the site boundary with the potential to expose new features, or destroy the integrity of previously recorded features.

C:13:291 Small Structure

SITE DESCRIPTION: This site consists of structures and Dox Sandstone cists. One feature includes a two-meter long wall and juniper post eroding from a gully. Artifacts include ceramics and lithics. Feature 2 has completely eroded away since the initial recording of this site.

PREVIOUS WORK: The site was originally recorded in 1988 and then again in 1990. The river corridor monitoring project has monitored the site at least annually since FY92. During the research flow of 1996, visitors created a trail though the site on their way to Unkar Delta. Additional monitoring efforts were also conducted here during the research flow (Burchett et al. 1996). The newly created trail was obliterated in FY97 at which time a total station map was completed of the site.

STATUS AND RECOMMENDATIONS: The only change noted at this site was at Feature 4 where rodent burrowing will eventually cause minor collapse of the stacked elements. There is a well-defined trail below the site that is used to hike from the upper Unkar camp to the Unkar site. In their transit, some people have hiked above the mesquite through Feature 5 due to high water releases. Trail obliteration was conducted last April, but maintenance should continue. A carbon sample should be taken from Feature 4 in conjunction with a dendro sample that will be taken from a possible upright post at Feature 1. Furthermore, it is uncertain if Feature 5 is a cultural manifestation. This feature should also be tested before more time and effort is expended on preserving it. Annual monitoring will continue. If a high flow occurs, it is likely that the bank will retreat, as it did after the last 45,000 cfs flood (Burchett et al. 1996), which will affect the trail and possibly the site.

C:13:321 Roaster Complex

SITE DESCRIPTION: This site consists of four roasting features and a rubble mound of Dox Sandstone that is likely a historic structure. The rubble mound may be associated with a historic cabin (C:13:092) located south of this site. Ceramics, fire-cracked rock and a Dox Sandstone lid have been found on-site.

PREVIOUS WORK: The site was originally recorded in 1978 and monitored by NPS personnel until being turned over to the river corridor monitoring project. The RCMP has monitored the site at least annually since FY93. This site was one of three sites selected for data recovery prior to the research flow in 1996. Excavation was conducted at Feature 4, the only feature that would have been impacted by the flood. After excavation, it was determined that Feature 4 had no subsurface deposits (Andrews et al. 1996). See Hereford et al. (1993) for photogrammetric topography mapping used prior to the completion of a total station map of the site in FY97.

STATUS AND RECOMMENDATIONS: All features are experiencing eolian deposition due to the proximity of the dunes. There is a noticeable increase in surface erosion at Feature 5, including one slab of Dox Sandstone that is no longer upright, and movement of some of the other basal rocks. The fallen slab at Feature 5 may be related to deflation caused by its proximity to the foot trail leading up from the beach. Some of the rocks in Feature 3 also show downslope movement. Features 1 and 6 are also experiencing some eolian erosion. No remedial actions are recommended at this time. Monitoring will continue annually.

C:13:322 Rock Image

SITE DESCRIPTION: This site consists of six faint images pecked into a Dox Sandstone overhang. There are three letters also pecked into the wall above the elements that are likely modern graffiti, though there is no record of the history of this incident. A fire feature and lithics were found in association with the pictographs.

PREVIOUS WORK: The site was originally recorded as a pictograph panel in 1989. The river corridor survey incorporated the fire feature and lithics into the site boundary in 1990. The site has been monitored in FY94, FY96 and FY98.

STATUS AND RECOMMENDATIONS: No physical impacts were observed. This site is well-protected from natural elements. No new visitor-related disturbances were observed. The incised letters are still present. It is recommended that they be removed as soon as possible if it is determined that it is not recent. It is also suggested that this site be placed on the inactive list and only monitored by archaeologists before and after experimental floods higher than 45,000 cfs. River patrol will visit this site during the summer months to note any vandalism to the site.

C:13:323 Artifact and Hearth Features

SITE DESCRIPTION: This site consists of a hearth with an associated lithic assemblage. The assemblage includes three biface tools and lithic debris.

PREVIOUS WORK: The site was originally recorded in 1990 and monitored in FY94 and FY98.

STATUS AND RECOMMENDATIONS: There is increased erosion at the roaster/hearth feature, and two new charcoal lenses are exposed. No visitor-related impacts were observed. The site has seen some downslope changes since last monitored in 1994. The dune is fragile but fairly stable. Continue monitoring the site every four years.

C:13:325 Historic Structure and Prehistoric Artifacts

SITE DESCRIPTION: This site consists of the historic remains of a small corral. Scattered driftwood planks and poles, plus several upright posts are arranged in a circular shape. Milk and food cans, cable and barbed wire are strewn about the site area. There is also a prehistoric roasting feature containing a one-handed mano and ceramics.

PREVIOUS WORK: The site was originally recorded in 1990 and monitored in FY94 and FY98.

STATUS AND RECOMMENDATIONS: The site is stable and unchanged since the last monitoring episode in 1994. No visitor-related impacts were observed. The site is currently stable, yet there is a gully west of the structure that appears active. Monitoring will continue every four years watching the movement of the gully. If the gully heads toward the structure then remedial work will be implemented before it impacts the feature.

C:13:327 Artifact Scatter

SITE DESCRIPTION: This site is a dense concentration of chert flakes and ceramics. A roasting feature, slab-lined hearth and charcoal lenses in adjacent arroyo cuts were discovered during geomorphologic research activities on-site.

PREVIOUS WORK: The site was originally recorded in 1990 and monitored in FY96 and FY98. NPS personnel conducted test excavations in conjunction with trail work in 1992. Carbon samples taken at this time date the site from the late Archaic age through the 16th century, indicating multiple use of the area. Checkdams were constructed at the headcut of the main drainage and along the bank wall in FY97 (Leap 1997a).

STATUS AND RECOMMENDATIONS: The checkdams are intact. It appears that minor amounts of water have moved through them, depositing new fill. There is moderate vegetation cover above Check #1 that is adding considerable stability. The features also appear to be in stable condition. Trail obliteration has successfully decreased visitor-related impacts to the site. Because there is obvious evidence of water movement on the site, the site will be monitored biennially to determine the success of the checkdams, and for the likelihood of newly exposed materials and or features.

C:13:336 Artifact Scatter, Hearth Features

SITE DESCRIPTION: This site consists of two concentrations of lithics and sherds, a possible hearth and a roasting feature. A cobble alignment eroding out of a dune may be the remnants of a possible structure.

PREVIOUS WORK: The site was originally recorded in 1986 and mapped in 1990. This site has been monitored in FY92, FY94, FY96 and FY98.

STATUS AND RECOMMENDATIONS: The gully that intersects the artifact concentration has experienced some increased deflation and has widened since 1996. There has been slight movement of artifacts along the gully, though most of the artifacts are located on either side of the gully. All other features are stable. Trail eradication looks good. There is even cryptogamic soil development within the trail. The gully that cuts through the artifact concentration in the center of the site should be watched. If cutting continues, a small checkdam/leaching field should be placed in the gully to keep artifacts from washing downslope. (This site is adjacent to C:13:099, Palisades Delta, therefore, the gully has the potential to create more impact because it shares the same catchment system as C:13:099.) Monitoring will continue every three years.

C:13:338 Roaster Complex

SITE DESCRIPTION: This site consists of roasting features, a possible hearth/cist and a lithic scatter. No ceramics were observed on-site.

PREVIOUS WORK: The site was originally recorded in 1990 and monitored in FY96 and FY98. NPS trail crew completed retrailing around the site in 1997. Two of the

features located in the Tanner Trail were excavated in FY97 (Yeatts 1998). A total station map of the site was completed at that time.

STATUS AND RECOMMENDATIONS: Minor animal burrowing was noted at Feature 5. There is also some minor downslope movement of rocks at this feature. All other features are unchanged. Trail obliteration has been successful. No human disturbances were noted on-site. Continue biennial monitoring to insure the success of the trail obliteration work.

C:13:339 Small Structure

SITE DESCRIPTION: This site consists of a burned rock midden, a hearth and several rock alignments. Lithics and ceramics are lightly dispersed throughout the site boundary.

PREVIOUS WORK: The site was originally recorded in 1990 and monitored in FY93, FY95, FY96, FY97 and FY98. Retrailing was conducted in FY95 after completion of archaeological clearance by the river corridor office (Leap 1994).

STATUS AND RECOMMENDATIONS: Increased deepening of the gully bisecting Feature 3 is burying the feature, which is acting like a checkdam. Increased surface erosion at Feature 5 is resulting in movement of fire-cracked rock off the surface, down the cutbank. All other features appear stable. Human visitation was not observed. Continue annual monitoring because of tribal significance. It is also recommended that some seedlings be placed near Feature 1 to decrease the minor rilling. This site is also in the process of being mapped with a total station instrument. Map completion is expected to be this summer.

C:13:343 Small Structure

SITE DESCRIPTION: This site consists of an activity area with three slab-lined features, a rock alignment and a concentration of sherds, lithics and fire-cracked rock. More artifacts are eroding below the site into a large arroyo that drains to the river.

PREVIOUS WORK: The site was originally recorded in 1990 and monitored in FY92, FY93, FY95, FY96, FY97 and FY98. A total station map was completed in FY97.

STATUS AND RECOMMENDATIONS: Surface erosion has increased on-site resulting in the movement of artifacts on the slope, down into the drainage. More black-on-white pottery sherds were identified as a result of the increased erosion. Eolian deposition has increased at Feature 3. There are recent footprints above the site. On-site, however, there is no evidence of recent human visitation. Continue annual monitoring due to the increased erosion and the identification of new artifacts along the slope. During the past three monitoring visits it has been recommended that some type of data recovery be performed at Features 1 and 2. It is unknown whether these are slab-lined features or a result of physical downslope movement of Dox slabs resulting in upright positions.

C:13:347 Small Structure
SITE DESCRIPTION: This site consists of a masonry wall eroding out of a steep arroyo and artifacts including Black Mesa Black-on-White sherds, a metate and a serpentine pipe bowl fragment.

PREVIOUS WORK: The site was originally recorded in 1990 and monitored in FY92, FY93, FY95, FY96, FY97 and FY98. The pipe bowl fragment was collected and curated at the South Rim. A total station map was completed for this site in FY97.

STATUS AND RECOMMENDATIONS: The arroyo that the artifacts are located in showed minor signs of runoff and new nick points. The metate in the wall is acting as a checkdam and is actually doing a good job at slowing down erosion. No visitor-related disturbances were noted. It is recommended that the monitoring schedule be changed from semiannual to annual because the activity that has occurred in the last couple years is fairly minimal. It is further recommended that data recovery of the feature eroding from the wall occur, first and foremost before it looses its entire context, then to determine its function and whether it is the beginning or the end of feature erosion.

C:13:348 Small Structure
SITE DESCRIPTION: This site consists of several concentrations of ceramics, lithics and groundstone with jacal fragments. The presence of the jacal suggests buried structural remains.

PREVIOUS WORK: The site was originally recorded in 1990 and monitored in FY96 and FY98. In FY96 it was recommended that the gullies be stabilized with brush lining to protect the buried remains from eroding down the drainage. Checkdam installation was completed in FY97 (Leap 1997b). A total station map was completed for the site in FY97.

STATUS AND RECOMMENDATIONS: The features appear stable. Checkdams in both drainages have not experienced runoff, and are unchanged. The only footprints identified were likely from the mapping crew. No other disturbances were observed. Continue biennial monitoring to track the success of the checkdams.

C:13:349 Historic Structure and Prehistoric Artifacts
SITE DESCRIPTION: This site contains both historic and prehistoric components. The historic component consists of a cabin/dugout structure of wooden planking built into the side of a dune. The prehistoric component consists of fire-cracked rock roasting features and charcoal. Sherds and lithics are also present.

PREVIOUS WORK: The site was originally recorded in 1990 and monitored annually since FY93. A profile was examined at this site to better understand flood and debris

flows along the terrace (Hereford et al.1993) and incorporated into the Lower Tanner section of that report. A total station map of the site was completed in 1997.

STATUS AND RECOMMENDATIONS: Features 1 - 4 appear stable. The headcut of the large arroyo that is adjacent to Feature 2 shows some eolian movement and minor bank slump. The more obvious change is that the headcut has widened to the north by approximately 50 cm. Channeling above the headcut has also become a little more defined. No visitor-related impacts were observed. The same management plan proposed in October, 1996 still holds true. No actions will be performed to preserve the site. Data recovery methods will be implemented if new features are exposed in the arroyo. Furthermore, Feature 2 will be excavated if its current stable condition changes. Annual monitoring for newly eroded materials will continue.

C:13:354 Storage

SITE DESCRIPTION: This site consists of four granaries along a Dox Sandstone ledge. No artifacts are present on-site.

PREVIOUS WORK: The site was originally recorded in 1990 and monitored in FY92, FY93, FY94 and FY98.

STATUS AND RECOMMENDATIONS: The granaries are well-protected and in stable condition. The mortar at Feature 1 is deteriorating at a slow, but steady pace. The granaries are easily accessible from the river, although they are difficult to see. One set of footprints was observed below Features 1 and 2 but there was no sign of visitor disturbance on-site. The site is in stable condition and unchanged since 1994. Because the granaries are easily accessible and there is potential for more cultural information to surface, continue monitoring every five years.

C:13:355 Camp

SITE DESCRIPTION: This site consists of four fire features with a Cerbat Brownware sherd concentration.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored in FY92, FY93, FY94 and FY98.

STATUS AND RECOMMENDATIONS: There is increased soil deflation and decreased vegetation at Feature 1. The sandstone slabs are deteriorating, and the southwest corner of the feature has experienced minor movement. At least half of Feature 2 has been blown out due to an active gully, and charcoal is no longer present. Feature 3 is present, though deteriorating and now has the appearance of an ash lens. Feature 4 appears unchanged with increased vegetation growth and deposition in the adjacent gully. There is increased arroyo activity and major bank slumpage on-site. No sign of human disturbance was observed. Features 1, 2 and 3 are all experiencing increased erosion. The Feature 3 charcoal lens is deteriorating. It is recommended that

this feature be excavated in an attempt to determine its extent and age before it is completely lost. This should occur in the next two years. Stabilization efforts will supplement the excavation. The site schedule will change from every three years to biennially due to the activity that is occurring.

C:13:359 Small Structure

SITE DESCRIPTION: This site consists of wall alignments indicating buried structures, upright slabs and charcoal stains. Lithics and ceramics are associated with the site.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored annually since FY92. Data recovery was conducted at Feature 2 (Yeatts 1998). Prior to excavation work, a total station map was completed for the site. Upon completion of the excavation work, checkdams were installed in the gully bisecting Feature 2 (Leap 1997b).

STATUS AND RECOMMENDATIONS: There has been a slight increase in surface erosion at Feature 3 because the feature is located on a slope. Runoff in the gully has resulted in sediment deposition behind the checkdams. Human impacts were not observed. It is recommended that the monitoring schedule change from annual to biennial. There is the potential for new artifacts to be uncovered and the project should monitor the success of the checkdams.

C:13:371 Small Structure

SITE DESCRIPTION: This site consists of shelter overhang features with dry-laid walls, a two room structural outline and several roasting features. Lithics, ceramics and groundstone are also associated with this site.

PREVIOUS WORK: The site was originally recorded in 1990 and monitored semi-annually since FY92. In FY96 the site was mapped with a total station instrument. Three checkdams were constructed adjacent to two features and carbon samples were taken at this time (Leap 1996a, 1996b). Prior to the research flow of 1996, Feature 8 was tested for subsurface deposits. The results showed that Feature 8 was nothing but the remains of a debris flow (Andrews et al. 1996).

STATUS AND RECOMMENDATIONS: In general, this site received a lot of alluvial erosion this summer. Features 2 and 3 showed evidence of rilling. Feature 3 is in worse condition because the gully below it washed through and made a new channel on the west side of the checkdams, thus cutting more into the feature. The new channel continued downslope, producing a major nick point behind the northeast corner wall of Feature 5, and a smaller channel from this gully cut through the middle of Feature 5. Feature 4 experienced bank slump, thus, exposing more artifacts. The main drainage that runs through this site is river-based again and has a new channel forming downstream of it (an off shoot). No visitor-related disturbances were observed. The erosion at this site was very active at one time this summer. Checkdam maintenance is scheduled for November

1998 because last summer two of the three checkdams were damaged from heavy rains. Data recovery is recommended for Feature 2 (roasting feature), and a carbon sample should be taken from Feature 3. The date from Feature 3 is needed to collaborate with the dates from Features 2 and 4 (AD 1680 to 1755 and AD 1470 to 1640, respectively (1 Sigma, 68% probability). The surface artifacts reveal PII occupation. It is also recommended that testing be conducted at Features 6 and 7 because we are uncertain as to whether these two fire-cracked rock features are a result of surface runoff from above or actual, intact features. Semiannual monitoring will continue.

C:13:384 Hearth Features

SITE DESCRIPTION: This site consists of a slab-lined hearth, charcoal lenses and historic artifacts. All of the features are eroding from a cutbank adjacent to a major side canyon drainage.

PREVIOUS WORK: This site was originally recorded in 1991 and monitored in FY92, FY93, FY94, FY97 and FY98. Geomorphologic studies conducted along the side canyon drainage included a carbon date at Feature 3, indicating a protohistoric affiliation. The arroyo cut was faced-off and H. Fairley took charcoal samples in the late 1980s.

STATUS AND RECOMMENDATIONS: The primary impact on-site is erosion from Lava Chuar Creek. Feature 2 is no longer present. Features 1 and 3 are difficult to locate. No sign of human disturbance was observed. Due to the lack of exposed features, there is little archaeological information present. It is recommended that this site be placed on the inactive monitoring list.

C:13:386 Small Structure

SITE DESCRIPTION: This site consists of a single slab-lined cist. No artifacts have been observed on-site.

PREVIOUS WORK: This site was originally recorded in 1991 and monitored in FY93, FY94, FY96 and FY98.

STATUS AND RECOMMENDATIONS: Minor animal burrowing is present at the cist, yet cryptogamic soils and vegetation are present and stabilizing the feature. No sign of human disturbance was observed. Continue biennial monitoring due to the increase in animal burrowing. Though the burrowing isn't currently impacting the feature, there is potential for rodents to expose new cultural material.

C:13:389 Ephemeral Structure

SITE DESCRIPTION: This site consists of an overhang and two roasting features. Burned bone, lithics, tools and charcoal are present on-site.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored in FY96, FY97 and FY98.

STATUS AND RECOMMENDATIONS: There is minor surface erosion present in the shelter area of Feature 1. The other features remain stable. People have moved the logs around in the shelter. Minor movement of rocks has occurred on the shelter wall but no courses have been added or removed. The trail below the site appears unused. Human impacts are most threatening to this site. Continue annual monitoring and watch for increased trailing. It is recommended that the existing trail be assessed and possibly retrailed away from the features to discourage visitation.

G:03:003 Roaster Complex

SITE DESCRIPTION: This site consists of an overhang rockshelter and four roasting features. Lithics, tools, groundstone, ceramics and charcoal are dispersed below the rockshelter and at the roasters.

PREVIOUS WORK: The site was originally identified in 1969 with subsequent additions to the site made in 1981 and 1991. The site has been monitored at least annually since FY92. In FY96 the site was mapped with a total station instrument. Retrailing and trail obliteration work conducted in FY96 and FY97 has only minimally curtailed visitation to the overhang. Also in FY96 and FY97 checkdams were constructed in the terrace-based drainage below the site (Leap 1996b and 1997b).

STATUS AND RECOMMENDATIONS: The only noticeable physical change was animal burrowing at Feature 5. The checkdams are stable. There are grasses growing in the gully and there does not appear to be any sediment deposition or erosion occurring since last spring. Human trailing is apparent through Features 1-4 but they are not as well defined as during previous monitoring episodes. There appears to be some human disturbance at Feature 1. One set of footprints was found leading to the overhang. In the past, several new artifacts have been identified near Feature 1 from visitors making collection piles, or monitors looking around. In general, regardless of the trail obliteration work completed for the last three years, visitors continue visiting the shelter. It was originally recommended that the site be monitored twice a year, but upon further assessment, annual monitoring is advised after the commercial season is over. The management of this site should be discussed with PA members at the next meeting. More than likely the feature will be hit hard by visitors during the summer boating season.

G:03:004 Roaster Complex

SITE DESCRIPTION: This site contains several large roasting features situated at the base of an overhang shelter. “M BUNDY” is inscribed in charcoal at the overhang and there are several mason jars and other trash dating to the 1930s. Charcoal, burned soil, fire-cracked rock, ceramics and lithics are present throughout the site.

PREVIOUS WORK: The site was originally recorded in 1972 with additions made until 1991. The site has been monitored at least annually since FY93. In FY95 a total station map of the site was completed. Trail obliteration and retrailing work was completed by the NPS trail crew in FY95 and again in FY97. Medium format photographs were taken of the rock images and historic inscriptions.

STATUS AND RECOMMENDATIONS: Features 1-5, 7 and 8 show little physical impact. Feature 6, however, has some surface erosion to the south, southeast. Currently, erosion is not a problem, but it should be closely monitored due to several small nick points in the drainage. Features 1, 2 and 8 receive the most visitor-related impacts. There was a large collection pile (70+ artifacts), general foot trampling, and historic artifact movement. Trail maintenance should continue, or a new trail should be created. Apparently the new trail is unsatisfactory to some commercial guides because elderly people cannot use the new trail as easily. Feature 8 (cist or probable hearth feature) should be excavated before its integrity is lost due to trampling. Surface collection is also recommended near Features 1, 2 and 8 before several of the diagnostic artifacts begin to disappear. The status of excavation of Feature 2 (roaster) is still up in the air. Our intention is to have the commercial guides fund the project. Annual monitoring will continue.

G:03:006 Roaster Complex

SITE DESCRIPTION: This site consists of a structural alignment, several roasting features, rockshelters and an activity area. Artifacts on the surface include ceramics lithics, groundstone and charcoal.

PREVIOUS WORK: This site was originally recorded in 1973 by R. Euler and mapped in 1991. Monitoring occurred in FY94 and FY98.

STATUS AND RECOMMENDATIONS: This site is very stable. The drainage systems adjacent to the site are currently inactive. No visitor-related disturbances were observed. There is no evidence of physical or visitor-related impacts since the previous monitoring episode. It is recommended that the site be placed on the inactive list due to the overall stability of the site and the drainages.

G:03:020 Roaster Complex

SITE DESCRIPTION: This site consists of two loci located on opposite sides of a major side canyon drainage. Locus A contains a large donut-shaped roasting feature, three smaller roasting features and a charcoal lens. Locus B contains two roasting features. No ceramics were found on-site.

PREVIOUS WORK: The site was originally recorded in 1978 by R. Euler with further recording by NPS personnel in 1991. The site has been monitored at least annually since FY92. In FY97 a total station map of the site was completed.

STATUS AND RECOMMENDATIONS: All but one feature are in stable, yet poor condition. Feature 7, a roasting feature, is still actively eroding downslope into the gully. Excavation of this feature is scheduled for FY99. The gully adjacent to Feature 2 shows signs of sediment erosion but it has yet to directly impact the feature. Currently, the headward movement of the gully is away from the feature. A trail is present below Feature 2, leading into Fall Canyon. This same trail runs through the site, upstream past Feature 7 to the boat beach. It is recommended that the trail be obliterated this spring and that monitoring continue annually due to gullying near Feature 2. Continued trailing could expose new archaeological material.

G:03:024 Roaster Complex

SITE DESCRIPTION: This site consists of five roasting features and associated lithic and ceramic artifacts. Burned bone and groundstone tools were also found on-site.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored in FY93, FY94, FY95, FY97 and FY98. In FY96 trail obliteration work was conducted. A total station map of the features was completed in FY96. Instead of surveying in all the topography, the plotted features are overlain onto a topographic map completed by Hereford et al. (Thompson et al. 1996). In FY97 checkdams were constructed near Features 2, 3 and 4 (Leap 1997b).

STATUS AND RECOMMENDATIONS: No physical impacts were noted. The checkdams looked unchanged with very little water runoff occurring in the area. The only impact from visitors is a prominent trail below the site that was created when the checkdams were constructed last April. The site appears very stable and in good condition. Because there is very little potential for newly exposed materials and there is no change to the checkdams, it is recommended that the monitoring schedule change from annual to biennial. The schedule change would also allow more time for the trail to recover.

G:03:026 Roaster Complex

SITE DESCRIPTION: This site consists of seven roasting features and two activity areas. Ceramics, lithics, groundstone and purple glass are all observed on-site.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored at least annually since FY92. Trail obliteration and retrailing were conducted in FY96 and FY97. In FY96 the features were plotted using a total station instrument and overlain onto a topographic map (Thompson et al. 1996). Checkdams were also constructed in the terrace based drainage in FY96 (Leap 1996b).

STATUS AND RECOMMENDATIONS: No physical impacts to the features were observed. The checkdams that were built in February of 1996 also appear unchanged. There was minor bank slump however, near Check # 1, but overall they look great. There is very little evidence of visitation. The trail work that was completed in February,

1996 is looking good. Several of the cacti that were transplanted are looking very healthy. Trail maintenance should occur on an as needed basis. Currently, no work is necessary. The monitoring schedule is annual, however, if minimal impact is observed next year, visitation to this site will decrease.

G:03:030 Roaster Complex
SITE DESCRIPTION: This site consists of seven roasting features and a rockshelter with a partial wall. Lithics are dispersed across the site.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored in FY96 and FY98. The site was mapped with a total station in FY97, and will be completed this summer.

STATUS AND RECOMMENDATIONS: Gullying and surface erosion are present on-site but currently inactive. All features look the same since 1991, and vegetation has increased around the structure. There has been some minor rock movement at the structure that appears to have been caused by humans. Footprints cover the site, though they are likely from the total station mappers in September 1997. The gully will be assessed for checkdam installation upon completion of the total station map. Only Locus A was monitored due to the presence of the terraced-based drainage system. Monitoring will continue biennially.

G:03:033 Enigmatic Feature
SITE DESCRIPTION: This site consists of a circular enclosure of stones, two meters in diameter. No artifacts were found in association with this feature.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored in FY96 and FY98. Trail obliteration and retrailing was conducted in FY96.

STATUS AND RECOMMENDATIONS: No physical impacts were observed. Trail work completed previously at this site has been successful in deterring visitation. It is recommended that the site be tested for subsurface cultural deposits due to a lack of surface artifacts or fire-cracked rock debris. After testing, personnel will reassess management recommendations including the current (every four years) monitoring schedule.

G:03:038 Roaster Complex
SITE DESCRIPTION: This site consists of three roasting features. Ceramics were found in association with these features.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored in FY96 and FY98. In FY97 brush linings were installed and the site was mapped with a total station (Leap 1997b).

STATUS AND RECOMMENDATIONS: The features appear stable but are all located in precarious positions. The checkdams showed signs of alluvial deposition, with minor breaching at some of the checkdams. There is increased surface erosion, gullying, and bank slump, all of which were observed along the active gully. There was no sign of human disturbance. Continue biennial monitoring with checkdam maintenance. It is also recommended that vegetation be planted in the bank slump area.

G:03:040 Roaster Complex

SITE DESCRIPTION: This site consists of six, possibly seven roasting features divided into two loci. Lithic debris and formal tools have been identified in association with several roasters.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored at least annually since FY94. In FY96 the site was mapped with a total station instrument. In FY97 checkdams were constructed near Locus B (Leap 1997b).

STATUS AND RECOMMENDATIONS: The features are in stable condition, yet the checkdams have showed minor increases in alluvial deposition and sheet wash. No human disturbances were noted. Minor checkdam maintenance will be conducted in FY99. The monitoring schedule will change from annual to biennial mainly to determine the success of the checkdams.

G:03:041 Roaster Complex

SITE DESCRIPTION: This site consists of three large roasting features. A sparse lithic scatter and one Pai sherd are also found on-site.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored in FY96 and FY98. In FY97 two rock and brush linings were constructed in the terrace-based drainages below the site (Leap 1997b).

STATUS AND RECOMMENDATIONS: Feature 2 is in poor condition because it is bisected by a slightly active gully. Feature 3 has experienced alluvial erosion causing cryptogamic soils to pedestal and collapse. The checkdams are showing minor deposition though there is slight pooling below the checkdams. Checkdam 1 (where Feature 2 is located) appears to be in a much more active system than Checkdam 2. The trail present above the site is directly related to monitoring and remedial action activities. No other signs of human disturbance were observed. The trail made from monitoring and remedial actions should be obliterated, and new and different routes will be taken in the future. It is recommended that the monitoring schedule be changed from biennial to annual due to the condition of Feature 3 and the pooling below Checkdam 2.

G:03:042 Mortars
SITE DESCRIPTION: This site consists of three deeply ground bedrock mortars. The mortars have been ground into a Tapeats Sandstone bench.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored annually from FY92 through FY94 and again in FY98.

STATUS AND RECOMMENDATIONS: No physical impacts were detected. No visitor-related impacts were observed. These features are in no danger of impact, and all archaeological information has been documented. It is recommended that the site be placed on the inactive schedule.

G:03:043 Roaster Complex
SITE DESCRIPTION: This site consists of several eroded hearths and fire-cracked rock. Artifacts identified include lithics, charcoal and groundstone.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored in FY94 and FY98.

STATUS AND RECOMMENDATIONS: Feature 1 is experiencing sheet washing and gullying. The gully develops into an arroyo further down the drainage where is it impacting Features 3, 4 & 5. Bank slump also threatens these features. Human disturbance was not observed. Data recovery is recommended for Features 4 and 5 because they are in danger of being lost due to bank slump. A biennial monitoring schedule is recommended because of the precarious location of the features.

G:03:044 Fire-Cracked Rock Scatters
SITE DESCRIPTION: This site is a large activity area divided into two loci. Locus A contains five dry-laid walls and a lithic scatter. Two large sherds were found in the rocks below the activity area. Locus B contains three roasting pits below the activity area.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored annually since FY92. Minor trail obliteration was completed in FY97.

STATUS AND RECOMMENDATIONS: There is active rodent burrowing at the uppermost (northern) roaster. Some areas appear to have less vegetation. Although arroyos and gullies are present, they are stable and inactive. No sign of human disturbances was observed. The site appears stable although several of the features are located on the sides of the currently inactive drainage systems. It is suggested that the monitoring schedule be changed from annual to biennial due to the stable status the site has exhibited in the past two years. In the next couple years, the site will be assessed for data recovery and remedial work if erosion activities are evident.

G:03:052 Roaster Complex
SITE DESCRIPTION: This site consists of three distinct roasting features and a sparse but extensive scattering of fire-cracked rock. A single Moapa Brownware sherd was observed on-site.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored in FY96 and FY98. Minor trail obliteration was completed in FY97.

STATUS AND RECOMMENDATIONS: The features appear stable with only minor rock movement observed since the previous monitoring episode. There is a trail present along the lower Tapeats Sandstone ledge leading to the chert boulders across the drainage. No recent footprints were observed in the trail and no human disturbances were detected on-site. All of the features are stable and unchanged. It is recommended that the schedule be changed from biennial to every three years.

G:03:058 Camp
SITE DESCRIPTION: This site consists of a single roasting feature. A fragmented mano was also located on-site.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored in FY94, FY96 and FY98. Checkdams were built in FY97 in conjunction with minor trail obliteration.

STATUS AND RECOMMENDATIONS: No physical impacts were noted at the feature. Minor deposition was noted at Checkdam 1. There is a nice camp just below the site. One visitor has walked up to the site and across the checkdams. Trail obliteration work does not appear to have been successful. Overall, the site is stable. Consider planting vegetation to deter trailing in addition to routine trail maintenance. The site monitoring schedule is biennial.

G:03:064 Roaster Complex
SITE DESCRIPTION: This site consists of 13 features including nine roasting features. Charcoal lenses are present in several of the arroyo cuts. Artifacts associated with the roasting features include lithics, ceramics, shell, groundstone and charcoal. Several complete projectile points have also been located on-site.

PREVIOUS WORK: The site was originally recorded in 1991 and has been monitored at least annually since FY94. In FY93 carbon samples were collected resulting in a range of dates from 1880 +/- 70 BP to 2870 +/- 60 BP. In FY95 total station mapping was begun and in FY97, a completed map was produced.

STATUS AND RECOMMENDATIONS: The entire drainage system has increased in erosion. This site, commonly referred to as "Arroyo Grande" continues to erode. However, several of the features are outside of the areas that are eroding and are therefore fairly stable. Some trails have become more defined since the site was mapped this fall, but this trailing should recover on its own. No other human disturbances were observed. It is recommended that minor trail obliteration occur and that data recovery be performed on newly exposed features and existing features that are eroding as a result of active arroyo cutting. Monitoring will continue annually due to the likelihood of newly exposed cultural features.

G:03:065 Lithic Scatter

SITE DESCRIPTION: This site consists of a rockshelter with charcoal, ceramics and lithics. Handtools and a worked stick are also present on-site.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored in FY94 and FY98.

STATUS AND RECOMMENDATIONS: There is minor surface erosion on the slope below the overhang. Because of the loose, spalled-off condition of the slope below, the site is potentially unstable. The overhang shows no change since the survey photograph, but there is a fairly active packrat midden. Human disturbance was not observed. Two years ago a packrat exposed a yucca sandal fragment. Because there is high potential for more cultural materials to be exposed, monitoring will continue every three years.

G:03:072 Roaster Complex

SITE DESCRIPTION: This site is an extensive complex of 13 roasting features and an overhang shelter area. Groundstone, lithics, ceramics and charcoal have all been found in association with the features.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored in FY93 and annually since FY95. In FY97 a total station map of the site was completed and checkdams were placed in three terrace-based drainages located on-site (Leap 1997a).

STATUS AND RECOMMENDATIONS: Increased surface erosion is present at Feature 11 in the form of minor downslope movement of the fire-cracked rock. There has been an increase in deposition in Drainages 3 and 4 resulting in minor to moderate alluvial deposition to the checkdams in these drainages. Overall, these gullies are beginning to widen in some areas, possibly reaching equilibrium. No sign of human disturbance was observed. Feature 14 is bisected by an active gully with increased erosional activity. It is recommended that this feature be excavated for subsurface cultural deposits before it is lost. Continue monitoring Features 11, 12, and 14 annually as well as the checkdams in Drainages 3 and 4. All other features should remain on a three to five year schedule.

G:03:080 Roaster Complex
SITE DESCRIPTION: This site consists of two loci. Locus A contains lithics, ceramics, hand tools and hematite images along a basalt outcropping. Locus B contains nine separate structures and roasting features.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored in FY92, FY93, and annually since FY95. In FY97 medium format photography was used to archive the rock images.

STATUS AND RECOMMENDATIONS: Minor animal burrowing is present throughout several features but there has been no damage to the features. Fresh footprints were observed in the overhang, near the pictographs. These prints originated from the boat beach downstream of the site. Continue monitoring the site annually due to the possibility of new artifacts eroding near the overhang, and human disturbances.

G:03:083 Historic Artifacts
SITE DESCRIPTION: This site consists of a cache of gasoline and oil cans plus a tool box, wooden crates and glass jars. It is possible that boaters up-running the river from Lake Mead left the cache.

PREVIOUS WORK: The site was originally recorded in 1991 and monitored in FY97 and FY98.

STATUS AND RECOMMENDATIONS: No physical impacts were observed. Artifacts have been slightly rearranged compared to the last photograph dated in 1991. As long as there is a detailed inventory of the artifacts, this site should be visited by river patrol for criminal violations.

III. Management Actions Completed in FY98

The Historic Preservation Plan (HPP) specifies *in situ* preservation of downstream cultural resources as a primary management goal. To accomplish this goal, the RCMP utilizes a varied approach to cultural site protection and preservation. Management actions include systematic site monitoring, total station mapping, and a suite of preservation methods intended to forestall resource degradation. Upon consultation with PA Signatories and the GCMRC, recovery options are performed at sites where *in situ* preservation is not possible. The following three sections describe the management actions completed in FY98, which include 99 sites monitored, total station maps completed at 15 sites, and remedial work performed at 5 sites.

A. Monitoring

Monitoring is the periodic, systematic assessment of resource condition, and it is an ongoing activity. It is only the first step in site preservation. The observations and recommendations recorded in the field are translated into preservation and/or recovery actions, which are then scheduled and completed in conjunction with monitoring work on subsequent downriver trips. Remedial work performed at a site is later monitored to evaluate success or failure.

Fiscal year 1998 completes the seventh year of archaeological site monitoring along the Colorado River corridor by the RCMP, with 99 unique sites monitored. Six of the semiannual sites were monitored twice, for a total of 105 monitoring episodes. See Chapters II and III for discussions of the various threats to cultural resources along the river corridor, and the site specific evaluations completed during monitoring. Criteria for site selection, monitoring schedules, and field and laboratory methods are included in this section. Sites are selected for monitoring based upon their previously assigned schedule. Monitor schedules are assigned to sites based upon the degree of impacts (visitor-related or physical) occurring at sites and their rate of change.

Site Selection and Scheduling Criteria

The 1990-91 inventory of 475 archaeological sites along the river corridor (Fairley et al. 1994), categorized 336 sites as directly, indirectly, or potentially impacted by operations of Glen Canyon Dam. Forty-two of these sites are located in Glen Canyon National Recreation Area and are addressed in the GLCA section of this report. The remaining 294 sites potentially or directly impacted by dam operations ("I" group) are located within Grand Canyon National Park and are the subject of the GRCA section of this report. As of last year, all 294 GRCA sites have been visited by RCMP archaeologists and monitored at least once.

Each year the RCMP monitors a subset of the 294 GRCA sites, based upon the previously assigned schedule for each site. Schedule categories include the following: semiannual, annual, biennial, 3-5 years, inactive, and discontinue. Appendix B summarizes the sites monitored in FY98, with their current monitoring schedule.

In FY98, 99 sites were scheduled for monitoring. This sample included 7 semiannuals, 37 annuals, 25 biennials, 29 three-to-five year sites, and 1 previously discontinued site at Spring Canyon that was revisited to document an additional feature.

"Semiannual" sites demonstrate extreme erosive conditions and are monitored in the fall and spring. Changes are obvious to regular monitors even before photographs are used to make comparisons. "Annual" sites exhibit moderate erosion and are monitored in the fall, after the commercial season and summer monsoons. It is effortless to identify physical and/or visitor-related impacts using previous photographs. "Biennial" sites illustrate erosion that is fairly difficult to detect, yet noticeable when comparing photographs. "Three to five year" sites are located in areas susceptible to erosion, yet no change can be detected using photographs. The sites are located in fairly stable environments, but have the potential for impact due to proximity to camp sites or active drainages. Whether a three, four, or five-year schedule is recommended depends on the unique conditions at each site. This group includes the 13 control sites that are monitored every three years. "Inactive" sites are in stable condition, but are located in areas where there could be a slight potential for change, though unlikely. These sites are usually in pristine condition, located within the 300,000 cfs level, and often covered by healthy cryptogamic soils. These sites are monitored on an as-needed basis, i.e., after severe weather disturbances, heavy visitation, at the request of the tribes, or before and after high release flows. "Discontinued" 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 currently under the jurisdiction of the Park-based monitoring program.

Forty-two of the 99 sites monitored in FY98 received a schedule change. Ninety percent of the schedule changes were from more frequent monitoring visits to less frequent visits. This change in schedules is due to the remedial work that has been conducted at sites along the river corridor, mitigating as best as possible the effects of physical erosion and/or human visitation. As site preservation and data recovery work are performed at sites, there is a decreased need to monitor as frequently. Fourteen sites were placed on the "inactive" list in FY98. These sites are A:15:004, A:16:155, A:16:160, A:16:171, B:10:261, B:11:275, C:05:004, C:05:039, C:06:005, C:13:322, C:13:384, G:03:006, G:03:042, and G:03:083. These sites were moved to the "inactive" list because they are stable, are under no threat via physical erosion or visitor-related impacts, their information potential has been exhausted, or remedial activities have mitigated any physical or visitor-related impacts.

Six sites were placed on the "discontinue" list in FY98. These sites include A:15:044, A:16:173, C:02:089, C:06:003, C:09:083, and C:13:005. The sites are out of the project APE and have been turned over to the Park-based backcountry monitoring program.

Field and Laboratory Methods

Four river monitoring trips were conducted in FY98, ranging from 16 to 20 days in length. All trips launched from Lees Ferry, Arizona with takeouts 225 miles downstream at Diamond Creek Wash. Field personnel consisted of two project archaeologists and

two to four archaeological technicians. Individual trip reports were prepared and sent to all PA signatories in a timely fashion.

There were several exciting changes in both field and laboratory methods in FY98. The monitoring form was slightly redesigned to address current information needs and more accurately reflect project goals. A copy of the revised form is in Appendix A. Revisions were made to all four sections of the monitoring form (management, physical impacts, visitor-related impacts, and recommendations).

In the management section, a new variable called "PA Signatories" was added. The names of any PA signatories accompanying archaeologists to sites are recorded. This variable allows the project to track PA involvement and participation in archaeological site monitoring.

There were several changes to the physical impact section of the monitoring form. Foremost among these is a conceptual change in the values of the various physical erosion variables. To distinguish differences between sites and site condition through time, the project measures the degree of physical erosion or deposition occurring on-site. In the first three years of the monitoring program, erosion was categorized as "absent", "minor", "moderate", or "extensive" (Coder et al. 1994a and b). From FY94 through FY97, the categories were changed to "absent", "present", "increasing", or "decreasing" physical impact (Coder et al. 1995a and b; Leap et al. 1996 and 1997). The changed occurred to minimize subjectivity. The shift to "increasing" or "decreasing" categories was intended to capture the growth or expansion of on-site impacts versus a decline. These conceptual categories served the project well for four years. After four years of field testing, it was decided in FY98 to change the physical impact categories to "absent", "active", and "inactive." It is often difficult to distinguish between increasing or decreasing erosive processes (the subjectivity issue again). A more objective determination is possible using "active" or "inactive" categories. Monitors watch active on-site processes more carefully. These sites are often selected for remedial actions when the erosional processes become destructive to cultural materials.

Also in the physical impact section, the term "rock art" was changed to "rock image" in an attempt to keep the functional interpretation "art" out of the term. On the impact matrix, "animal-caused erosion" was combined into the "other" category because the frequency of observation is too low to warrant its own category. Lastly, on Question 15: "If arroyos or gullies are present, do they drain to the river? ", the value "side canyon based" was added to distinguish between drainages that empty into side canyons from those that empty directly into the Colorado River.

In the visitor-related section, the values for the degree of impact were changed to "absent" or "present" instead of "absent", "present", "increase", or "decrease". The "increase" or "decrease" values were dropped because archaeologists felt they were too subjective and inaccurate. Likewise, the "active" and "inactive" categories were not added, as with the physical impact variables, because it is believed that the

"absent"/"present" categories are sufficient for the purpose of accessing visitor-related impact

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The question about trails (#20) was reworded to reflect on-site trails only. Discussion of any off-site trails is to appear in the "comments" section. This change was made to distinguish between trails that directly impact archaeological sites from trails that are in the vicinity of the sites.

In the Recommendations section of the monitoring form, two new terms were added and several categories were combined. The terms "preservation options" and "recovery options", introduced in the FY97 Annual Report, are first used on the monitoring form in FY98. Under preservation options, the "close site to visitors" category is combined with the "other" category because it is seldom used. Under recovery options, the "surface collection" and "map site" variables are included in the "other" category for the same reason.

In addition to these changes to the monitoring form, the project purchased new computer hardware and software in FY98 to upgrade the existing system and to conform to NPS standards. The project now utilizes the Microsoft Office 97 suite of programs: Word, Access, and Excel. Databases were converted over to Access and the new monitor form was designed solely in Access. A scanner was purchased to incorporate photographs, maps, and images into project documents. The monitoring program continues to become more efficient, with improvements to the monitoring and photographic databases, new conceptual categories, and better database software.

Photographic Documentation

The photographic archive is approaching 8,000 images. Photographs continue to serve as the main measure of change to site condition. Monitors compare past images to current conditions for a determination of change or stability. Photographs are also used in the evaluation of remedial actions and documentation of new features.

The photographic archive is growing at a rate of nearly 1000 images a year. It is currently divided into approximately 7,000 35mm black-and-white prints, 1,000 medium format black-and white/color prints, hundreds of color slides, and 8mm video documentation of selected sites. Project images include 3 x 5" black-and-white prints (b/w), medium format 5 x 7" color and b/w prints, color slides, and 8 mm video. Pentax 90WR cameras are used with b/w Kodak Plus-X pan 125 film and Kodachrome 64 for color slides. A Mamiya 6 x 7 cm medium format camera is used with Kodak b/w Tri-Xpan 120 and Kodak Pro100 (120) film. All photographs are mounted onto cards which contain site numbers, dates, descriptions, and directional information. Negatives are archived in polypropolene sleeves, filed in acid-free binders, and stored in a fire-proof filing cabinet.

Nearly 150 medium format photos were taken in FY98. The majority of photography was conducted during the 98-3 and 98-4 trips to document reconstruction of checkdams at C:13:099 and excavation at C:13:010. Photos were also replicated at C:13:371

showing the return of a river-based drainage plugged by the 1996 habitat and beach building flow. Medium format photos continue to provide excellent clarity useful in the documentation of remedial actions.

The photocard database was transferred from Dbase 3+ to Microsoft Access 97 in FY98. Access 97 is a more efficient and productive database program. The database was essentially redesigned to make data entry and the access of information more user-friendly. The photo log and medium format documentation form were also redesigned. Photography will continue to be conducted using the Pentax 90WR 35mm camera due to its durability in the field and production of quality images.

B. Total Station Mapping

Coming into our fifth year of total station mapping, 75 sites have complete baseline site maps: five in FY95; 21 in FY96; 34 in FY97; and 15 in FY98. See Appendix C for the list of sites that have been mapped with a total station. For more detail on the procedures and criteria for conducting total station mapping see Leap et al. *1997 Summary Report*.

New baseline site maps for the upcoming fiscal year will be determined by those sites receiving intrusive remediation (i.e., checkdam building and data recovery). Planting vegetation and conducting trail work will not require total station mapping.

Of the 75 sites mapped, a sample of 10 has been selected for remapping in FY99. These selected sites have demonstrated much activity as seen through our monitoring efforts. In particular, several gullies, and arroyos have either shown an obvious increase or decrease in sediment deposition, and/or headward movement of nick points and headcuts. These areas will be remapped in an attempt to identify the rate and degree of change as compared to the original base map. Additional factors such as soil type, vegetation, and slope will be incorporated into the calculation to determine rate and degree of change.

Remapping began in September, 1997 with two survey crews. A mapping trip is scheduled for September, 1998 and upon completion of this trip a listing for the fiscal year will be produced. On the November 1998 trip, a single survey crew will continue remapping as many sites as possible.

C. Remedial Actions

In FY98, remedial actions included, total station mapping, data recovery and checkdam maintenance. All work was conducted under the supervision of the project archaeologists. Documentation included 35mm and medium format photographs and complete written documentation. Remedial actions such as checkdam building will be inspected on the appropriated site monitoring schedule, on the regularly scheduled monitoring trips. Below are brief discussions of the type of work completed at the selected sites. For definitions of the various remedial actions the project performs please see Leap, et al. *1997 Summary Report*.

Total Station Mapping
Two sites (C:02:098 and G:03:030) were recommended last year for data recovery of specific features. These maps were completed, in conjunction with other sites, in order to perform the data recovery this fiscal year.

Checkdam Maintenance
Checkdam maintenance was performed at sites C:13:099, C:13:100, C:13:381 and B:14:107. At Palisades Delta the work was extensive while at the other two sites (B:14:107 and C:13:381) only minor maintenance was performed.

The Zuni Soils Conservation team constructed a water diversion structure in April 1997 above B:14:107 to divert the runoff from draining into Feature 2. In October 1997, monitors noticed that the water was circulating around the structure, thus still impacting the feature. By February of 1998, the Zuni revisited the area and extended the water diversion bar by two meters (Leap 1998a).

At C:13:381, three checkdams were constructed in February of 1997 (Leap 1998b) Once again, as a result of monitoring, it was recommended by Zuni Soils Conservation team members that the upper checkdam be built up a little more. In April of 1998, this work was performed by three of our staff members. Similar to the structure at B:14:107, more cobbles were added to decrease water migration.

More intense maintenance was conducted at C:13:099 and C:13:100 (Leap 1998b). In October of 1997 monitors noted major damage to the checkdams after the summer monsoons. Several checkdams experienced impacts ranging from breaching to major blowouts. See Figure 6 for an example of one of the more drastic results. In February of 1998 three days were spent reconstructing checkdams, mainly by discarding much of the rock that was initially placed. In general, several of the original structures were too massive for such a soft soil environment, and for such a large catchment basin. Although C:13:100 has similar soil type, the catchment system is not as well-defined as it is at C:13:099. Very little work was performed at C:13:100 compared to C:13:099. Again, the work performed included taking rock away, making the structure less obtrusive and filling in sides of the existing checkdams with gravel.

Data Recovery
After several discussions and many draft proposal plans, C:13:010 (Furnace Flats) received excavation in April, 1998 (Leap and Yeatts, 1998). Four nine hour days, with three crews of three were used to excavate seven cists, three rooms and one four meter long trench. See Figure 7 for an overview of Structure 9. No formal burials were uncovered, and there appeared to be no fragmented human bone recovered. Results of the excavation will be written and disseminated to PA members after all analyses are completed.

IV. Management Recommendations

The long-term monitoring program was established to implement management assessments and recommendations that are advised from field inspection. This chapter summarizes the management recommendations made at all the sites monitored in FY98. It also discusses the work plan for FY99 based on accumulated information since FY92.

Recommendations are based on the degrees of various impacts to a site as illustrated during field observation and photo comparisons. Management actions include preservation and data recovery options, and each site can receive one or more recommendation.

A. Preservation Options

Options for preserving sites consist of retrailing, trail obliteration, planting vegetation, and installing checkdams. The monitoring form has an "other" category that supplements preservation methods not specified. When these measures are recommended, it usually means that the impacts observed have the potential to be reversed. A total of 49 preservation actions were recommended at 34 sites in FY98. The various preservation actions are discussed below.

Trail Obliteration and Retrailing

Trail obliteration was advised at eight sites and retrailing was suggested for four sites. All four sites recommended for retrailing are located in areas where there is a boat beach. Retrailing is intended not to deter visitation outright, but to curtail further visitor-related impacts by re-routing visitors away from cultural resources.

The eight sites recommended for trail obliteration are not located near common boat beaches. They are areas where quick lunches are taken, where backpackers pass through, or where access to side canyon drainages occur. Trail obliteration is justified in these areas because they have the direct potential of destroying archaeological sites. These unnecessary trails also destroy native terrain.

Planting Vegetation

Revegetation is beneficial in areas where minor soil deflation or compaction occurs. In some cases, minimal planting encourages new local vegetation growth, curtailing surface erosion. In other areas of deflation that involve more than only planting or transplanting, jute mat has been laid, supplemented by planting seedlings. Jute mat is a biodegradable netting that retains moisture and sediment. It has been used in several areas throughout the park and has proven to be very beneficial in restoring the land.

This year 12 sites have been recommended for some type of vegetation work, ranging from transplanting seedlings, to jute mat placement and planting new, native seedlings. This is 12 more sites than was recommended last year because we are attempting to reprioritize our remedial actions by implementing less intrusive methods (as compared to building checkdams) at sites where rates of destruction are moderate enough to allow for

use of organic materials. At sites were rates of destruction warrant immediate treatment, checkdam construction and data recovery are our only options for remedial actions.

The revegetation crew from the park will complete much of the recommended work. They are responsible for several large delta areas, including deltas with sites recommended for vegetation work. Most of the work this year will include transplanting and laying jute mat. Prior to any planting of seedlings, supervisor, Frank Hays, Park revegetation supervisor, will collect and propagate actual seedlings from the corridor instead of planting seeds that were propagated from the rim.

Checkdam Construction
Seven sites are recommended for placement of checkdams, however, three of these sites already have checkdams in place. The remaining four sites recommended for checkdam construction, have moderate sized gullies exhibiting nick point movement. Currently, these gullies are not directly impacting any site features, but features are in their path; therefore, implementation of check building will be a preventative action. All gullies have advanced beyond any type of revegetation work.

"Other" Preservation Options
"Other" remedial actions are recommended for 17 sites. This work would include such tasks as graffiti removal, maintaining checkdams, maintaining trail work, and other methods designed for specific impacts not commonly encountered along the river corridor.

B. Recovery Options

Recovery options are recommended when disturbances, whether physical or visitor-related, have the potential to strip the site of cultural information, and all methods to preserve site integrity have failed or are impractical. Such options include testing, data recovery, and "other" options. For this coming fiscal year, we propose that much of the work include completion of the data recovery recommendations. In doing so, we will continue fulfilling our sections 106 and 110 responsibilities. Twenty-one sites were recommended for at least one of the three data recovery options.

Test

Five sites are recommended for testing. This entails taking a carbon or dendro sample from a feature that is rapidly eroding from a cut bank or steep slope. This also involves testing a feature to correctly identify it as a cultural manifestation.

Data Recovery

Data recovery for our project involves complete excavation of an identified feature. Fifteen sites are recommended for such work.

"Other" Recovery Options

Six sites were recommended for more specific recovery actions. These include tasks such as completing a total station map, surface collecting artifacts, and taking a carbon sample.

C. Summary of Recommendations

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 four is suggested when no remedial action will occur until enough evidence is provided to justify the action. A rank of zero is given when the work was completed while monitoring the site, or it was completed at a later date during the same fiscal year.

Tables 3 and 4 summarize the FY98 sites that received remedial action recommendations, the types of impacts observed, and priority rank. In some cases, more than one priority is given for multiple remedial actions. To date 25% of the sites recommended for some form of data recovery has been completed and 64% of the preservation actions has been performed. These percentages are generated from all sites with priority ranks of 0 – 3.

Table 3. Summary of FY98 Data Recovery Recommendations.
(N = 21 Sites)

Site	Schedule	Impacts	Action	Priority
A:15:005	Annual	Surface erosion, gullying	Remap active gully with total station	1
A:15:048	3-5 years	Arroyo cutting, surface erosion	Data Recovery	1
A:16:174	Biennial	Gullying	Analyze bone fragments	2
C:02:096	Annual	Arroyo cutting	Data Recovery	1
C:02:098	Annual	Gullying	Complete a total station map	0
C:09:050	Semi- annual	Side canyon cutting	Test	3
C:13:010	Annual	Arroyo cutting	Data Recovery	1
C:13:099	Semi- annual	Arroyo cutting	Data Recovery	1
C:13:100	Annual	Arroyo cutting	Data Recovery	1
			Test	1
C:13:273	Annual	Arroyo cutting	Data Recovery	2
C:13:291	Annual	Slope erosion	Data Recovery	1
			Test	2
C:13:347	Annual	Arroyo cutting	Data Recovery	1
C:13:355	Biennial	Arroyo cutting, bank slump	Data Recovery	2
C:13:371	Semi- annual	Surface erosion, gullying, arroyo cutting	Test Features 6 and 7	2
			Data Recovery	1
			Carbon sample from Feature 3	1
G:03:004	Annual	Visitation	Surface collect Feature 8 area	1
			Data Recovery	1
G:03:030	Biennial	Gullying	Map with a total station	0
G:03:033	3-5 years	Surface erosion	Test	2
G:03:043	Biennial	Surface erosion, gullying	Data Recovery	1
G:03:044	Biennial	Arroyo cutting	Data Recovery	2
G:03:064	Annual	Arroyo cutting	Data Recovery	1
G:03:072	Annual	Gullying, surface erosion	Data Recovery	1

Priority Ranks:
0 = action completed
1 = extensive impacts, high priority
2 = moderate impacts, medium priority
3 = minor impacts, low priority
4 = no action

Table 4. FY98 Summary of Preservation Recommendations.
(N = 34 Sites)

Site	Schedule	Impacts	Action	Priority
A:15:005	Annual	Surface erosion, gullying	Checkdams	2
A:15:048	3-5 years	Arroyo cutting, surface erosion	Perform remedial actions after data recovery	1
A:16:004	Biennial	Trailing	Obliterate Trail	2
		Sediment erosion and deposition	Plant Vegetation	2
A:16:160	Inactive	Trailing	Obliterate Trail	4
			Plant Vegetation	4
			Maintain trail work	1
A:16:167	Biennial	Game trails	Retrail	2
A:16:174	Biennial	Gullying	Checkdams	1
A:16:180	Biennial	Gulling, trailing	Plant Vegetation	4
B:14:105	Biennial	Surface erosion	Plant Vegetation	1
		Trailing	Maintain trail work	1
B:14:107	3-5 years	Surface erosion	Maintain water diversion structure	0
B:15:138	Annual	Trailing	Plant Vegetation	1
			Retrail	1
			Obliterate Trail	1
C:02:094	Annual	Visitation	Graffiti removal	1
C:02:098	Annual	Trailing	Maintain trail work	1
		Gullying	Checkdams	2
C:02:101	Biennial	Gullying	Maintain checkdams	1
C:06:005	Inactive	Visitation	Graffiti removal	1
C:09:051	Annual	Visitation	Trail maintenance	2
C:13:006	Annual	Deflation	Plant Vegetation	2
			Minor checkdam maintenance	1
C:13:098	Annual	Visitation	Plant Vegetation	3
			Obliterate Trail	2
			Retrail	3
C:13:099	Semi-annual	Arroyo cutting	Checkdams	0
		Visitation	Plant Vegetation	3
C:13:100	Annual	Arroyo cutting	Maintain checkdams	1
C:13:291	Annual	Visitation	Trail maintenance	2
C:13:322	Inactive	Visitation	Check for graffiti	1
C:13:336	3-5 years	Gullying, surface erosion	Checkdams	2
C:13:355	Biennial	Soil deflation, gullying	Assess for stabilization	2
C:13:371	Semi-	Arroyo cutting, gullying,	Plant Vegetation	4

Site	Schedule	Impacts	Action	Priority
	annual	deflation		
			Checkdams	1
C:13:389	Annual	Visitation	Retrail	2
G:03:003	Semi-annual	Visitation	Trail maintenance	1
G:03:004	Annual	Visitation	Trail maintenance	1
G:03:020	Annual	Visitatioin	Obliterate Trail	1
G:03:030	Biennial	Gullying	Checkdams	2
G:03:038	Biennial	Alluvial deposition, surface erosion	Plant Vegetation	1
			Maintain checkdams	1
G:03:040	Biennial	Alluvial deposition	Maintain checkdams	1
G:03:041	Annual	Visitation, gullying	Obliterate Trail	1
			Plant Vegetation	4
G:03:058	Biennial	Visitation	Obliterate Trail	1
			Plant Vegetation	1
G:03:064	Annual	Visitation	Obliterate Trail	1

Priority Ranks:
0 = action completed
1 = extensive impacts, high priority
2 = moderate impacts, medium priority
3 = minor impacts, low priority
4 = no action

D. FY99 Work Plan

The work plan for fiscal year 1999 consists of continued monitoring of selected sites and implementation of the highest priority remedial actions. Within the following section is a discussion of the proposed river trip dates, a list of sites to monitor, and remedial actions to complete for FY99.

Trip Dates and Site List

The work plan for FY99 will incorporate regular monitoring and remedial actions. It is proposed that one and a half the trips are for monitoring and assessment trips and two and a half trips for implementing remedial work. The proposed trip dates for Fiscal Year 1999 are as follows:

October 6 – 21, 1998, Monitor and Assessments
November 8 – 23, 1998, Monitor and Remedial Action
February 24 – March 12, 1999, Remedial Actions
April 14 – 30, 1999, Remedial Actions

Currently, 99 sites will be monitored in FY99. Table 5 is an alphanumeric listing of the FY99 schedule.

Table 5. Sites Scheduled for Monitoring in FY99.
(N = 99 Sites)

Site Number					
A:15:005	B:10:121	C:02:092	C:13:099	G:02:009	G:03:076
A:15:017	B:10:224	C:02:094	C:13:100	G:02:100	G:03:077
A:15:021	B:10:230	C:02:096	C:13:272	G:02:101	G:03:080
A:15:027	B:10:236	C:02:098	C:13:273	G:02:108	G:03:085
A:15:039	B:11:271	C:05:031	C:13:291	G:03:003	
A:15:040	B:11:277	C:05:037	C:13:321	G:03:004	
A:15:042	B:11:281	C:06:010	C:13:329	G:03:019	
A:15:051	B:11:282	C:09:031	C:13:333	G:03:020	
A:16:156	B:14:095	C:09:034	C:13:334	G:03:026	
A:16:158	B:15:091	C:09:050	C:13:335	G:03:028	
A:16:185	B:15:097	C:09:051	C:13:339	G:03:032	
	B:15:121	C:09:069	C:13:340	G:03:034	
	B:15:126	C:09:080	C:13:342	G:03:041	
	B:15:127	C:09:082	C:13:343	G:03:048	
	B:15:132	C:09:088	C:13:346	G:03:055	
	B:15:138	C:13:006	C:13:347	G:03:057	
	B:15:143	C:13:009	C:13:349	G:03:060	
	B:16:003	C:13:010	C:13:367	G:03:062	
		C:13:069	C:13:371	G:03:064	
		C:13:070	C:13:373	G:03:067	
		C:13:092	C:13:385	G:03:071	
		C:13:098	C:13:389	G:03:072	

Remedial Actions

FY99 will be the fifth year that remedial actions are implemented. Tables 6 and 7 list the Priority 1 and 2 recommendations for recovery and preservation measures. These tables represent an accumulation of information since FY92. Priority work is given to the sites that we are monitoring this year and that are in poor condition. All sites scheduled for remediation will have a total station map completed prior to any action. A work plan will be completed for each site prior to any testing or data recovery. See Table 6 for the sites proposed for data recovery this coming fiscal year.

Table 6. Priority 1 Recovery Measures for FY99 Based on Monitoring Data since FY92. (N = 15 Sites)

Site	Action
A:15:048	Data Recovery
C:09:069	Test
C:13:010	Data Recovery
C:13:070	Data Recovery
C:13:099	Data Recovery
C:13:100	Data Recovery
C:13:291	Test
C:13:343	Data Recovery
C:13:347	Test
C:13:349	Test
C:13:356	Test
C:13:371	Data Recovery
G:03:004	Data Recovery
G:03:020	Data Recovery
G:03:072	Data Recovery

Table 7 lists all Priority 1 sites scheduled for preservation measures in FY99. When checkdams are constructed a total station map will be completed. Total station maps are not necessary for other preservation measures.

Table 7. Priority 1 Preservation Measures Proposed for FY99 Based on Monitoring Data since FY92.
(N = 21)

Site	Action
A:15:005	Checkdams
B:15:138	Plant Vegetation
	Retrail
	Obliterate Trail
C:02:094	Place a sign to direct day hikers
	Remove graffiti
C:02:098	Checkdams
	Trail maintenance
C:09:051	Trail maintenance
C:13:006	Checkdam maintenance
	Plant Vegetation
C:13:070	Checkdams
C:13:098	Obliterate Trail
	Obliterate Trail
	Maintain checkdams

Site	Action
0	
C:13:291	Trail maintenance
C:13:339	Plant Vegetation
C:13:371	Checkdams
C:13:389	Retrail
	Dismantle the walls visitors have constructed
G:02:009	Obliterate Trail
G:03:003	Trail maintenance
G:03:004	Graffiti removal
	Trail maintenance
G:03:020	Checkdams
	Obliterate Trail
G:03:028	Retrail
	Obliterate Trail
G:03:041	Obliterate Trail
G:03:064	Obliterate Trail

Prior to any remedial actions, with the exception of trail work, preliminary assessments will be made by the project archaeologist and if needed a resource specialist. If actions are warranted, a proposal will be written describing the remedial work 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.

Section 2

Glen Canyon National Recreation Area

On various days between February 19 and July 1, 1998, the Glen Canyon NRA GCMRC Colorado River monitoring program was conducted between Glen Canyon Dam and the Paria River Riffle. Glen Canyon NRA personnel included Archaeologists Tim Burchett, Chris Goetze, Joseph Garrotto, and Dennis Peebles. Volunteers who participated in the monitoring program in Glen Canyon NRA included Kate Bobowski, Larry Clark, Larry Clark Jr., Chad Hunter, Lynn Hunter, and Tup Tupper. Several activities were conducted, including monitoring of erosional and human impacts at 42 sites (21 are on the Navajo Nation [Table NN]), total station mapping at eight sites, conducting remedial actions at 16 sites, condition/stabilization assessments at five sites, an ARPA damage assessment at one site, and recording one site.

Table 9. Sites on the Navajo Nation that are monitored by Glen Canyon NRA. (N = 21)

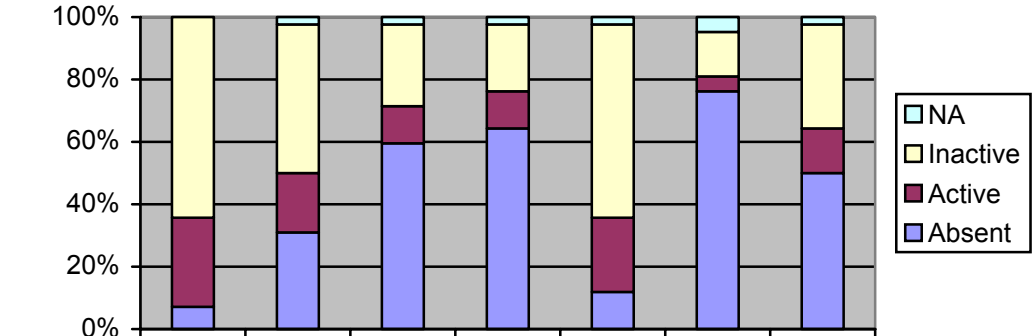
Site Numbers						
C:02:011	C:02:012	C:02:041	C:02:048	C:02:057	C:02:058	C:02:059
C:02:060	C:02:072	C:02:076	C:02:078	C:02:82	C:02:083	C:02:086
C:02:087	C:02:090	C:02:091	C:02:099	C:02:100	C:02:106	C:02:108

V. Impacts to Cultural Resources

The fundamental goal of the monitoring program is to gather data useful in identifying potential and ongoing erosional impacts to historic properties within the Colorado River corridor. Thus far, gathered monitoring data suggest patterns of continuing erosion and the nature of those erosive processes. Two major impact classes are physical impacts and visitor-related impacts. Physical impacts are defined based on their relation with Colorado River flows: 1) Adverse impacts such as inundation or bank cutting thought to be directly caused by the river, downcutting of peripheral arroyos due to lack of sediment replenishment and a continuously lower base level for the river; and 2) potential adverse impacts to sites as predicted by a geomorphic model of site erosion (Hereford et al. 1993). Visitor-related impacts of concern are those pertaining to modified recreational use patterns caused by various river flow regimes. Patterns in physical and visitor-related impacts for FY98 are discussed below.

A. Physical Impacts

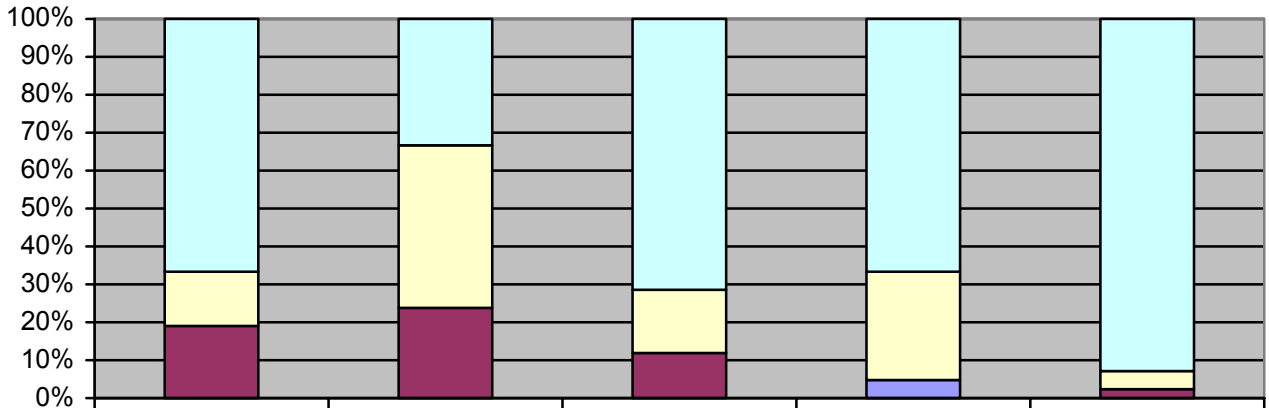
In Glen Canyon NRA, one site (C:02:105 [2% of the 42 sites monitored in FY98]) exhibited no physical impacts. This is the "Hislop 1889" historic inscription inside Hislop Cave. Figure PI summarizes the frequency of physical impact types within Glen Canyon NRA in FY98. Of the 42 sites monitored, active physical impacts are generally exhibited at less than half of the sites with any particular physical impact type. For example, active surface erosion is present at 29% (N = 12) of the sites, while surface erosion is inactive at 64% (N=27) of the sites. Gullying is active at 19% (N = 8) of the sites, and is inactive at 48% (N = 20). Arroyo cutting is active at 12% (N = 5), and is inactive at 26% (N = 11) of the sites. Figure 8 also indicates that surface erosion is present most often, followed by eolian erosion/deposition, gullying, other erosion, and finally by arroyo cutting and bank slumpage.



	Surface Erosion	Gullying	Arroyo Cutting	Bank Slumpa	Erosion /	Side Canyon	Other Erosion
NA	0	1	1	1	1	2	1
Inactive	27	20	11	9	26	6	14
Active	12	8	5	5	10	2	6
Absent	3	13	25	27	5	32	21

Figure 8. Frequency of physical impact types within Glen Canyon NRA in FY98.

Figure 9 summarizes the frequency of physical impacts to features within Glen Canyon NRA in FY98. Of the 42 sites monitored, those consisting solely of artifact scatters (24%, N = 10) and those containing structures (19%, N = 8) more frequently exhibited active erosion than did sites with roasters (12%, N = 5). Rock image panels exhibited no active erosion. The active erosion of the Bureau of Reclamation Trail was also noted (PI Other).



	PI Structures	PI Artifacts	PI Roasters	PI Rockart	PI Other
NA	28	14	30	28	39
Inactive	6	18	7	12	2
Active	8	10	5	0	1
Absent	0	0	0	2	0

Figure 9. Frequency of physical impacts to features within Glen Canyon NRA in FY98.

Table 9 summarizes physical impacts versus stream type within Glen Canyon NRA in FY98. The table suggests that active physical impacts at sites with river-based drainages are more numerous than active physical impacts at sites with terrace-based drainages, and that active physical impacts are least numerous at sites with side drainages. The table also suggests that among the possible physical impact types, active surface erosion occurred most frequently on sites with river-based drainages, and that active gullying, arroyo cutting, and bank slumpage occurred equally on sites with river-based drainages.

Table 9. Physical Impacts Versus Stream Type within Glen Canyon NRA in FY98. (N = 42)

Physical Impacts	Drainage Types						
	Active River-based	Inactive River-based	Active Terrace-based	Inactive Terrace-based	Active Side Drainage-based	Inactive Side Drainage-based	NA
Surface Erosion	7/17%	7/17%	3/7%	12/29%	1 /2%	6/14%	6/14%
Gullying	5/12%	8/19%	2/5%	11/26%	1 /2%	1 /2%	14/34%
Arroyo	5/12%	7/17%	0/0%	4/9%	0/0%	0/0%	26/62%
Bank Slump	5/12%	5/12%	0/0%	2/5%	0/0%	1 /2%	29/69%
Erosion/ Deposition	6/14%	1 /2%	1 /2%	2/5%	2/5%	4/9%	26/62%
Side Canyon	2/5%	4/9%	0/0%	1 /2%	0/05	1 /2%	34/82%
Other	2/5%	7/17%	2/5%	5/12%	1 /2%	1 /2%	24/57%

B. Visitor-Related Impacts

In Glen Canyon NRA, 45% (N = 19) of the 42 sites monitored exhibited various visitor-related impacts, including collection piles (N = 1); trails (N = 17); on-site camping (N = 2); and criminal vandalism (N = 1). See the discussion below concerning the ARPA investigation and the criminal vandalism. Visitor-related impacts occurred at sites with artifact scatters (N = 5), sites with structures (N = 3), and sites with roasters (N = 2).

C. Summary

Within the Glen Canyon reach, physical impacts were active at less than half of the sites monitored (N = 42). Active surface erosion is the most prevalent physical impact, followed by eolian erosion/deposition, gullying, other erosion, and finally by arroyo cutting and bank slumpage. Sites consisting of artifact scatters and structures exhibited active erosion more frequently than did sites with roasters. Sites with river-based drainages exhibited more active erosion than did sites with terrace-based drainages. Visitor-related impacts included collection piles, trails, on-site camping, and criminal vandalism.

VI. Site Specific Results and Recommendations

This section briefly describes the sites, previous work, stability, physical- and visitor-related impacts, current status and recommendations. Fifty-four sites are present in Reach 0 (Appendix A). In FY98, 42 sites were monitored.

C:02:011 – Historic Structures
SITE DESCRIPTION: This is the Lees Ferry Historic District, which encompasses some of the following re-recorded features (with additions by the GCRCS): (F1) Lee's Fort; (F3) main ferry—left and right bank; (F4) corral; (F5) cable crossing inscriptions; (F6) walls on cable crossing hill; (F11) staging area for hydraulic mining operations and Spencer's boiler; (F12) Spencer's steamboat; (F13) USGS guesthouse; (F14) USGS cableway (right and left bank); (F17) steamboat inscriptions; (F18) gate holders; (F19) post office; (F20) root cellar; and (F21) hogans. The GCRCS expanded the scope of F11 to include features related to Spencer's mining operation in addition to the boiler, plus a root cellar and a trash scatter. Lee's Lookout (F2) and Spencer's trail (F10) were outside of the GCRCS project area and not included. F7 (cabins and outbuildings) was reassigned as site AZ:C:2:57; F8 (cairn and inscriptions) and F9 (cairn and sledgehammer) are considered GCRCS I.O. #57 and I.O. #50, respectively; F15 (USGS gauging station) was reassigned as site AZ:C:2:59; and F16 (Bureau of Reclamation cableway) was reassigned as site AZ:C:2:58. F17 through 21 were added by the GCRCS.

PREVIOUS WORK: Various features of the Lees Ferry Historic District have been monitored periodically since 1991. Features 5, 6 and 14 were mapped using a total station in FY98. Also in FY98, Feature 5 received three checkdams along one river-based stream, and Feature 14 received 7 checkdams along three river-based streams. A revegetation assessment at Feature 14 was conducted in FY98 (see below for a discussion of the assessment). During the FY96 Habitat Building Flows, underwater monitoring of Feature 12, the Spencer Steamboat occurred.

STATUS AND RECOMMENDATIONS: In FY98, Features 5, 6, 12, 14, 17, and 21 were monitored. Features 5, 6, 17 and 21 are stable with no active impacts. The day Feature 12, the Spencer Steamboat was monitored, the river flow was 14,785 CFS. Feature 12 was completely submerged. Photo comparisons were conducted, revealing that the port side, the area around the hatch, and the starboard paddlewheel hub have received increased deposition of silt.

At Feature 14, the USGS cable towers and cable car, the terrace is being disected by river-based drainages. Arroyo cutting and gullying have increased since the last monitoring episode. Planting vegetation has been recommended for the terrace, and a revegetation assessment was conducted in consultation with Glen Canyon NRA Botanist John Spence. Several observations were made: 1) The terrace is on the south side of the Colorado River on the Navajo Nation; 2) the success of any revegetation program in this area would require the removal of cattle and discontinuance of grazing; 3) it would be possible to control the erosion of the side drainages on the terrace by constructing a berm

or stock pond up stream in the river-based drainage; 4) possible native species would include rice grass, eight weeks fescue and sand dropseed, however, the cattle would simply eat them; 5) more aggressive revegetation efforts might include placement of jute mats, transplanting cacti, and a seed mix specifically suited to the local sediments; 6) however, none of these efforts would produce long term remediation without the removal of cattle. Considering these issues, planting vegetation is not a viable remedial action at Feature 14.

At Feature 21, the hogans, several rocks were moved. In Structure 1, some rock from inside the structure was placed on the walls. Stone elements have collapsed onto the hearth in Structure 1. Rocks have been removed from a rock pile at Structure 1.

Monitoring schedules vary for this site as follows: Feature 5-annually to determine success of checkdams; Feature 6-every 5 years; Feature 12-annually; Feature 14-annually to determine success of checkdams; Feature 17-every 3 years; Feature 21-biennial. Checkdams were installed at Features 5 and 14 on 03-31-98. Site mapping was conducted at Features 5, 6, and 14 on 04-01
-98. Mapping is recommended at Feature 21.

The following features, not monitored this session, have monitoring schedules as indicated: F. 1-every 3 years, F. 3-every 3 years, F. 4-every 3 years, F. 11-inactive, F. 13-every 3 years, F. 20-Every 3 years.

C:02:013 – Small Structure

SITE DESCRIPTION: The site consists of a rockshelter 3 x 3.5 m in plan dimension and ca. 1 m high with a low, dry-laid wall enclosing the front, creating a probable habitation room (F1). A moderate number of sherds and lithics are scattered along the talus slope below; artifacts indicate a PII Kayenta Ancestral Pueblo association. A small petroglyph panel is located along the cliff face 15 m to the east, and an additional petroglyph element is located ca. 45 m east. F2 is an enigmatic rock alignment that may be historic. A small, slab-lined storage feature (F3) is situated below a small overhanging Kayenta sandstone outcrop ca. 20 m N/NE of the lone glyph. Lithics suggest only non-intensive, unstaged reduction activity. Tools included a chert bi-edge and a utilized chert flake. A large, unformalized grinding slab and a fragment of an apparently well-shaped mano round out the assemblage. The shelter was possibly used as a fieldhouse related to agricultural pursuits on the adjacent alluvial terrace.

PREVIOUS WORK: The site was monitored in FYs 91, 93, 94, 95, 96, and 97.

STATUS AND RECOMMENDATIONS: No new physical or visitor impacts were noted. The site is on a biennial monitoring schedule.

C:02:032 – Artifact Scatter
SITE DESCRIPTION: When initially recorded on 1/22/84 the site consisted of 15 charcoal lenses eroding from a high cutbank adjacent the river, ranging from "concentrated . . . black" features with "chunks of charcoal" to "long thin lenses of grey-black soil." When re-recorded by the GCRCS the multiple lenses were no longer visible as such, nor were the separate lenses (designated A and B) described by P. Bungart from a 1986 visit. Instead, it appeared that there was one continuous lens approx. 60 cm thick and ca. 24.4 m long that occurred between 1.4 and 2.0 m below the present top of the terrace surface. Unlike the main lens, which appeared to be ash-stained silt, the upper lens contained chunks of charcoal. The cultural origin of the lenses could not be determined without subsurface testing; no associated artifacts were visible. They may be the result of natural burns.

PREVIOUS WORK: The site has been monitored annually since FY91. It was tested in FY92. This testing program failed to verify a cultural origin of the lenses. However, radiocarbon samples recovered from the cutbank and from an excavation unit returned the following results:

Cutbank	–	3150 +/- 55 BP (Beta-57294)
Excavation Unit A	--	1715 +/- 55 BP (Beta-57295)

The charcoal lens represented by the Cutbank sample is stratigraphically below the sample recovered from Excavation Unit A. Even though at this point there is no solid evidence that these lenses are cultural in origin, they are still important in that they help to date alluviation of this particular high terrace within the Glen Canyon reach. Within the Colorado River corridor, few terraces contain sediments susceptible to absolute dating techniques. In addition, nearby site C:02:038, the Descending Sheep Panel, includes rock art elements typical of both the Late Archaic and PI-III Ancestral Pueblo periods. The lens from the cutbank may be evidence of more extensive use of the terrace during the Late Archaic. The sample from Excavation Unit A may represent use of the terrace during the Preformative, or Basketmaker II period. Future research may help to determine the origin of the lenses, and that research may conclude that indeed the origin is cultural.

The site was mapped with a total station in FY94 prior to the Beach Habitat Building Flow. It is monitored daily with a stationary camera.

STATUS AND RECOMMENDATIONS: Sediment has been lost from above and below the charcoal lenses due to bank slumpage. No visitor-related impacts were noted. The site is on an annual monitoring schedule.

C:02:033 – Storage Site
SITE DESCRIPTION: The site consists of a small rockshelter with the remains of a crude, wet-laid granary (F2), an associated sherd and lithic scatter, and a probable "niche" storage space in a low bedrock shelf. Artifacts indicate a PII Ancestral Pueblo

cultural affiliation. The granary was roughly D-shaped originally, enclosing an area ca. 2.2 x 1 m against the back of a Kaibab limestone overhang. Currently only a single wall segment remains, constructed of expedient, locally available masonry elements and brown clay mortar. Artifacts scattered downslope consist of a light lithic scatter and about 12 sherds of several types. At the northeast end of the site a small shelf was walled-off on one side with a single rock mortared to the bedrock (F1). No other construction evidence was present; the shelf was probably used as a windbreak for storage. It is likely that some site materials were buried or destroyed during construction of the river drive; however, no evidence of habitation is now visible. The site possibly served as a storage and processing locus related to farming on the nearby alluvium.

PREVIOUS WORK: The site was monitored in FYs 91, 94, and 96. In FY98, structure condition and stabilization needs assessments, and a work plan were completed.

STATUS AND RECOMMENDATIONS: Since the last monitoring episode, the artifacts are exhibiting active surface erosion and gullying, and stone elements of Feature 1 have collapsed. A work plan for a small relaying project has been developed and is provided under Remedial Actions. No visitor impacts were noted. The site is on a biennial monitoring schedule.

C:02:037 – Rock Image

SITE DESCRIPTION: The site consists of two prehistoric rock art panels and one panel of historic inscriptions situated at the base of a Navajo sandstone cliff. Feature 1 is the lower prehistoric panel consisting of ca. 25 anthropomorphs, sheep, and abstract elements. Feature 2 is the upper prehistoric panel consisting of 13 anthropomorphs and sheep. All of the prehistoric elements appear to be Glen Canyon Style 5 of the Late Archaic era. The historic panel includes inscriptions by F.G. Faatz (1892), which is believed to be authentic. An 1892 inscription by G.M. Wright was believed to be unauthentic and post-date 1972 by Glen Canyon ranger Tom Workman, but G. Foster recorded this inscription in 1956, and Wright also inscribed his name during the same month and year, but a day earlier, at Lees Ferry, so it appears Workman is mistaken.

PREVIOUS WORK: The site was monitored in FYs 91, 94, and 96. Medium format photography was conducted in FY96.

STATUS AND RECOMMENDATIONS: In FY98, no physical changes or visitor-related impacts were noted. The site is on a biennial monitoring schedule.

C:02:038 – Rock Image

SITE DESCRIPTION: The site consists of a petroglyph panel situated at the base of a vertical Navajo sandstone cliff face. The panel is ca. 11 m long (horizontally) and 1.75 m in height. It has 35+ elements, including “smiley” and rectangular sheep, abstract geometrics, and anthropomorphic figures. Also present are several historic/modern inscriptions (names and letters). The prehistoric figures are all pecked; some stippled and

some solid. There is evidence of superimposition of figures and repatination. Additional sheep figures had recently been uncovered at the bottom of the panel, having been buried by terrace sediment; consequently, it is suspected that more elements may remain buried under existing fluvial deposits. Previous site reports mentioned the presence of nondiagnostic white wares and a mano; lithics were observed during the GCRCS survey in the vicinity (but recorded as AZ:C:2:81). There are two possible prehistoric components at the site: Late Archaic and PI-III Ancestral Pueblo.

PREVIOUS WORK: The site was monitored in FYs 91, 92, 93, 94, 95, 96, and 97. In FY92, a dry-laid four-five course sandstone wall was build away from the petroglyph panel to restrict visitor access. In addition, cactus was planted inside the wall to discourage climbing over the wall. The trail to the site accommodates 40,000 visitors per year, and was upgraded in FY95. The site was mapped in FY94, and medium format photography was conducted in FY96. In FY98, trail work included obscuring secondary trails with brush. General maintenance on the visitor wall included relaying collapsed top course stone elements. An assessment for planting vegetation was conducted. See below for the results of the assessment.

STATUS AND RECOMMENDATIONS: The site is stable. No physical or visitor-related impacts were noted. The upgrade of the visitor trail in FY95 has concentrated foot traffic within it and has discouraged foot traffic outside of it. The site should be tested to determine the presence of buried cultural deposits. The site is on a semi-annual monitoring schedule.

Previous recommendations include increasing the density of cactus behind the rock wall to discourage visitor access to the panel. An assessment for planting vegetation was conducted and it is considered a viable remedial action. Locally available prickly pear and possibly a cholla from Lunch Beach downstream could be transplanted to further carpet the area between the stone wall and the panel. An effort should also be made to raise the wall as per the recommendations of the Zuni Tribe.

C:02:039 – Lithic Scatter

SITE DESCRIPTION: This is a lithic reduction and procurement area on two large, prominent terraces atop Navajo sandstone slickrock. The terraces are littered with a variety of river cobble lithic materials; wherever cobbles occur there is evidence of lithic reduction activity. Mainly decortication flakes and shattered cobbles are present, as well as smaller concentrations of secondary flakes. The main area of later-stage reduction (without cobbles present) is at the base of the Navajo sandstone cliff. Here are many secondary and tertiary flakes that are further reduced than the majority of flaked materials found in areas of cobbles, where cobble-testing was the primary activity. Raw materials include assorted river cobble cherts, basalt, chalcedony, jasper, and quartzite. No structures or tools were found, although a projectile point fragment was collected during an earlier survey. The site may be Archaic, but actual cultural affiliation is uncertain.

PREVIOUS WORK: The site was monitored in FYs 91, 92, 94, and 96.

STATUS AND RECOMMENDATIONS: The site is stable. In FY98, no new physical or visitor-related impacts were noted. Instrument mapping is recommended. The site is on a 5 year monitoring schedule.

C:02:040 – Lithic Scatter

SITE DESCRIPTION: The site consists primarily of approximately 25 flakes, several cores, and a chert cobble hammerstone. The site is located on an old alluvial terrace at the base of the Navajo sandstone where a slight bedrock indentation creates a degree of shelter from weather out of the north and northwest (however, this is not an overhang). There has been extensive exploitation of cobbles and gravels on the terrace and bench deposits. This expedient and practical resource was utilized in an informal matter; broken and shattered rock is everywhere. Some of these are naturally fractured and others are obviously cultural. Chalcedony, red chert, Chinle materials, and numerous nondiagnostic varieties of chert were observed. No tools or bifaces of any kind were found at any of the quarry locations themselves. These quarried areas exist downstream from and above the actual location of AZ:C:2:40. Cultural affiliation is unknown.

PREVIOUS WORK: The site was monitored in FYs 91, 94, and 96.

STATUS AND RECOMMENDATIONS: The site is very stable. In FY98, no new physical or visitor-related impacts were noted. Instrument mapping is recommended. The site is on a 4 year monitoring schedule

C:02:048 – Trail

SITE DESCRIPTION: This historic road was constructed across the Shinarump Conglomerate bench on the left side of the Colorado River in the early 1870s to access the original and upper ferry crossings. Laborers working for the LDS Church built the road by hand. Early Mormon colonists to Arizona and others continually used the road between 1873-1878. During 1878-1898 it was occasionally used during periods of high water. It is severely eroded and often difficult to follow. Occasional remnants of rockwork bordering the road can be discerned. Also, wagon wheel ruts are incised into the Shinarump bedrock at one spot. One notable feature of the road is Sentinel Rock, which contains an incised 1878 inscription recording the passing of the "First Mesa Company" under the command of Hyrum S. Phelps.

PREVIOUS WORK: The site was monitored in FYs 91, 93, 94, and 96.

STATUS AND RECOMMENDATIONS: The site is stable. No new physical or visitor-related impacts were noted. The trail tracing the Lee's Backbone Road is hiked only occasionally. Lee's Backbone Road is on the Shinarump Conglomerate and is not impacted by the Colorado River. It is placed in the Discontinue Monitor category.

C:02:050 – Roaster Complex
SITE DESCRIPTION: This multi-component site consists of an elongated sherd and lithic scatter divided into two loci (A and B) situated on the narrow remnant of an alluvial terrace. The site also contains fire features that have been highly altered by sheetwashing and historic impacts. (Locus A) F1 is an FCR concentration with charcoal and nails; and F2 is a cobble concentration cut by a tire rut with another nearby hearth/cist. (Locus B) F3 is a possible cist; F4 is a linear FCR concentration with ash, flakes, and tin can; F5 is another FCR concentration; F6 may be the remains of an eroded structure (perhaps a cist) with sherds, lithics, ash, charcoal, and bone; and F7 is an FCR concentration with ashy soil. The ceramic assemblage is a mix of Virgin and Kayenta types, and suggests a PII-early PIII Ancestral Pueblo occupation. Historic trash suggests use from the late nineteenth century through the early twentieth century. Two large posts downstream from the site are part of AZ:C:2:94, the lower ferry crossing.

PREVIOUS WORK: This site was monitored in FYs 91, 94, 95, 96, and 97. It was total station mapped in FY98.

STATUS AND RECOMMENDATIONS: Since the last monitoring episode in FY97, physical impacts include stone displacement on Features 2 and 7, and Feature 3 exhibits an increase in eolian deposition. Visitor-related impacts on Feature 6 include stone displacement into the trail through the feature apparently due to foot traffic. The trail along the terrace traverses the middle of the site. A lesser-used trail is below the terrace to the south, and foot traffic to Hidden Beach to the west will be rerouted to this lower trail by placing vegetation to discourage traffic. The site is on an annual monitoring schedule.

C:02:053 – Artifact Scatter
SITE DESCRIPTION: This PII Ancestral Pueblo site consists of a ceramic and lithic scatter in a flat, fairly denuded area that used to be a plowed alfalfa field; site is about 25 x 35 m in size. Abundant small sherds were observed, probably broken and dispersed during plowing episodes. During the GCRCS visit two cobble cores and a mano fragment were observed; previous surveys reported seeing a scraper, a biface, and a metate/grinding slab fragment. The trash suggests that this was once a habitation locus; additional artifacts and features could still be buried in the alluvium.

PREVIOUS WORK: The site was monitored in FYs 91, 92, 94, and 96.

STATUS AND RECOMMENDATIONS: In FY98, no physical or visitor-related impacts were noted. Testing is recommended to determine depth of cultural deposits. The site is on a 3 year monitoring schedule.

C:02:057 – Historic Structures
SITE DESCRIPTION: This historic site consists of six distinguishable structures and associated trash that may be related to any number of activities (e.g., sheep herding,

ferry/road operations, mining). The main structure is a dugout (F2), which still retains a quantity of trash and appears to be the main habitation quarters. F1 is a rock outline that may have been a tent foundation. F3 is a long stone wall with a possible attached lambing pen, and F4 is another possible pen. F5 appears as a stone corral, while F6 may have been used for storage. An earlier survey found glass bottles with marks dating to 1920-1964 and 1926 to present. Milk cans found during this survey dated to between 1917-1929. The site is close to the end of the Lee's Backbone trail and is near the beginning of Stanton's Road. The outlet for the Dugout road is also nearby. In addition to its Euro-American historic component, it appears to include a Navajo re-occupation, and a possible Late PI-early PII Ancestral Pueblo affiliation.

PREVIOUS WORK: This site was monitored in FYs 91, 92, 93, 94, and 96. In FY98, total station mapping was conducted, and structure condition and stabilization needs assessments were completed.

STATUS AND RECOMMENDATIONS: Since the last monitoring episode in FY96, Feature 1, the frame/stone footing tent platform, exhibits movement of its wooden elements. There is no movement of the stone footing outline. In addition, there is a decrease in surface erosion, gullying, and trailing through the site. No visitor-related impacts were noted. The site is on a five year monitoring schedule.

C:02:058 – Artifact Scatter

SITE DESCRIPTION: This site, known as the Bureau of Reclamation cableway, includes not only features associated with the cableway on the left bank and pre-cableway inscriptions dating between the 1920s and 1930s (Locus A), but ephemeral masonry rooms that may or may not be associated with the cable system (Locus B), a concrete slab with trash downstream from Locus A (Locus C), and the right bank portion of the cableway (Locus D). The latter three loci were added by GCRCS crews to the original Locus A documentation by Anderson and Madden. Locus A is the main focus of the left bank portion of the cableway, and includes a cable anchor/cement block complex with a 1959 B of R benchmark, a terracing system with walls, and a series of historic inscriptions. Locus B consists of two enigmatic masonry rooms of dry-laid sandstone incorporating in situ boulders; they appear Anglo or Navajo, although a single sherd was found in the doorway of one. Locus C consists of a slab with milled lumber and iron bolts 100+ m downstream from Locus A; it is suspected to be associated with the cableway, perhaps as a cable/wire anchor. Locus D is the right bank portion of the cableway and includes an iron anchor, trash, and painted letters/symbols. A 1936 inscription by D.P. Monroe, once designated F9 of AZ:C:02:060 (Stanton's Road) was reassigned to this site as part of the Locus A complex by the GCRCS.

PREVIOUS WORK: This site was monitored in FYs 91, 93, 94, and 96.

STATUS AND RECOMMENDATIONS: In FY98, no physical or visitor-related impacts were were noted. A trail is present on both sides of the river. However, the trails

do not impact any of the features. There are no active impacts. The site is stable. The site is placed on the INACTIVE monitoring list.

C:02:060 – Trail

SITE DESCRIPTION: This road was built in 1899 by crews working for R.B. Stanton, who was attempting to mine gold in this part of the Canyon at the turn of the century. Mining law at that time required that a certain sum of money be spent each year on every mining claim in order to hold the claim. The road was constructed to meet this requirement, an "improvement" that linked several of Stanton's claims (see E.B. Measeles's book *Lees Ferry*). It was subsequently abandoned and later reused by other Anglos and Navajos. Currently eight features are associated with the road (F1-8), including (F1) a forge with inscriptions and prehistoric petroglyphs; (F2) a remnant masonry structure of unknown function; (F3) a remnant wood structure (which GCRCS crews could not relocate); (F4) a Navajo stock gate; (F5) a feature previously described as a cairn by P. Bungart, but defined as another stock gate by GCRCS; (F6) remains of a wood and masonry structure; (F7) a stone corral and stock pens; and (F8) a petroglyph. What used to be F9—an historic inscription—was reassigned as part of the Bureau of Reclamation cableway (AZ:C:02:058).

PREVIOUS WORK: Various features of this site were monitored in various years beginning in FY91. Stabilization condition and needs assessments were completed for Features 2 and 4 in FY98.

STATUS AND RECOMMENDATIONS: Over the last two monitoring episodes, no new impacts have been noted at Features 1, 2, 4, 7, and 8. At Feature 6 in FY97, a wooden element was broken most likely by cattle trampling, and the upright pole near the feature has collapsed. The Stanton Road and a foot trail on it traverses the area near the features, although they are not directly impacted by it. Cattle trailing occurs in the area. At Feature 4, the stock gate was closed by the Navajo cattleman in FY98. Total station mapping is recommended for Feature 7, the corral and stock pens. The site is on a 5 year monitoring schedule.

C:02:070 – Artifact Scatter

SITE DESCRIPTION: The site consists of a small Kaibab limestone rockshelter with a light scatter of lithics and sherds on the talus slope below. The artifact assemblage is dominated by ca. 40-50 flakes of mostly locally available cherts, quartzites, and coarse igneous rocks from river cobbles and the Shinarump Conglomerate. Flake attributes indicate that some late-stage biface manufacturing occurred here, as well as unintensive, unstaged reduction (either flake tool production or simple raw material sampling). Sparse decorated and utility ware ceramics suggest that small level areas below the overhang were occupied; however, no evidence of architecture is present. The site may have served as a small field camp related to farming on alluvium below the site. Several mammal long bones were found in the shelter, but except for one burned bone, these may not be cultural. A complete corncob and another fragment were found on the site. Ceramics suggested PII-early PIII Ancestral Pueblo affiliation.

PREVIOUS WORK: The site was monitored in FYs 91, 94, and 96.

STATUS AND RECOMMENDATIONS: Surface erosion is inactive at the present time. No new physical or visitor-related impacts were noted in FY98. The site is on a five year monitoring schedule.

C:02:071 – Artifact Scatter

SITE DESCRIPTION: The site contains two loci (A and B) and includes an artifact scatter and a petroglyph panel. Locus A surrounds a Navajo sandstone boulder and consists of an artifact scatter, with many sherds and lithics placed in a collector's pile. Locus B is situated on a Navajo sandstone cliff face and consists of a petroglyph panel; there is a 1959 brass cap benchmark nearby. In addition to the 32 sherds and ca. 60 flakes in the collector's pile, Locus A has a light lithic scatter, a Navajo sandstone mano fragment, and one rim sherd. There is also a pothole in the vicinity. The sherds indicate a mid-to-late PII Kayenta Ancestral Pueblo affiliation. The Locus B glyph may be a Style 5 element. It is very faded and on a lightly patinated Navajo sandstone surface; it may not be related to the artifact scatter.

PREVIOUS WORK: The site was monitored in FYs 91, 93, 94, and 96.

STATUS AND RECOMMENDATIONS: In FY98, no changes were noted. Surface erosion is inactive at the present time. No visitor-related impacts were noted. The site is on a three year monitoring schedule.

C:02:072 – Camp

SITE DESCRIPTION: The site consists of a scatter of ca. 30 Late PI-early PII Western/Kayenta Ancestral Pueblo sherds and 25 lithics, plus a couple of probable buried hearth features. The site is dispersed across a 30 X 60 m area along the north edge of the highest alluvial terrace. The site is apparently buried in the alluvium. There is also a sparse scatter of historic trash and a (early 1900s?) historic hearth in the eastern half of the site area. Both the prehistoric and historic components appear to represent temporary campsites.

PREVIOUS WORK: The site was monitored every year since FY91. Total station mapping, a revegetation assessment, and checkdam construction were conducted in FY98. See the discussion below for the results of the revegetation assessment.

STATUS AND RECOMMENDATIONS: In FY98, no changes were noted in the features, artifacts, or drainages. Erosive impacts are inactive at the present time. No visitor-related impacts were noted. Monitoring should be conducted annually to determine the success or failure of installed checkdams. If erosion becomes active near the features and artifact scatters, data recovery efforts consisting of excavation of the features and surface collection will be considered.

Planting vegetation has been recommended for the site, and a revegetation assessment was conducted in consultation with Glen Canyon NRA Botanist John Spence. Several observations were made: 1) The site is on the south side of the Colorado River on the Navajo Nation; 2) the success of any revegetation program in this area would require the removal of cattle and discontinuance of grazing; 3) it would be possible to control the erosion of the side drainages on the terrace by constructing a berm or stock pond up stream in the river-based drainage; 4) possible native species would include rice grass, eight weeks fescue and sand dropseed, however, the cattle would simply eat them; 5) more aggressive revegetation efforts might include placement of jute mats, transplanting cacti, and a seed mix specifically suited to the local sediments; 6) however, none of these efforts would produce long term remediation without the removal of cattle. Considering these issues, planting vegetation is not a viable remedial action at C:02:072.

C:02:074 – Lithic Scatter

SITE DESCRIPTION: The site consists of an alcove shelter ca. 1 m high, 1.8 m deep, and 14 m long. It contains a scatter of six flakes and a broken cobble mano. These are located in a 3 x 7 m area in front of the west half of the shelter. No diagnostic artifacts were found and cultural affiliation is unknown.

PREVIOUS WORK: The site was monitored in FYs 91, 92, 94, and 96.

STATUS AND RECOMMENDATIONS: The FY98 monitoring episode showed that surface erosion and gullying are inactive at the present time. No changes were noted. No visitor-related impacts were noted. The site is on a three year monitoring schedule.

C:02:075 – Camp

SITE DESCRIPTION: The site consists of a lithic scatter eroding out of an alluvial terrace cutbank, which is divided into two loci (A and B). Locus A consists of ca. 30 flakes in an area measuring 20 x 12 m. Locus B consists of a small concentration of FCR, an associated ash strain, and a scatter of about 25-30 flakes eroding down the cutbank. A 12-foot deep, 24-foot wide arroyo has cut through the site. The lithics are more concentrated and diverse at Locus B. The lithic assemblage reflects early stage reduction and comprises a variety of material types. No ceramics or diagnostic tools were seen during the GCRCS; however, later monitoring efforts noted a sand tempered Tusayan Corrugated sherd on the west side of the arroyo. This suggests a possible PII-PIII Kayenta Ansectral Pueblo cultural affiliation.

PREVIOUS WORK: The site has been monitored annually since FY91. Total station mapping was conducted in FY95.

STATUS AND RECOMMENDATIONS: Active erosion includes the following: Bank slumpage and arroyo cutting have increased along the trail through both Loci A and B. The sherd noted in previous monitoring episodes eroded into the drainage. It was collected this monitoring episode. Increased bank slumpage is noted along trail, probably

due to foot traffic along it. The site should be excavated in FY99. Artifacts in Locus B are eroding into the arroyo. The site is on an annual monitoring schedule.

C:02:076 – Camp

SITE DESCRIPTION: The site consists of a single slab-lined hearth with a few crude lithics. The hearth is a roughly circular feature ca. 85 cm in diameter and lined with thin sandstone slabs along its sides and at least partially on the bottom. The hearth had been filled with charcoal-stained soil, but apparently vandals have cleaned out much of the fill, leaving dark backdirt piles around its perimeter. Even so, the slabs of the feature are structurally intact, and there is potential for the remaining fill to provide chronological and subsistence information. A pin flag probe indicated the hearth was originally ca. 50 cm deep down to the slab bottom. Flakes consisted of four quartzite and one coarse-grained igneous item, suggesting only very limited, unintensive reduction. The site probably functioned as a brief food-processing location/campsite. Cultural affiliation is unknown.

PREVIOUS WORK: The site was monitored in FYs 91, 93, 94, and 96. In FY98, a checkdam was installed in the gully headcutting toward the feature.

STATUS AND RECOMMENDATIONS: As of the FY98 monitoring episode, gullying is inactive. There has been no change. The vegetation around the stones has stabilized the sediment. The area exhibits increased vegetation and detritus from trees and shrubs on site that have filled in and obscured previously noted trailing. No new visitor-related impacts were noted. The site is on a biennial monitoring schedule.

C:02:077 – Lithic Scatter

SITE DESCRIPTION: The site consists of a large, dispersed lithic scatter measuring 25 x 40 m. The site contains 60-70 visible flaked lithics, which are concentrated on the first alluvial terrace above the river, and are eroding along a 40 m cutbank section of the second terrace. A few FCR fragments and some heat-treated flakes were observed at the south end of the first terrace. A quartzite river cobble hammerstone was also seen eroding from the second terrace cutbank. No diagnostic artifacts were seen; cultural affiliation is unknown.

PREVIOUS WORK: The site was monitored in FYs 91, 93, 94, 95, 96, and 97.

STATUS AND RECOMMENDATIONS: In FY98, no changes were noted. Surface erosion, gullying, and bank slumpage are all inactive at the present time. No new visitor-related impacts were noted. The trail to Ferry Swale Camps traverses the site. Decreased trail use is noted. In the future, the site should be tested to determine whether buried deposits exist. The site is on an annual monitoring schedule.

C:02:078 – Lithic Scatter
SITE DESCRIPTION: The site is situated within a shallow Navajo sandstone rockshelter. Artifacts are eroding out of the floor and down a loose soil slope below the shelter, which is 7.5 m long and 1.75 deep. There is a sparse concentration of lithic tools in the shelter, although the ratio of tools to flakes is quite high. Tools are mostly of local cobble material and include a chopper/core, a nondiagnostic projectile point, a worked cobble and a mano fragment. No ceramics were observed. The slope in front of the shelter is active and steep and a good portion of the site may have already disappeared. Cultural affiliation is unknown.

PREVIOUS WORK: The site was monitored in FYs 91, 94, 95, 96, and 97.

STATUS AND RECOMMENDATIONS: In FY98, active erosion is noted. There is an increase in surface erosion and gullying. No visitor-related impacts were noted. The site is on an annual monitoring schedule due to active erosion.

C:02:080 – Lithic Scatter
SITE DESCRIPTION: The site consists of a lithic scatter at the base of the Navajo sandstone slickrock on a terrace system N/NW of 3-Mile Bar. The artifacts occupy a 40 x 30 m area, having been dispersed by runoff from the slickrock. A variety of materials are present, all procured locally from the wealth of cobbles on the surrounding benches. Cores, hammerstones, a biface fragment and eight groundstone pieces are present. No diagnostic artifacts were observed, except for a single sherd that suggested a PII Ancestral Pueblo affiliation. Based on the weathered surface and present position of the cultural debris, it appears that at some point in the past the lower cliff face was buried to some degree along its front by a sand dune that has subsequently deflated, leaving the artifacts as a residual component on the ever-eroding surface.

PREVIOUS WORK: The site was monitored in FYs 91, 92, 94, and 96.

STATUS AND RECOMMENDATIONS: Surface erosion, gullying, and arroyo cutting are all inactive at the present time. On the east side of the site there is an increase in eolian deposition on the east side of the metate. There are no visitor-related impacts. Total station mapping is recommended. The site is on a four year monitoring schedule.

C:02:082 – Ephemeral Structure
SITE DESCRIPTION: This site contains a rock alignment and artifact scatter, and is located in a shallow 9 x 2 m overhang of Navajo sandstone at the base of a sandstone outcrop. There is a single, coursed rock alignment extending 1 m out from the base of the overhang on the south end of the shelter. Lithics extend from the shelter downslope ca. 14 m to the edge of the terrace. The heaviest concentration of lithics is found along the terrace edge. Lithics are composed of Kaibab and river cobble chert and quartzite. Three sherds were found, two of which are off the edge of the terrace directly above the wash. A couple of charcoal pieces were seen in the shelter, but no hearth feature. A

sandstone mano midsection, probably originally a two-handed item, was also observed. Artifacts indicate a PI-III Ancestral Pueblo affiliation.

PREVIOUS WORK: This site was monitored in FYs 91, 92, 93, 94, and 96.

STATUS AND RECOMMENDATIONS: Surface erosion is inactive at the present time. An increase in eolian deposition is noted on the rock alignment and along the adjacent cliff face. No visitor-related impacts were noted. The site is on a three year monitoring schedule.

C:02:083 – Camp

SITE DESCRIPTION: This is a small PII Ancestral Pueblo sherd and lithic scatter with a possible hearth feature. The artifacts consist of a few corrugated sherds and several lithic flakes. A small 1 meter diameter ash stain is present on the sloping terrace with several associated charcoal fragments. No bone or burned sandstone was found. The artifacts appear to be eroding from the base of the Shinarump. No obvious concentrations were noted. This may be the remains of a short-term camp.

PREVIOUS WORK: This site was monitored in FYs 91, 93, 94, 95, 96 and 97. Total station mapping was conducted in FY98.

STATUS AND RECOMMENDTIONS: Gullying and arroyo cutting are inactive at the present time. However, there is an increase in surface erosion causing a rivulet to form through the feature. There is no change to the rock alignment. Trailing to the U.S.G.S. gauging station has decreased since the last monitoring episode. The site should be monitored annually.

C:02:084 – Ephemeral Structure

SITE DESCRIPTION: The site consists of a shallow overhang with a collapsed wall, a surficial midden, and artifacts. The artifacts include numerous hand tools, manos, hammerstones, cores, biface fragments, lithic debris, ceramics, and charcoal. Fragments of mammal bone were also present on the surface. A lithic analysis unit was placed at the base of the sheet midden. About 150+ flakes were noted, mainly primary/secondary items of local river cobble chert. However, some biface thinning flakes were noted, and several biface "preforms" and fragments were observed, plus a couple hammerstones. All ceramics were analyzed; they suggested a mid-late PII Ancestral Pueblo affiliation. A wall of Navajo sandstone elements abuts the back of the shelter; it is 1.7 m long. There was a highly polished mano within the rubble. A small collector's pile of five flakes was also observed.

PREVIOUS WORK: This site was monitored in FYs 91, 93, 94, and 96.

STATUS AND RECOMMENDATIONS: Surface erosion and gullying are inactive at the present time. No new visitor-related impacts were noted. Total station mapping is recommended. The site is on a four year monitoring schedule.

C:02:086 – Small Structure

SITE DESCRIPTION: This site, which contains a cist, wall, burned rock, and artifact scatters, is divided into three loci: A, B, and C. Locus A has one feature (F1) that appears as a large, slab-lined cist. Only part of the feature is exposed; mostly the north half. The structure is ca. 3.5 x 4 m in diameter and is constructed with long, rectangular slabs. Locus B is ca. 50 m W/SW of F2 and consists of some burned sandstone in a 2 m diameter area. Just above F2, on the terrace overlying the sandstone bedrock, is Locus C (ca. 25 m east and southeast of F3). It contains a lithic scatter covering an area ca. 30 x 60 m; essentially the entire bedrock bench/terrace overlooking the lower sandy beach on the delta. The heaviest concentration, however, is on the westernmost portion of the bench. Locus C may have functioned as a quarry site, as it appears that quartzite cobbles occur naturally here; most of the flakes originated from these cobbles. Ceramics indicate that this is a PII Ancestral Pueblo site.

PREVIOUS WORK: This site was monitored in FYs 91, 93, 94, and 96. In FY98, Feature 4 was recorded in Locus A east of Feature 1.

STATUS AND RECOMMENDATIONS: Erosion is inactive at Feature 1. At Feature 2, surface erosion is active and has increased near the cliff face. Feature 3 exhibits loss of stone elements. No visitor-related impacts were noted. Feature 4 is newly exposed, actively eroding from bank slumpage, and consists of two stratified charcoal lenses. The lower lens contains burned and cracked flat tabular sandstone slabs. The lenses are exposed on the cutbank of a terrace-based drainage on the east side of the site. The trail through the area has naturally been obliterated through eolian deposition and plant growth. Testing is recommended. The site is on a biennial monitoring schedule.

C:02:087 – Historic Trash Scatter

SITE DESCRIPTION: The site consists mainly of historic trash possibly dating between the 1920s and 1950s. There are both historic and modern artifacts present. The site may be what NAU recorded as IF C:2:35, a collapsed wooden tower; however, no such tower was in evidence. Historic artifacts are scattered across the site, although there is somewhat of a concentration near a level area on the site's south side. They include purple and clear glass, an old toothpaste tube, large wire-cut nails, Prince Albert-type tobacco cans (the most common can type), saw-cut wood (including plywood), milk can with sanitary solder top, a knife-opened can, etc. Some of the trash (plywood) seems more recent than the rest (e.g., purple glass). Also seen were two U-shaped "anchor" bars imbedded in the sandstone cliff base—similar to others found along this stretch. A flat boulder downslope may have served as another anchor—there appears to be a metal rod buried in it. If this is the "tower" site, perhaps these "anchors" were used to secure the structure. The site is probably associated with Bureau of Reclamation activities related to exploration for an alternative dam site in 1922.

PREVIOUS WORK: The site was monitored in FYs 91, 93, 94, and 96.

STATUS AND RECOMMENDATIONS: In FY98, surface erosion and arroyo cutting are inactive at this time, however, there has been a slight increase in gullying. Cryptograms are in abundance. No visitor-related impacts were noted. Total station mapping is recommended. The site is on a four year monitoring schedule.

C:02:088 – Small Structure

SITE DESCRIPTION: The site is within an overhang shelter located at the contact between a Navajo sandstone cliff face and a talus slope of the same material. The shelter contains a Navajo sandstone grinding slab enclosed by two expedient parallel walls extending from the back of the overhang. A single sherd was found in the talus just below (south of) the shelter area, suggesting a possible PII Ancestral Pueblo affiliation. The walls are dry-laid and constructed of Navajo sandstone elements; they run NW/SE, are 1.25 m apart, and are 1 to 2 m long.

PREVIOUS WORK: The site was monitored in FYs 91, 94, 95, 96, and 97.

STATUS AND RECOMMENDATIONS: In FY98, surface erosion and gullying are inactive. There has been no change to the wall. There has been an increase in eolian deposition to the metate. A hiking trail is along the river 30 m distant. There is no impact from the trail on the site. Monitoring activities do not have an effect on the site because access is up a boulder talus slope. No other trails are produced accessing the site from the trail along the river. Total station mapping is recommended. The site is on a biennial monitoring schedule.

C:02:090 – Small Structure

SITE DESCRIPTION: The site consists of a group of massive sandstone boulders with the remains of a dry-laid structure and a few crude petroglyphs. The structure was built against the west side of the southernmost and largest boulder. It is an expedient feature, only slightly protected from the elements, with 1-3 masonry courses. It possibly served as a fieldhouse or transient camp. The petroglyphs consist of seven elements on three separate boulders. Designs include sheep, probable yucca elements, a meandering line, and an unidentified element. No chipped or groundstone artifacts were observed. A light ceramic scatter suggests a Mid-late PII Ancestral Pueblo occupation.

PREVIOUS WORK: This site was monitored in FYs 91, 93, 94, and 96.

STATUS AND RECOMMENDATIONS: In FY98, no changes were noted on Features 1 and 2, and Panels 1 through 3. There has been a general decrease in surface erosion and gullying in the artifact scatter since the FY96 monitoring episode. Previous monitoring episodes have reported a trail. The Stanton Road trail is on the next terrace below and does not cross the site. The previous recommendation to obliterate the trail is

reevaluated. The trail does not impact the site. No site camping was noted, as opposed to the FY96 monitoring episode. The site is on a four year monitoring schedule.

C:02:091 – Camp

SITE DESCRIPTION: The site consists of two loci of charcoal lenses/stains, which may or may not be related. Locus A was discovered first; B was found in the waning moments of the day and quickly added. Locus A consists entirely of a charcoal lens eroding from the side of an arroyo. It is about 20 cm below present ground surface and is 35 cm long and 11 cm thick; some burned rock is associated. No artifacts were found in association and cultural affiliation is unknown. Across the arroyo (at 330°) ca. 30 m away is Locus B. It contained one sherd and three small ash/charcoal stains all in a 5 m diameter area; could be part of the same feature. These are about 4 m from the arroyo. This locus may have a PII Ancestral Pueblo cultural affiliation.

PREVIOUS WORK: This site was monitored in FYs 91, 93, 94, 95, 96, and 97. In FY98 trail obliteration was conducted.

STATUS AND RECOMMENDATIONS: In FY98, erosion is active. The top of the feature has collapsed from bank slumpage. Only 1/3 to 1/2 of the feature is still present. Surface erosion has increased. The site is located on the Navajo Nation. A small segment of the trail was noticable. It was obliterated by placing local dry dead vegetation in the route. Due to the reduced integrity of the site from active erosion, monitoring efforts will be discontinued.

C:02:095 – Artifact Scatter

SITE DESCRIPTION: The site consists of a small rockshelter at the base of a low Shinarump Conglomerate cliff. A light sherd and lithic scatter is eroding down an ephemeral drainage below the shelter, which measures 4 by 2.5 m with a ceiling height of 1.7 m. Lithics at the site are dominated by coarse cobble material of quartzite, basalt, and other igneous rocks. The primary technological strategy was probably cobble tool production, such as in making hammerstones and choppers. Some smaller chert flakes from locally available cherts were also noted. A variety of PII Western Ancestral Pueblo ceramics were found. Although some site materials may have been buried or destroyed by construction of the road below the site, it appears that occupation was limited in duration and range of activities. It perhaps served as a transient camp or work station related to nearby farming on the flood plain.

PREVIOUS WORK: This site was monitored in FYs 91, 92, 93, 94, and 96.

STATUS AND RECOMMENDATIONS: In FY98, surface erosion is inactive. There are no natural impact changes. Criminal vandalism is noted under the overhang in the back of the rockshelter. Evidence includes distinguishable foot prints, and one area has a pot hole with a backdirt pile. The evidence appears very recent. An ARPA investigation

is being conducted. A summary of the damage assessment is provided in Chapter IV. The site is on an annual monitoring schedule.

C:02:099 – Camp

SITE DESCRIPTION: This site has both a prehistoric and probable historic component; the former consists of a very dispersed scatter of artifacts, including 4-5 sherds, two pecked basin metates, a projectile point base, broken river cobbles, and a few flakes exposed in deflated areas. A few sandstone slabs occur here and there, suggesting that this is a buried site beginning to be exposed. A possible hearth was also observed. The wind was particularly strong during recording and it is likely that artifacts/features appear and disappear with rapidity around here. The possible historic component consists of a very ephemeral "road" that appears to cross the site from east to west, along with a rock alignment by an ephemera drainage that may have acted to retain soil and keep the road from washing out here. The road probably linked the ferry crossing with the dugway road (AZ:C:2:12), Lee's Backbone, and/or the historic complex of AZ:C:2:57 about 250 m away. The prehistoric component appears to be PI-early PII Ancestral Pueblo, while the historic component may date to the turn of the century.

PREVIOUS WORK: This site was monitored in FYs 91, 93, 94 and 96. Total station mapping was conducted in FY98.

STATUS AND RECOMMENDATIONS: In FY98, eolian surface erosion is active on the artifacts in the dune. The rock alignment on the hard pan exhibits some increase in aeolian deposition. The grinding slab on the dune that was noted as being initially exposed in FY96 is now further exposed. There is also burned sandstone and fragmented animal bone newly exposed this year on the dune. No visitor-related impacts are noted.

A previous recommendation to install checkdams was reevaluated. There is no need to do so. Active aeolian erosion is impacting the artifacts on the dune. No gullies or arroyos are present here. Testing is recommended to determine the depth of buried deposits on the dune. Active erosion and deposition justifies annual monitoring to record newly exposed material.

C:02:100 – Camp

SITE DESCRIPTION: The site consists of two ephemeral, surficial hearths defined as small concentrations of flat-lying tabular sandstone; one (F1) has an associated charcoal stain and a sparse sherd scatter. The other (F2) has two associated petrified wood manuports. The ceramics place the site squarely in the PII Ancestral Pueblo camp. Additionally, there is a charcoal lens in an arroyo cutbank ca. 25 m northeast of the hearths. The lens is 75 cm below ground surface and is suspected to be a cultural feature; it may or may not be associated with F1 and F2.

PREVIOUS WORK: This site has been monitored annually since FY91. In FY92, a charcoal sample was recovered from a hearth in the drainage cutbank. The sample

returned a radiocarbon age of 2430 +/- 55 BP (Beta 57297). Total station mapping, a revegetation assessment, and checkdam installation were conducted in FY98.

STATUS AND RECOMMENDATIONS: In FY98, all erosion elements were inactive. There have been no physical changes. No new visitor-related impacts were noted. The site should be monitored annually to assess the success or failure of checkdam construction. When erosion threatens the features, they should be excavated as part of a data recovery program.

Planting vegetation has been recommended for the site, and a revegetation assessment was conducted in consultation with Glen Canyon NRA Botanist John Spence. Several observations were made: 1) The site is on the south side of the Colorado River on the Navajo Nation; 2) the success of any revegetation program in this area would require the removal of cattle and discontinuance of grazing; 3) it would be possible to control the erosion of the terrace by constructing a berm or stock pond up stream in the river-based drainage; 4) possible native species would include rice grass, eight weeks fescue and sand dropseed, however, the cattle would simply eat them; 5) more aggressive revegetation efforts might include placement of jute mats, transplanting cacti, and a seed mix specifically suited to the local sediments; 6) however, none of these efforts would produce long term remediation without the removal of cattle grazing. Considering these issues, planting vegetation is not a viable remedial action at C:02:100.

C:02:104 – Rock Image

SITE DESCRIPTION: This possible "multi-component" site consists of a sandstone boulder about a meter cubed in size with three pecked petroglyphs: a circle or zero, a circle with a tangent line (maybe a 9 or a 6), and a sheep. The panel is on a boulder near the launch ramp at Lees Ferry. The panel faces south toward the river. The two circular elements may be historic—they appear more recently pecked than the sheep (which is clearly prehistoric)—and could represent the numbers 90 or 06. The boulder does not seem to be in its original position, as it would have been awkward to peck the sheep glyph in its present position. The boulder may have been displaced by a road grader during construction of the adjacent roadbed.

PREVIOUS WORK: This site was monitored in FYs 91, 94, and 96.

STATUS AND RECOMMENDATIONS: In FY98, no new physical or visitor-related impacts were noted. The site is on a biennial monitoring schedule.

C:02:105 -- Inscription

SITE DESCRIPTION: This is a large Navajo sandstone alcove that contains the inscription "1889 Hislop," which is deeply pecked into a slanting 3 x 2 m slab that spalled off of the ceiling of the alcove. The inscription consists of large block letters 10 cm wide and 20 cm high, occupying an 85 x 50 cm area. The slab tilts downward to the east; the inscription is upside down to someone standing in the center of the alcove

looking west. The alcove opening is 48 m wide and 20 m high, with a depth of 16.5 m. There is no evidence of prehistoric use. There is a cleared area in the east half of the alcove and a piled rock/dry-laid wall at the far east side that were apparently constructed in the late 1960s by a resident hippie. There are modern slab-lined hearths near the opening on the east side also.

PREVIOUS WORK: This site was monitored in FYs 91, 94, and 96. In FY98, new photos were taken of a spiral petroglyph and another historic inscription "Hislop 1890" on the east wall of the alcove along the access route.

STATUS AND RECOMMENDATIONS: In FY98, no new physical or visitor-related impacts were noted. The site is placed on the inactive list. There are no ongoing impacts and the site is well above the area of potential effects.

C:02:106 – Camp

SITE DESCRIPTION: This site consists of a roasting feature, two sherds of unknown brown ware, a couple flakes, and a biface fragment on a dune/terrace slope beneath a Navajo sandstone outcrop/cliff. The roasting feature is ca. 2.5 m in diameter, and consists of cobble-size sandstone FCR oxidized to a dark gray and gray-white. No charcoal was seen, although some of the soil is slightly gray in appearance. Artifacts were sparse and eroding out of the sand; they included a Navajo sandstone chert flake, nicely thinned biface dart point/knife tip midsection, also of Navajo chert, a cortical flake of river chert, and two brown ware sherds that may either be Navajo or Southern Paiute.

PREVIOUS WORK: This site was monitored in FYs 91, 92, 93, 94, and 96.

STATUS AND RECOMMENDATIONS: In FY98, surface erosion is inactive. No physical or visitor-related changes are noted. A previous recommendation to obliterate the trail was reevaluated. The trail is a foot path along the Stanton Road and it does not cross the features or impact the remains. The site is monitored on a biennial basis.

C:02:108 – Rock Image

SITE DESCRIPTION: The site consists of a large sandstone boulder located on a dune-covered talus slope, with several stipple-pecked petroglyph elements on its south face. The rock art elements include seven sheep, a cross-like figure, an elongated anthropomorph, an amorphous blob, and a linear figure (11 figures total). The 1.5-meter wide panel is near the bottom of the boulder; the highest figure is ca. 60-70 cm above the present ground surface. The figures are somewhat faint, eroded, and repatinated. The sheep appear to be Glen Canyon Style 5, which has a Late Archaic temporal affiliation.

PREVIOUS WORK: This site was monitored in FYs 91, 94, and 96.

STATUS AND RECOMMENDATIONS: In FY98, no physical or visitor-related impacts were noted. The site is on a five year monitoring schedule.

C:02:110 – Isolated Roaster

SITE DESCRIPTION: This site is an isolated oval-shaped roasting feature measuring 2.20 m north/south by 1.75 m east/west. Burned stone elements are dominated by thin flat sandstone fragments and a lesser amount of Shinarump Conglomerate chunks. An area of charcoal staining is evident in the northeast quadrant of the feature. Also in this area are several buried upright stone elements, indicating that the feature is slab-lined. Intact buried deposits of charcoal are suggested. Several fire-burned stones have been displaced from the central feature probably by cattle. No other features or artifacts are associated.

PREVIOUS WORK: This site was initially recorded, total station mapped, and monitored in FY98.

STATUS AND RECOMMENDATIONS: The site is generally stable. Cattle have displaced some stones from the feature. No visitor-related impacts were noted. The site is on a biennial monitoring schedule.

C:03:003 – Trail

SITE DESCRIPTION: The site consists of a modern trail built during the time of the initial construction of Glen Canyon Dam. It runs for about ¼ mile along the river corridor. For much of its length retaining walls have been built of sandstone masonry and back-filled with earth to create a level path averaging 3.3 m in width. At the southern terminus a series of masonry steps were constructed, which provide access to a broad flat area of slickrock. At the far end of this slickrock platform is a wooden electric pole, part of the Lees Ferry power line. The trailing was done as part of the development for a proposed marina below the dam site, a project that never came to pass.

PREVIOUS WORK: This site was monitored in FYs 91, 93, 94, and 96. Condition and stabilization needs assessments were conducted in FY98.

STATUS AND RECOMMENDATIONS: In FY98, active arroyo cutting and bank slumpage are occurring. The retaining wall at the east end of the trail has collapsed down the talus slope. Animal burrowing and vegetation growth are now impacting the trail bed. Toward the west end of the trail, bank slumpage has increased and is reaching the trail margin. At the west end of the trail, eolian deposition has increased as much as 50 cm, filling the top rizer. The wall on the west end of the trail exhibits differential fill levels of eolian sand behind the wall. Stabilization assessments (see Chapter IV) suggest that building retaining walls to shore up the trail would be a viable option for preservation. The site should be monitored every 5 years.

C:03:004 – Rock Image
SITE DESCRIPTION: The site consists of a prehistoric petroglyph panel ca. 10 m long and 1 m in height at the base of a Navajo sandstone cliff atop a talus slope. The 15 figures probably represent Glen Canyon Style 5, a Late Archaic rock art type. The figures are solid-pecked and stippled, and consist of sheep and anthropomorphs and other stylized elements. There is light to medium repatination, with spalling occurring at the top of the panel, possibly obliterating previous glyphs. No associated artifacts were found. Many of the figures appear to have been "re-worked," with vague outlines that are difficult to discern. There are better rock art examples downstream.

PREVIOUS WORK: This site was monitored in FYs 91, 94, and 96.

STATUS AND RECOMMENDATIONS: In FY98, surface erosion of the panel remained inactive. No physical or visitor-related changes were noted. The site is on a four year monitoring schedule.

C:03:006 – Rock Image
SITE DESCRIPTION: The site consists of a large, southeast-facing sandstone cliff face petroglyph panel with 23 prehistoric elements and three historic inscriptions. The prehistoric elements include 10 anthropomorphs, seven sheep, one so-called elk (probably a deer), one handprint, one circle with rays, two unidentified mammals, and one line with vertical hatching. Historic inscriptions include "A.M.", "A", and "H. Smith". The panel is in fair condition, having been vandalized by abrasive scratches, new "fake" elements, and bullet holes (impacting the sheep), plus erosion. There are several recent names as well. All prehistoric elements are pecked Glen Canyon Style 5, a late Archaic representation.

PREVIOUS WORK: This site was monitored in FYs 91, 94, and 96.

STATUS AND RECOMMENDATIONS: In FY98, no physical changes were noted. Trailing has decreased, although there are recent foot prints. The site is on an annual monitoring schedule.

VII. Management Actions Completed in FY98

Management actions planned for FY98 included three various activities, monitoring, total station mapping, and remedial actions.

A. Monitoring

Monitoring activities include four components: site selection, scheduling, field and laboratory methods, and photographic documentation.

Site Selection

The intent of the Monitoring Plan is for sites to be visited to the minimal extent necessary in order to identify and prevent erosional processes and visitor-related impacts. Given the monitoring data base generated to date, patterns of continuing impacts have been established, and based on that patterning, beginning in FY95, recommendations concerning the cycle of monitoring at specific locations were adhered to. The recommendations include monitoring only those that are actively eroding or receiving visitor-related impacts based on continuing observations and on the results of a consultation trip conducted on July 25, 1994 with representatives from the Navajo Nation Historic Preservation Department concerning locations on Navajo Nation lands. But, the monitoring plan holds that there is flexibility in cases of site impacts such as intense local seasonal monsoon rains and debris flows caused by them.

The NPS has developed site selection criteria that justify six monitoring schedule categories, discussed below. The criteria are based most importantly on whether erosional impacts are related to river fluctuations and/or dam operations. Lesser issues for site selection include erosion not related to the river or dam, visitor-related impacts such as graffiti on rock art panels, visibility of the sites from the river or trails, and proximity of sites to heavy use areas.

Site Monitoring Schedules

The Glen Canyon NRA GCMRC monitoring program includes 54 sites. Appendix D lists monitoring schedules for all sites. The monitoring schedule categories are defined, and the number of locations assigned to each category follow:

> Semi-annual Monitoring. One site is being impacted by extensive visitor traffic, over 40,000 people per year. A semi-annual monitor schedule, twice per year, is recommended. Episodes will be conducted prior to and following the visitor season.
>
> Annual Monitoring. Sites (N = 12) that are currently being impacted by river fluctuations or dam operations will be monitored annually;

Biennial Monitoring. Sites (N = 15) that are being impacted by erosion not related to river fluctuations or dam operations will be monitored biennially, every 2 years. Included are locations containing recent graffiti, locations visible from the river or trails, and locations near visitor-related impact areas;

Monitoring 3-5 Years. Sites (N = 18) that are stable or not being impacted by river fluctuations, dam operations, other erosion, or visitor-related impacts will be monitored every 3 years initially, and if warranted, less frequently in the future;

Inactive Monitoring. Sites (N = 4) that are in stable condition but are located in areas where there is a slight potential for change. These sites are usually in pristine condition and are located around the 300,000 cfs level. These sites will be monitored on an as-needed basis.

Discontinue Monitoring. Past monitoring episodes have shown that certain sites (N = 4) do not need to be monitored. These sites may be reassessed and possibly placed on the inactive monitoring list.

In Reach 0, 41 sites were scheduled for monitoring in FY98, including those assigned to the semiannual (N=1), annual (N=12), and biennial schedules (N=28). A newly-recorded site was also monitored, totalling 42 sites.

Field and Laboratory Methods

In Reach 0, sites are accessible by boat on day trips. Thirteen days were required to perform the monitoring activities. The day trips are opportunities for signatories wishing to travel between Lees Ferry and Glen Canyon Dam. Field personnel consisted of one project archaeologist, one or two archaeological technicians, and several volunteers. Site monitoring involves the in-field assessment of site conditions and documentation of impacts through photographic means and the completion of the monitoring form.

The monitoring form developed in FY94 is modified as the need arises, and is used to record physical and visitor-related impacts. This is a compilation of qualitative observations that represent current site conditions. The form records information concerning physical and visitor-related impacts and presents site-specific management assessments and recommendations.

Locations of impacted features are noted on both the monitoring forms and sketch maps. Current condition/previous condition assessments are based on comparisons of monitoring forms and photographic records. When conditions change, the new condition is recorded with photography and on monitoring forms. This way, changes through time are observed and impact trends are identified.

Beginning in FY98, data compiled on monitoring forms was entered into ACCESS, and statistics were generated from SYSTAT statistical analysis software. For Reach 0, raw field data, photographs, and negatives are stored at Glen Canyon NRA. Photographic information is archived using the Glen Canyon NRA photo documentation system.

B. Total Station Mapping

Total station mapping serves as a form of detailed baseline archaeological information that can also be used to record erosional information. In Reach 0, 27 sites are currently in the total station mapping program (Table 10). Maps have been completed for 16 sites, while 10 sites remain to be mapped. One site, AZ C:02:011, is partially mapped. In FY98, maps were completed at seven sites, and AZ C:02:011 was partially mapped, by Chris Brod of the GCMRC. These included Features 5, 6, and 14 at C:02:011, C:2:050, C:02:057, C:02:072, C:02:083, C:02:099, C:02:100, and the newly recorded C:02:110.

Table 10. Sites Recommended for Total Station Maps within Glen Canyon NRA. (N = 27)

Completed Fiscal Year 94	Completed Fiscal Year 95	Completed Fiscal Year 96	Completed Fiscal Year 98	Sites still to map
C:02:032	C:02:071	C:03:010	C:02:011, Features 5, 6, 14	C:02:011, Features 3, 21
C:02:035	C:02:073		C:02:050	C:02:013
C:02:038	C:02:075		C:02:057	C:02:039
C:02:081	C:02:077		C:02:072	C:02:040
			C:02:083	C:02:060, Feature 7
			C:02:099	C:02:078
			C:02:100	C:02:079
			C:02:110	C:02:080
				C:02:084
				C:02:087
				C:02:088

C. Remedial Actions

The monitoring program has documented both beneficial and harmful impacts to cultural resources. By far, most impacts have been harmful. Remedial actions are performed at sites based upon previous results of the monitoring program and recommendations from participating tribes. For adverse impact situations, measures are taken to slow the erosion or remove cultural material before it is destroyed.

Remedial actions include the removal or redirection of trails, planting vegetation, installing check dams, artifact collection, mapping, subsurface testing and excavation.

Developing a site for public interpretation, closing a site to the public, and no action based on traditional cultural values are also options.

Due to varying degrees of site conditions, it is crucial to prioritize the needs of each site based on the degree of impact. Three priority ranks were subjectively established and assigned to sites needing remedial actions. Information used to prioritize the sites for remedial actions include the accumulated monitoring data, comparative photographic records, and the field archaeologist's opinions concerning relative need of the remedial actions.

For Glen Canyon NRA, Table 11 lists remedial actions at Priority 1 sites, and Table 12 lists remedial actions at Priorities 2 and 3 sites. For Reach 0, a revised work plan and budget was submitted to the Bureau of Reclamation on March 19, 1998. This revised work plan recommended the completion of remedial actions at all Priority 1, 2, and 3 sites within Glen Canyon NRA during the FY98 season. Remedial actions consisted of checkdam construction, trail work, stabilization activities, and planting vegetation at the sites on Tables 11 and 12.

Table 11. Remedial Actions Recommended at Priority 1 Sites.
(N = 8)

AZ Site Number	Recommendations
C:02:011, Feature 14	Plant Vegetation, Install Checkdam
C:02:038	Retrail, Obliterate Trail, Stabilize, Plant Vegetation
C:02:072	Plant Vegetation, Install Checkdam
C:02:076	Obliterate Trail, Install Checkdam
C:02:081	Retrail
C:02:091	Obliterate Trail
C:02:099	Install Checkdam
C:02:100	Plant Vegetation, Install Checkdam

Table 12. Remedial Actions Recommended at Priority 2 and 3 Sites.
(N = 9)

AZ Site Number	Recommendations
C:02:033	Stabilize
C:02:050	Retrail
C:02:057	Stabilize
C:02:060, Feature 2	Stabilize
C:02:060, Feature 4	Stabilize
C:02:086	Obliterate Trail
C:02:090	Obliterate Trail
C:02:106	Obliterate Trail
C:03:003	Stabilize

Trail Work

Within Glen Canyon NRA, six sites were recommended for trail obliteration (C:02:038, C:02:076, C:02:086, C:02:090, C:02:091, and C:02:106), and three sites were recommended for retrailing efforts (C:02:038, C:02:050, C:02:081) (Tables 11 and 12). Prior to conducting these activities, all sites were reevaluated as to the need of the remedial action. Trail work was not conducted at the following sites based on those reevaluations:

C:02:076: Trail obliteration was recommended. Trailing noted in previous monitoring episodes has been obscured by falling detritus.

C:02:081: Retrailing was recommended. Data recovery was conducted on this site in FY95 and the trail was upgraded in FY96 to provide more controlled access to C:02:038, the Descending Sheep Panel.

C:02:086: Trail obliteration was recommended. The trail has naturally been obliterated due to eolian deposition and plant growth.

C:02:090: Trail obliteration was recommended. Previous monitoring episodes have reported this trail. The footpath along the Stanton Road is on the next terrace below and does not cross the site.

C:02:106: The previous recommendation to obliterate the trail was reevaluated. The trail is a footpath along the Stanton Road and it does not cross the features or impact the remains.

At the following sites, trail work was completed as indicated:

C:02:038: Trail obliteration was recommended. Trails were obscured by covering with brush.

C:02:091: A small segment of the trail was noticeable. Placing local dry dead brush in the route to discourage foot traffic obliterated it.

At C:02:050, retrailing was recommended. An assessment of the situation prior to the work has been completed. Retrailing is a viable remedial action at this site. Two trails leading to Hidden Beach ¼ mile downstream of the site are present. One crosses the features, and the other is located on the bench below the site. Foot traffic can be redirected to the trail below the site by covering the trail through the site with locally available tamarisk and other brush. This work is being planned for later in the summer, FY98.

Revegetation

As Tables 11 and 12 indicate, planting vegetation as a remedial action has been recommended at four sites: Feature 14 at C:02:011; C:02:038; C:02:072; and C:02:100. Prior to the planting of vegetation at any particular site, the viability, methods, species, and seasonality issues were assessed through consultation with Glen Canyon NRA Botanist John Spence. The results of those assessments are as follows:

Feature 14 at C:02:011; C:02:072; C:02:100. Several observations were made: 1) The sites are on the south side of the Colorado River on the Navajo Nation; 2) the success of any revegetation program in this area would require the removal of cattle and discontinuance of grazing; 3) it would be possible to control the erosion of the side drainages through these sites by constructing berms or stock ponds up stream in the river-based drainages; 4) possible native species would include rice grass, eight weeks fescue, and sand dropseed; however, the cattle would simply eat

them; 5) more aggressive revegetation efforts might include placement of jute mats, transplanting cacti, and a seed mix specifically suited to the local sediments; 6) however, none of these efforts would produce long term remediation without the removal of cattle. Considering these issues, planting vegetation is not a viable remedial action at these sites.

C:02:038. Previous recommendations included increasing the density of cactus between the stone wall and the petroglyph panel to restrict visitor access to the panel. An assessment for planting vegetation was conducted and it is considered a viable remedial action. Locally available prickly pear and possibly a cholla from Lunch Beach downstream could be transplanted to further carpet the area between the stone wall and the panel. This would discourage foot traffic between the wall and the panel. This project could be conducted in concert with raising the wall as per recommendations of the Zuni Tribe. The best time of year to conduct the transplanting is prior to the summer monsoon season.

Checkdam Construction

As Table 11 indicates, checkdam construction was recommended at five sites within Glen Canyon NRA. A preconstruction assessment was conducted at each site to verify the need for the remediation. Twenty checkdams were built at four of the sites. At the fifth

site, C:02:099, the remediation was not necessary. The site is on a dune and has no gullies or arroyos impacting the artifacts. Impacts are limited to eolian surface erosion; therefore, no checkdams were built here.

Construction techniques and recording methods followed those outlined in Leap and Coder (1995). Materials used included locally available arroweed, tamarisk, and sandstone. Table 11provides summary data on the checkdams. At C:02:011, Feature 5 received three checkdams along one river-based stream, and Feature 14 received 7 checkdams along three river-based streams. At C:02:072, six checkdams were placed into six river-based streams. At C:02:076, one checkdam was placed into one terrace-based stream. At C:02:0100, three checkdams were placed into three river-based streams. All drainages were photographed prior to and following the construction of the checkdams. All checkdams were mapped with a total station following their completion.

Table 13. Summary of Checkdam Construction within Glen Canyon NRA, FY98.

River-Based ®/ Terrace-Based (T) Stream	Checkdam No.	Length x Width x Height (m)	General Description
C:02:011, Feature 14			
1 ®	1	2.80 x 0.30 x 0.20	Brush/Rock check
1 ®	2	1.70 x 0.60 x 0.25	"
2 ®	3	1.70 x 0.80 x 0.30	"
2 ®	4	2.00 x 0.80 x 0.30	"
3 ®	5	1.30 x 0.45 x 0.20	Brush/Rock liner
3 ®	6	5.00 x 0.70 x 0.20	"
3 ®	7	2.00 x 0.30 x 0.20	"
C:02:011, Feature 5			
4 ®	8	1.80 x 0.40 x 0.15	"
4 ®	9	1.80 x 0.50 x 0.20	"
4 ®	10	1.10 x 0.50 x 0.20	"
C:02:072			
1 ®	1	2.00 x 0.70 x 0.20	Brush/Rock liner
2 ®	2	1.50 x 0.85 x 0.20	"
3 ®	3	2.50 x 0.60 x 0.20	"
4 ®	4	3.50 x 0.70 x 0.20	"
5 ®	5	3.50 x 0.85 x 0.20	"
6 ®	6	2.20 x 0.45 x 0.20	"
C:02:076			
1 (T)	1	3.50 x 0.35 x 0.25	Brush/Rock liner
C:02:100			
1 ®	1	2.60 x 0.20 x 0.15	Rock check
2 ®	2	1.60 x 0.50 x 0.20	Brush/Rock liner
3 ®	3	1.80 x 0.60 x 0.20	Rock check

Pre-Stabilization Assessments

Prior to any hands-on stabilization work, the conditions and stabilization needs of structures need to be determined. In FY98 within Glen Canyon NRA, six structures at five sites were recommended for and received pre-stabilization assessments (Tables 11 and 12). Two assessments were conducted for each structure. A structure condition assessment documents the agents and types of deterioration of the interior and exterior exposures of wall foundations, midsections, and top courses; the roof; and other non-structural features. A determination of overall condition is made based on classifications defined for the List of Classified Structures (Fairchild 1993). The assessment makes a determination of the level of impact severity, again based on criteria listed for the List of Classified Structures (Fairchild 1993). Other applicable issues may include life safety and professional consultation.

A stabilization needs assessment determines maintenance activities for specific wall and roof areas, such as repointing and/or relaying masonry on the interior of an east wall. The assessment determines whether repair materials can be reused or whether they can be gathered nearby. If possible, the assessment estimates the repair time in person days. This information can then be used to generate a scope-of-work for specific problems at specific structures. Consultation with the signatories of the Programmatic Agreement, and in two cases with the Gap-Bodaway Chapter, would be necessary prior to any stabilization. The results of efforts in FY98 in Glen Canyon NRA are as follows:

C:02:033

Feature 2 is the deteriorated remains of a crude wet-laid granary below a limestone bedrock overhang. Only a portion of the feature remains. Prior to the FY98 monitoring episode, the wall segment was 90 cm long and up to 50 cm high, and was made of irregular limestone and sandstone rocks set in brown mortar. Prior to the FY98 monitoring episode, the wall segment appeared to be stable. During the FY98 monitoring episode on April 7, 1998, wall fall was evident. Two assessments were conducted, one a structure condition assessment, and the other an assessment of stabilization needs.

Condition Assessment Summary

General structure condition is considered to be poor, since significant features, such as other wall segments, are missing and since deterioration affects more than 25% of the structure (Condition criteria are based on condition definitions used in the List of Classified Structures [Fairchild 1993]). The single west wall stone element has collapsed, and the top south end of the east wall, including some 4-5 elements, has collapsed. Both the east and west wall segments have been impacted by structural deterioration due to wind and water erosion of the mortar.

Stabilization Needs

Before the west wall segment collapsed, it consisted of 1 stone mortared into the corner of the overhang. It could be easily relaid. The east wall segment could be replaced by relaying the 4-5 stone elements, which are lying in a drainage just beneath the wall. Original mortar can be reproduced by matching eroded mortar samples with local sediments. The extant wall segments can be repointed.

Work Plan

Five steps are necessary to complete the project, and would require six person days: 1) Determine mortar characteristics and locate local sources; 2) assemble water, mortar mix at site; 3) prestabilization recording; 4) relaying stones using earlier monitoring photographs; 5) post-stabilization recording.

Using existing stone elements and local mortar developed from extant mortar, the two wall segments could be relaid in 1 day with 3 people. One person-day will be required to

determine appropriate mortar matches, and 2 person-days would be required to complete documentation.

C:02:038

In FY92, a visitor retaining wall was built in front of the Descending Sheep Panel to deter visitors from touching or committing graffiti on the petroglyph panel. As part of the FY98 monitoring effort, condition and needs assessments were conducted.

Condition Assessment

The general condition is good. However, by stepping over and onto the retaining wall, visitors have caused stone elements to be displaced and collapsed.

Immediate action was taken to rebuild the retaining wall by dry-laying collapsed stone onto the wall. Material included reused and newly acquired sandstone. This was accomplished in 0.2 person-days.

C:02:057 – Feature 2

This site in on the Navajo Nation and consists of several structures including what appear to be lambing pens, a tent platform, and a dugout cabin. Associated activities include sheep herding and those associated with the nearby Lee's Backbone trail, the Stanton Road, and mining operations. Feature 2 is the dugout cabin, the primary habitation feature. It is a one-room, semi-subterranean structure constructed of wet-laid masonry and milled and hand-cut lumber. There are remnants of adobe mud plaster on the interior wall, and a stove is present near the north wall.

At the time of recording in 1991, approximately 70-75% of the exterior walls were standing, the ridge beam was in place, and a fair amount of roofing, consisting of logs with cut lumber as closing material, was in place. In FY94, Feature 2 exhibited loss of a piece of milled lumber from the south wall. The FY96 monitoring episode recorded human impacts. The roof material, milled lumber and roof beams, were removed from the roof and placed on the south side of the structure. Some of the south wall stone elements had also been removed or possibly collapsed due to structural failure. Again, two assessments were conducted, one to assess the condition, and one to determine stabilization needs.

Condition Assessment Summary

All interior and exterior wall surfaces exhibit mortar erosion, loose, or missing stones. All basal footings are on unconsolidated sediment and surface erosion has deteriorated them. The north and west walls exhibit differential fill levels, and along the north wall, this is causing it to lean inward to the south. The doorframe is leaning to the south as well. The south wall and roof exhibit structural collapse. The center ridge beam and

some north side roof beams are still in place. The southeast corner of the structure is leaning inward and collapse is eminent.

Reconstruction Needs

The south and east walls need relaying and repointing, and the entire roof needs to be rebuilt. Reusable repair masonry and roof elements are available on site, and an unamended mortar could be developed from local sediments to match the original. Water is available from the river, 240 m distant. It could be easily pumped to the site. An estimated 30 person-days would be required to complete the work. At this time, a scope-of-work has not been prepared. Consultation with all Programmatic Agreement signatories and with the Gap-Bodaway Chapter needs to be conducted prior to any stabilization effort.

C:02:060 – Feature 2

Feature 2 is on the Navajo Nation along the Stanton Road (C:03:060). It is a remnant masonry structure setting on the edge of the terrace overlooking Three Mile Bar. It is likely that the feature is related to the original building of the Stanton Road. At the time of recording in 1991, it was partially collapsed and measured 3.0 x 2.0 m. The size suggests a possible storage function. Previous monitoring episodes have recorded active erosion. Pre-dam floods have cut the river bank precariously close to the structure, and the recent fluctuating flows of FYs 95-98 have reestabilished bank slumpage, further indangering the site.

Condition Assessment Summary

The north side of the structure is adjacent to the river cutbank. Base coarse element loss is occurring to this side of the structure due to surface erosion and bank slumpage.

Stabilization Needs

Stabilizing this feature would involve the construction of a retaining wall on the north side of the feature. The wall would then be backfilled with approximately 100 cubic meters of sediment to form a stable surface on which reconstruction of the feature could be conducted. The stones of the feature could then be relaid. No mortar would be used; this is a dry-laid structure. A scope-of-work has not been completed. Consultation with Programmatic Agreement signatories and with the Gap-Bodaway Chapter needs to be conducted prior to stabilization.

C:02:060 -- Feature 4

Feature 4 is the Navajo Stock Gate along the Stanton Road. It is in use. Previous monitoring episodes have recorded its dismantling and reconstruction. The latest monitoring episode was in FY97 when it was noted that the gate had been closed.

Condition Assessment Summary

The stock gate walls are in fair condition with some loose stones in the midsection and top coarses. It is still performing its intended function. It is modified as needed by the local cattlemen and is not in need of stabilization.

C:03:003

This is the Bureau of Reclamation Trail built around the time of the construction of Glen Canyon Dam. Along much of its length retaining walls of sandstone masonry have been built and backfilled with sediment to create a level path averaging 3.3 m in width. At the southern terminus of the trail a series of masonry steps were constructed, which provide access of a broad flat area of slickrock above the Colorado River. The trail was built as part of the development of a proposed marina below the dam site, which was never built.

Previous monitoring episodes have recorded stone element loss along the retaining walls and colluvial erosion of sediment. A rockslide took out a small portion of the trail. The most recent monitoring episode in FY98 recorded an increase in arroyo cutting, bank slumpage, and alluvial deposition. The retaining wall at the east end of the trail has collapsed down the talus slope, taking the east end of the trail with it. Toward the west end, bank slumpage has increased and is reaching the trail margin. At the west end of the trail at the top of the steps, eolian deposition has increased as much as 50 cm, filling the top rizer. Active eolian deposition has increased behind the wall segments below the steps, causing differential fill pressure outward on the wall segments.

Condition Assessment Summary

The Bureau of Reclamation Trail is in good condition. In most areas the retaining walls and the culverts are performing their intended function. Two areas of concern are east of the steps and at the east end of the trail, where the retaining wall has collapsed due to bank slumpage. Active erosion of the trail is occurring in these areas.

Stabilization Needs

The top rizer could be repaired by filling the rizer cavity with the eolian fill deposited behind the wall segments below the steps. Removing this sediment would relieve the differential fill pressure on these wall segments. Masonry could then be wet-layed to repair the top rizer. The rizer could be repaired in 10 person-days using local materials and concrete to match the original.

To the east, the two bank slumpage areas would require construction of retaining walls more massive than the ones recently eroded away. It would probably have to be built of concrete and filled in behind to slow the loss of the trail and slope sediments. The amount of effort would be considerable, and would not guarantee success since the erosive agents would not be eliminated.

Newly-Recorded Site -- C:02:110

A previously unknown site was identified and recorded. The site is directly across the river from the downstream side of the boat launch area at Lees Ferry. It is located at the mouth of the drainage created by the contact of the Chinle Shale and the Shinarump Conglomerate. Lee's Backbone Road ascends this drainage. The site is an isolated oval-shaped slab-lined roasting feature. An area of charcoal staining is evident in the northeast quadrant of the feature along with several burned upright slabs. The feature contains buried intact charcoal deposits and possibly information useful in determining subsistence practices. Therefore, it is considered eligible for nomination to the National Register of Historic Places. The site has been impacted somewhat be cattle trampling, which has displaced several of the surface stone elements. The site was mapped using a total station.

ARPA Damage Assessment

One site, C:02:095, exhibited criminal vandalism. The site is described in Chapter III. On April 7, 1998, Glen Canyon NRA Archaeologists Tim W. Burchett, Joe Garrotto and Dennis Peebles were monitoring sites in the vicinity of Lees Ferry, Arizona. Vandalism was noted underneath the overhang. The evidence of vandalism included a pot hole, a backdirt pile, and recent foot prints. Burchett noted the vandalism from outside the overhang, and did not enter. Burchett immediately contacted Joe Sumner, Glen Canyon NRA Criminal Investigator, and Lees Ferry Subdistrict Mike McGinnis and waited for their arrival. A preliminary investigation was conducted to gather evidence concerning the vandalism, including recovering casts of the foot prints and a grayware sherd.

On April 29, 1998, Burchett and McGinnis conducted a follow up data recovery program at the site to record and recover materials from the looted area. The following observations and steps were conducted:

1. Photo documentation of the existing condition.
2. Establishment of horizontal and vertical control by placement of a north/south baseline west of the looted area and a vertical datum.
3. Map drawn of disturbance. A pit measuring 68 cm x 1.1 m x 15 cm deep was noted. Sediment from this pit formed a backdirt pile measuring 40 cm x 70 cm x 20 cm high. Total volume of disturbance was 0.1916 cubic meters.
4. Define two study units. Study Unit 1 was defined as the south portion of the disturbance area, the backdirt pile. Study Unit 2 was defined as the pit itself. The area of disturbance is at the base of a packrat midden containing animal bone. It is not known what if anything was removed.
5. Screen through 1/8 inch wire hardware sediment from Study Units 1 and 2.
6. Recovery of animal bone fragments from Study Unit 1, and animal bone fragments and two Moenkopi Corrugated sherds from Study Unit 2.
7. Photograph excavated study units.
8. Backfill excavated looted area and recontour.
9. Rephotograph recontoured area.

Major disturbance is noted at AZ C:02:095. Minor disturbances are those that show movement of sediment without evidence of the displacement or the removal of artifacts or features. Major disturbances are those that clearly show the displacement and/or removal of artifacts or features from their context. The data recovery program clearly showed that sherds were displaced from their original context. The bone fragments are not cultural, and are probably the result of packrat gathering.

In reference to ARPA (43 CFR Subpart A Section 7.4), specific prohibited activities conducted at site AZ C:02:095 include the following:

1) Excavation, noted by the circular shovel pit, associated backdirt pile, and disturbed areas of packrat midden
2) Damage and alteration of two sherds while digging, such as removing these artifacts from their primary context

The archaeological resources were damaged in violation of the Archaeological Resources Protection Act of 1979 (ARPA). The preliminary Archaeological Value of the violation is appraised at $5468.00, and the preliminary cost of Restoration and Repair is appraised at $3937.00. Since these values are over $500.00, the violation is a felony. Further investigation and final preparation of the damage assessment are ongoing.

VIII. Management Recommendations

A. Preservation Options

Trail Obliteration and Retrailing
In Reach 0, all sites thus far recommended for trailing obliteration and retrailing have either been reevaluated, or the remedial action has been completed.

Checkdam Construction
In Glen Canyon NRA, all sites thus far recommended for checkdam construction have either been reevaluated, or the remedial action has been completed.

Planting Vegetation
In Reach 0, increasing the density of cactus was previously recommended at C:02:038, the Descending Sheep Panel. This remediation was assessed as a viable option in consultation with John Spence, Glen Canyon NRA Botanist. Supplementing the existing prickly pear cactus planted in FY92 by planting more behind the rock wall will help to discourage visitor access to the panel. Locally available prickly pear and possibly a cholla from Lunch Beach downstream could be transplanted to carpet the area between the stone wall and the panel. This is in line with a 1996 recommendation from the Zuni Tribe.

Other Preservation Options
Other preservation options are recommended at C:02:038, the Descending Sheep Panel. The Zuni Tribe has recommended that the visitor wall in front of the panel be raised to further restrict visitor access. A wall consisting of multiple components could be built. The wall base would consist of the existing visitor wall with the addition of several more courses. Above that, a latticework of arroweed and tamarisk could be built. All materials are locally available.

B. Recovery Options

Recovery options are recommended when disturbances have the potential to remove cultural information and all possible methods to preserve site integrity have failed or are determined to be impractical. Options include testing, data recovery, and "other options". For FY99, eight sites are recommended for at least one of these recovery options.

Data Recovery
Data recovery is defined as complete excavation of an identified feature. One site is recommended for data recovery in FY99. Site C:02:075 should be excavated due to active bank slumpage, which is removing cultural material.

Testing
Testing involves the collection of radiocarbon and flotation samples from features that are rapidly eroding from a cutbank or steep slope. Determining that a feature is a positive cultural manifestation is another justification for testing. For FY99, three sites are recommended for testing: C:02:086, and C:02:099. They are all on the Navajo Nation. A scopes-of-work will be submitted to the signatories of the Programmatic Agreement for consultation to recover radiocarbon samples from features at these sites.

Other Recovery Options
Total station mapping for baseline erosional control is to conducted on the following five sites: C:02:011, Features 3 and 21; C:02:040; C:02:080; C:02:084; and C:02:088.

C. Summary and Recommendations

Due to varying degrees of site conditions, it is critical to prioritize the needs of each site based on the degree of impact. Four priority ranks are subjectively established and assigned to sites needing remedial actions. The four priority ranks are as follows:

No Action – No remedial action will occur until evidence is provided to justify the action, or when work has already been completed;

Extensive Impacts, High Priority – Remedial actions should be completed within the following fiscal year;

Moderate Impacts, Medium Priority – Sites with this priority rank are not endangered by any immediate impact, remedial actions should be implemented within two years;

Minor Impacts, Low Priority – Sites with this priority rank have minor impacts and remedial actions should be implemented within three years.

In Reach 0, the following remedial actions have been completed for all sites: Retrailing (except at C:02:050 as noted above), trail obliteration, and checkdam installation. Table 12 summarizes FY98 sites that received recovery recommendations, the types of impacts observed, and priority rank.

D. FY99 Work Plan

Trip Dates and Site List
In Reach 0, Glen Canyon NRA sites and those on the Navajo Nation are accessible on day trips from the dam. Table 14 lists the 19 sites selected for monitoring in FY99. Six day trips will be required to complete the monitoring. One, C:02:038, will be monitored twice, totalling 20 monitoring episodes. FY99 monitoring efforts will begin in the fall, FY98. Total station mapping is to be conducted on the following five sites: C:02:011, Features 3 and 21; C:02:040; C:02:080; C:02:084; and C:02:088.

Table 14. Sites Scheduled to be Monitored in FY99 in Glen Canyon NRA
(N = 19 sites)

Site Number				
C:02:011	C:02:012	C:02:032	C:02:035	C:02:038
C:02:041	C:02:050	C:02:072	C:02:073	C:02:075
C:02:077	C:02:078	C:02:083	C:02:095	C:02:099
C:02:100	C:02:102	C:02:0103	C:03:006	

Monitoring schedules have been reevaluated. Beginning in FY99, this reevaluation of monitoring schedules for sites in Reach 0 will reduce the yearly monitoring effort by approximately half. Emphasis is shifting away from the monitoring of physical and human impacts and conducting remediation at sites where that has been possible to data recovery and testing at sites where those are warranted.

Remedial Actions

For Reach 0, Table 15 lists the Priority 1 sites recommended for remediation in FY99. As designed by the FY98 Glen Canyon NRA revised scope-of-work submitted to Bureau of Reclamation, all sites thus far recommended for trail obliteration, retrailing, or checkdam construction have either been reevaluated, or the remedial action has been completed. Planting vegetation as a preservation measure was reevaluated as being unviable at three sites. This is a viable preservation option at C:02:038, and will be undertaken in FY99. Another viable preservation option at C:02:038 to be completed in FY99 is to raise the height of the visitor wall to further restrict access to the Descending Sheep Panel.

Following consultation with the signatories of the Programmatic Agreement, the wall segments at site C:02:033 will be stabilized as per the work plan in Chapter IV. Also listed on Table 15 are three Priority 1 sites designated for testing and/or data recovery: C:02:075; C:02:086; and C:02:099. Scopes of work for these projects will be submitted to the signatories of the Programmatic Agreement for consideration.

Table 15. Summary of FY98 Management Recommendations.
(N = 22)

Site	Schedule	Impacts	Recommendation	Rank
C:02:011	3	Active erosion, gullies, arroyos	Map	2
C:02:013	4	Inactive erosion, gullies	Map	3
C:02:033	4	Active erosion, gullies, structural collapse	Stabilize wall	1
C:02:038	2	Inactive erosion	Test, Upgrade wall, Plant vegetation	1
C:02:039	5 (5)	Inactive erosion	Map	3
C:02:040	5 (4)	Inactive erosion	Map	3
C:02:050	3	Active trailing	Test	2
C:02:053	5 (3)	Inactive erosion	Test	3
C:02:060	5 (5)	Active bank slumpage	Map	3
C:02:072	3	Inactive erosion	Data recovery	3
C:02:075	3	Active arroyos, bank slumpage	Test, Data recovery	1
C:02:077	3	Inactive erosion, gullies, bank slumpage	Test	2
C:02:078	3	Active erosion, gullies	Map, Data recovery	2
C:02:079	5 (4)	Inactive erosion	Map	3
C:02:080	5 (4)	Inactive erosion, gullies, arroyos	Map	3
C:02:082	5 (3)	Inactive erosion	Test	3
C:02:084	5 (4)	Inactive erosion, gullies	Map	3
C:02:086	4	Active erosion	Test	1
C:02:087	5 (4)	Active gullies, inactive erosion, arroyos	Map	3
C:02:088	4	Inactive erosion, gullies	Map	3
C:02:099	3	Active erosion	Test	1
C:02:100	3	Inactive erosion	Data recovery	3

X. Appendices

A: River Corridor Archaeological Site Monitoring Form

B: Grand Canyon National Park
Sites monitored in FY98 with Monitoring Schedules

FY98 Site Monitoring Schedules

Semiannual Sites (4)

Site Number
C:09:050
C:13:099
C:13:371
G:03:003

Annual Sites (26)

Site Number
A:15:005
B:15:138
C:02:094
C:02:096
C:02:098
C:09:051
C:13:006
C:13:010
C:13:070
C:13:098
C:13:100
C:13:273
C:13:291
C:13:321
C:13:339
C:13:343
C:13:347
C:13:349
C:13:389
G:03:004
G:03:020
G:03:026
G:03:041
G:03:064
G:03:072
G:03:080

Biennial Sites (26)

Site Number
A:15:003
A:16:004
A:16:167
A:16:174
A:16:180
B:09:317
B:11:272
B:14:093
B:14:105
C:02:097
C:02:101
C:09:052
C:13:007
C:13:327
C:13:338
C:13:348
C:13:355
C:13:359
C:13:386
G:03:024
G:03:030
G:03:038
G:03:040
G:03:043
G:03:044
G:03:058

3 to 5 Year Sites (22)

Site Number
A:15:020
A:15:026
A:15:035
A:15:048
A:16:148
A:16:151
A:16:159
A:16:163
B:09:314
B:09:316
B:10:225
B:14:107
B:15:119
C:09:072
C:09:084
C:13:323
C:13:325
C:13:336
C:13:354
G:03:033
G:03:052
G:03:065

Inactive Sites (14)

Site Number
A:15:004
A:16:155
A:16:160
A:16:171
B:10:261
B:11:275
C:05:004
C:05:039
C:06:005
C:13:322
C:13:384
G:03:006
G:03:042
G:03:083

Discontinue Sites (7)

Site Num ber
A:15:001
A:15:044
A:16:173
C:02:089
C:06:003
C:09:083
C:13:005

C: Grand Canyon National Park
Table of all Sites with Total Station Maps Completed

Fiscal Year Baseline Map Completed	Site Number
FY95 N = 5	A:15:003
	A:15:021
	A:16:004
	G:02:100
	G:03:004
FY96 N = 21	A:15:005
	A:15:030
	A:15:031
	A:15:032
	A:16:180
	B:15:126
	B:15:143
	C:02:096
	C:13:365
	C:13:371
	G:03:002
	G:03:003
	G:03:024
	G:03:025
	G:03:026
	G:03:027
	G:03:028
	G:03:040
	G:03:058
	G:03:059
	B:11:272
FY97 N = 34	A:16:156
	B:10:121
	B:10:230
	B:10:236
	B:14:107
	C:02:101
	C:09:050
	C:09:051
	C:09:058
	C:09:080
	C:13:006
	C:13:069
	C:13:098
	C:13:099
	C:13:100

FY97 Cont.	C:13:273
	C:13:321
	C:13:327
	C:13:338
	C:13:343
	C:13:346
	C:13:347
	C:13:348
	C:13:349
	C:13:356
	C:13:359
	C:13:367
	C:13:381
	G:03:019
	G:03:038
	G:03:041
	G:03:072
	C:09:052
	C:13:384
FY98 N = 15	A:15:017
	A:15:033
	A:16:149
	B:15:121
	B:15:132
	B:15:138
	C:02:098
	C:13:010
	C:13:070
	C:13:291
	C:13:339
	G:03:020
	G:03:030
	G:03:055
	G:03:064

D: Glen Canyon National Recreation Area
All Sites Monitored and Monitoring Schedules

Semiannual Sites (N = 1)

C:02:038					

Annual Sites (N = 12)

C:02:011	C:02:032	C:02:050	C:02:072	C:02:075	C:02:077
C:02:078	C:02:083	C:02:095	C:02:099	C:02:100	C:03:006

Biennial Sites (N = 15)

C:02:012	C:02:013	C:02:033	C:02:035	C:02:037	C:02:041
C:02:073	C:02:076	C:02:086	C:02:088	C:02:102	C:02:103
C:02:104	C:02:106	C:02:110			

3-5 Year Sites (N = 18) Numbers in parentheses indicate specific-year monitoring schedules.

C:02:039 (5)	C:02:040 (4)	C:02:053 (3)	C:02:056 (5)	C:02:057 (5)	C:02:060 (5)
C:02:070 (3)	C:02:071 (3)	C:02:074 (5)	C:02:079 (4)	C:02:080 (3)	C:02:082 (4)
C:02:084 (4)	C:02:087 (4)	C:02:090 (5)	C:02:108 (3)	C:03:003 (5)	C:03:004 (4)

Inactive Sites (N = 4)

C:02:036	C:02:058	C:02:059	C:02:105		

Discontinue Sites (N = 4)

C:02:048	C:02:081	C:02:091	C:03:010		