

**1997 Summary Report:
Archaeological Site Monitoring and Management
Along the Colorado River
Corridor in Grand Canyon National Park
(Cooperative Agreement 8210-97-002)**

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Abstract

This 1997 Summary Report, reviews archaeological site monitoring, impact assessment and remedial actions conducted during fiscal year 1997 (October 1, 1996 - September 30, 1997). The River Corridor Monitoring Project identifies and assesses physical and visitor-related impacts to Colorado River corridor cultural resources as outlined by the Programmatic Agreement and the Historic Preservation Plan for the operations of Glen Canyon Dam.

Monitoring results, recommendations and impact assessment data are outlined for each of the 97 unique sites monitored in FY97. Management recommendations based on monitoring data led to the implementation of remedial work at 57 sites. Total station mapping, repeat photography and medium format archival photography were also employed by the project this year.

The FY98 work plan summarizes the upcoming field season and schedule. Recommendations for remediation measures, monitoring form changes and possible additional monitoring techniques are also discussed.

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I. Introduction

With the end of the fiscal year, the National Park Service (NPS), in cooperation with Northern Arizona University (NAU), completed its sixth year of monitoring cultural resources affected by the operations of Glen Canyon Dam. Fiscal year 1997 (FY97) is also the third year that remedial actions have been conducted to mitigate adverse impacts to archaeological sites along the river corridor. This year-end 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), and synthesizes the fiscal year's monitoring results.

Since 1992, NPS monitors have observed physical and visitor-related impacts to a sample of the 475 archaeological sites recorded during the 1990-91 inventory (Fairley et al. 1994). To-date, 336 of the sites impacted or potentially impacted by river flows have been monitored in the field at least once (294 of which are in Grand Canyon). A monitoring schedule has been assigned to each site, with more frequent visits to sites severely eroding or subject to ongoing damage from visitors. In FY97, monitoring was conducted at 97 sites. The seven sites on a semiannual monitoring schedule were visited twice, for a total of 104 monitoring episodes. Work was accomplished during four river trips in October and November of 1996 and February and April of 1997. Chapter II discusses the physical and visitor-related impacts observed during these trips.

Two new sites were recorded this fiscal year. Site B:15:138, a prehistoric roasting feature with a light artifact scatter, has been subjected to visitor-related impacts and was added to the annual monitoring list. Site C:13:486, a prehistoric artifact scatter, is fairly stable and will be monitored again in five years.

At those sites with adverse impacts, remedial actions were performed in FY97 to mitigate the effects of the identified impacts. Mitigative measures fall into two categories: preservation options and recovery options. Preservation options are actions intended to reduce site impact or assist in site preservation. Examples of preservation options are planting vegetation or rerouting trails. Recovery options are actions intended to protect site integrity or recover data before it is lost. Examples of recovery options are surface collection, testing or data recovery. In FY97, 66 remedial actions were conducted at 57 sites along the river corridor. These included building checkdams at 21 sites, conducting trail work at 21 sites, planting vegetation at one site, and performing other stabilization work at two sites. Also this year, five sites received data recovery at selected features. See Chapter IV for a detailed discussion of remedial work accomplished in FY97.

A new project, involving medium format photography of rock images within the river corridor, was completed. Discussions with Programmatic Agreement (PA) signatories and Grand Canyon Monitoring and Research Center (GCMRC) personnel resulted in approval to photograph prehistoric and historic rock images with a medium format (6 x 7 cm negative) camera. Photographs were taken in order to have a visual record of the elements before they deteriorated further. Some of the sites with rock images were also experiencing visitor-related impacts. Nineteen sites were chosen for medium format photography, which was conducted during the 97-3 monitoring trip. Total station maps were completed at 43 sites. These sites were either within the control group,

monitored annually or semi-annually, or scheduled to receive remediation. The total station maps are more accurate than the original survey site maps, allowing for detection of small-scale change (.25 meter contour intervals), and can be used to compare erosional change through time. To-date, 68 sites have been mapped with a total station.

Various Programmatic Agreement (PA) signatories accompanied NPS archaeologists on the downriver field trips. Representatives from the Hopi Tribe, Zuni Pueblo, Hualapai Tribe, Bureau of Reclamation (Reclamation), Western Area Power Administration, and the GCMRC were among the trip participants. The River Corridor Monitoring Project (RCMP) gratefully acknowledges and appreciates their assistance. The Zuni Conservation Team was especially helpful with their supervision of the erosion control work.

Project staff participated in several professional/public outreach events during FY97. In March 1997, the George Wright Society held its 9th Conference on Research and Resource Management in Parks and on Public Lands in Albuquerque, New Mexico. The session was held entitled "Below the Dam: An Experiment in Partnerships for Management of Cultural Resources Along the Colorado River Below Glen Canyon." RCMP personnel were among the presenters at this session, along with representatives from Grand Canyon National Park, Reclamation, U. S. Geological Survey, NAU, the Hopi Tribe, Zuni Pueblo, Navajo Nation, Hualapai Tribe, and the Southern Paiute Consortium. RCMP personnel also participated in the 1997 Arizona Archaeology Expo in Coolidge, Arizona in March 1997. Members of the public had an opportunity to learn about the natural and cultural resources within Grand Canyon National Park and along the Colorado River at this outdoor exhibit.

The scope of work for FY98 includes monitoring, remedial work, and total station mapping (see Chapter V). One hundred and four sites will be monitored in FY98. Thirteen sites are listed as high priority for preservation work, and ten for recovery work. If time and budgetary constraints arise, the most critical areas will be selected for remedial work.

II. Impacts to Cultural Resources

Cultural resources in the river corridor are threatened by the existence and operation of Glen Canyon Dam. Each year, 66 million tons of sediment is trapped behind Glen Canyon Dam. This lack of sediment below the dam has, in effect, reduced the magnitude of deposition compared to predam times (Collier et al. 1996). After 1963, the disruption of beach building floods and lack of predam sediment deposition created new erosion variables, thus accelerating the erosion of archaeological sites in the river corridor. The disappearance of large, sediment-laden floods, baselevel lowering of the river, rainfall, eolian activity, and mass wasting are all factors attributed to the accelerated physical erosion of archaeological sites in the corridor.

Since 1992, monitors have collected data identifying which physical and visitor-related impacts are present, absent, increasing or decreasing. This information is used for the development of monitoring schedules and implementation of remedial actions. This year, 97 unique sites were monitored, seven on a semiannual schedule, for a total of 104 monitoring episodes. Ninety-two percent of these episodes revealed the presence of physical and/or visitor-related impacts.

The RCMP uses two forms of exploratory data analysis to view and present the monitoring dataset. Eight physical and five visitor-related impact variables are identified in the monitoring form. Frequency tables display the presence and absence of impact types, and are a numeric representation of the data set.

A. Physical Impacts

The project identifies eight key physical impacts with the potential to alter the integrity of cultural resources located along the river corridor. Impacts include erosional processes induced by dam operations, river flow, rain, wind, gravity, and animal activity. Impacts which may be directly related to dam operations include bank slumpage, gullying and arroyo cutting in locations where drainage systems are actively changing to achieve the dam-induced, lowered river baselevel.

Physical impact categories consist of the following: surface erosion, gullying, arroyo cutting, bank slumpage, eolian/alluvial erosion or deposition, side canyon erosion, animal-caused erosion, and "other." Surface erosion includes any and all sheetwashing, channelling, or rilling from the modern surface level to a depth of ten centimeters. Gullies, channels or trenches, extend ten centimeters to one meter below the modern ground surface. Entrenched gullies can become arroyos, channeling over one meter below the surface. Bank slumpage refers to the collapse or deflation of sediments along the Colorado River bank or other prominent drainage systems. Eolian sediments are eroded or deposited by wind action. The flow of running water directs alluvial processes. Side canyon erosion includes debris flows and rain-induced flash flooding from canyons draining into the Colorado River and adjacent to cultural resources. Animal-caused erosion includes digging, burrowing, nesting, trailing, or unearthing resources. The "other" category is reserved for the identification of impacts not previously defined or regularly encountered by monitors, such as rock spall onto features or vegetation growth uprooting cultural materials.

Eighty-nine percent of the sites monitored in FY97 had some form of physical impact. This percentage remains consistent with physical impact data recorded in FY96, although the sites sampled are slightly different. Surface erosion continues to be the most commonly observed impact to archaeological sites. In FY97, 62% of the monitoring episodes recorded the presence of surface erosion at cultural resources. The remaining impacts in rank order are: animal-caused (51%), gullyng (41%), eolian/alluvial deposition or erosion (35%), "other" impacts (25%), bank slumpage (24%), arroyos (23%), and side canyon erosion (15%). The same rank order was present in the FY96 data. Table 1 outlines the frequencies and percentages of physical impact types.

Table 1. Frequency of Physical Impact Types in FY97.
(N = 104 Monitoring Episodes)

Physical Impact Types	Present		Absent	
	Freq.	Percent	Freq.	Percent
Surface Erosion	64	62	40	38
Gullyng	43	41	61	59
Arroyo Cutting	24	23	80	77
Bank Slumpage	25	24	79	76
Eolian/Alluvial Erosion or Deposition	36	35	68	65
Side Canyon Erosion	16	15	88	85
Animal-Caused Erosion	53	51	51	49
Other	26	25	78	75

Figure 1 shows the relative frequency of physical impacts (N = 484 observations). The 484 observations represent the actual number of times any physical impact was identified during regular monitoring activities. The figure represents each individual occurrence of physical impact observed during the fiscal year. It is important to note that more than one physical impact may be occurring at the same site or to the same cultural feature. Management recommendations and priority rankings for remediation are based on understanding why and how multiple impacts may be related. Identification of impacts is only the first step in protecting and preserving cultural resources.

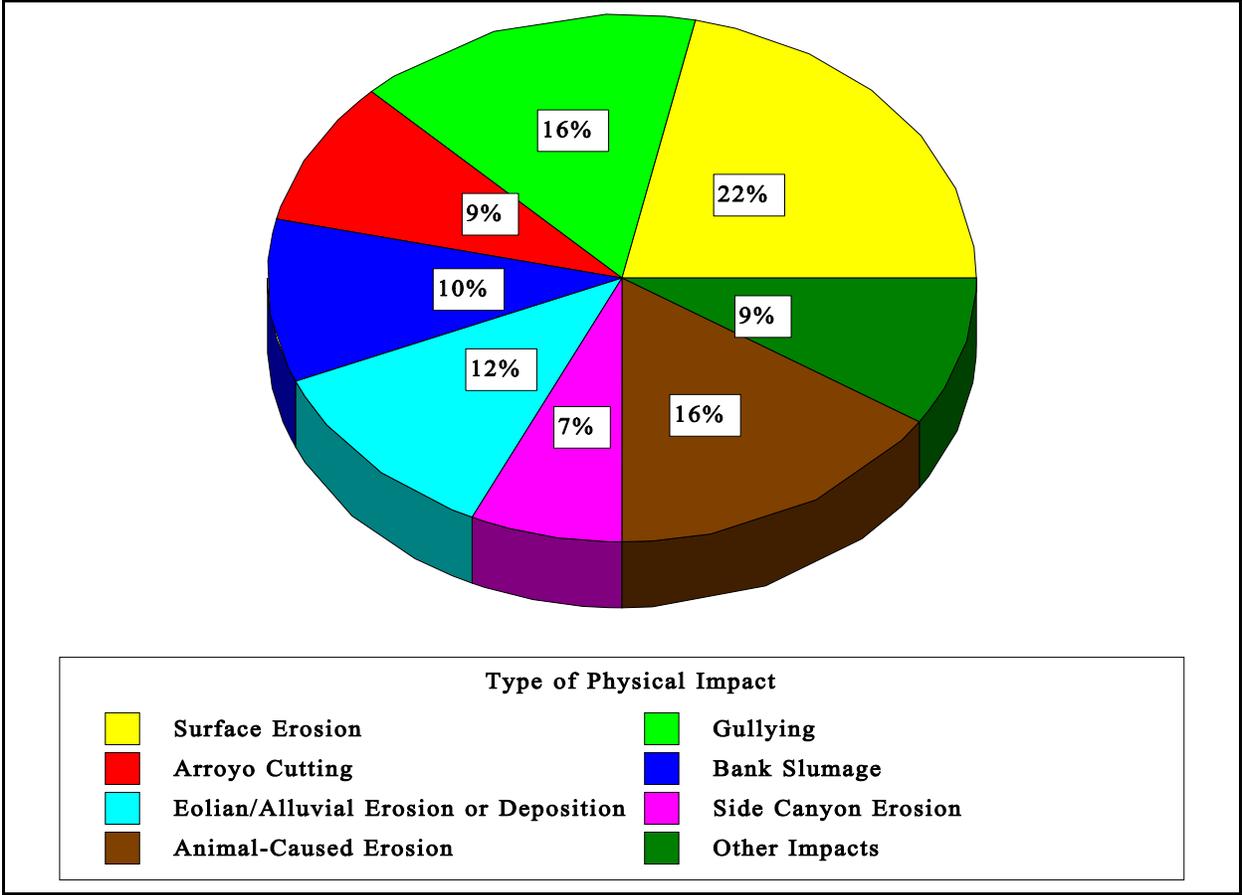


Figure 1. Relative frequency of physical impacts in FY97.
(N = 484 Observations)

Identification of on-site impacts leads to a better understanding of the nature and severity of observed impacts. Locational data aid managers in the formulation of a ranking of impacts on sites selected for remediation. Figure 2 shows the relative frequency of physical impacts to specific cultural features. The highest frequency of impact occurs at structures/storage features, artifact

scatters, and roasters/hearths. However, these features are the most commonly observed cultural features in Grand Canyon. The majority of impacts observed in FY97 were identified at sites located within Reaches 5 and 10. No physical impacts were observed at the rock image sites.

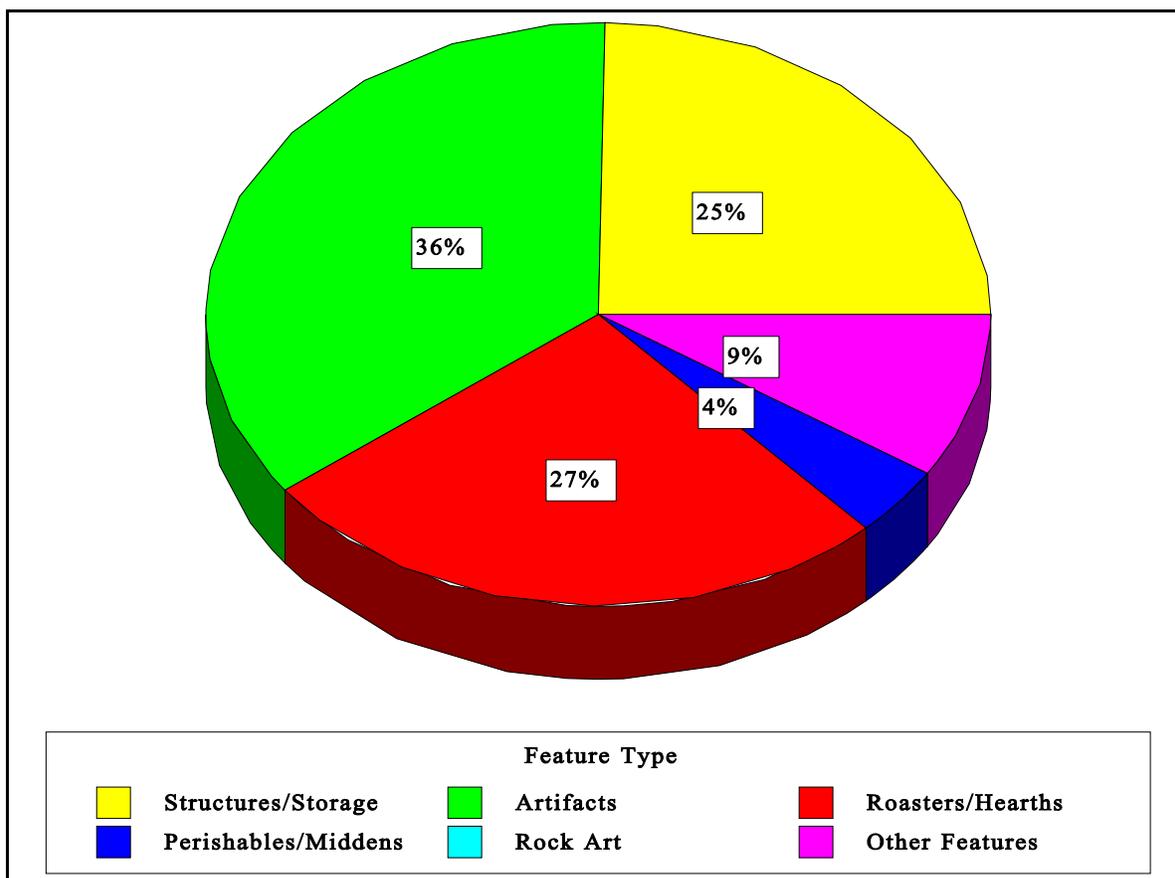


Figure 2. Physical impacts to features in FY97.
(N = 484 Observations)

Hereford et al. (1993) state that baselevel lowering of the Colorado River channel geometrically increases erosion in river-based drainage systems (arroyos that drain to the river). The postdam baselevel is three to four meters below the lowest predam level due to the elimination of annual flooding and a six-fold loss of sediment load (Hereford et al. 1993). When drainage systems impacting site features drain into the river, it is assumed that the lowering of the river baselevel due to dam operations directly affects the adjacent cultural resources. River-based channels have the potential to directly impact site integrity. Thirty-five sites (34%) monitored in FY97 have river-based drainage systems.

In the absence of replenishing sediments from regular flooding in Grand Canyon, erosion along terrace-based drainages (drainages that do not reach the river) can also be associated with the existence of Glen Canyon Dam. Terrace-based systems are oftentimes the most active, having the greatest potential for sediment loss (Hereford et al. 1993).

Table 2 outlines the frequency of increased physical impacts based on impact category and site feature. The total number of increases equals 170 observations and is a subset of the total FY97 monitor data representing only identified impact *increases*.

Table 2. Frequency of Increased Impact Episodes
at Sites Monitored in FY97.
(N = 170 Observations)

Physical Impact Types	Site Features						Total Row	Percent Row
	Structures /Storage	Artifacts	Roasters /Hearths	Perishables /Middens	Rock Art	Other		
Surface Erosion	10	12	10	1	0	2	35	21
Gullyng	6	10	9	0	0	2	27	16
Arroyo Cutting	2	4	3	0	0	2	11	7
Bank Slumpage	10	9	7	1	0	6	33	19
Eolian/Alluvia l Erosion or Deposition	7	10	7	1	0	4	29	17
Side Canyon Erosion	2	1	1	0	0	0	4	2
Animal-Caused Erosion	5	9	9	1	0	2	26	15
Other Impacts	1	2	2	0	0	0	5	3
Total Column	43	57	48	4	0	18	170	
Percent Column	25	34	28	2	0	11	100%	

4-27-96

Figure 3. The confluence of a river-based drainage impacting C:13:099. The 45,000 cfs flow (Spring 1996) deposited sediment along the shoreline, plugging the drainage.

10-5-96

Figure 4. After six months, the river-based drainage has cut through the new sediment draining to the river.

Increases in previously identified impacts alert monitors to active changes on-site. The identification of increased impacts leads to detailed site and impact assessment. After assessment, remediation measures may be implemented to curtail further site degradation or a loss of site integrity. Chapter IV outlines the remediation measures completed in FY97. Increased surface erosion continues to be the highest ranking type of impact at 21% of the total sites. Bank slumpage also shows increases at 19% of the sites. The remaining increased impacts in rank order include eolian or alluvial deposition or erosion (17%), gullyng (16%), animal-caused erosion (15%), arroyo cutting (7%), other (3%), and side canyon erosion (2%).

Sixty-two sites (60%) experienced physical impacts since the last monitoring episode, and over one-half of the monitored sites exhibit new physical impacts since the last observation. This number has increased by 11% over FY96 data. Low rainfall since 1995, river corridor visitation, and actual monitoring schedules all contribute to understanding the rise in increasing impacts in Grand Canyon.

Though new impacts appear to be increasing over previous years data, increases may also be located on sites already heavily impacted.

B. Visitor-Related Impacts

The development of a commercial river-runner industry, in conjunction with private trips and backpackers, has caused visitor-related impacts to sites in the river corridor. Approximately 22,000 people raft annually through the Colorado River, camping on beaches that are in proximity to archaeological sites. Visitor-related impacts include both the intentional and unintentional disturbance of archaeological sites by human visitors. Visitor-related impacts include trails, collection piles, on-site camping, criminal vandalism, and an "other" category.

The frequency of visitor-related impacts is presented in Table 3. Fifty-two (50%) of the 104 monitoring episodes had one or more of the five visitor-related impacts identified above. In the previous years (1992-96), trails were also identified as the most frequently observed visitor-related impact. The trend continues, supported by 44 (42%) trail occurrences.

Table 3. Frequency of Visitor-Related Impact Types in FY97.
(N = 104 Monitoring Episodes)

Visitor-Related Impact Types	Present		Absent	
	Freq.	Percent	Freq.	Percent
Collection Piles	15	14	89	86
Trails	44	42	60	58
Camping on-site	4	4	100	96
Vandalism	2	2	102	98

Other	2	2	102	98
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As with the physical impacts observed this fiscal year, visitor impacts tend to affect artifact scatters, roasters/hearths, and structures/storage features most often. These features, however, are the most commonly occurring cultural features in Grand Canyon. Figure 5 illustrates the relative frequency of visitor-related impacts at the various feature types.

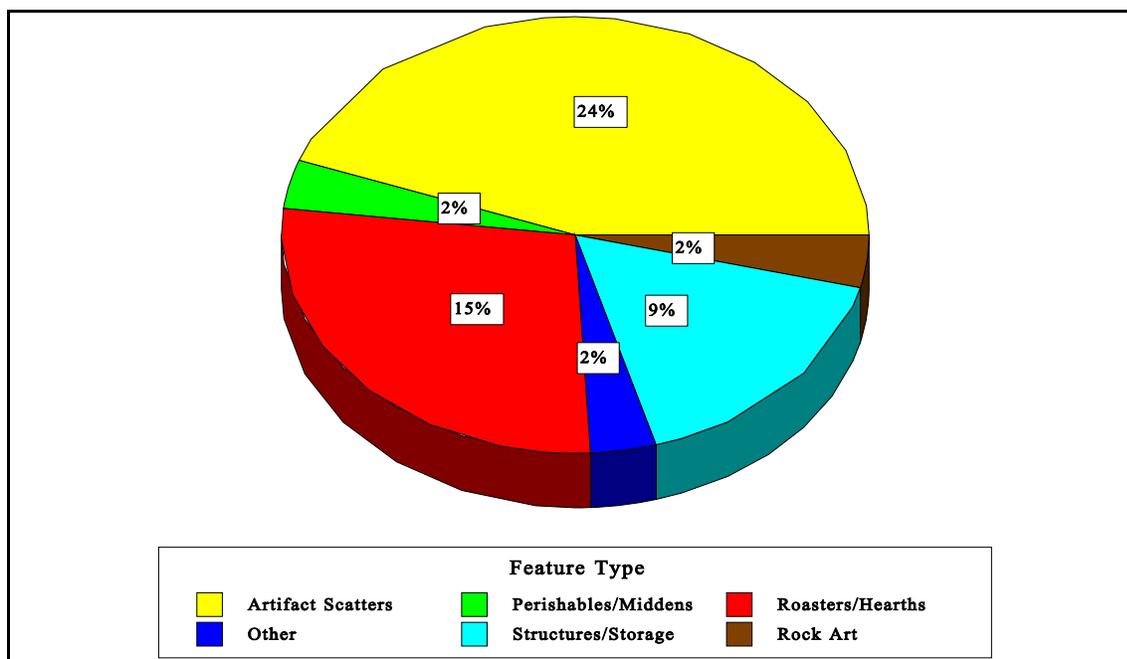


Figure 5. Visitor-related impacts to features in FY97.
(N = 56 Observations)

Visitor impacts are prevalent throughout the river corridor, however, concentrations were identified in Reaches 4, 5 and 10. These reaches have both a high site density and popular river camps, where layovers with time for exploration above the beaches is possible (i.e., Nankoweap, Palisades, Tanner and Granite Park).

C. Summary

Physical impacts were noted at 89% of the sites monitored in FY97. Over half of these sites displayed impacts since the last monitoring visit. Surface erosion continues to be the most frequently recorded physical impact and accounts for the majority of the increase in erosion. The types of cultural features receiving the greatest amount of disturbance include structures/storage features, artifact scatters, and roasters/hearths.

Half of the sites monitored in FY97 had some form of visitor-related impact. New visitor-related impacts were recorded at 21% of these sites. Trails to and through sites, and the formation of collection piles, were the most frequently occurring form of visitor-related impact. Artifact scatters and roasters/hearths are the cultural features most often disturbed by visitors.

Chapter Three outlines specific impacts observed and recommendations on a site by site basis. Recommendations to maintain the integrity of cultural resources threatened by physical and/or visitor-related impacts are discussed.

III. Site Specific Results and Recommendations

This section describes the individual sites monitored in FY97, in alphanumeric order. Previous work conducted at each site is summarized, along with frequency of monitoring. The current status of physical and/or visitor-related impacts at the sites are included, and recommendations made for additional work. More detail concerning remedial work performed in FY97 can be found in Chapter IV, Management Actions Completed in FY97. Some of the sites in the project area are included in the NPS trail crew monitoring program. In instances where dual monitoring occurs, the NPS reported any observed on-site changes to the RCMP.

A:15:005 -- Small Structure, Rock Images, Roasters

SITE DESCRIPTION: Locus A consists of red (hematite) pictograph panels on fallen, angular, limestone boulders. Locus B contains two expedient single-course stone walls against a cliff base with lithics, groundstone, and charcoal. Locus C consists of two roasting features. The site may be associated with late prehistoric-early historic Pai or Paiute use.

PREVIOUS WORK: This site was originally recorded in 1984 and was re-recorded by NPS survey personnel in 1991. The site was monitored in FY93, FY95 and FY96. A total station map of Locus B was completed in FY96 and trail work was conducted in FY97. Medium format black-and-white and color prints were taken of the pictographs at Locus A.

STATUS AND RECOMMENDATIONS: A narrow, terrace-based arroyo is located approximately five meters north of Feature 2. The headcut is about one meter deep but appears to be inactive. The gully north of Feature 1 is currently inactive. Additional fire-cracked rock is exposed at the northern site boundary.

A trail leading from the side drainage to the site is approximately 25 cm deep and shows signs of gullyng. A second trail taking off from the drainage and about five meters west of the previously mentioned trail, is steep and gravelly. The trails join at the top of the dune then multiply throughout the roasting features and artifacts.

A brief visit was made at the rock image panel. It looks good but there are several trails leading to it. It is therefore advised that more cairns be placed along the trail so people do not stray. Annual monitoring and trail maintenance will continue.

A:15:030 -- Isolated Thermal Feature

SITE DESCRIPTION: This is an aceramic site consisting of one fire-cracked rock midden/roaster with charcoal fragments and burned limestone. The feature is interesting because erosion exposed the feature construction. It appears to have a broad, dish shape (ca. two meters in diameter), with a layer of large limestone blocks on the bottom of the pit; smaller burned limestone/sandstone rocks and charcoal pieces make up the remainder of the feature. Inside are upright slabs of unknown function; they seem to partition the feature. Heavy erosion has removed much of the interior fill,

however the "floor" or bottom of the pit is intact and clearly recognizable. No artifacts have been observed in association, thus cultural affiliation is unknown.

PREVIOUS WORK: The site was initially recorded by NPS personnel in 1991, and only monitored once before, in FY95. The site was mapped using a total station in FY96 and in FY97 the roaster feature was excavated. The results of the excavation will be disseminated to PA members at a later date.

STATUS AND RECOMMENDATIONS: After data recovery this spring, the feature materials, fire-cracked rock, were used to backfill the excavated area. It is recommended that this site be placed on the discontinued monitoring list because the single cultural feature no longer exists.

A:15:035 -- Isolated Thermal Feature

SITE DESCRIPTION: This site consists of a concentration of fire-cracked rock and charcoal-stained soil eroding out of a sandy talus slope. The feature was probably a roasting pit. No artifacts were found associated with the roasting feature.

PREVIOUS WORK: The site was originally recorded by the NPS survey crew in 1991 and previously monitored in FY93.

STATUS AND RECOMMENDATIONS: The upper portion of the site where the feature is located shows an increase in vegetation. It also appears to be more stable than in the previous photographs. The lower portion of the site seems to be accumulating terrace sediments and fire-cracked rock, but it was difficult to determine if it is an increase because no photographs were available for comparison. There is no evidence of human visitation.

It is recommended that the site be visited next year to compare the site's condition with the photographs taken in FY97. These comparisons will aid in determining the monitoring schedule and any remedial actions that may be needed.

A:16:159 -- Rock Images, Artifacts

SITE DESCRIPTION: This site consists of an overhang with sherds, lithics, tools, and pictographs; the shelter has experienced post-occupational wall and ledge fall. The most interesting cultural item at the site is a two-figure pictograph in red pigment three meters above the bench. It depicts two small anthropomorphs leaping/dancing. More elements were present, but have deteriorated, leaving only small pigment remnants. The ceramics indicate a multi-component site, with Pueblo II Virgin and late prehistoric-early historic Pai occupations.

PREVIOUS WORK: The site was initially recorded in 1990 by NPS survey personnel and has been monitored annually since FY92. In FY94 and FY95 the site was monitored semiannually. Medium

format black-and-white and color prints were taken of the pictographs in FY97.

STATUS AND RECOMMENDATIONS: This site is relatively stable with a high potential for spalling to occur, though no increase was noted. No human disturbance was observed yet the site is easily accessible. Monitoring will continue annually.

A:16:162 -- Camp

SITE DESCRIPTION: This aceramic site is located in the Bright Angel Shale Formation under a shallow overhang. It contains three distinct flat/possible activity areas with Bright Angel shale slabs "defining" each area. It is not known whether these alignments are man-made or simply debris from the eroding overhang. Features A and C both have scattered charcoal remains associated with their alignments. One of the features contained a battered cobble of solidified sandstone. It may be the result of a Paiute occupation.

PREVIOUS WORK: NPS survey crew recorded this site in 1990 and it was previously monitored in FY92 and FY93.

STATUS AND RECOMMENDATIONS: The site is stable. There is a high potential for spalling, however this has not occurred since 1990. No human disturbance was observed. Since there has been no change to this site since 12/90, we recommend that the site be placed on the inactive monitoring list.

B:10:249 -- Historic Structure

SITE DESCRIPTION: The site consists of a small rockshelter that contains the remains of a low, crude, masonry structure. It is probably of turn-of-the-century historic Anglo affiliation.

PREVIOUS WORK: The site was first recorded in 1990 by NPS archaeological surveyors and was monitored for the first time this year.

STATUS AND RECOMMENDATIONS: A single rock element was displaced since it was first recorded. An arroyo is present, but it is not impacting the site. Generally, the structure is well-protected. The Kanab/Deer Creek trail runs through the site, but people do not disturb it. They probably do not even notice it. Although the site appears to be in fairly stable condition, monitoring will occur every five years due to the potential for visitor-related impacts.

B:11:282 -- Camp

SITE DESCRIPTION: The site consists of an eroding roasting feature located at the top of a sand dune at the mouth of a small canyon, with an associated sub-circular rock outline adjacent to the arroyo. Feature 1 is a probable wickiup or brush structure; the organic superstructure is gone, all that remains is a cobble surface alignment. Feature 1 lies between two sheep trails and could be easily destroyed in a single flash flood. Lithics are present. This may be a late prehistoric-early

historic Paiute/Pai site.

PREVIOUS WORK: This site was initially recorded by NPS surveyors in 1990 and monitored annually from FY92 through FY95. In FY94 the site was monitored twice.

STATUS AND RECOMMENDATIONS: There is a noticeable decrease in grasses, yet, cryptogamic soils are abundant on and around the feature. Feature 1 is stable and unchanged despite its proximity to the side canyon, and there is no apparent change in the soil deposition as noted during the previous monitoring session. There are no signs of human visitation. Generally, this site is in good condition. A biennial monitoring schedule is proposed.

B:13:001 -- Small Structure

SITE DESCRIPTION: This is a small multi-component site consisting of remnant wall features dividing probable activity areas against a Bright Angel Shale cliff. Both walls are dry-laid and only one to two courses high. Associated with the walls is a small hearth/roasting feature with bone, charcoal, and a couple of slabs. Other prehistoric artifacts present include a few Redwall Chert and river cobble flakes, a mano, and a polished cobble. The site's historic component includes a small trash pile of glass and tin cans dating from the 1940s and 1950s. Cultural/temporal association for the prehistoric component is unknown.

PREVIOUS WORK: The site was originally recorded in 1969, re-recorded by NPS survey personnel in 1990, and monitored for the first time this fiscal year.

STATUS AND RECOMMENDATIONS: A small, but active talus slope adjacent to the northwest wall of Feature 1 is affecting the feature by filling debris behind the wall and moving slabs downslope. There is increased rodent activity in both Features 1 and 2. Feature 3 is a questionable wall alignment, but regardless, shows no change. Feature 4 is experiencing minor fire-cracked rock movement along the trail, yet increased vegetation has stabilized the majority of the feature.

There are 25 m of established trail from the main drainage to the shallow drainage just below the site, branching off and then working back to the cliff area where the features are located. New slabs were placed on the wall and several cobbles were situated on the cliff ledge above the features. The glass jar in the historic debris area has been moved but remains in the vicinity.

The established portion of the trail is covered by a healthy amount of vegetation so to obliterate it would take minimal effort and time. Obliteration of the trail at both ends of the site would deter visitors from impacting the site, and it would keep them in the main drainage. It is recommended that the site be monitored again in four years.

B:14:108 -- Isolated Metate

SITE DESCRIPTION: This aceramic site consists of a relatively long, but shallow, Tapeats Sandstone rockshelter with several grinding tools. Of the observed groundstone, two large Tapeats Sandstone slabs show obvious grinding wear, with pecking on a single surface and shaped margins.

Two other Tapeats slab fragments appeared smooth on one surface, but may not be grinding tools. Two sandstone river cobble manos were also present. Locus B contained one of the manos and a grinding slab; all of the other artifacts were at Locus A. The site was probably occupied on a transient basis, possibly focused on plant food gathering and processing. Cultural affiliation is unknown.

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

STATUS AND RECOMMENDATIONS: Locus B shows minor exfoliation on some slabs along the wall. No human disturbance was noted.

These artifacts are well-protected, but spalling poses threats. Human visitation is possible because the site is located under a large overhang near the water and could easily be used as a lunch location. No remedial actions are warranted at this time. Monitoring will continue every three to five years.

B:15:097 -- Bass Cable Way

SITE DESCRIPTION: This site consists of the remains of the William Bass cable car system. The cables (cut by Park officials on the right bank in 1971) extend from the river upslope 30 m to a schist outcrop. The cable car is located seven meters downslope from the outcrop. Locus A includes several cables of varying widths and the cable car. Locus B consists of related historic artifacts, campfire remnants, rock features, a platform, and a constructed trail. The cable system was used during the early decades of the 20th Century.

PREVIOUS WORK: The site was initially recorded in 1978, then re-recorded by NPS archaeologists in 1990.

STATUS AND RECOMMENDATIONS: Sand is being re-worked by wind on-site. Cryptogamic soils are abundant. Surface erosion is present in the low areas between rocks, but the site is in stable condition.

Trails lead to and through the site. The historic artifacts have all been rearranged by visitors. The historic artifacts are in a collection pile in association with a wooden tripod and platform. It is difficult to ascertain whether anything has actually been removed.

Biennial monitoring is advised due to the probable high level and continuous visitation by campers. Once the artifacts appear stable, monitoring can be less frequent. An artifact inventory will be conducted in FY98.

B:15:120 -- Possible Roaster

SITE DESCRIPTION: The site consists of a small "platform", jutting from a rocky slope. This enigmatic flat space is surrounded by broken and rocky terrain. The slopes of the feature are covered with what could be construed as fire-cracked rock, and is rimmed by some larger flattened

boulders; apparently these were intentionally placed to keep the flat surface from eroding away. The site is circumvented by two game trails. Several crew members brainstormed the nature of this feature; possible functions include: a large, eroding mesquite pit, a tent platform, a helicopter pad, hunting blind, or photographers/surveyors platform. No artifacts were present.

PREVIOUS WORK: The site was first recorded by NPS surveyors in 1990, and monitored in FY92 and FY93.

STATUS AND RECOMMENDATIONS: An animal/human trail runs from the beach and continues west of the feature, moving above it and heading north. A possible human trail runs from the beach and west, above the feature. A golf ball was noted just below the "platform" and was collected as trash.

The site should be visited within three years to determine how frequently the trail is used, and who is using it. Also, in the next three years this site should be tested for subsurface deposits.

B:15:122 -- Historic Structure

SITE DESCRIPTION: The site consists of three partial walls located among large boulders 50 m downstream from the lower Bass Camp. The walls appear crude and expedient and reach a maximum height of 40 cm. They are well hidden and generally protected from the elements. The main reason the site is construed as historic is because the only observed artifact was a piece of saw-cut animal bone.

PREVIOUS WORK: This site was first recorded in 1991 by NPS survey personnel and monitored for the first time this fiscal year.

STATUS AND RECOMMENDATIONS: One rock from the east wall has fallen from the structure. The west and south walls are stable with no evidence of change.

The trail that leads to Bass Camp is nearby, as are spur trails that branch off and lead to scenic overlooks. There is trailing in the direct vicinity of the site, adjacent to the large boulders in the historic shelter area. A cigarette butt was found and collected. The sawed bone could not be located.

Monitor the site in three years for additional changes. Impacts are most likely visitor-related because of the site's proximity to Bass Camp.

B:15:123 -- Isolated Pot

SITE DESCRIPTION: This site consists of a single plain-ware ceramic jar, originally cached in a small crevice between two limestone boulders. At least one boulder apparently shifted since the pot was left in place, crushing the jar into several pieces. The jar was probably used for storage; however, it is doubtful that recoverable stored remains survived. The cache may be related to a

small rockshelter site located nearby. The jar dates somewhere in the Pueblo I to Pueblo III range.

PREVIOUS WORK: The site was initially recorded in 1990 and monitored in FY92 and FY93.

STATUS AND RECOMMENDATIONS: An arroyo is present though inactive and no human impacts were observed. The site should be monitored every three years because the pot is located in a precarious location.

B:15:128 -- Camp

SITE DESCRIPTION: This is a multi-component site with a prehistoric--possibly Archaic--lithic scatter and a turn-of-the-century historic trash scatter. The prehistoric scatter is comprised of three projectile points, 100+ flakes, a broken graver, and a couple of biface fragments. Two of the points were Elko items and the third was a Gypsum-like point, but with a wider than usual base. Debitage reflected biface thinning; no groundstone, ceramics, or tools suggestive of core reduction were seen. The historic camp includes a drill jack, cartridges, two cans, a black pepper tin, and a railroad spike. The multiple use of this area suggests that it was a favorable location for various cultures and activities.

PREVIOUS WORK: Original recording of this site was in 1990 by NPS archaeological surveyors. The site was first monitored this year.

STATUS AND RECOMMENDATIONS: The site is very stable with only minor surface erosion present in the low areas. The vegetation appears unchanged except for noticeable growth in the prickly pear cacti. A trail along the bench shows use, but the site appears unvisited. Monitoring will occur every five years because the site is fairly stable with the exception of minor visitor disturbance.

B:15:134 -- Ephemeral Structure

SITE DESCRIPTION: The site consists of a crude, single-course wall under a large travertine boulder with a chunk of charcoal in front of the wall. The boulder provides a dry, well-sheltered space just large enough for one, and possibly two, people. The ground surface slopes steeply up underneath the boulder; only the riverside part of the sheltered area is inhabitable. The wall alignment is of unshaped travertine boulders. It is generally one-course high, but three courses are visible at the west end of the wall. There is a second possible alignment of five boulders roughly parallel to the "main" alignment at the rear of the shelter. The main wall probably functioned as a retaining device to create a level sleeping space behind it. The site could be historic, but it is definitely not recent.

PREVIOUS WORK: In 1991 this site was initially recorded by NPS personnel and monitored for the first time this fiscal year.

STATUS AND RECOMMENDATIONS: The site is in good, stable condition with no threat of

physical or visitor-related impacts. It is recommended that this site be placed on the inactive monitoring schedule.

B:15:138 -- Fire-Cracked Rock Scatter

SITE DESCRIPTION: The site contains two fire-cracked rock concentrations and a sparse scatter of lithics and sherds. It is located near a canyon that is frequently hiked by boaters, therefore there are several trails near and on the site.

PREVIOUS WORK: This site was originally recorded in 1997 by NPS archaeological monitors. The trail directly below the site and through Feature 2 was obliterated and a new trail was outlined below the site after the site was recorded. It will be interesting to see if the trail work holds up during the summer months.

STATUS AND RECOMMENDATIONS: Both fire-cracked rock features have a single rill bisecting the cultural deposits, but they do not appear active. The area is frequently visited by commercial boaters. The site is recommended for annual monitoring.

B:15:139 -- Ephemeral Structure

SITE DESCRIPTION: The site consists of two flat areas sheltered by shallow overhangs at the base of a cliff with historic and prehistoric artifacts. Two components are indicated: Pueblo II and early 20th Century (1900-1930) Euro-American. Shelter A is a small area with historic cans, one sherd, a granite cobble mano, and a large mammal bone, possibly a burro. Shelter B contains a schist rock alignment, two metal plates, and one metal can. The historic artifacts may be related to trail building/mining activities by W. Bass.

PREVIOUS WORK: The site was originally recorded by NPS personnel in 1990 and monitored for the first time this fiscal year.

STATUS AND RECOMMENDATIONS: Shelter A is experiencing animal burrowing near the base of the schist wall. The cans have been scattered throughout the shelter, and the artifact disturbance appears to have been caused by large and small animals. Shelter B is stable. Minimal bighorn sheep and packrat activities are evident throughout the site. No visitor-related impacts were observed. Monitoring will continue every three to five years due to the chance that new artifacts may be exposed from the animal disturbances.

B:16:003 -- Small Structures

SITE DESCRIPTION: The site consists of five well-defined masonry structures aligned along the base of a schist slope. The structures are all multi-coursed of tabular schist. Sherds and lithics are lightly dispersed on the terrace, but are definitely concentrated in front of Feature 3 at the present time. Any other prehistoric remains such as, trash deposits, have been eroded away. Ceramics

indicate a Pueblo II affiliation. The GCRCS crew reported an Elko Corner-Notched projectile point and a mano.

PREVIOUS WORK: The site was initially recorded in 1978 and was re-recorded by NPS personnel in 1991. It was monitored in FY93 and FY95.

STATUS AND RECOMMENDATIONS: Features 1, 2, and 3 are in stable condition. Slight surface erosion along Feature 4's west wall interior is evident. A gully northeast of Feature 4 may cause impacts in the future, currently, however, the gully is inactive. There has been no change to Feature 5, but it is positioned on a steep, talus slope. A trail is present from the side drainage to the site. This trail is entrenched and visible below the site, though on the terrace the trail is faint.

Trailing is the biggest threat to the site, but it is not altering the site's integrity. No trail work is currently recommended because the trail may recover on its own. The present trail is the only access to the site. The proposed monitoring schedule is biennial.

B:16:258 -- Historic Structures

SITE DESCRIPTION: The site consists primarily of two historic masonry features. Feature 1 is an L-shaped alignment of rock one to two courses high, adjacent to a trail. Feature 2 consists of a leveled spot on the downstream side of a granite boulder with schist walls of seven to 12 courses. There are two other rock alignments above Feature 2 that act as water/slope creep diversions, and two possible tent platforms. Artifacts include a friable piece of saw-cut wood, bailing wire, and rubber fragments. The site may date to the turn-of-the-century.

PREVIOUS WORK: The site was originally recorded by NPS surveyors in 1991.

STATUS AND RECOMMENDATIONS: These two historic structures are related to the Bright Angel suspension bridge. They are maintained by Phantom Ranch staff, and have been placed on the inactive monitoring list.

B:16:364 -- Artifact Scatter

SITE DESCRIPTION: This is a marginal site consisting entirely of a sparse and somewhat dispersed scatter of lithics in an area measuring 15 by 20 m. The site is within an alluvial/colluvial debris flow/fan at the mouth of Bright Angel Creek. All of the artifacts are of the same material: white/gray Redwall Chert. The flakes appear to be the result of unintensive core reduction. No formal tools were observed, but one flake with a battered dorsal surface was noted. Much of the site has been trampled by visitors, though the area, including the site, is part of an NPS revegetation project. It may also have been impacted by creek or high river flows. Cultural affiliation is unknown though, it may be affiliated with the Bright Angel site nearby.

PREVIOUS WORK: This site was originally recorded in 1991 and monitored in FY93.

STATUS AND RECOMMENDATIONS: It was very difficult to identify the area because it is located at the Phantom Ranch beach area where the Park has performed major revegetation work. The site was placed on the inactive monitoring list.

C:02:085 -- Isolated Thermal Feature

SITE DESCRIPTION: The site consists entirely of a charcoal stain with bits of charcoal and a few associated pieces of animal bone. The stain is a circular area about one meter below the present terrace surface. It may be the remains of a buried hearth. No associated artifacts were seen. Cultural affiliation is unknown.

PREVIOUS WORK: This feature was initially documented in 1991 by NPS personnel, and monitored in FY93 and FY95. It was also tested by J. E. Conner and others for flood research in the early 1990s (see Conner et al. 1994).

STATUS AND RECOMMENDATIONS: The feature no longer exists after the testing conducted by Conner et al. It is recommended that this site be placed on the inactive monitoring list. Monitoring will only occur on an as-needed basis, i.e., another research flow may impact the bank, thus exposing new features.

C:02:094 -- Historic Inscription

SITE DESCRIPTION: The recorded portions of this site consist of a dugway that accessed the lower ferry on the left bank, numerous historic inscriptions associated with the dugway/ferry crossing, and large wooden posts on the right bank that were also associated with the crossing. The ferry was established in 1873 and used until 1898; and built as a means of avoiding the Lee's Backbone road. There are many historic names and dates written in tar on a rock surface plus four carved initials at the base of the dugway. Other inscriptions are located at the top of the dugway, but were not re-recorded by GCRCs crews. There is an ephemeral rock wall at the panel between the upstream and downstream portions of the panel. There is also modern graffiti. The historic dates cluster between 1892 and 1898. The wooden posts on the right bank are thought to be mooring posts.

PREVIOUS WORK: This site was originally recorded in 1991 by NPS archaeologists and monitored in FY92, FY93 and FY96. The inscriptions were photographed with a medium format camera in February, 1997 to obtain quality images for the archival record. Most of the recent graffiti was removed in November, 1996 by using water and Pink Pearl erasers.

STATUS AND RECOMMENDATIONS: The inscriptions show no signs of physical/natural erosion. They are well-protected from natural forces due to their location in an alcove.

A new name and date "Kennon Honiek 7/14/96" has been lightly scratched into the panel, and trash in and around the site continues to be a problem. A well-defined trail leads to the river from the overhang. It appears that fishermen are the primary users of the trail and overhang based on the type

of trash littered in the area.

It is inevitable that the site will continue receiving visitor use due to its location. Additional graffiti removal will be completed in FY98. Site monitoring will continue annually.

5-10-91

Figure 6. Historic inscriptions at C:02:094 (arrow indicates graffiti location).

2-19-97

Figure 7. Historic inscriptions after graffiti removal.

C:02:096 -- Ephemeral Structure and Buried Hearth

SITE DESCRIPTION: The site consists of two sheltered areas separated by a drainage and talus cone. The upstream area (Locus A) consists of a shallow overhang with an ephemeral wall. Stones consist of small, local limestone cobbles in a single ground level course. The front of the shelter ledge might exhibit some alignment and level preparation. One large tertiary flake of white-orange Kaibab Chert was noted, as well as a long, tapered river cobble of a pestle shape, that has been pecked on two faces with a smooth surface on another margin. Locus B is located about 60 m downstream of Locus A under a west-facing Kaibab Limestone overhang. An arroyo runs beneath the overhang dripline, exposing layers of river-deposited silt and sand interbedded with coarser sand and gravel colluvium. Several layers of charcoal and cultural features are exposed in the arroyo side walls as well.

PREVIOUS WORK: The site was recorded in 1991 by NPS archaeologists, and monitored in FY95 and FY96. In FY96 the site was mapped with a total station. O'Connor et al. (1994) reported finding fluvially-transported charcoal at a depth of about 2.5 m below present ground surface near the bottom of the stratigraphic section with a radiocarbon date of 4567-4125 B.P. In FY97 the area was assessed for checkdam installation and data recovery.

STATUS AND RECOMMENDATIONS: Locus A is in stable condition with the exception of increased rodent nesting. Locus B is impacted by a large (five meters deep), active, and almost fully mature arroyo. This cut is exposing several charcoal lenses, fire-cracked rock concentrations and artifacts. No signs of human visitation were observed.

A partially mineralized, worked, digging stick was found at Locus A. This artifact was not recorded or mentioned on previous monitoring forms, therefore it was photographed and described in FY97. Building checks in the active arroyo is an option however, data recovery of the newly exposed

roasting features takes priority. Furthermore, the newly collected data will supplement previous work performed at this location. Annual monitoring will continue.

10-1-96

Figure 8. A large arroyo at C:02:096, exposing several layers of charcoal and cultural features

C:02:097 -- Ephemeral Structure

SITE DESCRIPTION: The site consists of two Kaibab Limestone rockshelters with sparse but diverse artifacts within and on the slopes below. Shelter 1 has a mostly bedrock floor (there is old alluvial sediment at the back) and contains lithic tools, bones, groundstone, flakes, and a sherd. There is a historic/modern firepit with rusted cans, plastic, and tattered underwear. Shelter 2 is smaller, but has more interior fill and a possible one-course-high wall enclosure. A core and flake were found on the slope below. Ceramics suggest two possible occupations: Pueblo I and late to early Pueblo III. Tools range from expedient flake tools to bifaces and manos. The artifact assemblage is suggestive of more than just overnight or single activity use.

PREVIOUS WORK: The site was recorded in 1991 and monitored in FY95. The NPS trail rehabilitation crew performed retrailing and trail obliteration in FY96. This site was also looked at closely during the research flow in 1996 (Balsom and Larralde, 1996 draft).

STATUS AND RECOMMENDATIONS: Physical impacts are minor with little potential for increase due to the site's location in well-protected shelters. Minor spalling, gullying, and animal disturbances were noted within the shelters. The bedrock above the shelters provide for small drainage systems that deposit minor amounts of debris around the shelters. This action is currently nonthreatening.

This is an area frequently used by fishermen. The presence of trailing and on-site camping were noted. The same trail that intersects C:02:098 continues through this site. Glass bottles, beer cans, fishing tackle, and assorted paper trash are scattered throughout the site. Despite previous trail work, one trail still reflects heavy use. Due to the popularity of this area, it is recommended that one trail be established to avoid multiple trailing. Annual monitoring will continue.

C:02:098 -- Camp

SITE DESCRIPTION: The site consists of an overhang with a charcoal scatter, one sherd, and lithics. The terrace at the base of the overhang has been cut by high water, and charcoal is eroding from this cut. At the downstream end of the overhang are recent trash and charcoal. Visitors have dug into the site and moved rocks. Several sherds identified during the survey are no longer present.

PREVIOUS WORK: The site was first documented in 1991 and monitored in FY95. Trail obliteration was completed by the NPS trail rehabilitation crews in FY96. This site was also recommended for data recovery, but upon further assessment in FY97, it was advised that this site be passed over because most, if not all, of the feature is gone.

STATUS AND RECOMMENDATIONS: The presence of surface erosion, gullying, bank slump, and animal burrowing were noted. Above the main trail are several active gullies ranging in size from 20 x 10 cm to 5 x 3 cm.

Increased trailing, directly impacting the artifact scatter and charcoal area (midden), were observed. Fishermen appear mostly responsible for the trailing and the littering. The trail work completed in February, 1996, has kept people directly off the site but it has not kept people from traversing directly below the site, near the midden area.

This site will continue receiving visitor-related impacts regardless of any action. Monitoring will continue annually due to the possibility of newly exposed cultural materials.

C:02:101 -- Isolated Thermal Feature

SITE DESCRIPTION: The site is located in dune sand just below the bottom of an exposed talus slope. It consists of a cluster of fire-cracked rock with a single charcoal chunk in association on the surface. This probable roasting feature is eroding downslope due to deflating dune sand and slope water run-off. Cultural affiliation is unknown.

PREVIOUS WORK: The site was initially recorded by NPS personnel in 1990, and monitoring has occurred in FY92, FY93, and FY94. In FY97, 14 checkdams were constructed in the two active gully systems and a total station map was completed. Checkdam types consisted of rock linings, rock checkdams, headcut treatments, and rock/brush piping fill.

STATUS AND RECOMMENDATIONS: Surface erosion and eolian erosion are both present. The feature is stable, but the gully adjacent to the fire-cracked rock has slightly increased in size and depth. In some places, the gully is now over one meter wide and deep, thus transforming into an arroyo. Human disturbances were not observed. The site will be monitored annually, with emphasis on the success or failure of the checkdams.

C:05:031 -- Ephemeral Structure

SITE DESCRIPTION: The site consists of two Loci (A and B) with two structural features (Features 1 and 2) and three areas of fire-cracked rock concentrations (Features 3-5). Artifacts indicate a Pueblo I- early Pueblo II affiliation. Note: Feature 2 is natural, not cultural, according to the 97-2 monitors.

PREVIOUS WORK: NPS survey personnel recorded this site in 1990. Monitoring occurred annually from FY92 through FY95. In FY94 it was monitored twice.

STATUS AND RECOMMENDATIONS: All features appear in very stable condition. There was, however, minor deflation noted at Feature 5. The gully between Features 3 and 4 seems to be filling in. No human disturbances were observed.

Monitoring will continue biennially because of the active gully between Features 3 and 4. If the gully shows additional downcutting in two years it will be a candidate for checkdam construction.

C:05:039 -- Isolated Pot

SITE DESCRIPTION: The site consists of a single North Creek Corrugated jar cached in a one meter high Redwall Limestone solution "cavern". The jar was toppled and broken by a large chunk of fallen limestone so that the vessel is now in four large pieces currently nested along side each other on their sides. The GCRCs crew made no attempt to move either the sherds or the rock to see what might be underneath them. The ceramic type indicates a Pueblo II Virgin affiliation.

PREVIOUS WORK: NPS survey personnel recorded the site in 1990.

STATUS AND RECOMMENDATIONS: No physical impacts were observed. The pot fragment is well-protected from potential physical impacts.

There were footprints leading up the dune towards the site, but no footprints could be traced to the site because it is on the bedrock. A 1981 dime was found four meters in front of the pot on a rock and collected as trash. The pot appeared unchanged since last visited in 1990. Annual monitoring is suggested to determine if visitation is regular.

C:06:003 -- Prehistoric Camp

SITE DESCRIPTION: This site consists of a dispersed sherd and lithic scatter and the remains of two wall alignments. Locus A includes flakes, formal and expedient tools, shell, and ceramics. One rock alignment was observed eroding out of a dune face. Locus B contains flakes, groundstone, sherds, and an ashy lens. A crude alignment of Supai cobbles and a slab may be the remains of a structure. Artifacts indicate a Pueblo II occupation. Hopi ceramics were noted during the original recording of the site and during the GCRCS re-record. Note: the 95-1 monitors noted new animal bone and artifacts near a large boulder in Locus A, and the 97-1 monitors found a possible fire pit (dark ash) exposed in the artifact scatter at Locus A.

PREVIOUS WORK: The site was originally recorded in 1976 and then re-recorded in 1990. Monitoring by the river corridor personnel has occurred at least annually since FY94. The site was visited twice in FY94 and FY95. In FY96 Park personnel and volunteers conducted trail obliteration and re-trailing. The original trail that went through the site was obliterated with deadfall and jute mat and a new trail was created onto the lower delta. To date, this trail work has been very successful.

STATUS AND RECOMMENDATIONS: At Locus A, surface erosion, gulying, side canyon erosion, and spalling are all potential threats to the site but are currently inactive. The main gully above the artifact concentration and near the talus slope is in stable condition. However, the lower section of the gully shows signs of activity, although photographs could not confirm this observation. Rills are present near the boulder, but appear stable. No sign of human visitation was observed. The trail obliteration performed in the spring of 1996 has significantly decreased on-site human traffic.

The Park will perform regular trail maintenance because it is a very popular boat beach and backpacker area. The main gully should be examined closely in the future due to its proximity to a hearth. It may be a good candidate for checkdam construction. Site monitoring will continue annually.

C:06:005 -- Rock Image

SITE DESCRIPTION: The site consists of a Supai Sandstone bedrock petroglyph panel with three pecked figures. The petroglyph elements are in excellent shape, with minimal wind/water erosion. The figures include an anthropomorph, a pecked line, and an abstract element shaped like a flying "U". Cultural affiliation is unknown.

PREVIOUS WORK: The site was initially recorded in 1979 and was re-recorded in 1989 by NPS archaeologists. The site has been monitored annually since FY94. In FY97, there was an attempt made to remove with water and sand, an inscribed "X" on a boulder near the petroglyph. Medium format black-and-white and color prints were taken for archival purposes.

STATUS AND RECOMMENDATIONS: No physical or visitor-related impacts were noted. The site is very stable and in good condition. The site was visited in May, 1997 and the "X" is still present, though not as prominent. Additional graffiti maintenance is recommended for FY98. Monitoring will continue on an annual basis.

C:06:006 -- Artifact Scatter

SITE DESCRIPTION: This is a Pueblo II site that consists of a sparse sherd and lithic scatter on an alluvial terrace. Three corrugated sherds (two from one vessel) and two decortication flakes from coarse-grained cobbles were the only artifacts observed. Other remains may be buried (or have been collected, as the site is at a popular camping area). Based on surface evidence, this was probably a limited activity site associated with C:06:003. Note: in 9/92, a rock alignment of about six boulders was added to the site map.

PREVIOUS WORK: NPS survey personnel recorded this site in 1990, and monitoring occurred in FY92 and FY93.

STATUS AND RECOMMENDATIONS: Surface and eolian erosion are present, but they are barely noticeable. Overall, the site appears very stable. No visitor disturbances were observed.

Previously, the main impact to this site has been visitation by boaters and backpackers. Yet, previous trail work has successfully decreased on-site foot traffic. Monitoring every three to five years is recommended. The trail network on the delta is monitored by the Park's trail crew annually.

C:09:005 -- Small Structure

SITE DESCRIPTION: The site consists of at least three, and possibly four or five, rooms of unshaped, dry-laid Redwall Limestone slabs and blocks built directly against a Redwall cliff face. No cultural debris was observed, but a Pueblo I-III affiliation is inferred.

PREVIOUS WORK: The site was initially recorded by Park personnel in 1990 and monitored for the first time this year.

STATUS AND RECOMMENDATIONS: This site, perched on a remnant of Redwall Limestone jutting into the river, is nearly inaccessible to the casual climber. Two approaches up the polished cliff face are maneuverable directly from the river, though extremely unsafe. Ropes should be used. The site is virtually free from impact from visitation or dam impacts. It is recommended that the

site be placed on the inactive monitoring schedule, because if the casual climber (who makes up the majority of people in the canyon) cannot get to it, and the site is in a sheltered location, it can be presumed that the site is stable. It is recommended, however, that a skilled climber, representing the park, visit the site for better photographic documentation.

C:09:030 -- Historic Burials

SITE DESCRIPTION: Locus A is the grave of Peter Hansbrough who died in July, 1889 on the Stanton and Brown expedition. His body was retrieved by the 1890 Stanton expedition and buried here. A carved inscription on a vertical face above the grave reads "PMH 1889". Locus B is the grave of a boy scout named David Quigby who drowned on June 26, 1951. It consists of an oval arrangement of river and talus cobbles with a taller rock as a headstone.

PREVIOUS WORK: Locus A was recorded two times (1969 and 1985) prior to the NPS survey recording in 1990. Locus B was also recorded twice (1963 and 1982) and was recorded yet a third time by NPS personnel in 1990. The site was monitored by the RCMP in FY93. Trail obliteration and retrailing was completed in FY95 and medium format photographs were taken of the Hansbrough inscription in FY97.

STATUS AND RECOMMENDATIONS: There is a possible one-time trail leading along the cliff wall, both southeast and northeast of Hansbrough's grave (Locus A). It is undetermined if the trail is a result of animal or human use, but it is present, and continues very faintly along the edge of the grave. The rocks outlining Hansbrough's grave have been displaced from the inside to the outside of the rock wall.

Since 1992, the cairn on top of the boy scout grave headstone (Locus B) has been removed, and the rock at the base of the grave has been placed upright. The trails surrounding the site were previously vegetated with short grasses, though this is now absent. There are signs of compaction in the trails. The trails are monitored annually and maintained by the NPS trail crew. Changes in both graves have occurred in the last four years, but the changes are minor. The site will be monitored every three years.

C:09:034 -- Historic Scatter

SITE DESCRIPTION: The site consists of the remains of Bert Loper's wooden boat which capsized in 1949 upstream at 24.5 Mile Rapids. Loper did not die as a result of the capsized boat, but from a heart attack that occurred in conjunction with the flip. The boat was found at this location that same year by Don Harris. The bow is still intact, although the rest of the hull is in various stages of deterioration. A metal plaque commemorating Bert as the "Grand Old Man of the Colorado River" was cemented onto a piece of talus limestone about two meters upslope of the boat.

PREVIOUS WORK: The boat and commemorative plaque were recorded in 1972 and re-recorded in 1990. The site has been monitored annually by the Park since 1982, and for this project in FY95. Trail obliteration and retrailing was conducted in FY97 because most site impacts are caused by visitors walking in and around the area. Special monitoring efforts were exhibited at this site during the research flow of 1996 (Burchett et al. 1996 draft).

STATUS AND RECOMMENDATIONS: A few boat planks on the stern have fallen downslope. The movement is probably due to natural downslope movement of the steep slope (approximately 30 degrees) that the site is located on. Increased eolian erosion and a gully are present near the boat.

Several wood planks have been placed in the center of the boat. There is a designated trail that leads directly to the site that is regularly used during the summer months. Monitoring will continue biennially as human impact is expected to continue.

C:09:050 -- Isolated Pot Cache

SITE DESCRIPTION: The site originally consisted of a single complete Tusayan Black-on-Red mug/pitcher eroding out of a cutbank, and nine rectangular rock cobbles in an alignment adjacent to Little Nankoweap Creek. After its discovery, the vessel was stabilized with local cobbles and boulders, then covered with sand. Park Archaeologist J. Balsom subsequently collected the vessel, and several others from the same locale, on a later visit. This is considered a late Pueblo I-early Pueblo II Formative site.

PREVIOUS WORK: The site was initially documented in 1990, and monitored once in FY92 and semiannually from FY93 to the present. Instrument mapping was completed in April, 1997 after an elaborate retaining wall was built along the base of the dune to capture sediment coming from the top of the slope where the vessels were collected. See Hereford (1996) for photogrammetric topography mapping of the immediate area.

STATUS AND RECOMMENDATIONS: Surface erosion, side canyon erosion, animal burrowing, and root impacts are all present but inactive. The slope where the pots were removed is fragile but currently in stable condition. The enigmatic wall has not changed since last monitored in October, 1996. A non-impacting trail leading from Little Nankoweap to the network of trails on Nankoweap Delta exists 15 m east of the site, but no human impacts were observed. Semiannual monitoring will continue due to the fragile, steep slope and the potential for more artifacts to erode.

C:09:051 -- Pueblo

SITE DESCRIPTION: This is a large Pueblo II camp area on the lower side of Nankoweap delta. The site was recorded in 1989 as three separate loci. The GRCA crew retained this scheme and added a fourth locus, located on the bank of the creek to the north and northwest. Locus A contains a soft L-shaped roomblock of four to six rooms consisting of discernable cobble alignments, wall fall, clay daub, ash, scattered rock, ceramics, and a midden. Locus B is an area of fire-cracked rock, a broken mano, and a few sherds; no feature designations were assigned. Locus C consists of shattered cobbles, a few ceramics and flakes, and no definable features. Locus D is situated on the bank of Nankoweap Creek northwest of Locus A. It consists of a poorly-defined roomblock, carbon, sherds, and fire-cracked rock eroding from the bank. A large San Juan Redware sherd was collected eroding out of the cutbank; the possibility of intact vessels is high and some stabilization is warranted. The 97-1 monitors found a newly exposed charcoal stain with several artifacts in a cutbank in Locus D.

PREVIOUS WORK: The site was originally recorded in 1989 and re-recorded by the NPS survey

crews in 1990. The site was visited once in FY92 and FY93, monitored semiannually in FY94 and FY95, and then annually since FY96. The site has received much in the way of trail work by the Park (prior to 1990) and by this project (FY96). The site was mapped with an instrument in FY97, and a portion of Feature 4 was excavated in July, 1997. The results will be sent at a later date. See Hereford et al. (1996) for photogrammetric topography mapping of the immediate area.

STATUS AND RECOMMENDATIONS: A minor increase in surface erosion was noted at Feature 1. An increase in eolian activity was noted near Feature 2, although this feature remains stable. Feature 3 is virtually gone due to the side canyon flash flood in the spring of 1995. The drainage's vertical cutbank shows minor changes resulting mostly from a combination of undercutting and bank slump.

No signs of visitation were apparent. It should be noted that we arrived shortly after a heavy rain that may have covered any previous footprints. The old trails in this area are barely discernable. Visitation has definitely decreased since the beginning of the monitoring program. This is mostly due to the trail obliteration project that occurred in 1992. Data recovery is recommended for Feature 4 because of its location and its association with artifacts that have fallen into the side drainage. This site will continue to be monitored annually.

C:09:053 -- Small Structure

SITE DESCRIPTION: This site consists of three artifact concentrations and a rock alignment. Artifacts consist of sherds, lithics, and bone, mostly concentrated on the east and south slopes of a dune. Artifact density is fairly heavy, with 200-300 sherds and 100-150 lithics. The rock alignment is three meters long with possible corners at either end. It may be the foundation of a habitation unit or room of some kind. The structure/rock alignment could also possibly be a historic or a more recent tent campsite. Cultural affiliation is considered mid to late Pueblo II.

PREVIOUS WORK: This site was originally recorded in 1976 as C:09:001 then was changed to the present site number in 1989. A third recording of the site was completed in 1990 by NPS survey personnel. The site was monitored by this project in FY93 and FY95. See Hereford et al. (1996) for photogrammetric mapping results of the area.

STATUS AND RECOMMENDATIONS: Due to the location of the sand dune to the site, there are some wind and water erosional processes present, though the site is stable and in good condition. The site should be monitored every three to five years.

C:09:056 -- Ephemeral Structure

SITE DESCRIPTION: This possible Late Archaic-Basketmaker II site consists of two artifact concentrations, a charcoal scatter, and upright slabs against a rock outcrop that offers two overhangs, designated A and B. Artifacts include flakes, a side-notched chert projectile point, four bone fragments (two of them burned), and a charcoal scatter. The slabs may have served as windbreaks,

but their true function is unknown.

PREVIOUS WORK: The site was originally recorded in 1990 by NPS survey personnel and monitored for the first time this year.

STATUS AND RECOMMENDATIONS: Physical and visitor-related impacts are not present. Previous photographs from 1990 poorly documented the site's location, so new locational photographs were taken. The site is in excellent condition and will be placed on the inactive monitoring list.

C:09:065 -- Historic Dam Scatter

SITE DESCRIPTION: The site consists of a number of related features and artifacts associated with the testing of a Marble Canyon Dam site in the 1950s. There are a total of 16 numbered features. Features 1-11 are on river right, and Features 12-16 are on river left. Features include: stakes with guidewires, looped rebar and anchors cemented into the Redwall, adits, cable, masonry platforms, painted inscriptions, and related artifacts. The 97-2 monitors located three additional features.

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

STATUS AND RECOMMENDATIONS: There is some gullying present near Features 5-8, and 19, but the gully's current direction avoids the features. Minor eolian erosion is also present. Human visitation was not observed.

The features are extremely stable with only a few areas within the site boundaries exhibiting minimal erosion. Most of the features are cemented into bedrock and boulders and therefore, are not at risk from visitor-related or physical impacts. Many photographs were not available for comparison, so much time was spent photographing features. Now that photographs have been taken and maps have been corrected, monitoring will be much more efficient. The next visit is scheduled in five years.

C:09:068 -- Artifact Scatter

SITE DESCRIPTION: This site consists of about 10 sherds and as many lithics. No obvious architectural features were visible on the surface, but given the nature and depth of alluvial deposits, it is very likely that structures are buried beneath the present ground surface. The site surroundings may have offered good agricultural potential. Artifacts suggest a Pueblo II occupation.

PREVIOUS WORK: NPS personnel recorded this site in 1990, and monitoring occurred in FY93.

STATUS AND RECOMMENDATIONS: Since 1990, vegetation has slightly increased in the artifact concentration area located on the dune slope. This growth has added to the stability of the slope and artifact area. Overall, the site appears stable.

Trails leading from the upper beach to 50 Mile Canyon come within the vicinity of the site boundary but do not appear to pose any impact to the site. Monitors recommend placing the site on the inactive monitoring list because the dense vegetation is protecting it.

C:09:069 -- Roaster Complex

SITE DESCRIPTION: This is an open sherd and lithic scatter with roasting pit and alignment features. The site is situated on a gently sloping terrace amidst saltbush and prickly pear and is almost completely surrounded by mesquite and acacia. There is a large roasting pit (Locus B) in the north-central portion of the site. Several metates and manos are clustered under mesquite trees in the northwest corner of the site (Locus C). To the south, on the slope of a small hill, are several rock alignments (Locus A). The latter may be agricultural features; they follow the hill contours, creating small terraces. Near these alignments is a circular stone feature approximately 75 cm in diameter; possibly a storage pit/cist. No artifacts or charcoal were observed in association with this feature. This may be a multi-component site, with both late Pueblo I to early Pueblo II occupation and late prehistoric-early historic Paiute occupations. The 97-2 monitors indicate that Locus C is a Paiute activity area.

PREVIOUS WORK: The site was first recorded in 1990 and monitored in FY92 and FY93. See Hereford et al. (1996) for photogrammetric topography mapping of the immediate area.

STATUS AND RECOMMENDATIONS: The major impacts to this site are animal-caused. Large and small burrows are scattered across the site, and are particularly numerous near the roaster, causing some disturbance of the fire-cracked rock. Even though the trail to Little Nankoweap Canyon passes through the site, it avoids all the features.

Testing of the circular feature is recommended to determine if it is a cultural manifestation. A detailed map of the entire site is needed because the sketch map from the survey is not accurate enough for current monitoring needs. A biennial monitoring schedule is recommended because animal trailing may uncover new artifacts or features.

C:09:088 -- Marble Canyon Dam

SITE DESCRIPTION: This site consists of numerous features and artifacts related to the testing of the alternative Marble Canyon Dam site. This project took place from 1949 through 1951. The site mainly consists of several test shafts and their associated tailings, a loading platform, a ferry boat stacked in another ferry boat, numerous painted letters on the cliff face and rock, and industrial trash (cable, nails, iron plates, ladders, wood planks, barrels, blasting wire, food cans, anchor bolts, and a grease bucket). These are spread over a half-mile length of the river on both banks; the right bank has 13 numbered features (Features 1-13) and the left bank has three loci.

PREVIOUS WORK: Archaeological recording of this site was completed in 1990 by NPS

personnel. Annual monitoring occurred from FY92 to FY95, then in FY95 the monitoring schedule changed to biennial.

STATUS AND RECOMMENDATIONS: The talus cones created by the tailings from the test holes were truncated during the research flood in March, 1996. There is also increased surface erosion and gullying on the talus cones. The rest of the features are stable.

A collection pile exists at adit 1 and consists of industrial materials on the stone wall that blocks the adit. Stone movement from the upper middle and left courses of the adit's wall is evident.

Monitoring of the site will continue biennially due to the light visitation the area receives and the minor erosion. Monitoring of the talus cones will occur more frequently when higher water levels are released.

C:13:005 -- Roaster Complex

SITE DESCRIPTION: The current survey identified nine features on the site; all but one small rockshelter are fire-cracked rock middens with associated charcoal stains. The four features along the edge of the terrace are eroding downslope and are in generally poor condition. The remaining features on top of the bluff are in an area traditionally used by campers. There are few lithics overall, but tools include large core scrapers, a hammerstone, a "pounding" tool, and utilized flakes. A broken sandstone mano was also observed. Ceramics suggest a Pueblo II-early Pueblo III affiliation, with a possible late prehistoric-early historic Hopi connection. The 95-5 monitors found a unifacial chert scraper inside Feature 6.

PREVIOUS WORK: The site was initially recorded in 1962 with updates in 1976 and 1989. The site has been monitored several times by Grand Canyon National Park (GRCA) archaeologists and monitored by this project annually since FY95. It has been extensively impacted by hikers and river runners; part of the site is used as a scouting location for Hance Rapids. There is a trail running through four of the site's roasting features but this was stabilized by K. Crumbo (NPS trail crew) sometime in the last few years. Official trail obliteration through this project occurred in FY96.

STATUS AND RECOMMENDATIONS: The fire-cracked rocks that remain at Features 1-4 appear stable. The rocks shoring up the trail, adjacent to Features 2 and 3, are dislodged and loose. Feature 5 is stable though large logs and sticks block the entrance and are covering the fire-cracked rocks. Trail work has been successful and the only footprints observed were at the scout trail running through Features 1-4. Feature 6 has been used as a shelter by visitors, but it does not appear recently disturbed. The extensive brush piles, rocks and cacti transplants near Features 7 and 8 are still in place. Feature 9 is difficult to locate, but the recently built checkdams and brush piles have stabilized and obliterated the trail through the feature. No toilet paper was observed, as has been the case during previous monitoring episodes.

Trail obliteration seems to be working. The scouting trail needs to be monitored and maintained, and the Park has taken the lead on all trail maintenance annually. This area receives a lot of

visitation, mainly by backpackers, therefore annual archaeological monitoring will continue.

C:13:006 -- Small Structures

SITE DESCRIPTION: This site consists of a ceramic and lithic scatter eroding from a dune face with a fire-cracked rock, cobble-strewn, ashy midden. Four to five possible rooms are also present in fair to poor condition. The site is dominated by mid-late Pueblo II sherds. Groundstone is present, but no formal chipped stone tools were observed. The 95-2 monitors made several additions to the site map, including walls eroding out of gullies, an additional roasting pit and an artifact concentration.

PREVIOUS WORK: The site was recorded in the early 1960s, 1965, 1984 and again in 1990. GRCA monitored the site throughout these years until this program began. River corridor archaeologists monitored this site annually in FY92 and FY93, semiannually in FY94 and FY95, and then the schedule was changed back to annual in FY95. The site was mapped with a total station in FY96. Since the map, checkdams were built in the two active gully systems (Leap 1996b) and jute mat was laid in the deflated dune areas (FY97).

STATUS AND RECOMMENDATIONS: Surface erosion increased around the fire-cracked rock concentrations. Bank slump also increased around the unstable slope along the site's southern boundary. Gullying and side canyon erosion are present but no increases were detected. A possible human trail was discovered above the site. This will be monitored in the future for further growth or the determination as a game trail.

The checkdams constructed in the spring of 1996 are in stable condition. Minor sediment deposition and cacti growth were observed at several checkdams. K. Thompson, Soil Scientist, recommended rain gages in this area for determining the rate of gully formation due to surface runoff. This site will remain on an annual monitoring schedule.

C:13:007 -- Small Structures

SITE DESCRIPTION: This is a mid-late Pueblo II-early Pueblo III occupation consisting of three, possibly four structural outlines (Features 1-4). Feature 1 is an L-shaped structure open to the east. Feature 2 is the remains of a rectangular structure outline, also open toward the river. Feature 3 is another L-shaped structure. Feature 4 is the remnant corner of a single-course structure. Campers have used the structural elements to hold down tents, and the site has apparently gone through a phase of deterioration since its original recording. Many sherds have disappeared and Features 3 and 4 have come to the surface since the previous investigations. Some fire-cracked rock, sherds, a few flakes, ashy soil, and rodent bones of questionable affinity are present. No formal tools were observed.

PREVIOUS WORK: This site was noted in the early 1960s, but was not recorded until 1965. NPS personnel completed a more detailed recording of the site in 1990. GRCA monitored the site periodically until this project took over the monitoring in FY93. In FY95, the monitoring schedule changed to biennial. In 1992, NPS trail crew placed jute mat across the site and built a retaining

wall to stabilize the erosional trend at Feature 5. The wall was blown out by localized rain in 1993 and repaired in 1994. See Hereford (1996) for photogrammetric topography mapping of the immediate area.

STATUS AND RECOMMENDATIONS: Lava Chuar Creek flooded recently and bank slumpage is active near the site. There is no change to Features 1, 2 and 4, yet Feature 3 shows signs of minor surface erosion and minor gullyng. The retaining wall protecting Feature 5 is stable, however, the wash in front of the wall appears to be periodically active.

The revegetation work and trail obliteration has effectively discouraged visitors from walking through the site. There were no signs of human visitation when the site was monitored in FY97.

Feature 5 should be checked as it is located adjacent to Lava Chuar Creek and could be impacted by flooding. It is advised that the site be monitored annually.

C:13:009 -- Pueblo

SITE DESCRIPTION: The site consists of numerous (24) non-architectural and structural features. The artifact assemblage is dominated by Pueblo II-early Pueblo III ceramics. Numerous tools used as percussion items and abraders were observed, but there is a curious lack of metates and metate fragments; chipped stone tools are non-existent.

PREVIOUS WORK: Portions of this site were previously recorded several times. The site was originally designated C:13:009 and 9A in 1965. C:13:009A corresponds to the GRCA river corridor survey Locus A, while C:13:009 corresponds with the GCRCS Locus B. Since that time various sherd collections have been conducted in 1976, 1984 and 1989. NPS survey personnel recorded the site in detail in 1990. The site was monitored in the past by GRCA, and this project began biennial monitoring in FY93. Additional monitoring research was conducted at this site during the research flow of 1996. See Burchett et al. (1996 draft) for information.

STATUS AND RECOMMENDATIONS: With the exception of Features 10, 11 and 14, the site is very stable. Features 10, 11 and 14 are experiencing ongoing, downslope movement by increments due to their location on the upstream cutbank facing the river. Extreme high water flows in excess of 120,000 cfs will erode the base of the cutbank proximal to the secondary channel of the Colorado River below these features. No human visitation was observed.

The most practical benefit to the site and the profession would be to complete an instrument map and a detailed ceramic analysis. The surface artifact assemblage is dense and displays high variability. It is recommended that Locus B be removed from the monitoring schedule because it is located outside the project area. The few changes that have occurred in the last two years at Locus A are difficult to discern because they are so minimal. Changing the schedule to annual may not show the changes that are occurring, therefore a biennial monitoring schedule will continue.

C:13:010 -- Pueblo

SITE DESCRIPTION: This is a large, multi-component habitation site divided into three "locales". Locale 1 was recorded in 1965 and Locales 2 and 3 were discovered on a 1983 GRCA monitoring trip. Five structures and 21 features are assigned to Locale 1, including a pithouse, several one to two room masonry structures, a pueblo, cists/hearths, and rubble/wall alignments. Four structures and 16 features are noted at Locale 2, including rooms and rubble piles. Locale 3 contains two structures and five features, including a shelter, cists and wall/room remains. Testing results suggest the site may have had from two to three occupations, including use by Pueblo I Cohonina and Pueblo II Puebloan; ceramics also suggest a late prehistoric-early historic Hopi connection. For details consult Jones (1986).

PREVIOUS WORK: Extensive research was completed at this site by Jones and Balsom in 1984 (Jones 1986). The river corridor project has monitored the site since FY95, but GRCA staff monitored the site several times prior. Because the site is located on such fragile terrain, the area has been closed to visitors since 1985. A topographic map was completed by Hereford et al. in 1993 with supplemental plotting of features and structures by K. Thompson (Hereford et al. 1993). During the 1996 research flow, additional monitoring efforts were conducted at this site (Burchett et al. 1996 draft).

STATUS AND RECOMMENDATIONS: The structures in good condition include: 2-5, 7, 8, 10, 19, 22-25, 27, 39, 40-45, and 47-49. At Structure 38, bank slumpage occurred as one boulder moved three to five centimeters downslope and one upright fell 1.5 meters downslope. Basal erosion is also occurring. Structure 9 is in very poor condition. No photographs were available to compare, but it is very fragile -- two very active gullies are present in the second room to the south. Structure 26 shows increased slumping and gullying. Structures 20 and 21 show downslope movement. There is also new bank slumpage between the features. Structure 11 is missing a basalt cobble from the top course. Structure 46 exhibits both soil deposition, and erosion of more artifacts. No human disturbance was observed. The beach remains closed to the public.

It is recommended that a total station map be completed this fiscal year. Full mitigation, checkdam construction and some form of ruins stabilization are also suggested for the features on the downstream side of the large arroyo. A mitigation plan is currently underway for data recovery of features in poor condition. Some data recovery is scheduled for FY98. Annual monitoring will continue.

C:13:069 -- Small Structures

SITE DESCRIPTION: This is a large site complex consisting of several cists and masonry structures eroding out of surrounding dunes. Many of the features are on the same vertical level, but their cultural/temporal relationship is unknown. Feature 1 is a slab-lined cist remnant; Feature 2 may be a masonry room/midden; Feature 3 is a masonry wall; Feature 4 consists of eroding slabs where additional architecture may be present; Feature 5 is a well-preserved cist; Feature 6 is a masonry room; and Feature 6B is another masonry room outside of the main dune area. Ceramics suggest a Pueblo II-early Pueblo III affiliation. The site is near the Tanner-Hance Trail and a well-

used beach camp.

PREVIOUS WORK: NPS personnel recorded this site in 1990, and monitoring occurred in FY93, FY95 and FY96. In 1992, the NPS rehabilitation project conducted trail obliteration, revegetation, and stabilization of minor drainages. A total station map was completed, and checkdams were constructed in FY97. See Hereford et al. (1993) for photogrammetric topography mapping of the immediate area.

STATUS AND RECOMMENDATIONS: The gully west of Features 1 and 2 shows no sign of water runoff after heavy rains. Feature 1 did experience minor bank slump on the upper western half. On the lower western portion there is a log that acts as a sediment catchment device. At least 20 cm of sediment have accumulated. This sediment probably came from Feature 1 and possibly from alluvial deposition. Minor surface runoff was noted northeast of Feature 5. Increased animal burrowing was observed at Features 3 and 6.

A trail that leads from the boat camp to the Tanner Trail runs through the site, separating Features 5 and 6 from the rest of the features. Visitors do not seem to stray from this trail, human impact appears minimal. Monitoring will continue annually.

C:13:070 -- Small Structures

SITE DESCRIPTION: This site has four loci (A-D). Locus A has three artifact scatters overlooking the drainage mouth and along the terrace edge to the northeast. Locus B is a rubble mound that suggests a small masonry structure. Abundant sherds and lithics are located around the structure and upslope. Locus C consists of a dense scatter of charcoal (historic) and artifacts scattered over the surface. Locus D includes three to four charred logs exposed in an arroyo that may be the remains of a roof and several artifacts. The quantity and diversity of artifacts suggests that this is a habitation site; however, few architectural features were located. Artifacts indicate a Pueblo II-early Pueblo III occupation. The 96-1 monitors found small mammal bones on the northeast edge of Locus A. The 97-1 monitors found a basalt axe fragment in the artifact area at Locus D.

PREVIOUS WORK: The site was originally recorded in 1973 and re-recorded in 1991 by NPS personnel. The site was monitored in the previous years by GRCA, and more recently has been monitored by this project: once in FY93, twice in FY94, FY95, and FY96. In FY96 the monitoring schedule changed to annual. A total station map of Loci B - D will be completed by September, 1997.

STATUS AND RECOMMENDATIONS: Locus A showed increased deflation in the gully with the pedestalled sherd, which has fallen since the last visit. The manos and metates in Locus B are located in very fragile areas, but they appear stable. The drainage systems at Locus D are moderately to extensively active due to water runoff and bank slump. The burned logs are eroding out of very active arroyos, however, none of the available photographs showed increased erosion. At Locus B there is a collection pile, noted on the previous visit, that exists near the structure. The trail that monitors used in the past to go from Locus B to A is no longer in use, and therefore on the

road to recovery.

The Zuni Cultural Advisory Team monitored this site in May, 1996 and their recommendation was to install several checkdams. Upon visiting the site in April, 1997 it was also recommended that samples be taken from the charred logs in Locus D. The site should receive some form of data recovery followed by erosion control efforts. Annual monitoring will continue.

C:13:092 -- Historic Structure

SITE DESCRIPTION: This multi-component site consists of a historic habitation camp, and a prehistoric artifact scatter. The main historic feature is the remains of a small, rectangular foundation/tent platform constructed of driftwood and thick hard-hewn pine planks. About five meters to the east is another possible foundation of beams and driftwood. There is a possible sandstone outhouse foundation about 50 m east. The few historic artifacts that remain on-site include: the bulk of a small, cast-iron stove; a three-inch-long piece of half-inch rod with a threaded end, numerous wire-cut nails, and a single fragment of opaque, aqua glass bottle. To the north, on a talus slope, is a small, sparse, prehistoric artifact scatter of sherds and lithics. The historic component is probably turn-of-the-century and the prehistoric component appears to be Late Pueblo I-early Pueblo II affiliation. The 95-5 monitors found two grayware sherds north of the cabin. One was Tusayan corrugated, and probably associated with site C:13:321.

PREVIOUS WORK: Initial recording of this site was in 1976. NPS survey personnel recorded the property in greater detail in 1990. GRCA staff have monitored this site many times in the past. This project monitored the site twice in FY93 and then annually since then.

STATUS AND RECOMMENDATIONS: No physical impacts were observed, although an increase in visitor impacts was noted in the form of rearranged artifacts within the cabin. No artifacts appear to be missing and trails leading to the cabin are not entrenched. Photographs were replicated from 1978 and 1981 solely illustrating minor artifact movement. Biennial monitoring is recommended.

C:13:098 -- Historic Structure

SITE DESCRIPTION: This historic mine and cabin site contains two loci. Locus A consists of two mine adits at the base of the Palisades cliff along the Palisades fault. The main adit is situated about 10 m above the surrounding terrain with an extensive tailing pile below it. The second adit is located about 10 m below and 20 m south of the main adit. About 225 m S/SW is Locus B, which includes a log cabin constructed of driftwood logs. The cabin measures 2.6 x 4.1 m (interior) and is five courses high. The floor is partially paved with sandstone slabs, with a log/board bed frame in the northeast corner. A canvas tent probably formed the upper walls and roof. About four meters due south of the cabin door is a driftwood log "fence". This structure is made of stacked logs up to four courses high. It may have been a windbreak. Artifacts date from 1900-1920 and mid-1930s.

PREVIOUS WORK: This site was initially recorded in 1978 and then re-recorded by NPS

personnel in 1990. This project has monitored the site semiannually since FY93, and previously GRCA monitored the site. See Hereford (1996) for photogrammetric topography mapping of the immediate area. A total station map was completed this fiscal year.

STATUS AND RECOMMENDATIONS: Increases in surface erosion were noticed at the cabin, in a gully west of the cabin, and near the artifact concentration. The rills near the artifact stump also exhibited some movement. A small gully with several headcuts is developing on the north side of the cabin, yet, human disturbance is the main impact to this site. Artifact movement, displacement and the formation of small collection piles were observed in FY97. Human disturbance is inevitable because the cabin is highly accessible and visible.

On the second monitoring episode of the year, the site appeared stable with only minor movement of the artifacts located on the tree stump and in the cabin. Semi-annual monitoring will continue due to the amount of visitation the site receives in the summer and due to its proximity to the active arroyo system where checkdams were constructed in September, 1995 (Leap and Coder 1995). It is also recommended that trail maintenance be performed on a regular basis.

C:13:099 -- Small Structure

SITE DESCRIPTION: This site contains two loci of fire-cracked rock features, buried/collapsed structures, and artifacts. Locus A includes several charcoal lenses, burned rock features, and an artifact concentration. Features are eroding out of a dune-like area cut by an arroyo. Sherds and Redwall chert flakes are present; ceramics suggest an early-mid Pueblo II occupation. Locus B is a masonry structure constructed of undressed sandstone and limestone river rocks. Another possible feature is eroding just a few meters south. The site was tested and C¹⁴ samples taken during prior investigations. Three slab-lined cists (Features 6, 7, and 8) were located during subsequent monitoring visits.

PREVIOUS WORK: The site was initially recorded in 1978, then re-recorded by NPS staff in 1990. GRCA monitored the site frequently in the past, and this project has monitored the site semiannually since FY93. This site has a highly erosive arroyo system bisecting several cultural features. In FY95, it received trail obliteration and retrailing of the Beamer Trail, and it marked the first site to place traditional Zuni constructed checkdams into the arroyos (Leap and Coder 1995). The map used prior to the total station map was a photogrammetric map derived from an aerial photograph (Hereford et al. 1993). In FY97, the site was mapped in greater detail with a total station and checkdam and trail maintenance were performed. Additional monitoring efforts were completed during the 1996 research flood (Burchett et al. 1996 draft).

STATUS AND RECOMMENDATIONS: River-based drainage 1 (RB1), the main drainage impacting the site, experienced substantial runoff on October 2 due to heavy rains. The volume of this flow presented our first look at the integrity of the checkdams constructed in September, 1995.

Many checkdams captured sediment and appeared to be working as planned. However, some of the flow cut around certain checkdams and into the drainage walls as runoff made its way to the river. Increases in gullying, arroyo cutting, bank slump, alluvial deposition, and animal-caused disturbances continue to be observed. The presence of surface erosion was also noted but increases were not discernable. Many artifacts washed down the drainage. Portions of Feature 3 had minor bank slump, rodent activity and movement of one upright slab. Undercutting remains substantial at Feature 1. Feature 8 was also impacted by bank slump and continued undercutting. Feature 7 remained intact but had water flowing under one of the uprights. Overall, physical impacts are still very active but the checkdams appear to have decreased the force of the drainage's flow to some degree.

This arroyo is different from all the others we monitor because it is tapped into an extensive drainage basin, or playa. Rainwater collects in this basin then releases into its only outlet, RB1, with a strong and consistent force to the river. The checkdams will be monitored closely and will require some maintenance after heavy localized rainfall. Monitoring will continue on a semiannual basis because of increased physical impacts and the site's proximity to the Palisades river camp and Beamer Trail. It is also advised that some data recovery be conducted in the near future.

C:13:100 -- Pueblo

SITE DESCRIPTION: This site is an open Pueblo II habitation site. Feature 1 is a rectangular habitation room. Feature 2 is another probable habitation room with a possible south entrance; it has standing walls two to three courses high. Adjoining Feature 2 is Feature 3, a small, more difficult to define structure; there may be another room attached to the southwest wall of Feature 3. Feature 4 and Feature 8 are possible associated rooms exposed in an arroyo, with walls two to three courses high. Features 5 and 6 are the remains of slab-lined cists of Dox Sandstone. Feature 7 is evidenced by a charcoal stain in a trail and bits of charcoal eroding from the dune. South of the dwellings is an eroding drainage two meters across and 50 cm deep. Lithics and ceramics are scattered down the slope directly above the drainage. There is also a heavy groundstone concentration near the cists. Groundstone/tools include manos, metates/slabs, hammerstones, and sandstone knives. During the 9/95 erosion control trip, archaeologists located a new feature (Feature 9) consisting of upright Dox slabs in an arroyo. Two other features were located during the 97-1 monitoring visit, a charcoal lens in the dune near Feature 7 and a probable cist near Features 5 and 6.

PREVIOUS WORK: The site was first recorded in 1978 and re-recorded by NPS staff in 1990. In earlier years the site was monitored by GRCA. Since FY92, this project has taken over monitoring, which occurred once in FY92 and since then semiannually. In FY95 this site received trail work and was also a part of the stabilization efforts conducted at C:13:099 (Leap and Coder 1995). This site has two arroyo systems where checkdams were built. In FY96 trail obliteration was conducted and in FY97 the site was mapped with a total station. See Hereford (1996) for photogrammetric topography mapping of the immediate area. During the research flow of 1996, additional monitoring

was completed (Burchett et al. 1996 draft).

STATUS AND RECOMMENDATIONS: The majority of the features are in stable condition. Increases in surface erosion and gulying were noted at Features 5 and 6 due to their location in River-based drainage 3 (RB3). A small rill is developing downstream of and adjacent to Feature 6. Feature 7 and 10, charcoal lenses, could not be seen after local rains.

The rains in October provided valuable information concerning the activity of RB2 and RB3. Both drainages appear stable with minor changes since the last visit. (These drainages are not tapped into a large drainage basin like RB1 at C:13:099). RB2 revealed alluvial deposition and water scouring below the site, near the Beamer Trail. The headcut in this area was photographed and should be monitored in the future. RB3 experienced minor channeling mainly near Features 5 and 6.

On the second monitoring episode of FY97, some sediment deposition was noted near Feature 7, but all other features appeared unchanged since October, 1996. The arroyo system that bisects the site appears inactive. The checkdams installed in the system in September, 1995, are all in good, stable condition. Visitor-related impacts were not observed. Semiannual monitoring will continue due to the potential of the arroyos becoming active. Furthermore, Palisades Delta receives a rather substantial amount of traffic during the summer months. Future data recovery methods will be implemented at Features 5 and 6.

C:13:273 -- Roaster Complex

SITE DESCRIPTION: This site is a Late Pueblo I-early Pueblo II Formative special use area consisting of five features and two artifact concentrations. Features 1, 3, 4, and 5 are roasting pits with charcoal staining and fire-cracked rock. Feature 2 is a possible slab-lined cist. The two artifact concentrations consist of lithics and ceramics, and there is a light artifact scatter over the general site area.

PREVIOUS WORK: The site was first recorded by NPS survey personnel in 1990 and has been monitored in FY93, FY95 and FY96. In FY95, project staff conducted archaeological clearance prior to some retrailing conducted by the Park trail crew (Leap 1994). In FY97, the site was mapped with a total station and Feature 5 was excavated. The results of the excavation will be written in a separate report.

STATUS AND RECOMMENDATIONS: This site is in good condition with a few minor erosional increases. Heavy rains created surface erosion and alluvial erosion and deposition. An increase in cacti growth was also noted near Feature 1. Feature 3 is adjacent to a large, active drainage system but most of the feature is located on stable ground. During photographic comparisons, erosional increases could not be detected.

The Beamer Trail is located on the southwest portion of Feature 1 traveling east to west between Features 2 and 4. This is a well-traveled trail but people to not wander beyond it. No other visitor-related impacts were observed. Monitoring will continue yearly. It is also recommended that a retaining wall be placed below Feature 3 to stabilize the bank.

C:13:291 -- Small Structures

SITE DESCRIPTION: The site consists of standing walls of several structures and Dox Sandstone cists. Feature 1 is a two-meter long wall and juniper post eroding downslope. Feature 2 is a slab-lined cist with a room exposed in a cutbank. Feature 3 is a wall exposed in a gully. Feature 4 is a hearth or cist. Feature 5 is a cluster of Dox slabs that may be coursed. Artifacts include sherds and lithics, including a chopper, a hammerstone, and a bi-edge tool. Sands and slope wash cover the site to a depth of more than one meter in some areas. Apparently the site was constructed on a terrace, and has since been covered periodically by slope wash and fluvial sand deposits and cut by slope erosion. Artifacts indicate a mid-late Pueblo II occupation. On the 95-2 monitoring trip, monitors noted that Feature 2 has completely eroded away.

PREVIOUS WORK: This site was initially recorded in 1988 and again in 1990. The site was monitored by this project once in FY92, twice in FY93 and FY94, and beginning in FY95 the monitoring schedule changed to annual. As a result of the 45,000 cfs research flow, visitors created a trail through the site on their way to Unkar Delta. Additional monitoring efforts were also conducted during the research flow of 1996 (Burchett et al. 1996 draft). This trail was obliterated in FY97, and a new trail was constructed below the site. During FY97, a total station map was completed.

STATUS AND RECOMMENDATIONS: All physical impacts were observed in the drainage where Features 1 and 4 are exposed. Feature 1 has received minor gully cutting and surface runoff.

Management actions are difficult to determine due to the site's fragile condition. The Zuni Conservation Team suggested small airstair checkdams in the gully and a basket weave checkdam in the arroyo. Annual monitoring will continue but it is also recommended that data recovery occur at Features 1 and 4, and follow-up erosion control methods be completed. A dendrochronology sample from the post at Feature 1 will be obtained in FY98.

C:13:321 -- Roaster Complex

SITE DESCRIPTION: This site consists of an enigmatic rubble mound of Dox Sandstone slabs (probably historic), and four roasting pits/hearths. The rubble mound may be a feature associated with a historic cabin to the south (C:13:092). No chipped stone tools were associated with the site, although several groundstone tools were found. Four corrugated sherds were found associated with Feature 5, and could be from C:13:009, Locus B. The features are scattered throughout a dune field below Basalt Creek on the drainage flowing north/south out of the boater's camp. Cultural affiliation is unknown. On the 95-5 monitoring trip, monitors found an additional fire-cracked rock feature and several sherds, and the 96-2 monitors found a Dox lid.

PREVIOUS WORK: The site was first recorded in 1989, and re-recorded by NPS personnel in 1990. GRCA monitored the site in the past, and this project monitored it twice in FY93 and FY95 and once in FY94 and FY96. Presently, the site is on an annual monitoring schedule. The site was tested for depth and extent prior to the research flow of 1996 (Andrews et al. 1996 draft). No

cultural deposits were located. The site was also mapped with a total station beginning in FY96 and was completed this fiscal year. See Hereford et al. (1993) for photogrammetric topography mapping of the immediate area.

STATUS AND RECOMMENDATIONS: Increases in eolian activity and surface erosion were noted. Features 5 and 6 are experiencing physical impacts due to their position in a deflated area. Displaced rocks were noted near Feature 6. Feature 5, a nicely preserved roasting feature, showed some shifting of the uprights. Features 1 and 2 had minor increases in surface erosion. Feature 3 experienced minor alluvial erosion.

One collection pile was observed at Feature 5. These artifacts were dispersed around the feature by monitors. Feature 5 should be watched closely due to the basal erosion occurring on the feature's west side: the uprights lining the feature are nearly horizontal. Annual monitoring will continue.

C:13:329 -- Enigmatic Feature

SITE DESCRIPTION: This is a Pueblo II site consisting of a small rockshelter with a charcoal/bone scatter (Feature 1), an artifact cluster (Feature 2), and a small circular rock feature (Feature 3). Only a small portion of the site may be visible, with the remainder buried under dune deposits.

PREVIOUS WORK: This site was initially recorded in 1990 and monitored in FY92, FY93, and FY95.

STATUS AND RECOMMENDATIONS: Features 1 and 3 show no physical impacts. The gullies at Feature 2 are filling in, but very slowly. This feature has become more stable by eolian deposition. Human visitation was not observed.

There are no detrimental impacts to this site. It is very stable. Continue monitoring the site biennially to determine how active the gully is near Feature 2 to advise future preservation tactics.

C:13:337 -- Isolated Thermal Feature

SITE DESCRIPTION: The site consists of a circular distribution of fire-cracked rock, some of which are spalls, and most of which are fist-sized or smaller. This assemblage is assumed to be the remains of a roasting pit, or perhaps an earth oven. No charcoal-stained soil or charcoal fragments were associated with this feature. A few lithics co-occur with the fire-cracked rock scatter. Cultural affiliation is unknown.

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

STATUS AND RECOMMENDATIONS: This site is very stable and looks good. There is a healthy abundance of cryptogamic soil. The only sediment movement evident is by eolian processes, yet, this appears to have been a positive effect. The mesquite tree in the center of the main roasting feature acts as a stabilizing force. There is no sign of recent visitor-related impacts. It

is recommended that the site be monitored in five years to see if the eolian processes have become erosive and new artifacts have been exposed.

C:13:339 -- Small Structure

SITE DESCRIPTION: The site consists of a mid-late Pueblo II habitation buried in an alluvial terrace, and two later (protohistoric/historic) hearth features which post-date the main occupation of the site. A burned rock midden, a buried hearth, and several vague rock alignments comprise the Pueblo II remains. The burned rock midden, with sparse lithics and ceramics, is located on the north side of the site. It is eroding out of a cutbank. The Beamer Trail drops through this area down to the next terrace.

PREVIOUS WORK: The site was initially recorded in 1990 by NPS personnel and was monitored in FY93, FY95, and FY96. Prior to re-trailing in FY95, archaeological clearance was conducted by this staff (Leap 1994). A total station map was begun in FY95, and will be completed in FY98.

STATUS AND RECOMMENDATIONS: Impacts were visible at Features 2, 3 and 7. Due to recent rains, an increase in surface runoff on the west side of Feature 2 was noted. Feature 3 also experienced minor changes on its south side through gullying. This gully was very active, exposing two new, possibly cultural, Dox slabs. Feature 7 was stable with minor rodent burrowing on the northeast side. No comparison photographs were available for Features 4 and 5.

The Beamer Trail bisects Feature 1 but does not appear to be impacting it. Trail compaction on the southern site boundary may be an indirect cause of the rills, piping and collapse of sediment that has been observed on the last three trips. Management recommendations warranted at this time include revegetating the area where the impacts are occurring. Monitoring will continue annually.

C:13:342 -- Historic Structure

SITE DESCRIPTION: The site consists of the deteriorated remains of a historic wooden structure, possibly a storage building or log cabin. The structure is in very poor condition, and its original configuration is difficult to discern. The wood building elements include milled lumber, as well as logs. The milled lumber was probably used for the foundation/basal course, while rough logs were used for walls and possibly rough beams. It is obvious that many elements have been salvaged for use elsewhere. Square nails were primarily used, although a few large wire nails are also present. Historic trash includes two enamel-ware vessels (a bucket and coffee pot), a cast iron dutch oven lid, and purple glass, suggesting a turn-of-the-century occupation. The structural remains currently occupy a six by nine meter area, but the structure was obviously smaller when intact. The 95-2 monitors collected a shell button on the surface.

PREVIOUS WORK: This site was initially recorded in 1991 and monitored in FY92, FY93 and FY95.

STATUS AND RECOMMENDATIONS: Two cans next to the dutch oven lid have fallen. These

cans are very light so they may have been blown over by the wind. No human disturbances were noted. The collection pile that was here in 1994 is still present and unchanged. Visitor-related impact is still a legitimate concern due to the proximity of this site to the Tanner/Escalante Trail. Monitoring will continue biennially due to the possibility of human disturbance.

C:13:343 -- Small Structure

SITE DESCRIPTION: This is a Pueblo II limited activity area with three slab-lined features, a small artifact and fire-cracked rock scatter, and a rock alignment. Feature 3 is a small, circular, Dox Sandstone slab-lined feature. At the top of a dune are two rock alignments; one measures four meters long and the other consists of two Dox slabs. Artifacts are mostly sparse, consisting of sherds, lithics, and fire-cracked rock; one chert scraper was noted. The 92-3 and 95-3 monitors believe that Features 1 and 2 are not cultural, but are piles of debris flow. They appear to be rocks naturally deposited in a line following the drainage flow.

PREVIOUS WORK: The site was initially recorded in 1990 by NPS personnel and previously monitored in FY92, FY93 and FY95. A total station map was completed this year.

STATUS AND RECOMMENDATIONS: The site is located on a fairly active dune. It is apparent that an extensive site existed on this dune at one time, but now artifacts are mixed and eroding downslope. There is increased surface erosion and gullying. The Feature 1 debris flow is unchanged, and the Feature 2 debris flow is eroding into the main arroyo. A gully between the two debris flows has become entrenched. Mesquite branches are moving downslope. Feature 3 is actively moving downslope into the arroyo. No sign of visitor-related impacts were observed.

The two rock alignments appear to be rocks naturally deposited in a line following the drainage flow. These features should be tested for subsurface significance. It is also advised that this site be monitored next year to determine the rate of erosion.

C:13:347 -- Small Structure

SITE DESCRIPTION: This site consists of a Dox Sandstone slab wall eroding out of a shallow arroyo cutbank. Cultural affiliation is unknown. In April 1994, a serpentine pipe fragment was collected from the arroyo cutbank. The 95-3 monitors found a Black-on-White sherd exposed near the wall.

PREVIOUS WORK: This site was initially recorded in 1990 by NPS personnel and monitored in FY92, FY93, and FY95. Beginning in FY96 the site was placed on a semiannual monitoring schedule, and in FY97, a total station map was completed. During the 1996 research flow, additional monitoring efforts were completed. For the results, see Balsom and Larralde (1996 draft).

STATUS AND RECOMMENDATIONS: Increases in arroyo cutting, bank slump and alluvial erosion were noted this year. This activity caused three Dox slabs to collapse into the arroyo on the east facing slope. The rodent burrow previously behind one of the fallen slabs was a factor in the

slab's displacement. The metate is in its original position but water periodically runs underneath it. Two newly exposed Dox slabs are visible below the coursed wall. No visitor-related impacts were observed.

On the second monitoring visit of FY97, minor surface erosion was observed on the arroyo bank, but not near the artifacts or wall alignments. Overall, the arroyo bank sediments have healthy cryptogamic soils which appear to be cementing the features in the arroyo. Animal burrows are present as is minor erosion from plant roots, however, they are not destabilizing the site. Semiannual monitoring will continue due to the potential for the arroyo to be active. Management assessments were made on the last visit by Zuni and PA representatives. It was decided that the site should be tested to determine the extent of the site prior to implementing any stabilization efforts.

C:13:349 -- Historic Structure and Prehistoric Artifact Scatter

SITE DESCRIPTION: This site is located in a dune terrace and includes a historic cabin/dugout, fire-cracked rock, and artifacts. No artifacts indicating function were found in association with the structure. Charcoal fragments were observed below the structure in a drainage but appear to pre-date its use. There are about eight remaining wood pieces to the historic structure. The back of the structure--consisting now of just one foundation pine plank--is "banked" against a dune. The prehistoric fire-cracked rock midden/roasting pits have good assemblages of sherds and lithics, but no formal tools were noted. The prehistoric components are pre-ceramic and Pueblo I-II, while the historic component is of unknown temporal affiliation. New charcoal lenses and fire-cracked rock were exposed due to recent bank slumpage.

PREVIOUS WORK: NPS survey personnel recorded this site in 1990, and monitoring of the site has occurred annually since FY93. An instrument map of the site was completed in FY97.

STATUS AND RECOMMENDATIONS: After the heavy rains of October 2, 1996, the main arroyo changed dramatically. Bank slump occurred throughout the arroyo, raising the base of the channel. New artifacts continue to be exposed, but the previously recorded features appear stable. In previous years, the activity of the arroyo has buried a metate and Feature 5. A minor increase in surface erosion and rock movement was also noted. No visitor-related impacts were evident.

The main activity at this site occurs in the arroyo. Continue monitoring annually due to the potential exposure of new features. Similar to C:13:347, the site was assessed on the spring visit by Zuni and PA representatives. It was decided that prior to any stabilization effort, the site should be tested to determine if we are looking at the beginning or the end of a site.

C:13:350 -- Isolated Thermal Feature

SITE DESCRIPTION: The site consists of a roasting feature eroding out of a deflating, alluvial, silty sand deposit. The feature is comprised of sandstone, limestone, and basalt rocks mixed with charcoal-stained soil. No artifacts were found in association. Cultural affiliation is unknown.

PREVIOUS WORK: NPS survey personnel initially recorded the site in 1990, and monitoring occurred in FY92 and FY93. A radiocarbon date from a charcoal sample was secured by R. Hereford (USGS) of 1610 BP (+/- 70) (A.D. 240-585) (Hereford et al. 1993). The sample was collected to supplement the alluvial sequence of the lower Tanner delta.

STATUS AND RECOMMENDATIONS: This site is in stable condition. Cryptogamic soils are moderately spread throughout the area. No erosion is present. Human visitation was not observed.

This site is in stable condition with no immediate or future disturbances likely. No further work is recommended. It is suggested that this site be placed on the inactive monitoring list.

C:13:359 -- Small Structure

SITE DESCRIPTION: This site consists of possible habitation and storage features and associated artifacts. Feature 1 is a small, wet-laid wall that is probably the remains of a granary. It is within a shallow Bass Limestone overhang and is constructed of Dox and Tapeats slabs. Feature 2 is a partially exposed structure evidenced by two walls at right angles that are partially buried in the sand. Two meters west, is a single vertical slab that may indicate another structure or feature. Feature 3 is another exposed structure comprised of a linear alignment of Dox slabs with associated sherds and lithics. North of Feature 2 is a one meter diameter stain of charcoal flecks and two manuport stones. Sherds suggest an early-mid Pueblo II affiliation. Other artifacts include a biface fragment, a chert pebble tool, and some lithics.

PREVIOUS WORK: The site was initially recorded in 1991, and has been monitored annually since FY92. Data recovery was completed on Feature 2 in FY97. Results of the excavation will be disseminated in FY98. Prior to the excavation, a total station map was completed. After the excavation, checkdams were built in the gully that bisected Feature 2.

STATUS AND RECOMMENDATIONS: Feature 1 is in stable condition. Although basal erosion and mortar cracks are present they are not increasing. The condition of this feature is fragile, yet protected because of its location along the overhang. Prior to the excavation, Feature 2 was being undercut by an active gully with increased sloughing on the northwest bank. Soils are falling into the gully, thus widening to impact the feature. Recent sloughing of sediments have fallen into the gully but have not yet moved downslope. There is less vegetation in Feature 3, probably due to the fact that the previous monitoring occurred during the spring. Surface erosion and pedestalling of artifacts are present but the feature is stable. No human disturbances were observed. Annual monitoring will continue.

C:13:360 -- Camp

SITE DESCRIPTION: The site consists of the remnants of a wall, two redware sherds and some mineralized charcoal at the base of a Tapeats cliff. The wall is of dry-laid Tapeats Sandstone and currently consists of five in-place elements with three more wall fall elements. There is so much salt percolating through the bedrock that the sediment and surface of the rock is permeated with it. The

site represents a possible late Pueblo I to early Pueblo II Formative association.

PREVIOUS WORK: The site was originally recorded in 1990 by NPS personnel and monitored for the first time this year.

STATUS AND RECOMMENDATION: No baseline photographs were available to make site condition comparisons. Surface erosion is present due to the Tapeats Sandstone dripline above the site but this is not threatening the site. The site appears stable, but in poor condition. It will be assigned a monitoring schedule after a second visit to the site is made in the next five years.

C:13:361 -- Storage

SITE DESCRIPTION: The site consists of an isolated granary wall remnant and some corn kernels. The granary is located in a small cave in the Shinumu Quartzite. The wall is dry-laid with stone chinking. Fifty or more corn kernel "shells" were noted on the granary floor; five were collected. Cultural affiliation is unknown but is possibly Pueblo I-III based on similarity with nearby dated sites.

PREVIOUS WORK: The site was initially recorded in 1991 by NPS personnel and monitored for the first time this year.

STATUS AND RECOMMENDATIONS: No physical or visitor-related changes have been observed since April, 1991. The site is in very good and stable condition. It is also well-protected. This site will be placed on the inactive monitoring list.

C:13:363 -- Small Structure

SITE DESCRIPTION: This site is in a rockshelter at the base of the exposed Shinumu Quartzite. It contains the remains of two small, standing, side walls that are four to five courses high and dry-laid. The large amount of rock fall in front of the shelter probably functioned as another "wall". A large corrugated sherd and a single one-handed sandstone mano were the only cultural artifacts on-site. A small piece of wood in the corner of the shelter was obviously imported. The single sherd suggests a late Pueblo II-early Pueblo III cultural affiliation.

PREVIOUS WORK: NPS personnel recorded this site in 1991, and it was monitored for the first time in FY97.

STATUS AND RECOMMENDATIONS: No physical impacts have occurred since the survey, although packrat feces are abundant. Human disturbances were also not observed.

The site has not changed since 1991; however, it will be monitored within three years in case packrat activities begin to impact the site. If no changes are apparent, the site will be monitored less frequently, or placed on the inactive monitoring list.

C:13:371 -- Small Structures

SITE DESCRIPTION: This is a mid-late Pueblo II habitation area situated on a debris fan on both sides of an unnamed side canyon. It consists of several rockshelter overhangs--some with dry-laid masonry walls, possible room rubble, several fire-cracked rock concentrations, and a lithic/ceramic scatter. Feature 1 consists of two small rock overhangs each with two to three course dry-laid masonry walls, possibly the remains of storage features. Features 2, 3, and 4 are fire-cracked rock concentrations. Feature 5 is an architectural unit consisting of two rooms. Feature 6 consists of two fire-cracked rock concentrations, one three meters in diameter and the other three by five meters, with artifacts. Feature 7 is a fire-cracked rock scatter with a few artifacts. In general, each fire-cracked rock area has at least some artifacts associated with it. The monitors in 97-1 found a Tapeats Sandstone mano below Feature 6.

PREVIOUS WORK: The site was initially recorded by NPS survey personnel in 1990 and has been monitored semiannually since FY92. In FY96, the site was mapped with a total station, three checkdams were constructed near Features 3 and 5, and carbon samples were taken from Features 2 and 4 (Leap 1996a, 1996b). Prior to the research flow, Feature 8 was tested for subsurface deposits and site extent. No cultural features were identified (Andrews et al. 1996 draft).

STATUS AND RECOMMENDATIONS: Increased bank slump was observed at Features 4, 6 and 7. The slumping appeared recent, perhaps from the heavy rains on October 2, 1996. Three, once stacked rock elements associated with Feature 5's western wall have collapsed. It is unclear whether this was caused by physical or visitor-related forces. Side canyon erosion and gulying are also present but no increases were noted. The western, outside edge of the checkdams that were constructed last spring have received minor deposits of sediment. No visitor-related impacts were observed, though it may be possible that the impacts to Feature 5 have been visitor-related. This site is in fair condition and will remain on a semiannual monitoring schedule.

C:13:373 -- Roasters and Artifacts

SITE DESCRIPTION: The site consists of a large, concentrated amount of charcoal, fire-cracked rock, Hopi sherds, and animal bone. This material is eroding out of the west side of a dune just below the top. The charcoal is fairly recent looking. All of the sherds were severely refired in the "hearth" area. The site could be evidence of late prehistoric-early historic Hopi use of the area.

PREVIOUS WORK: This site was initially recorded in 1990 by NPS personnel and monitored for the first time this year.

STATUS AND RECOMMENDATIONS: Overall, the dune is stabilized by a heavy growth of mesquite. The sherds, bone, and charcoal visible on the surface are slowly migrating down the dune face. An increase in surface erosion is apparent. A portion of the dune continues to slump away, slowly deteriorating beneath the site. No sign of human visitation was noted. Monitors will visit the site next year to determine the rate of erosion.

C:13:384 -- Historic Scatter

SITE DESCRIPTION: This site was originally found by GCES geomorphologists R. Hereford and others at Lava Chuar in October of 1990 while facing off a cutbank for a stratigraphic column. The profile they exposed is comprised of (from bottom to top): a basal prehistoric upright slab-lined hearth inset in and overlain by gravel lenses, an episode of overbank flooding, a level of intermediate fine-grained sediment with another episode of expedient fire hearths, and a surface unit of sand and gravels containing historic artifacts. The lowest slab-lined hearth (Feature 1) produced several C¹⁴ dates indicating an early Pueblo II (or possibly late Pueblo I) temporal affiliation. The C¹⁴ date from Feature 3 indicated a protohistoric temporal affiliation. Also, up Lava Chuar Creek is a rock structure with associated historic artifacts. In general, this site is suggestive of three components: late Pueblo I-Early Pueblo II, protohistoric Pai or Paiute, and turn-of-the-century Euro-American.

PREVIOUS WORK: This site was initially recorded in 1991 by NPS personnel and was monitored in FY92, FY93, and FY94. See Hereford (1996) for photogrammetric topography mapping of the immediate area.

STATUS AND RECOMMENDATIONS: The cist is no longer visible as noted by monitors in 1994. Bank slumpage has increased since last monitored, and wood has fallen from the bank's edge above the features. No photographs of Features 2 and 3 were available for comparison. Erosion is present, but the features are visible with the exception of the cist. Features 2 and 3 are fragile and will continue to erode out of the cutbank. Even though photographs were not available to compare, all the features are located along the same cutbank and experience the same erosional impacts. No sign of human visitation was observed.

No management actions are recommended at this time. Monitors will visit the site in FY98 to identify if the erosional processes are occurring annually. If active erosion is observed, a mitigation plan may be in order.

C:13:387 -- Small Structures

SITE DESCRIPTION: The site has six features (Features 1-6), including dry-laid walls, cists, sherds, and two metates. Features 1-4 are wall or slab-lined features that are under or in front of Dox overhangs. Feature 5 is a collapsed structure of unknown form and function with some burned limestone at the toe of a low dune ridge. Feature 6 is a small Dox wall on a terrace remnant that may be recent or historic. Most sherds were found below Feature 6 on a dune ridge; one large corrugated sherd was on an adjacent ridge slope. The two metates are eroding down the side of a deep arroyo below Features 1 and 2. Generally, the overhang features appear to be storage structures, however, Feature 3 contained remnant mortar. Ceramics suggest a Pueblo II cultural affiliation.

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

STATUS AND RECOMMENDATIONS: The current impact to the metates is sediment depositing from above and water erosion occurring directly below. The upper metate also showed signs of minor basal erosion. The lower metate experienced minor alluvial deposition and erosion, and now only 25% of the artifact is exposed. All other cultural features are stable. No human visitation was observed.

Stabilization via checkdams would not be practical under the circumstances because the drainage has reached bedrock. Installing checks would eventually fill in the drainage but the labor expended to build the checks would not be worth the effort for stabilizing two metates. Monitoring of the metates will continue annually, while the rest of the site will be monitored every three to five years. It is recommended that detailed recording of the metates be conducted, through measurements and photographs. After such work is completed, no collection is warranted.

C:13:389 -- Ephemeral Structure

SITE DESCRIPTION: The site consists of an overhang shelter (Feature 1) and two roasting features (Features 2 and 3). Feature 1 is a Dox overhang ledge and may be both prehistoric and the result of river-runner rebuilding/additions; match sticks and recent-looking charcoal are in this end of the shelter. A drainage at the base of the overhang has cut through charcoal and the stained living surface of the prehistoric occupation. Burned bone, lithics, a biface, and charcoal fragments are eroding out of this surface. North of the structure is an open area with a small retaining wall downslope and lithic material eroding downslope. Feature 2 is a large roaster north of Feature 1. A soil stain is at the top, on river-deposited sands. Boulders and cobbles are mounded around the feature and stacked rocks appear to stabilize or act like a retaining wall for the roaster on the north side. Flakes are downslope and on the feature itself. Feature 3 is a smaller roasting feature or fire-cracked rock midden downslope of Feature 1. The site has two possible components: Pueblo II and late prehistoric-early historic Paiute.

PREVIOUS WORK: The site was recorded by NPS personnel in 1991 and monitored in FY96.

STATUS AND RECOMMENDATIONS: The north side of Feature 1 exhibits some surface erosion from the dripline. A large block in the southeast wall has fallen, though it is not possible to discern if this is a physical or visitor-related disturbance. Features 2 and 3 are very stable. A trail however, is present below Features 2 and 3, but no disturbance was noted on the site.

Overall, the site is fairly stable with few physical and/or visitor-related impacts. Due to its proximity to Nevil's beach, a frequented camp area, it is recommended that the site be monitored annually and that minor trail obliteration and retrailing be completed.

C:13:392 -- Roasters and Artifacts

SITE DESCRIPTION: The site consists primarily of two roasting features. Feature 1 is slightly mounded, but has begun to erode and deflate. It has fist-sized fire-cracked rock of Shinumo Quartzite and limestone, and dark, ashy soil with no charcoal. The southwest periphery of the

roasting feature has an accumulation of sherds that indicate a late Pueblo II-early Pueblo III Kayenta affiliation. A scattering of lithics suggest biface reduction; material is mostly Kaibab Chert, with one flake of Utah obsidian. Small fragments of unidentifiable bone are also present. Approximately 35 meters southeast of Feature 1 is another collection of fire-cracked rock (Feature 2). In addition, there is a two meter diameter concentration of lithics and bone fragments 15 meters west of Feature 2, suggesting possible occupation of the entire terrace area. Artifacts indicate a mid-late Pueblo II to early Pueblo III site.

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

STATUS AND RECOMMENDATIONS: There is continued, incremental movement of rock in Feature 1. There are less artifacts on the surface than when the site was monitored in April, 1996, and there is a layer of carbon and charcoal across the site due to the fire of 1995. Feature 2 is unchanged. The site is affected mostly by backpackers; however, no one has camped here recently. The trail work is maintained annually by the NPS trail crew. This site is located beyond the parameters of the river corridor monitoring project, therefore the site will be turned over to the park-based monitoring project.

C:13:486 -- Artifact Scatter

SITE DESCRIPTION: The site consists of a crude biface, and four San Juan Redware sherds. It is located at the base of the Tapeats and is fairly protected from the elements.

PREVIOUS WORK: This site was discovered on the February, 1997 archaeological monitoring trip while looking for C:13:360.

STATUS AND RECOMMENDATION: The only current threat to the site is the spalling of the Tapeats Sandstone. Since our last visit in February, a rather large Tapeats boulder fell on top of one of the sherds. A baseline monitoring form was completed in conjunction with a site map and IMACS site form. Due to the recent spalling, the site will be visited again in five years. If no further changes are evident, the site will be placed on the inactive monitoring list.

G:03:002 -- Roaster Complex

SITE DESCRIPTION: The site consists of at least 10 roasting features, an enigmatic rock alignment, and scatters of artifacts and fire-cracked rock. The terrace has a battleship-like shape measuring 100 m (N/S) by 40 m (E/W). The roasting features are of various configurations and stages of deterioration, and all have gneiss, schist, and granite elements and charcoal. Other ephemeral scatters of fire-cracked rock may represent additional eroding features. Ceramics appear to be mostly representative of late prehistoric through historic Pai/Paiute affiliation. Tools include an obsidian Desert Side-Notched projectile point, various manos, grinding slabs, and metates. A few historic artifacts were noted, possibly from Hualapai use of the area around 1860-1920. These included brown and purple glass, a metal Indian tinkler, and a knife-opened can.

PREVIOUS WORK: The site was first observed in 1962, revisited in 1972, and officially recorded in 1991 by NPS survey personnel. Site monitoring has occurred in FY93, FY94, and FY95. In FY95 the site schedule was changed to biennial, and this year the schedule was recommended for every three to five years. A topographic map created by photogrammetry was completed by Thompson et al (1996) in 1995. The features were plotted with a total station in FY96 and is overlain over the photogrammetric map. The map identifies the terrace-based and river-based drainages, thus enabling us to monitor the drainages that could have an impact to the site. Also in FY96, trail obliteration was completed. In FY97, five checkdams were constructed in such a drainage downstream of the site (Leap 1997b).

STATUS AND RECOMMENDATIONS: All features, except for 4 and 7, are in excellent and stable condition. Feature 4 has minor pedestalling on the west side, and the rill, west and adjacent to the feature has filled in with cryptogamic soil thus stabilizing the area. Feature 7 has minor surface erosion on the east side. Previous photographs are inadequate for proper comparisons, so new photographs were taken, however the northwest side of the feature shows evidence of recent animal burrowing. No sign of human visitation was observed.

Overall, the site is in excellent condition. Cryptogamic soils have increased and filled in many of the trails that were formed during the survey. Monitor the site in four years based on the present site condition.

G:03:003 -- Roaster Complex

SITE DESCRIPTION: The rockshelter (Feature 1) was originally recorded by G. Gumerman and R. Euler on 9/4/69, and the GRCA survey crew added four roasting features (Features 2-5) in 1991. Feature 1 is a shallow overhang and midden. There is a lot of lithic debris, including obsidian flakes, an Elko base, a biface tip, and groundstone fragments. Charcoal, ashy soil, and fire-cracked rock are also present. Ceramics suggest both late Pueblo I to early Pueblo II Formative and late prehistoric-early historic Pai affiliations. The remaining features (Features 2-5) are roasters of varying sizes, some with tools and/or flakes, ceramics, etc. In the monitoring episode of 92-1 monitors noted nails, more projectile points, and sherds, and the 96-1 monitors found a projectile point at Feature 2.

PREVIOUS WORK: This site was initially discovered in 1969. In 1981 more recording of the site was conducted, and in 1991 NPS survey personnel completed thorough documentation. River corridor monitors have visited the site in FY92 and FY93, twice in FY94, once in FY95 and then it was determined that the site return to a semiannual schedule beginning in FY96. In FY96 the features were plotted with a total station and overlain on a topographic map (Thompson et al. 1996). The site receives a lot of visitors, and as a result, multiple trails bisect features and several collection piles are present. Retrailing and trail obliteration has occurred in FY96 and FY97, yet people continue to visit the site. A letter was published in the River Guides Newsletter asking people not to walk in this area. It is thought that the problems are coming from private trips. Also in FY96 and FY97, checkdams were built in a terrace-based drainage downstream of the site (Leap

1996b and 1997b).

STATUS AND RECOMMENDATIONS: Physical impacts are minimal. The only observable increase was minor rodent and animal burrowing near Features 1-3.

Since the completion of trail work last spring, this area has been heavily impacted by visitors. The main trail on the ridge has become more defined and there are at least four new trails from Granite Park Wash leading to the site. These trails are very fresh, and have been used by several people this summer. A collection pile, located on the overhang included a previously recorded basalt point, a chert biface, and approximately 50 other artifacts. A second collection pile was located below the midden, near Feature 2. This consisted of 10 - 20 artifacts. Both piles were dispersed by the monitors. The rock elements of the structure at Feature 1 were rearranged, but all present.

As mentioned in the October trip report, this site was abused by visitors trampling on-site and making collection piles everywhere. The winter months were good for the site. Vegetation was growing over the trails and no new trails were leading to the site. The site looked good and stable. Semi-annual monitoring will continue. It should be interesting to see how the summer clientele treat the site.

The PA signatories may want to reassess the current status due to the increased visitation. There are several alternatives: continue maintenance on the trails by obliteration; create one trail to the site; close the site; continue letters to the guides newsletter explaining the situation; write letters to the commercial outfitters; increase park backcountry contact with visitors; enhance the interpretive program prior to trips leaving Lee's Ferry; or begin interpretive programs for trips beginning at Whitmore Wash. (This could mean red flagging areas on the map.) Public awareness should play an important role when making management decisions for this type of situation.

10-16-96

Figure 9. Illustrates one of many trails intersecting cultural features at G:03:003.

G:03:004 -- Roaster Complex

SITE DESCRIPTION: This site contains a large, multi-component site with several roasting features, two rockshelters, rock images, and historic remains. The two rockshelters have a midden containing charcoal, burned soil, fire-cracked rock, and artifacts. One shelter has several historic mason jars and other trash dating to the 1930s, plus the inscription "M BUNDY". On the ceiling of this shelter, below the inscription, are some faint hematite figures. The remaining features are roasting pits. In addition to the historic component, the site may be affiliated with both Pueblo I-III occupation and late prehistoric-early historic Pai/Paiute. A fire-cracked rock concentration with no artifacts on the downstream side of Indian Canyon is probably affiliated with the main site. The 96-2 monitors added historic cans to the site map, and the 97-1 monitors found a slab-lined feature between Features 1 and 2.

PREVIOUS WORK: This site was initially recorded in 1972 and revisited several more times throughout the 1970s. NPS survey personnel re-recorded the site in 1991. From FY93 to FY95 the site was monitored twice a year, then in FY96 the monitoring schedule changed to annually. In FY95, a total station map was completed and retrailing and trail obliteration were completed. In FY97 more trail work was needed and medium format black-and-white and color photographs were taken of the rock images and historic inscriptions. After trail work was completed in FY95 a letter was published in the River Guides Newsletter requesting that visitors use the designated trail that leads directly to the "Bundy jars", and not traverse through the prehistoric areas. This request has not been honored and therefore, more trail work was conducted in April, 1997 and a second letter was drafted to the Park's concessionaire representative in June, 1997. This letter requested that the commercial guides use the new, designated trail or the Park may resort to forcing commercial outfitters to pay for any necessary mitigation.

STATUS AND RECOMMENDATIONS: A boulder in front of Feature 1 has slumped into a hole. This was caused by animal burrowing underneath the rock. Yet, many of the previously noted animal burrows in Feature 1 are filled, thus a decrease in animal disturbance was observed. However, animal burrowing increased at Features 2 and 4. Surface erosion, gullying, side canyon erosion, and spalling are all present but inactive.

Two new artifact piles are present in front of Feature 1. Historic cans and jars have been piled

together on the ledge west of the feature. Shallow digging was observed in the midden area of Feature 1. It was undetermined if the digging was visitor-related or animal disturbance. Deadfall used for trail obliteration in November of 1995 has been moved aside and the old trails are being used again.

It is recommended that trail maintenance continue but that education of the site's status be increased. This could continue with additional letters to the River Guides Newsletter and commercial outfitters. As a last resort, Features 1 and 2 could be excavated and billed to the Grand Canyon River Outfitters Association. Monitoring will continue annually due to visitor-related impacts.

G:03:020 -- Roaster Complex

SITE DESCRIPTION: The site is comprised of seven main features divided into two loci: A and B, each on opposite sides of Fall Canyon. Locus A contains Features 1, 2, 5, 6, and 7. Locus B contains Features 3 and 4. Feature 1 was originally described as being two charcoal lenses eroding from a high dune with fragments of burned bone associated. Feature 2 is a large "classic" donut-shaped roasting pit with a number of manos, charcoal, and a few flakes. Feature 3 is an eroding roasting pit with a discernable rock outline on top. Feature 4 is a diffuse scatter of fire-cracked rock. Feature 5 is a disturbed area of fire-cracked rock at the edge of the Fall Canyon drainage. Feature 6 is another eroding fire-cracked rock area with bone, and Feature 7 is a roaster deposit exposed by a small arroyo. No ceramics were found in association, and the cultural affiliation is unknown. Two lithic tools, including a projectile point, were also found.

PREVIOUS WORK: The site was initially recorded in 1978 and re-recorded in 1991 by NPS personnel. Monitoring of the site has occurred annually since FY92. In FY95 the site was monitored twice. A total station map was completed in FY95, yet more detail was needed. Therefore in FY97, more total station points were collected.

STATUS AND RECOMMENDATIONS: Feature 7 continues to be the most physically impacted area. This is evidenced by active runoff (surface erosion) within the gully. The gully adjacent to Feature 2 shows no change near the feature, but the nick point near the feature is slowly moving upslope. Presently, this activity is not threatening the feature. A trail is present on the north side of the site, near Feature 7, but it has not been heavily used.

A large amount of charcoal is eroding from Feature 7. It is recommended that data recovery be performed at this feature in FY98 for carbon dates and botanical remains. Trail obliteration will also occur this year. The arroyo near Feature 2 is of concern, and may require some stabilization next year. Annual monitoring will continue.

G:03:024 -- Roaster Complex

SITE DESCRIPTION: The site consists of five roasting features with associated ceramics and lithics. The artifacts are concentrated around the fire-cracked rock middens as well as dispersed downslope. Tools include tabular grinding slabs, cobble manos, a drill/perforator, and a cobble

chopper. Raw material types include Kaibab and Redwall Chert, chalcedony, and Partridge Creek Obsidian. Burned bone was also observed. The ceramic assemblage suggests use during Pueblo II occupation, late prehistoric-protohistoric Pai, and historic Pai/Paiute, the latter suggested by a few broken brown glass fragments and a metal artifact. The 94-5 monitors found a chert biface west of Feature 2.

PREVIOUS WORK: The site was first recorded in 1991 by NPS survey personnel and monitored in FY93, FY94, and FY95. In FY95 the site was placed on a biennial monitoring schedule. In FY96, trail obliteration was completed and a total station map of the features completed and overlain on a topographic map produced by Thompson et al. (1996). In FY97 checkdams were constructed near Features 2, 3 and 4 (Leap 1997b).

STATUS AND RECOMMENDATIONS: Features 1, 5 and 6 are in stable condition. Feature 2 has increased rodent activity with ash-colored soil exposed from burrowing. There is increased gully erosion adjacent to Feature 3. The gully is widening and undercutting the gully walls, causing charcoal fragments and soils to collapse. This same gully also borders Feature 2. Feature 4 is located just above what is commonly referred to as a sinkhole. Currently, it is not moving upslope and the feature does not appear to be in any apparent danger. No human visitation was noted.

The main concern is the active gully adjacent to Features 2, 3 and 4. Annual monitoring is recommended for Features 2, 3 and 4, and biennial monitoring is suggested for the remaining features.

G:03:025 -- Roaster Complex

SITE DESCRIPTION: The site consists of roasting and other types of features and some historic trash. Feature 1 is a fire-cracked rock scatter with a cluster of five partially buried limestone/sandstone slabs at the center. Feature 2 is a fire-cracked rock "ring" with a cleared center. Feature 3 is a "classic" donut-shaped roaster. Feature 4 is a bowl-shaped depression encircled by fire-cracked rock. Feature 5 is a ring of fire-cracked rock cobbles around a depressed, cleared center. Feature 6 is a cluster of five grinding slabs, three manos, purple glass, wire, and 45 Southern Paiute sherds from a pot break. Feature 7 is a jumble of slabs and cobbles with two lithics and a sherd in the vicinity. Feature 8 is a probable surface hearth--a concentration of fire-cracked rock with charcoal. Artifacts, except for the Southern Paiute utility ware sherds, are few, and include a crude biface and 10 or more tertiary flakes of a variety of material types. The historic trash is scattered throughout the site and includes a kerosene lamp base, tin cans, machined wood, and glass. The site assemblage possibly reflects both Paiute and Hualapai use of the area around the turn-of-the-century. The 95-3 monitors noted two cairns eight meters north of Feature 1.

PREVIOUS WORK: This site was initially recorded by NPS personnel in 1991 and monitored in FY93, FY94, and FY95. After monitoring in FY95 the site was placed on a biennial monitoring schedule. In FY96 checkdams were constructed and trails obliterated (Leap 1996b). Furthermore, the features were plotted with a total station and overlain on the topographic map produced by Thompson et al. (1996). In FY97 minor checkdam maintenance occurred.

STATUS AND RECOMMENDATIONS: Features 1-8 are stable. There is an increase in cryptogamic growth over the entire site, including old survey trails. Less grass was observed, probably because of the season. No visitor-related impacts were noted. New photographs were taken of features to show better clarity. Monitoring is recommended every four years because of the site's stable condition.

G:03:026 -- Roaster Complex

SITE DESCRIPTION: The site consists of seven roasting pits and two activity areas exhibiting several different phases of use and existing in various stages of deflation, from pristine to nearly eroded to their original baselevel. The sherds (and other artifacts) indicate late prehistoric-early historic and mid-historic (1850-1900) Pai use. Some flakes and tools were observed, including two biface items and an obsidian point. Groundstone was also located. Two fragments of pressed purple glass were observed near activity area A; perhaps pieces of a small candy or relish dish.

PREVIOUS WORK: This site was originally recorded by NPS survey personnel in 1991 and monitored annually since FY92, yet in FY94 the site was monitored semiannually. Trail obliteration and retrailing occurred in FY96 and FY97. The site receives a lot of traffic because it is located directly behind the boat camp and is adjacent to Granite Park Wash. Also in FY96, the features were located with a total station and overlain on the 1995 topographic map produced by Thompson et al. (1996) and checkdams were constructed (Leap 1996b).

STATUS AND RECOMMENDATIONS: The gully at Feature 3 appears stable, yet fragile. A slightly used trail from the drainage to the site is beginning just east of the checkdams that were installed last spring. Further west, another trail is beginning from the lower terrace trail. This trail leads to the site, yet once on-site, no defined trails are apparent. Two new, faint, access trails from the lower terrace trail are situated south of Features 5 and 6. There is only one instance where a new trail occurred and that was adjacent to a previously obliterated trail. Other trails that were obliterated last spring look good, but rain would help the new seedlings grow quicker.

The site made it through the summer's activities in fair condition. There are five slightly defined trails from the main, lower terrace trail, leading to the site, but once on top of the dune, the trails disappear. Annual monitoring will continue.

G:03:028 -- Roaster Complex

SITE DESCRIPTION: The site was divided into six loci of activity (A-F). Locus A consists of two roasting features with fire-cracked rock, ash, and charcoal, a lithic concentration and some ceramics. Locus B is a light scatter of lithic debitage, including a point base, and a sherd. Locus C is a tight concentration of about 20 flakes and a sherd. Locus D contains three "blow-out" or "dug-out" areas that may be wickiup depressions with associated flakes and fire-cracked rock, plus additional fire-cracked rock and lithic concentrations and a grouping of buried slabs. Locus E is an area of possible domestic activity, represented by four possible wickiup depressions--some with encircling stone "foundations", and associated lithics, sherds, groundstone, and fire-cracked rock.

Locus F has one well-defined roaster, and other fire-cracked rock concentrations that may represent more roasting features. Lithic debitage consists of a wide variety of cherts and obsidian, and reflects expedient reduction. Pueblo II Formative sherds dominate at Loci A, B, and E, while late prehistoric-early historic Pai sherds are seen at Loci C, D, and also E.

PREVIOUS WORK: The site was officially recorded in 1991 by NPS personnel and monitored in FY93, twice in FY94 and once in FY95.

After FY95, it was placed on a biennial monitoring schedule. In FY96 the features were located by a total station instrument and overlain on the 1995 topographic map produced by Thompson et al. (1996). The site also received trail obliteration, retrailing, and checkdam construction (Leap 1996b).

STATUS AND RECOMMENDATIONS: Features 1 and 2 are stable. There is, however, recent rodent burrowing near the top of Feature 1, near the creosote bush. Locus B is stable and shows no change. Locus C looks good with the exception of a trail on the west side. Loci D, E, and F are stable.

Trail obliteration on the south side of Feature 1 looks good, though there are signs of fresh footprints at Loci A and F. Generally, the site appears to be receiving very little visitation.

Locus A and F are the priority areas for future monitoring due to the proximity of these loci to the trails. The lower trail leading from the camp to Loci A and F was obliterated last spring, but this work has been ignored by visitors. The trailing is probably caused by boaters wanting to hike the side canyons, not to see the site. Until there is proof that people are directly impacting the site, i.e., collection piles, a biennial monitoring schedule will continue and trail work will be maintained annually by the NPS trail crew. If any impacts to the site occur before our scheduled visit, the NPS trail crew will report them to our office.

G:03:034 -- Roaster Complex

SITE DESCRIPTION: The site is located on both sides of a drainage that cuts through a dune-covered alluvial fan. Locus A is on the downstream side of the drainage and Locus B is on the upstream side. Features 1 through 6 and Feature 10 are located in Locus A. All but Feature 2 are roasting/fire features (one of which, Feature 5, has an associated pot break). Feature 2 is a cairn of rock and rebar that attests to some form of historic activity. All of the site's artifacts observed at this locus included a few chert and rhyolite flakes, a biface knife base, and a hammerstone. Features 7 through 9, at Locus B, are all roasting features. This site may be related to G:03:031, a rockshelter located slightly upstream and above this site. Prehistoric artifacts suggest a Pueblo I-early Pueblo II Virgin affiliation. The 94-4 monitors found a possible burial just downslope of Feature 6.

PREVIOUS WORK: The site was originally recorded in 1991 by NPS survey personnel and monitored in FY94 and FY95.

STATUS AND RECOMMENDATIONS: Animal tracks are present, but there are no developed trails. Feature 1 has rodent burrowing and slumpage along the northwest side. Feature 2 is stable. In Feature 3, new bushes have grown, creating a slight downslope movement of the fire-cracked rock. The fire-cracked rock has slightly slumped in Feature 4, but there are no major changes. Feature 5 is stable and has some cryptogamic soil growth. Feature 6 is stable, but eolian erosion is occurring around the creosote bush, roots, and grass clumps. Feature 7 is stable and unchanged. Minor sheet washing is evident on the north side with evidence of slumpage on the south side of Feature 8. This activity may cause future impacts. The gully on the south side of Feature 9 is not impacting it, nor does it look like it will in the future. Feature 10 is stable with a few flakes present. No photographs were available to compare Feature 11.

The cairn is no longer on top of Feature 2. The sheep pelvis located near Features 1 and 2 is gone and the animal bones have been rearranged.

Biennial monitoring is advised, with particular attention given to Features 8 and 9. This area was assessed in April 1997, and it was determined that no data recovery was warranted. Although these features are in poor condition, they remain stable.

G:03:037 -- Structures and Artifacts

SITE DESCRIPTION: The site is located in an outcropping basalt overhang on a Tapeats Sandstone slope. It consists of two loci (A and B), about 10 m apart, each containing an artifact scatter. Between 100-150 flaked lithics were noted, mostly at Locus B. Tools include bifaces, a core/chopper, and projectile point tip. The 50-65 sherds indicate that this is a multi-component site, with late Pueblo I-early Pueblo II Cohonina and late prehistoric-early historic Pai occupations. Locus B also contains several groundstone items, such as a ground/pecked shale slab metate, a basalt slab metate, a Tapeats mano, and a partially polished basalt cobble shaped like a maul. There is also a sparse charcoal scatter and a piece of shaped wood at Locus B.

PREVIOUS WORK: The site was initially recorded by NPS personnel in 1991 and monitored this year.

STATUS AND RECOMMENDATIONS: Overall, Locus A is stable. Animal burrowing and root disturbance from a brittle bush is occurring at Locus B. Pooling and slight surface runoff is also present near the dripline, overall, Locus B has changed very little since 1991. No sign of human disturbance was observed.

Monitoring is recommended every three to five years since Locus B shows minimal signs of surface erosion in the artifact concentration area. No new cultural materials are being exposed with the burrowing, but this will be something to look for during future monitoring.

G:03:040 -- Roaster Complex

SITE DESCRIPTION: The site consists of two loci of activity that represent at least two and possibly six to seven roasting features, with associated debitage and many formal tools. Locus A may be one large roasting feature that has been eroded by a wash, or more than one feature with elements eroding together. Fire-cracked rock elements at both loci are of predominately limestone cobbles, with a variety of Kaibab and/or Redwall Chert flakes in association. At least part of Locus A (the fire-cracked rock on the southern edge of the locus) forms a semi-circle that is half blown-out by the wash. Locus B contains a much more obvious circular fire-cracked rock feature with additional, smaller fire-cracked rock concentrations around it. The main feature is slightly mounded and has a clear center. Many tertiary flakes, including bifacial thinning items, were observed. Tools include a sandstone slab metate fragment, flakes with retouch and use wear--some possibly used as scrapers, bifaces/preforms, and cores. Cultural affiliation is unknown.

PREVIOUS WORK: This site was recorded initially in 1991 by NPS personnel and has been monitored annually since FY94. In FY96 the site was mapped with an instrument, and in FY97 checkdams were built near Locus B (Leap 1997b).

STATUS AND RECOMMENDATIONS: There are two narrow and deep gullies situated west of the site, which drain into the main side channel. The southern most gully is new, and the older gully showed evidence of sediment deposition where checkdams have been installed. No sign of human disturbance was observed on this trip. Monitoring will continue annually due to the presence of gullies.

4-25-97

Figure 10. Overview of a gully before checkdam installation.

4-27-97

Figure 11. Overview of gully after checkdam installation.

G:03:044 -- Fire-Cracked Rock

SITE DESCRIPTION: The site is divided into two loci (A and B). Locus A is a series of five cleared habitation or activity areas (Features 1-5). The features extend for 75-80 m along the base of an L-shaped shale cliff, one side of which faces a side drainage. All of the features have varying degrees of dry-laid, expedient walls, none of which are very substantial. A large lithic scatter with flakes and several tools extends downslope of Features 3 and 4. The greatest concentration is below Feature 3 and extends 60 m downslope to the south side of Locus B. Ceramics are sparse, but include two very large sherds from the same grayware vessel. Tools include various projectile point and biface fragments. Locus B consists of two to three roasting pits downslope of the shelters. Ceramics indicate that this is a late prehistoric-early historic Pai site. The March 1994 monitors found a 44 cal. cartridge (19th century).

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

STATUS AND RECOMMENDATIONS: Less vegetation was observed in the dune area. The main threat to the site is a two meter deep arroyo which travels through Locus B. A total of five nick points are in this cut, yet they do not appear active. Furthermore, cryptogamic soils are growing in the cut. No visitor-related impacts were observed.

At this stage of the arroyo's development, checkdams at the five nick points may prevent future erosion. This work could be completed in the next couple years since the site is showing no recent indications of activity. Annual monitoring will continue.

G:03:049 -- Shelter and Artifacts

SITE DESCRIPTION: The site is located under columnar basalt boulder rockshelters on the first Tapeats Sandstone ledge outcrop above the river. These are multi-component shelters, possibly used temporarily/seasonally during food processing and lithic tool manufacture activities, as indicated by groundstone implements and abundant lithic debitage. There are 80-125 flakes on-site, most of which are located in front of the rockshelter area on the Tapeats ledges. Nearly all of the flakes in the shelter area have been placed in a collector's pile. The 15 or so sherds found on-site suggest Pueblo II Virgin occupation and late prehistoric-early historic Pai/Paiute occupations. Two metates, three manos, a grinding slab, and two tools are in or around the shelter. There is a sparse scatter of charcoal fragments in the southeast end of the rockshelter area.

PREVIOUS WORK: This site was first discovered and recorded by NPS survey personnel in 1991 and monitored for the first time this year.

STATUS AND RECOMMENDATIONS: Sediment has been blown out of both shelters, exposing new gravel and basalt fragments. Basalt fragments also appear to be spalling off the large boulders, however, at a minimum.

The collection pile in the southern shelter has been rearranged. The mano that was in the northern shelter is now on top of the metate in the southern shelter. A popular stop called the "Diving Board" is directly below the shelters. Two cairns are located below the shelters indicating the route to the "Diving Board" yet, visitor impacts are minor. Monitor the site in four years due to minimal visitor-related disturbances. New collection piles could become a problem in the future due to the site's proximity to the "Diving Board".

G:03:053 -- Lithic Scatter

SITE DESCRIPTION: The site is located on the first Tapeats Sandstone ledge outcrop above the river. It consists strictly of lithics, divided into two concentrations. There are between 100-150 flakes; no formal or diagnostic tools were observed. A limestone river cobble--only slightly used--was found at the south edge of the main lithic concentration. There is a Tapeats Sandstone slab metate about 30 m upstream of the site. It was stashed for unknown reasons--possibly to protect it from the elements. Cultural affiliation is suspected to be late Archaic-Basketmaker II, based on the observance of some bifacial thinning flakes.

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

STATUS AND RECOMMENDATIONS: No physical impacts are threatening the site, and no human disturbances were noted. It is recommended that the site be placed on the inactive monitoring list because it is very stable.

G:03:057 -- Artifacts and Roasters

SITE DESCRIPTION: The site consists of a Tapeats Sandstone rockshelter containing a large, eroding fire-cracked rock feature, a charcoal scatter, an ash stain, and a scatter of lithics, sherds, and groundstone. Lithics are densely concentrated along the front edge of the shelter floor, with some eroding downslope. No formal lithic tools were seen. Two pecked and ground slabs, one of Tapeats Sandstone and one of Muav Limestone, were observed near the center of the site. The sherds are found in the north half of the shelter. Ceramics suggest a multicomponent occupation of the site: possibly early Basketmaker III-Pueblo I Formative and late prehistoric-early historic Paiute. The fire-cracked rock feature is composed of angular, cobble-size rocks of sandstone and limestone. The site appears to have been a limited lithic manufacturing and food processing area based on the artifacts present.

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

STATUS AND RECOMMENDATIONS: A minor increase in surface erosion appears to be fairly recent, but currently is not impacting the artifact concentration. Animal burrowing has exposed new artifacts to the surface. Minor sheet washing is occurring behind the fire-cracked rock, toward the cliff and washing into a shallow rill. The fire-cracked rock debris slope is stable with cryptogamic soils and moss growing.

The collection pile recorded during the survey is still present on the grinding slab, although the artifacts have been moved. Lithics have been placed on the large boulder in the center of the site. No trails are present.

Monitor the site in two years in an attempt to determine how frequent the impacts occur. The site is fairly stable though fragile, and best to monitor less frequently to curtail impacts.

G:03:064 -- Roaster Complex

SITE DESCRIPTION: The site has 13 features (nine roasting pits). Charcoal lenses (CL 1-25) are exposed by arroyo cutting through features. The lowest deposits are three meters below the present ground surface; these contain charcoal and artifacts. There are 50-60 cm of fill between the deposits. All artifacts appear to be associated with fire-cracked rock middens. Lithic tools include a flake drill and a reworked Elko Corner-Notched projectile point. The ceramic assemblage suggests a

multi-component site: Pueblo I-III Formative and late prehistoric-early historic Pai/Paiute. This could be one of the most informative sites in Western Grand Canyon with potential for dating and chronology-building. Note: the 96-2 monitors found a Redwall Chert point tip across from Feature 1, and the 97-1 monitors found a chert awl in Feature 6.

PREVIOUS WORK: This site was initially recorded by NPS survey personnel in 1991 and monitored annually since FY94. In FY94 and FY95 the site was monitored semiannually. The USGS is particularly interested in this location as a recent phenomenon of unique quality to the river corridor. They have studied this area since 1992. C¹⁴ samples were taken from buried cutbank deposits by the NPS in 1993 revealing a suite of dates ranging from 1880 +/- 70 BP to 2870 +/- 60 BP. In FY95, parts of the area were mapped with a total station, and by the end of FY97 the entire site should be mapped.

STATUS AND RECOMMENDATIONS: Feature 1 has minor downslope movement of fire-cracked rock into the gully and rill area on the western side of the cutbank. Feature 12 has less vegetation and minor slump on the north side of the cut. This feature is in a fragile state and should be monitored closely. Feature 13 has a nick point on the west side, one meter from the fire-cracked rock concentration. A new fire-cracked rock area is eroding from a headcut 20 m north of Feature 13. Features 3-5 and 7-11 are stable. No visitor-related impacts were observed.

The arroyo system is in an active and mature state and unless there is more sediment in the system to plug the main drainage, erosion will continue and new features will be exposed. Annual monitoring will continue, but data recovery will be initiated because stabilizing this system would not be cost effective.

G:03:067 -- Roaster Complex

SITE DESCRIPTION: The site consists of five fire-cracked rock middens with associated lithics and a dispersed flake scatter. Two thin bifaces were observed and one Moapa Brown Ware sherd was found upslope of Feature 1, suggestive of a late Pueblo I-early Pueblo II Virgin affiliation.

PREVIOUS WORK: This site was recorded initially in 1991 and monitored annually from FY92 to FY95. In FY95 the monitoring schedule changed to biennial. The NPS trail crew conducted trail obliteration in FY96, which has proven to be fairly successful. Our staff will take part in trail maintenance during our biennial monitoring visits.

STATUS AND RECOMMENDATIONS: Feature 3 appears stable and does not seem to be "blown out" as was implied on the IMACS site form. Feature 1 has a new dead-end trail present to the west. This may be from visitors looking for a camp site. This trail was obliterated by the monitors. Site monitoring will continue biennially, and the trail crew will continue monitoring visitor use in the area annually.

G:03:071 -- Structures and Artifacts

SITE DESCRIPTION: The site consists of a small rockshelter with a triangular opening in a granite outcrop with sherds eroding downslope in front of it. At least three different vessels are represented by the 15 sherds observed. The interior roof of the shelter is heavily smoke blackened and the rear wall and floor are mostly obscured by a packrat nest. The ceramic assemblage indicates a multi-component site of Pueblo I-III Cohonina and late prehistoric-early historic Pai.

PREVIOUS WORK: The site was recorded initially in 1991 by NPS personnel and monitored for the first time this year.

STATUS AND RECOMMENDATIONS: An active packrat midden exists at the site which may be causing minor surface erosion, and two barrel cacti in front of the shelter have died and fallen over. It is recommended that the site be monitored in two years because the packrat may expose new cultural materials.

G:03:072 -- Roaster Complex

SITE DESCRIPTION: This is an extensive roasting feature complex that includes an overhang shelter previously recorded as historic site G:03:023. The prehistoric component of that site is described here as G:03:072. Fourteen features (Features 1-14) are present. All but Feature 1 are roasting features or hearth/fire-cracked rock scatters of various shapes and sizes, some with associated groundstone, lithics, and sherds. Feature 1 is the overhang shelter, which, in addition to the historic component described as site G:03:023, has a prehistoric component consisting of a lithic scatter downslope of the shelter and in the shelter fill. Ceramics observed indicate that this may be a multi-component site, with both late Pueblo I-early Pueblo II Virgin occupation and late prehistoric-early historic Pai/Paiute occupations.

PREVIOUS WORK: NPS personnel discovered and recorded this site in 1991. It was monitored in FY93, then annually since FY95. In FY97 a total station map was completed of the site area and checkdams were built near Features 11, 12, and 14 (Leap 1997a).

STATUS AND RECOMMENDATIONS: Feature 11 shows increased gullying by the appearance of more sediment. Feature 12 shows increased, though minor, eolian deposition. The gully at Feature 14 looks as though it has deepened, though the headcut is unchanged. No sign of human disturbance was observed.

It is recommended that Features 11, 12, and 14 be monitored annually because these features are located in two active gullies. The rest of the features are stable and are recommended for monitoring every three to five years.

G:03:078 -- Artifact Scatter

SITE DESCRIPTION: This is an open lithic scatter of 1,000+ flakes, three sherds, and some circular rock alignments that may represent wickiup outlines. The site is on a level expanse of Tapeats Sandstone adjacent the Colorado River and the south side of Three Springs Canyon. The

lithic debitage is almost entirely comprised of heat-treated tertiary thinning flakes, dominated by white-cream-pink Kaibab Chert, but including some other (yellow/red/brown) cherts, black rhyolite, and possible Partridge Creek Obsidian. Several cores were present but no bifaces, formalized flake tools, or groundstone implements were observed on the surface. The three sherds suggest a late prehistoric-early historic Pai site.

PREVIOUS WORK: This site was recorded initially by NPS personnel in 1991 and monitored for the first time this fiscal year.

STATUS AND RECOMMENDATIONS: The site is in excellent condition with cryptogamic soils covering the entire area. A faint trail crosses through the site, but judging from the growth of the cryptogamic soils, there has been no recent use. There is a shallow gully on the eastern side of the site that drains into Three Springs Canyon, yet it does not appear to be impacting the site.

Due to its highly stable location atop a Tapeats Sandstone ledge, this site is not being impacted by the operations of Glen Canyon Dam. Furthermore, monitoring may enhance trails and lead to increased visitation by others, as well as disturb the healthy cryptogamic soils. It is recommended that this site be placed on the inactive monitoring list.

G:03:080 -- Roaster Complex

SITE DESCRIPTION: The site is divided into two loci. Locus A contains numerous lithics, sherds, hand tools, and extensive rock images. This locus is on a sheltered bench at the base of a basalt cliff, just upstream from the dune that Locus B is located on. Locus B consists of nine separate structural and fire features on a sand dune on the upstream side of 222-Mile Canyon. Numerous artifacts are present, including fire-cracked rock, lithics, ceramics, groundstone, tools, shell fragments, and charcoal. This site has excellent potential for buried materials and datable features. Ceramics suggest a late prehistoric-early historic Pai affiliation.

PREVIOUS WORK: The site was initially recorded by NPS personnel in 1991. It was monitored annually in FY92, FY93, FY95, and FY96. In FY97, medium format black-and-white and color prints were taken of Locus A, and an attempt was made to sketch several of the distinct rock image figures.

STATUS AND RECOMMENDATIONS: Minor sheet washing is occurring along the dripline in the shelter of Locus A, causing the runoff area to appear slightly deflated. Features 1, 2, 4, and 5-9 are in stable condition. All are surrounded by healthy cryptogamic soils, adding to their stability. Feature 3 is stable, but has a shallow rill forming on the southern boundary of the feature. Presently, the rill is not affecting the feature.

Locus A has three collection piles in the shelter, and a pot hole was dug since the 3/96 monitoring. This hole is of considerable size (30 x 30 x 7 cm) and in the northern portion of the shelter. Trails lead from the drainage through the site, and one trail leads from the north end of the site to the beach at 222 Mile.

Most of the trails leading across the site do have cryptogamic soil growth. Locus A, the rock shelter, is heavily visited. Monitor Locus A and the rock images annually because of the visitor impacts and vandalism activities. All other features are stable and should only be monitored every three to five years unless trailing increases. An ARPA violation notification was sent to the River District Rangers and the Hualapai Tribe, and the case has been turned over to Chuck Sypher, the Park ARPA coordinator.

G:03:083 -- Tool Cache

SITE DESCRIPTION: The site consists of a historic cache of seven five-gallon "honey cans" for gasoline, several motor oil cans, 25+ food cans, a broken crate, several glass jars--one containing matches, playing cards, and other items. Also present is a first aid kit in a green metal tool box that includes two Reader's Digest magazines dated April, 1945 and July, 1945. River lore has it that this cache was left by Post-WWII power boaters up-running from Lake Mead when the lake was higher.

PREVIOUS WORK: NPS survey personnel recorded this site in 1991, and it was monitored for the first time this fiscal year.

STATUS AND RECOMMENDATIONS: The cache is located on a slope between some large Tapeats Sandstone boulders where there is minor surface erosion in the low areas. The cans are rusting and slowly disintegrating due to exposure to the elements. The first-aid kit is under a rock and the contents are in place, but extremely fragile.

A couple of small cans and the large glass jar with the matches inside have been rearranged, but everything listed on the IMACS site form seems to be in place. Annual monitoring is advised due to apparent visitation by boaters and movement of artifacts.

IV. Management Actions Completed in FY97

In situ preservation of downstream cultural resources is one of the management goals listed in the Historic Preservation Plan (HPP). To this end, the RCMP conducted a variety of management actions to facilitate site protection and preservation. These actions included periodic monitoring, preservation activities, and total station mapping. Where *in situ* preservation was not possible, mitigation strategies were employed in consultation with PA signatories and the GCMRC. This chapter describes the monitoring, total station mapping, and remedial work conducted in FY97.

A. Monitoring

Fiscal year 1997 completes the sixth year of archaeological site monitoring along the Colorado River corridor. The monitoring program is not just passive observation of positive or negative changes to site condition. Instead, the monitoring project attempts not only to document current damage, if and when it occurs, but to anticipate future damage and prevent it if possible. The overall goal is to preserve and protect cultural resources in perpetuity.

Site Selection

From the 1990-91 inventory of 475 archaeological sites along the river corridor (Fairley et al. 1994), 336 sites were categorized 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 a separate 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 this report. With the close of FY97, all 294 sites have been monitored at least once.

Last fiscal year it was decided that the 13 control group sites unaffected by river flows would be monitored every three years. Therefore, no control group sites were monitored in FY97. The 13 sites are scheduled to be monitored in FY98.

Ninety-seven unique sites were monitored during the four downriver trips conducted in FY97. Seven sites were monitored twice (semiannual schedule) for a total of 104 monitoring episodes. Sixty-nine sites were from the "SI" group, 26 from the remaining "I" group (draft final Historic Preservation Plan 1997:72), and two were newly recorded sites.

Site Schedules

Monitor schedules are assigned to sites based upon the degree of impacts (visitor-related or physical) occurring at sites and their rate of change. Listed below are the site schedules used on this project and how the field staff defines them. Appendix A summarizes all sites monitored to-date, with their assigned monitoring schedule.

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

Annual: These sites exhibit moderate erosion and are monitored in the fall. It is effortless to

identify physical and/or visitor-related impacts using previous photographs.

Biennial: Sites illustrating erosion that is fairly difficult to detect, yet noticeable when comparing photographs.

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

Inactive: Sites that 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 covered by healthy cryptogamic soils. These sites will be monitored on an as-needed basis, i.e., after severe weather disturbances, heavy visitation, or at the request of the tribes.

Discontinue: These sites are located above the 300,000 cfs level. They are situated on Pleistocene or older talus, extremely old debris flows, or bedrock. These sites are outside the parameters of the river corridor monitoring program.

Field and Laboratory Methods

Four river monitoring trips were conducted in FY97, ranging from 16 to 18 days in length. All trips launched from Lee's Ferry, Arizona with takeouts 225 miles downstream at Diamond Creek Wash. Field personnel consisted of at least one project archaeologist and one to two archaeological technicians. Individual trip reports were prepared and sent to all PA signatories in a timely fashion.

The 97 sites monitored during FY97 were chosen from the group of 336 sites impacted, or potentially impacted, by Glen Canyon Dam. Their monitoring schedule (semiannual, annual, biennial, or 3-5 years) placed them in the pool of sites to be monitored this fiscal year.

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

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

Photographic Documentation

Photographic documentation is used for comparative observation of site condition and for the visual documentation and evaluation of remedial actions. Physical and visitor-related impacts have been visually documented with the use of 35mm and medium format photography. Monitors reproduce previous site photographs to illustrate presence, absence and degree of change. Near to exact replicas are attempted, which provide an objective visual record of site condition through time.

Occasionally, long-term photographic comparisons are made when older photographs are available. Analysis of these comparisons can often identify when impacts began accelerating and the cause of the acceleration (i.e., increased visitation, heavy localized rainfall, floods). Examples of this can be seen when examining sites with time series photography such as C:13:010 (Furnace Flats) or C:13:099 (Palisades). Long-term photographic analysis also shows site stability through time, aiding in monitoring schedule decisions.

Photographic information is entered into Dbase 3+, a database program, and archived in the project office. Nearly 1,000 photographic images were developed and archived in FY97, bringing the project archive to over 7,000 black-and-white images. Project images include 3 x 5" black-and-white prints (b/w), medium format 4 x 5" color and 5 x 7" b/w prints, 35 mm color slides, and 8 mm video. Pentax 90WR cameras are used with b/w Kodak Plus-Xpan 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 color Pro100 (120) film. All photographs are mounted onto cards which contain site numbers, dates, descriptions, and directional information. Negatives are archived in polypropylene sleeves, filed in acid-free binders, and stored in a fire-proof filing cabinet.

B. Total Station Mapping

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

Sites within the control and semi-annual groups, selected sites from the annual group, and those receiving intrusive remediation are mapped with the total station. Instrument mapping will not occur if remedial actions only involve brushing over trails, though trails will be plotted if receiving the type of work described above. Over time, mapping will produce detailed examples of a short life-span of each site, shedding light on such questions as:

- a. If the site is changing, what is the rate and degree of change?
- b. Have the preservation efforts decreased or increased erosion?
- c. What other attributes are involved with the stability or instability of a site?

What are the repercussions to the ecosystem in the immediate area, i.e., slope, soil and rock type, animals, vegetation?

- d. Is there an increase or decrease in trailing over time? (This information may assist the NPS when devising a strategy for visitation in the canyon, via boat or on foot).

The number of sites included in the total station mapping program is currently 89. Maps have been completed for 68 of these sites, with 21 sites remaining. In FY97, 43 maps were completed. Chris

Brod, under the GCMRC, has supervised all the mapping trips since FY96. See Table 4 for the sites mapped with a total station to date.

Table 4. Total Station Maps Completed To Date.
(N = 68)

Fiscal Year 1995	Fiscal Year 1996	Fiscal Year 1997	
A:15:003	A:15:005	A:15:017	C:13:273
A:15:021	A:15:030	A:15:033	C:13:291
A:16:004	A:15:031	A:16:149	C:13:321
G:02:100	A:15:032	A:16:156	C:13:327
G:03:004	A:16:180	B:10:121	C:13:338
	B:15:126	B:10:230	C:13:343
	B:15:143	B:10:236	C:13:346
	C:02:096	B:14:107	C:13:347
	C:13:365	B:15:121	C:13:348
	C:13:371	B:15:132	C:13:349
	G:03:002	B:15:138	C:13:356
	G:03:003	C:02:101	C:13:359
	G:03:024	C:09:050	C:13:367
	G:03:025	C:09:051	C:13:381
	G:03:026	C:09:058	G:03:019
	G:03:027	C:09:080	G:03:020
	G:03:028	C:13:006	G:03:038
	G:03:040	C:13:069	G:03:041
	G:03:058	C:13:070	G:03:055
	G:03:059	C:13:098	G:03:064
		C:13:099	G:03:072
		C:13:100	

Mapping will continue throughout FY98, after which all the designated sites should have base maps completed, and repeat mapping can begin. Other sites mapped with an instrument that are not of the designated group will receive repeat mapping only if recommended during regular monitoring visits.

C. Remedial Actions

The monitoring program has documented significant changes on archaeological sites along the river

corridor. A few changes have been in the positive direction, i.e., accumulation of sediments and regeneration of vegetation. Most changes, however, have been negative, resulting in the loss of artifacts, features, or deposits. When negative changes occur, a number of options exist to decrease or prevent site damage. These options are referred to as remedial actions and are of two types. Preservation options are utilized when there is an opportunity to slow down the rate of erosion and preserve the resource *in situ*. Recovery options are those designed to retrieve information when cultural materials cannot be preserved *in situ*.

In FY97, the following remedial actions occurred: data recovery, trail work, revegetation, checkdam construction, medium format photography, and graffiti removal. All work was conducted under the supervision of the project archaeologists. Documentation included photographs and completion of a remedial action form (Appendix C). Remedial action work will be inspected on the appropriate site monitoring schedule, on the regularly scheduled monitoring trips. Below are brief discussions of the type of work completed at selected sites.

Data Recovery

Five sites (A:15:030, A:16:180, C:13:273, C:13:338, and C:13:359), under the direction of Mike Yeatts, Hopi Tribe, underwent feature specific data recovery in February and April, 1997. The results of the excavations will be disseminated to Programmatic Agreement members in FY98.

Trail Work

Retrailing and trail obliteration were the most commonly recommended preservation options for reducing site impact. Some trails are not created with the intention of visiting a site, because many sites are difficult to detect. Trails are usually formed by commercial and private boaters hiking to side canyons. Together with the obvious impacts of human trailing on-sites, i.e., soil compaction, artifact collection and movement, trails may become entrenched, making shallow to deep gullies.

Trail obliteration is recommended when archaeologists want to prohibit access on, or near the site, in places such as Granite Park Delta. However, at several sites, no matter how determined the NPS is to obliterate trails, visitors are equally determined to hike in these areas. In such cases, like the Palisades Delta, retrailing is advised. These trails are well-marked and usually located several meters away from cultural deposits. Listed in Table 5 are the 21 sites where trail obliteration and/or retrailing occurred in FY97.

All the trail work was completed during our regularly scheduled monitoring trips. The NPS resource specialists and their trail crew assisted at times, though ultimately, the RCMP staff was responsible for the majority of the work.

Table 5. Trail Work Completed in FY97.
(N = 21 Sites)

Site Number	Retrail	Trail Obliteration
A:15:005	X	X
A:16:151		X
A:16:160		X
A:16:182		X
B:09:317		X
B:14:105		X
B:15:138	X	X
C:09:031	X	X
C:09:034	X	X
C:09:083		X
C:13:099		X
C:13:291	X	X
C:13:327	X	X
C:13:340		X
C:13:362		X
G:03:003	X	X
G:03:004	X	X
G:03:026	X	X
G:03:044		X
G:03:052	X	X
G:03:058		X

Revegetation

Revegetation is beneficial in areas where minor soil deflation or compaction occurs. In some cases, minor revegetation work, encourages new local vegetation growth, curtailing surface erosion.

Jute mat was placed at C:13:006 in a large, deflated areas measuring nine meters by one meter and two meters by one meter. In the past, this area exhibited eolian erosion and bank slump. After the jute mat was laid, it was covered with local seedlings and deadfall.

Checkdam Construction

The basic objective for building a checkdam is to capture sediment from channelled runoff. The idea is not to stop erosion, but to decrease water velocity and increase sediment deposition, thus slowing the erosive process. The standard sediment catchment construction utilized was surface checkdams. Simply stated, this means checkdams built on the surface. The types of checkdams built include: rock/brush checkdams, branch lining, rock lining, water diversion checks, rock/brush

checkdams with supporting posts, and single line basket weave checkdams.

All checkdams were constructed in February and April under the supervision of the Zuni Conservation Team -- Gabriel Yuselew, Sheldon Lallo, Defrades Luna, and Quincy Seoatewa. The checks were built with the natural resources in the vicinity and placed in the most active drainages, to lessen or curtail headward erosion. All checkdams were described, measured, and photographed in detail. The checkdams have also been mapped with the total station instrument for future reference and field use. Refer to the following reports for detailed checkdam descriptions (Leap 1997a, 1997b). Table 6 lists the sites that had checkdams constructed on them in FY97.

Table 6 . Checkdams Constructed in FY97.
(N = 21)

Site Numbers			
A:16:180	B:14:107	C:02:101	C:09:050
C:13:006	C:13:069	C:13:099	C:13:327
C:13:346	C:13:348	C:13:359	C:13:381
G:03:002	G:03:003	G:03:024	G:03:025
G:03:038	G:03:040	G:03:041	G:03:058
G:03:072			

Figure 12. Water diversion/ rock checkdam structure at C:13:327.

4-24-97

Figure 13. Before brush checkdam installation.

4-24-97

Figure 14. After installation.

Medium Format Photography

The 97-3 trip photography project focussed on the detailed documentation of rock images/historic inscriptions and site overviews. Visitor-related and physical impacts threatening rock images and

the lack of a qualitative rock image photographic record qualified 19 sites (Table 7). The GRCA photographer accompanied the trip and was assisted by one RCMP staff member. The objective was to produce baseline photographs that could be replicated easily in the future. The 212 medium format photos, tripod locational photos and written documentation are archived at the project office.

Table 7. Medium Format Photography Completed in FY97.
(N = 19 Sites)

Site Number			
A:15:005	A:15:018	A:16:001	A:16:159
A:16:163	A:16:172	A:16:179	B:11:284
B:15:118	C:02:094	C:05:007	C:06:005
C:06:007	C:09:030	C:13:003	C:13:132
G:03:004	G:03:077	G:03:080	

3-1-97

Figure 15. Medium format photography conducted at A:16:172. This photo is one of 212 taken on the 97-3 trip.

Graffiti Removal

GRCA provided personnel educated in graffiti removal on the FY97-2 river trip to examine various techniques used to remove graffiti at two selected sites. The methods implemented were very unobtrusive and did not compromise the integrity of the original rock images.

Site C:02:094 is a historic panel that receives visitor-related impacts continually. Most of the graffiti was removed with a water and sand mixture, pink pearl and gum erasers, an air can blower, and water. The majority of the graffiti was removed, although more removal is scheduled for FY98.

Site C:06:005 consists of prehistoric petroglyphs. The "X" etched into the rock beside the rock image was covered with a water and sand mixture. Upon visiting the site in May, it was recommended that additional removal techniques be used to further lessen the etching.

V. Management Recommendations for FY98

The long-term monitoring program was established to implement management assessments and recommendations that are advised from field inspection. This section summarizes the management recommendations made at all the sites visited in FY97. The recommendations are based on the degrees of various impacts to a site as illustrated during field observation and photo comparisons. Management actions include preservation or recovery options, and each site can receive one or more recommendation(s).

A. Preservation Options

Options for preserving sites consist of closing the site to visitors, retrailing and obliterating trails, planting vegetation, and installing checkdams. The monitoring form has an "other" category that supplements for other preservation methods not specified. A total of eleven sites were recommended for various actions and are discussed below. When these measures are recommended, it usually means that the impacts observed have the potential to be reversed. No sites were advised for planting vegetation or site closure, although C:13:010 remains closed to visitors since 1985.

Trail Obliteration and Retrailing

Retrailing and/or obliterating trails was recommended for four sites (C:02:097, C:13:005, B:13:001, and G:03:020). At sites C:02:097 and C:13:005, fishermen and backpackers are creating trails. At C:02:097, trail work was completed in FY96 by NPS personnel, however, since then, more trails have formed. C:13:005 is located on Red Canyon Delta, an area frequently used by backpackers and as a result, many compacted trails exist. The NPS trail crew has also worked on this area several times in the past, yet people ignore the preservation measures. In this case, retrailing around the site, has proven to be unsuccessful. Trail maintenance will continue at these sites, most likely on an annual basis.

B:13:001 is located at the mouth of a canyon that is hiked frequently by boaters and some rim to river hikers. There is also an overhang within the site boundary that can be inviting to hikers on a hot day. It is advised that trail obliteration occur, and that a new trail be defined within the wash (maybe just put a few cairns in the wash to guide the people away from the site).

G:03:020 is a large roaster complex near the mouth of a side canyon. A very distinct trail bisects the site. The trail extends about 50 m, through several features. The recommendation is to obliterate the trail on-site and retrail, guiding visitors below and into the side canyon drainage.

Checkdam Construction

Checkdam construction has been advised at one site (C:13:356). This site consists of a possible rock alignment eroding into a major side canyon. Upon further assessment, it was decided that before any effort be expended building checkdams, testing should occur to identify if there are more structures buried and the extent of subsurface cultural remains. It was suggested that an ideal way to test this would be through remote sensing.

Other Preservation Options

Other preservation options include methods designed for specific impacts not commonly encountered along the river corridor. Additional graffiti removal has been recommended for two sites, C:02:094 and C:06:005. If time permits, minor graffiti removal will also be conducted at the following sites: A:16:001, B:15:118, C:06:007, and G:03:004.

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, surface collection of the entire site, and data recovery. A total of seven sites were recommended for recovery actions (testing and data recovery) in FY97.

Data Recovery

Six sites (C:09:051, C:13:010, C:13:373, C:13:291, G:03:004 and G:03:020) were advised for some form of data recovery to occur in FY98. Data recovery at C:09:051 was completed this summer, and the results disseminated in FY98. C:13:373 has not been visited since its initial recording in 1990. The monitors suggested that the site either be left alone due to its precarious position on the lip of a river-side dune, or excavated. A separate data recovery proposal is being prepared for C:13:010, Furnace Flats. The work is scheduled for February, 1998 and will include features and structures which have been actively eroding in recent years. At C:13:291 a dendrochronology sample will be taken from a juniper post near Features 1 and 4. G:03:020, Feature 7, is a charcoal feature eroding from an active gully. Much of the charcoal has eroded down the gully, therefore this will be a high priority feature to mitigate. Prior to any excavation, on-site assessment will be completed.

Testing

C:09:069 and C:13:343 were recommended for testing. Both sites have features that are questionable cultural manifestations. Minor testing would determine whether there are intact, subsurface cultural deposits.

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 zero is suggested when no remedial action will occur until enough evidence is provided to justify the action, or when work has already been completed.

Table 8 summarizes FY97 sites that received remedial action recommendations, the types of impacts observed, and priority rank. In some cases, more than one priority rank was given for multiple

recommendations.

Table 8. Summary of FY97 Management Recommendations.
(N = 17 Sites)

Site No.	Schedule	Impacts	Recommend	Rank
A:16:001	annual	graffiti	graffiti removal	2
B:13:001	3-5 years	trailing	trail work	2
B:15:118	discontinue	graffiti	graffiti removal	2
C:02:094	annual	graffiti	graffiti removal	1
C:02:097	annual	trailing	trail work	2
C:06:005	annual	graffiti	graffiti removal	1
C:06:007	inactive	graffiti	graffiti removal	2
C:09:051	annual	erosion, bank slump	data recovery	1
C:09:069	biennial	animal-caused	test	1
C:13:005	annual	trailing	trail work	2
C:13:010	annual	erosion, bank slump	data recovery	1
C:13:291	annual	erosion, bank slump	data recovery	1
C:13:343	annual	surface erosion, gullys	test	1
C:13:356	3-5 years	bank slump, erosion	checkdams	2
C:13:373	annual	surface erosion	data recovery	2
G:03:004	annual	graffiti, trailing	graffiti removal/data recovery	2
G:03:020	annual	surface erosion, gullys	data recovery	1

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

D. FY98 Work Plan

The work plan for fiscal year 1998 includes continued monitoring of selective sites and implementation of the highest priority remedial actions. Within the following section is a discussion of the proposed river trip dates and site list, remedial actions planned for FY98, monitor form revisions, and an investigation of future technology which might enhance data collection and the monitoring process.

Trip Dates and Site List

The work plan for FY98 will incorporate regular monitoring and remedial actions. It is proposed that half the trips be monitoring and assessment trips and half be used for implementing remedial actions. The proposed trip dates for Fiscal Year 1998 are as follows:

October 7-25, 1997 Monitoring and Assessments

November 6-21, 1997 Monitoring and Remedial Action

February 25 - March 13, 1998 Monitoring and Assessments

April 15 - May 1, 1998 Remedial Actions

Table 9 is a listing of the sites scheduled to be monitored in FY98. Currently, 102 sites are scheduled. The table is an alphanumeric listing of the FY98 schedule.

Table 9. Sites Scheduled to be Monitored in FY98.
(N = 102 Sites)

Site Number					
A:15:003	A:15:004	A:15:005	A:15:020	A:15:026	A:15:035
A:15:044	A:15:048	A:15:051	A:16:004	A:16:148	A:16:155
A:16:159	A:16:160	A:16:163	A:16:167	A:16:171	A:16:173
A:16:174	A:16:180	B:09:314	B:09:316	B:09:317	B:10:225
B:10:261	B:11:272	B:11:275	B:14:093	B:14:105	B:14:107
B:15:119	B:15:138	C:02:089	C:02:094	C:02:096	C:02:097
C:02:098	C:02:101	C:05:004	C:05:039	C:06:003	C:06:005
C:09:050	C:09:051	C:09:052	C:09:072	C:09:083	C:09:084
C:13:005	C:13:006	C:13:007	C:13:010	C:13:069	C:13:070
C:13:098	C:13:099	C:13:100	C:13:272	C:13:273	C:13:291
C:13:321	C:13:322	C:13:323	C:13:325	C:13:327	C:13:336
C:13:338	C:13:339	C:13:343	C:13:347	C:13:348	C:13:349
C:13:354	C:13:355	C:13:359	C:13:371	C:13:373	C:13:384
C:13:386	C:13:387	C:13:389	G:03:003	G:03:004	G:03:006
G:03:020	G:03:024	G:03:026	G:03:030	G:03:033	G:03:038
G:03:040	G:03:041	G:03:042	G:03:043	G:03:044	G:03:052
G:03:058	G:03:064	G:03:065	G:03:072	G:03:080	G:03:083

Remedial Actions

FY97 marks the third year the long-term, Monitoring and Remedial Action Plan (MRAP) has been implemented.

Table 10 lists the Priority 1 sites recommended for recovery measures in FY98. This table represents an accumulation of information, rather than results, since FY92. These sites will be visited during the scheduled FY98 monitoring trips and assessed. The specific recovery measures recommended are included in the table. All sites scheduled for remediation will be total station mapped prior to and following the remedial action. A field assessment and work plan will be completed for each site prior to any data recovery.

Table 10. FY98 Priority 1 Recovery Measures.
(N = 10 Sites)

Site Number	Recommendation
C:09:051	Data Recovery
C:09:069	Test
C:13:010	Data Recovery
C:13:291	Data Recovery
C:13:343	Test
C:13:347	Test
C:13:349	Test
C:13:356	Test
G:03:004	Data Recovery
G:03:020	Data Recovery

Table 11 lists all Priority 1 sites scheduled for preservation measures in FY98. These sites will be visited during scheduled monitoring trips and assessed based on FY95, FY96 and FY97 recommendations and in-field observations. Trail work, however, will be performed without further assessments. All sites scheduled for remediation will be total station mapped prior to remediation.

Table 11. FY98 Priority 1 Preservation Measures
(N = 14 Sites)

Site Number	Recommendation(s)
A:15:033	Plant vegetation
A:16:149	Checkdams and Plant vegetation
C:02:094	Graffiti removal
C:06:005	Graffiti removal
C:09:051	Retaining wall and Checkdam
C:13:098	Trail work
C:13:273	Retaining wall
C:13:339	Plant vegetation
C:13:387	Detailed site recording
C:13:389	Trail work and Structural stabilization
G:03:004	Graffiti removal
G:03:020	Checkdam
G:03:028	Trail work
G:03:030	Checkdam

Eighty-three percent (86) of the 104 remedial actions suggested to reduce site impacts have been completed. Prior to any remedial actions, with the exception of trail work, preliminary assessments will be made by an archaeologist and if needed, a resource specialist. If actions are warranted, a proposal will be written describing the remedial actions and it will be sent to members of the Programmatic Agreement with the allotted 30 days for a response. A second field assessment is not necessary for sites that the field staff are familiar with.

Monitor Form Updates

Six changes to the monitoring form are proposed for FY98. The changes occur in all sections of the monitoring form.

1. In the management section, a category called "PA Signatories" was added to document the assistance of PA representatives on the monitoring and remedial action trips.
2. In the physical impacts section, the values for all variables in the matrix will be changed to the following: 0 = absent, 1 = active, 2 = inactive. The "increase", "decrease", and "N/A" values will be omitted. This change is an effort to increase objectivity of monitoring observations. In the past, the value "present", was often interpreted as indicating "active" erosion when in reality that was not the case. For instance, a gully may be observed but have

cryptogamic soils present, indicating stability. Furthermore, the values "increase" and "decrease" were often difficult to identify unless a catastrophic event had occurred.

3. Also in the physical impacts section, the variable "animal-caused erosion" will be eliminated and assumed under the "other" category. Although animal-caused disturbance does occur, it has not proven to be one of the main causes of site deterioration. Analysis of previous years data indicates that it appears too frequently in the physical impact matrix, skewing the data by over-representation.

4. Under visitor-related impacts, the values "increase", "decrease", and "N/A" will be eliminated and only "absent" and "present" will be used. Once again, the "increase" and "decrease" values were too difficult to identify in the field. Collapsing the data into presence/absence values should increase objectivity.

5. In the management assessment and recommendation section, the variable "close site to visitors" will be deleted because in the last six years of monitoring this variable has only been used once or twice. If a monitor does recommend closing a site, it can be assumed under the "other" category and explained further under "comments."

6. Also in the management section, the variables "surface collect" and "map" will be deleted. An "other" category will be added in their place, since these categories have not been used in the last six years of monitoring. The "comments" section can be used to explain what is meant by "other" recommendations.

Future Technology

The science of archaeological site monitoring and remediation is in its infancy, and it is expected that theoretical and methodological innovations will necessitate changes in the current program. One avenue under current investigation is how to increase monitoring efficiency while minimizing impacts to cultural sites. Project staff are researching such topics as the use of data collectors (also known as field recorders or hand-held computers) for field input of monitoring data. Another approach is to utilize remote sensing techniques to gather information about subsurface materials at sites without causing ground disturbance. While it is important to keep abreast of changing technology and advancing methods, it is also imperative that a thorough cost/benefit analysis is performed prior to implementation of any of the above technologies.

Field data collectors, or hand-held computers, are essentially an electronic replacement for paper, pencil, and clipboard. These devices, if proven to be inexpensive enough and durable in the harsh canyon and river environment, could eliminate a step in the data collection process. Instead of monitors writing their observations onto a paper form, they could input this information directly into the electronic database. This would eliminate the need for data entry upon returning to the office. Data cleaning, however, would still need to be done, although data collection devices could reduce some of the potential for error.

Investigations are ongoing into the use of nonintrusive geophysical prospecting techniques such as Ground Penetrating Radar (GPR) in the river corridor. GPR technology has the potential to identify

subsurface archaeological features while providing information such as structure dimensions or the extent of cultural materials. At some sites, active drainages have exposed portions of archeological features in cutbanks or headcuts. The extent of these features, whether a single wall or multi-room pueblo is unknown. In these situations GPR could be used as an archaeological tool to identify the magnitude of features and then implement the appropriate management action. Understanding the extent of a site would help make accurate cost and time projections for the implementation of management actions.

Low level aerial photography is another technique under investigation. Tethered blimps, helicopters, and remotely controlled aircraft are techniques currently used by researchers. The use of low level photography at archaeological sites could illustrate a comparison of overall site condition through time by providing a single high resolution image of the entire site. Replicated images could be put into a photogrammetry program (i.e., GRASS) to obtain quantifiable information such as, how effective checkdams are based on the amount of accumulation behind checkdams through time, rates of headcut advancement, or the success or failure of trail work or revegetation efforts through time. This is a more quantifiable photographic technique than current 35mm hand-held oblique photography due to its capability for actual measurement of change.

The use of vertical photography from a ladder tripod is also being investigated. By establishing control points on the ground and taking photographs from a tripod, images can also be placed into photogrammetry programs to quantify change. This is a micro scale approach compared to low level aerial photography discussed above. This technology could be applied to the examination of single checkdams or features with less cost and time investment than with aerial photography.

CD-ROM technology is currently being investigated for archival purposes, GIS, and as a medium for upgrading the photographic database. Photographic imaging software, using images stored on CD, could improve analysis of monitoring photography. Imaging software provides photographic enhancement and easy enlargements of selected areas in photographs. For example, enlargement of a gully headcut in a replicated photographic sequence would provide an extremely accurate analysis of change. It allows the freedom to enhance or enlarge any area of a photograph. CD-ROM could also act as an archival backup in case negatives were destroyed. Currently, the capacity of image storage on rewritable CDs (1 CD holds approx. 100 3 x 5" black-and-white images) is of concern due to over 7,000 images currently in the photographic archive. Current research into the best CD-ROM photographic application for the project is ongoing.

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VII. Appendices

**A: All Sites Monitored and Monitoring Schedules
(N = 327 Sites)**

Control Group Sites (N = 13)

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

Semiannual Sites (N = 7)

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

Annual Sites (N = 41)

A:15:005	A:15:035	A:16:159	B:15:138	C:02:094	C:02:096
C:02:097	C:02:098	C:02:101	C:05:039	C:06:003	C:06:005
C:09:051	C:13:005	C:13:006	C:13:007	C:13:010	C:13:069
C:13:070	C:13:273	C:13:291	C:13:321	C:13:339	C:13:343
C:13:349	C:13:359	C:13:373	C:13:384	C:13:387	C:13:389
G:02:009	G:03:004	G:03:020	G:03:024	G:03:026	G:03:040
G:03:044	G:03:064	G:03:072	G:03:080	G:03:083	

Biennial Sites (N = 42)

A:15:003	A:16:004	A:16:148	A:16:167	A:16:174	A:16:180
B:09:317	B:10:261	B:11:272	B:11:282	B:14:105	B:14:107
B:15:097	B:16:003	C:05:031	C:09:034	C:09:052	C:09:069
C:09:084	C:09:088	C:13:009	C:13:092	C:13:272	C:13:322
C:13:327	C:13:329	C:13:336	C:13:338	C:13:342	C:13:348
C:13:386	G:03:028	G:03:030	G:03:033	G:03:034	G:03:038

G:03:041 G:03:052 G:03:057 G:03:058 G:03:067 G:03:071

3 - 5 Year Sites (N = 115)

A:15:004 A:15:018 A:15:020 A:15:021 A:15:022 A:15:026
 A:15:027 A:15:028 A:15:029 A:15:033 A:15:038 A:15:039
 A:15:040 A:15:042 A:15:044 A:15:047 A:15:048 A:15:051
 A:16:149 A:16:151 A:16:154 A:16:155 A:16:158 A:16:160
 A:16:163 A:16:171 A:16:172 A:16:173 A:16:185 B:09:314
 B:09:316 B:10:111 B:10:224 B:10:225 B:10:237 B:10:249
 B:11:271 B:11:275 B:11:277 B:11:278 B:11:281 B:13:001
 B:14:093 B:14:095 B:14:108 B:15:119 B:15:120 B:15:122
 B:15:123 B:15:127 B:15:128 B:15:135 B:15:139 B:16:259
 C:02:089 C:02:092 C:05:004 C:05:037 C:06:002 C:06:006
 C:06:008 C:06:010 C:09:030 C:09:031 C:09:053 C:09:062
 C:09:065 C:09:072 C:09:082 C:09:083 C:13:033 C:13:101
 C:13:323 C:13:325 C:13:333 C:13:334 C:13:335 C:13:337
 C:13:340 C:13:346 C:13:352 C:13:353 C:13:354 C:13:355
 C:13:356 C:13:360 C:13:362 C:13:363 C:13:370 C:13:377
 C:13:379 C:13:381 C:13:385 C:13:393 C:13:486 G:02:100
 G:02:101 G:02:108 G:03:002 G:03:006 G:03:025 G:03:032
 G:03:037 G:03:042 G:03:043 G:03:048 G:03:049 G:03:055
 G:03:060 G:03:062 G:03:065 G:03:073 G:03:076 G:03:077
 G:03:085

Inactive Sites (N = 71)

A:15:025	A:15:031	A:15:032	A:15:036	A:15:037	A:15:043
A:16:150	A:16:153	A:16:157	A:16:161	A:16:162	A:16:175
A:16:176	A:16:184	B:10:227	B:10:229	B:10:231	B:10:260
B:10:262	B:11:280	B:11:283	B:13:002	B:15:096	B:15:124
B:15:134	B:16:257	B:16:258	B:16:261	B:16:262	B:16:364
C:02:085	C:05:007	C:05:009	C:05:035	C:06:004	C:09:005
C:09:032	C:09:056	C:09:061	C:09:067	C:09:068	C:13:008
C:13:131	C:13:274	C:13:326	C:13:344	C:13:345	C:13:350
C:13:358	C:13:361	C:13:364	C:13:365	C:13:368	C:13:372
G:02:001	G:02:102	G:02:103	G:02:105	G:02:106	G:02:107
G:03:027	G:03:029	G:03:046	G:03:053	G:03:054	G:03:056
G:03:059	G:03:063	G:03:066	G:03:078	G:03:082	

Discontinue Sites (N = 38)

A:15:001	A:15:030	A:16:001	A:16:002	A:16:003	A:16:179
B:09:315	B:09:319	B:09:320	B:10:248	B:11:279	B:15:001
B:15:118	B:15:131	B:16:001	B:16:365	C:02:050	C:09:001
C:09:004	C:09:028	C:09:054	C:09:058	C:09:059	C:09:071
C:09:073	C:13:001	C:13:003	C:13:132	C:13:324	C:13:357
C:13:374	C:13:392	G:02:032	G:03:001	G:03:023	G:03:061
G:03:069	G:03:079				

Note: Monitoring schedules have not been determined for sites B:11:284 and C:13:351.

B: FY97 Site Monitoring Form

C: Remedial Action Form