GLEN CANYON NATIONAL RECREATION AREA

FY94 GLEN CANYON ENVIRONMENTAL STUDIES MONITORING OF ARCHAEOLOGICAL SITES FROM GLEN CANYON DAM TO THE PARIA RIFFLE

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ABSTRACT

As part of the ongoing Glen Canyon Environmental Studies (GCES) program in Glen Canyon National Recreation Area (NRA), this report summarizes the FY94 archaeological monitoring effort. On various days between March 30 and September 1, 1994, monitoring of erosional and human impacts was conducted at all 69 locations between Glen Canyon Dam and the Paria Riffle. Glen Canyon NRA personnel included Archaeologists Tim W. Burchett, Christine E. Goetze and Susan Hall, and volunteers Manny Kropf, and Dan Hanson.

Sixty-nine locations are monitored by Glen Canyon NRA in Reach 0. Fifty-three archaeological sites are present from Glen Canyon Dam down to River Mile 1.6 Right Bank below Lees Ferry. Fifty-one sites have 1 monitoring location, site C:2:11 has 12 monitoring locations, and site C:2:60 has 6 monitoring locations.

The FY94 work plan is presented. The overall trends and relationships between several environmental and impact variables are explored. The analysis suggests that surface erosion, gullies, eolian/alluvial erosion, and animal caused erosion are probably not related to river fluctuations or dam operations; whereas arroyo cutting, bank slumpage, and side canyon erosion probably are related to river fluctuations and/or dam operations.

Site-specific summaries of previous monitoring results and the results of the FY94 monitoring effort are provided to illustrate the ongoing impacts present. A management summary includes a variety of recommendations. Eighteen monitoring locations are recommended for some form, or combination of, remedial action. These methods include retrailing, obliterating trails, planting vegetation, installing check dams, and stabilization.

Four measures suggested to protect site integrity are: mapping, surface collection of the entire site, subsurface testing, and excavation. Some form, or combination of, data collection is recommended at 29 monitoring locations.

The FY95 work plan includes monitoring activities, site mapping, continuing terrestrial photogrammetry, remedial actions, and reporting. For FY95, 23 locations will be monitored. Twenty-one locations will be monitored once and two locations will be monitored twice. Monitoring activities are scheduled to begin in March 1995. The two locations to be monitored on a semi-annual basis will be inspected in the spring prior to high visitor season and then in the fall following the visitor season.

Five sites have been chosen for total station mapping. Film retrieval and replacement every 34 days at two camera locations within Glen Canyon NRA will continue. A stabilization work shop for the application of remedial actions such as traditional erosion control methods is planned for spring FY95. Once this training is completed, a remedial action plan identifying a limited number of sites most appropriate for immediate remedial action and including field methods will be submitted to all signatories. A short assessment of the effectiveness of the monitoring program since its beginning is provided.

TABLE OF CONTENTS

LIST OF TABLES

I. INTRODUCTION

The preparation of an Environmental Impact Statement (EIS) on the effects of the operation of the Glen Canyon Dam on the downstream environmental and ecological resources and historic properties of Glen Canyon and Grand Canyon was ordered by the Secretary of the Interior. The goal of the EIS is to determine specific options that could be implemented to minimize adverse impacts on the downstream environmental and cultural resources and Native American interests in Glen and Grand Canyons.

To reach these objectives a joint effort among several agencies was designed to identify and evaluate the cultural resources present within Glen and Grand Canyons. A survey gathered information on the numbers, types, location, National Register eligibility, physical condition, and extant and potential impact agents (Fairley et al. 1991:1) of 475 cultural properties (Fairley et al. 1991:268).

A monitoring and remedial action plan was developed for managing the effects of Glen Canyon Dam operations on historic properties within the Area of Potential Effects (APE) and for carrying out remedial actions to address the effects of continuing identification, inspection, analysis, evaluation and remedial protection actions, as necessary, for the preservation of the cultural properties within the river corridor.

Pursuant to that monitoring and remedial action plan, this document reports the results of the FY94 monitoring activities conducted in Glen Canyon National Recreation Area (NRA) in Reach 0 from Glen Canyon Dam to the Paria Riffle. Section II presents a scope of work including objectives, site selection criteria, field monitoring methods, total station mapping program, and continued terrestrial photogrammetry for FY94. Section III presents some overall trends in impacts to the cultural resources.

Section IV presents site-specific results and recommendations of the monitoring effort including previous impact evaluations, current impact evaluations, and recommendations for continued monitoring, remedial actions, and data recovery. Section V is a management summary and includes sections on site specific measures to reduce impacts and to protect site integrity. A FY95 work plan and an assessment of the monitoring program conclude the report.

II. FY94 SCOPE OF WORK

The objectives of the FY94 monitoring season are based on the results and recommendations of the FY91 survey and FY92-93 monitoring activities. They included: 1) continued monitoring of erosional and human impacts and updating the monitoring data base for the sites in Reach 0 from the Glen Canyon Dam to the Paria Riffle; 2) detailed site mapping using total station equipment; and 3) continued terrestrial photogrammetry. Scoping for geomorphological studies on the terraces for the proposed FY95 Spike Flood was also conducted, and is presented elsewhere (Burchett 1994). Site selection criteria, field methods, mapping, and terrestrial photography programs are presented.

Site Selection Criteria for Monitoring

For FY94, all 69 monitoring locations were monitored for natural and human impacts so that at least one monitoring record is available for comparison with the original data recovered during FY91. With at least two monitoring records for each location, trends in ongoing impacts can be established. It is these trends upon which future monitoring schedules are developed. Those criteria, to be implemented in FY95, are presented in Section V, Management Summary.

Monitoring Field Methods

A new monitoring form, a modified version of earlier forms, was developed for FY94. This new form greatly increased the efficiency in recording impacts. Photographic recording using GLCA archival procedures continued.

One by one meter recording units were placed on sites with more than 25 artifacts to document changes in artifact counts and movement. Fourteen sites were treated thusly. These recording units will be inspected during subsequent monitoring episodes to document erosion/displacement of artifacts.

Total Station Mapping Program

Detailed mapping using total station equipment was planned at 5 selected sites: C:2:32, C:2:35, C:2:38, C:2:81, and C:2:105. Site-specific loci of erosion such as gullies and arroyos as well as feature/artifact information will be recorded.

Terrestrial Photogrammetry

Film retrieval and replacement every 34 days at two camera locations will continue. These photographic records are recording, on a daily basis, terrace cutbank erosion at C:2:38 and C:3:10. These day trips are opportunities for any signatories wishing to travel between Lee's Ferry and

Glen Canyon Dam. GLCA requests that arrangements be made with Tim W. Burchett, (602) 645-8278, at least one month in advance. The NPS river boat has a capacity of 6 people, 5 visitors and the driver.

III. IMPACTS TO CULTURAL RESOURCES

In general, the monitoring efforts in FY94 document the continuing degradation of archaeological resources by a number of natural and human impacts.

Natural Impacts

The FY94 monitoring program resulted in 69 monitoring locations being inspected. Of the 69 monitoring locations, 30% (N=21) have received impacts since the last monitoring session. Natural impacts include surface erosion, gullies, arroyo cutting, bank slumpage, eolian/alluvial erosion, side canyon erosion, animal-caused erosion such as trailing and burrowing, and other impacts such as spalling and root/plant growth.

Table 1 lists the presence, absence, and increase of these natural impacts. The table shows that 81.2% (N=56) of the monitoring locations exhibit surface erosion, and another 7.2% (N=5) exhibited an increase in surface erosion since the last monitoring episode. Gullying is impacting 50.7% (N=35) of the monitoring locations, and at 4.3% (N=3) of the monitoring locations, gullying has increased since the last monitoring episode.

Arroyo cutting occurs at 27.5% (N=19) of the monitoring locations, and it has increased at 5.8% (N=4) of the locations since the last monitoring episode. The same trends are true for bank slumpage, eolian/alluvial erosion, and animal-caused erosion. There is a general increase in the amount of erosion since the last monitoring episode.

Table 2 presents the various natural impacts at the 28 monitoring locations within Glen Canyon NRA that contain structures and/or storage features. All types of erosion are present, and there is an increase in the various kinds of erosion. Surface erosion effects 71.4% (N=20), while bank slumpage effects only 7.0% (N=2). The impacts thought to be most closely related to river fluctuations and/or dam operations, arroyo cutting, bank slumpage, and side canyon erosion, effect relatively few monitoring locations, while surface erosion, eolian/alluvial erosion, and animal-caused erosion effect more of the cultural resources.

Table 3 presents the natural impacts at the 36 monitoring locations with artifact scatters. The table indicates that surface erosion is present at 91.7% (N=33) of the locations with artifact scatters, and it has increased at three locations. Ranked are the other natural impacts in order of the numbers of monitoring locations they effect: Eolian/alluvial erosion (77.8%, N=28); gullying (66.7%, N=24); animal-caused erosion (41.7%, N=15); arroyo cutting (33.3%, N=12); side canyon erosion (13.9%, N=5); and bank slumpage (11.1%, N=4). Again, the impacts thought to be related to river fluctuations and dam operations such as arroyo cutting, side canyon erosion, and bank slumpage effect fewer sites than surface erosion or eolian/alluvial erosion.

Table 1. Natural impacts at all monitoring locations within Glen Canyon NRA.

	Present	Increase	Decrease	Absent	Totals
Surface Erosion (0-10 cm)	56/81.2	5/7.2	0/0.0	8/11.6	69/100.0
Gullying (10-100 cm)	35/50.7	3/4.3	0/0.0	31/45.0	69/100.0
Arroyo Cutting (> 1 m)	19/27.5	4/5.8	0/0.0	46/66.7	69/100.0
Bank Slumpage	8/11.6	5/7.2	0/0.0	56/81.2	69/100.0
Eolian/Alluvial Erosion/Deposition	48/69.6	7/10.1	0/0.0	14/20.3	69/100.0
Side Canyon Erosion	7/10.1	4/5.8	0/0.0	58/84.1	69/100.0
Animal-Caused Erosion (Trailing, Burrowing)	22/31.9	2/2.9	0/0.0	45/65.2	69/100.0
Other Natural Impacts (Spalling, Roots)	7/10.1	0/0.0	0/0.0	62/89.9	69/100.0

Table 2. Natural impacts at 28 monitoring locations with structures and storage features within Glen Canyon NRA.

	Present	Increase	Decrease	Absent	Totals
Surface Erosion (0-10 cm)	20/71.4	3/10.7	0/0.0	5/17.9	28/100.0
Gullying (10-100 cm)	8/28.6	1/3.5	0/0.0	19/67.9	28/100.0
Arroyo Cutting (> 1 m)	4/14.4	1/3.5	0/0.0	23/82.1	28/100.0
Bank Slumpage	1/3.5	1/3.5	0/0.0	26/93.0	28/100.0
Eolian/Alluvial Erosion/Deposition	19/67.9	1/3.5	0/0.0	8/28.6	28/100.0
Side Canyon Erosion	2/7.0	1/3.5	0/0.0	25/89.5	28/100.0
Animal-Caused Erosion (Trailing, Burrowing)	12/42.9	1/3.5	0/0.0	15/53.6	28/100.0
Other Natural Impacts (Spalling, Roots)	3/10.7	0/0.0	0/0.0	25/89.3	28/100.0

Table 3. Natural impacts at 36 monitoring locations with artifact scatters within Glen Canyon NRA.

	Present	Increase	Decrease	Absent	Totals
Surface Erosion (0-10 cm)	33/91.7	3/8.3	0/0.0	0/0.0	36/100.0
Gullying (10-100 cm)	24/66.7	1/2.7	0/0.0	11/30.6	36/100.0
Arroyo Cutting (> 1 m)	12/33.3	2/5.6	0/0.0	22/61.1	36/100.0
Bank Slumpage	4/11.1	3/8.3	0/0.0	29/80.6	36/100.0
Eolian/Alluvial Erosion/Deposition	28/77.8	4/11.1	0/0.0	4/11.1	36/100.0
Side Canyon Erosion	5/13.9	2/5.6	0/0.0	29/80.5	36/100.0
Animal-Caused Erosion (Trailing, Burrowing)	15/41.7	0/0.0	0/0.0	21/58.3	36/100.0
Other Natural Impacts (Spalling, Roots)	0/0.0	0/0.0	0/0.0	36/100.0	36/100.0

Twelve monitoring locations within Glen Canyon NRA have roasters, hearths, or thermal features. Table 4 presents natural impacts at those locations. Surface erosion, gullying, eolian/alluvial erosion, and arroyo cutting effect about the same number of locations. Again, there is an increase in the amount of erosion noted since the last monitoring episode.

Table 4. Natural impacts at 12 monitoring locations with roasters/hearths within Glen Canyon NRA.

	Present	Increase	Decrease	Absent	Totals
Surface Erosion (0-10 cm)	6/50.0	4/33.3	0/0.0	2/16.7	12/100.0
Gullying (10-100 cm)	6/50.0	2/16.7	0/0.0	4/33.3	12/100.0
Arroyo Cutting (> 1 m)	5/41.65	2/16.7	0/0.0	5/41.65	12/100.0
Bank Slumpage	3/25.0	2/16.7	0/0.0	7/58.3	12/100.0
Eolian/Alluvial Erosion/Deposition	6/50.0	4/33.3	0/0.0	2/16.7	12/100.0
Side Canyon Erosion	1/8.3	2/16.7	0/0.0	9/75.0	12/100.0
Animal-Caused Erosion (Trailing, Burrowing)	3/25.0	1/8.3	0/0.0	8/66.7	12/100.0
Other Natural Impacts (Spalling, Roots)	0/0.0	0/0.0	0/0.0	12/100.0	2/100.0

Twenty monitoring locations within Glen Canyon NRA contain rock art or historic inscriptions. Table 5 presents trends in natural impacts at these locations. The first thing noted is that there are apparently no increases in natural impacts at these sites. Most (75.0%, N=16) are effected by erosion to the panel surfaces through wind and water. Spalling of the panel surfaces occurs at four of the sites. It appears that rock art and inscription panels are effected relatively less by impacts directly related to river fluctuations or dam operations, such as arroyo cutting, bank slumpage, and side canyon erosion.

Table 5. Natural impacts at 20 monitoring locations with rock art/inscription panels within Glen Canyon NRA.

	Present	Increase	Decrease	Absent	Totals
Surface Erosion (0-10 cm)	16/75.0	0/0.0	0/0.0	4/25.0	20/100.0
Gullying (10-100 cm)	2/10.0	0/0.0	0/0.0	18/90.0	20/100.0
Arroyo Cutting (> 1 m)	1/5.0	0/0.0	0/0.0	19/95.0	20/100.0
Bank Slumpage	1/5.0	0/0.0	0/0.0	19/95.0	20/100.0
Eolian/Alluvial Erosion/Deposition	7/35.0	0/0.0	0/0.0	13/65.0	20/100.0
Side Canyon Erosion	1/5.0	0/0.0	0/0.0	19/95.0	20/100.0
Animal-Caused Erosion (Trailing, Burrowing)	3/15.0	0/0.0	0/0.0	17/85.0	20/100.0
Other Natural Impacts (Spalling, Roots)	4/20.0	0/0.0	0/0.0	16/80.0	20/100.0

Of the 69 monitoring locations, 31.9% (N=22) have Type I streams, draining to the Colorado River. Erosion of Type II streams occurs at 36.2% of the monitoring locations. These have no relation to regulated flows since they do not reach the River, rather their effective base level is usually well above the river emptying onto a higher terrace. Both types of streams adversely impact archaeological sites, however.

Is there a relationship between stream type and the kinds of erosion impacting the sites? Table 6 is a cross tabulation of stream type versus the various kinds of erosional impacts. This tables suggest that surface erosion, gullies, eolian/alluvial erosion/deposition, and animal caused erosion affect sites associated with Types I and II streams equally. These impacts do not seem to be related to river fluctuations or dam operations.

Arroyo cutting, bank slumpage, and side canyon erosion, on the other hand, seem to be prevalent on sites with Type I streams, those that drain to the Colorado River. These impacts are probably related to river fluctuations and/or dam operations.

Table 6. Natural impacts versus stream type at the 69 monitoring locations within Glen Canyon NRA.

Frequencies	Stream Type	
	Type I	Type II
Surface Erosion (0-10 cm)	19	22
Gullying (10-100 cm)	15	16
Arroyo Cutting (> 1 m)	13	5
Bank Slumpage	7	2
Eolian/Alluvial Erosion/Deposition	16	20
Side Canyon Erosion	7	0
Animal-Caused Erosion (Trailing, Burrowing)	8	8
Other Natural Impacts (Spalling, Roots)	4	1

Human Impacts

Human impacts of concern include collection piles, trailing, on-site camping, and vandalism. Table 7 presents information on visitor impacts. Sites with structures or storage features are impacted most often by visitation. Sites with structures or storage features, artifact scatters, or rock art/inscription panels have seen an increase in visitor impacts since they were last monitored.

There are collectors piles at three monitoring locations -- C:2:35, 39, and 84. Onsite camping is noted at six sites, and a decrease in camping activities was noted at one of them, C:2:11, Feature 3. There are two noted incidences of criminal vandalism, at sites C:2:50 and C:3:6.

One of the most devastating human impacts is trailing. There are trails at or near 40 of the monitoring locations. The trail to the Petroglyph Panel, C:2:38, passes through C:2:81, a lithic scatter. Continued visitation has cut the trail deep into the terrace through the site, and recent summer thunderstorms have exacerbated the problem, cutting the trail to 1 m deep through C:2:81.

The trail at C:2:81 is now a Type II stream, and another Type II stream is nearby. These two drainages could join and develop into a Type I stream. A trail rehabilitation project, Glen Canyon NRA Compliance No. 94026, is planned for spring 1995 to upgrade and stabilize the trail (Burchett 1995). A recent testing program was conducted at C:2:81 to recover materials prior to that project, which when completed will halt the erosion of the trail.

Table 7. Visitor impacts related to various cultural resources.

	Present	Increase	Decrease	Absent	Totals
Structures/Storage	8/28.6	1/3.6	0	19/67.8	28/100.0
Artifacts	6/16.7	2/5.6	0	28/77.7	36/100.0
Roasters/Hearths	3/25.0	0	0	9/75.0	12/100.0
Rockart/Inscriptions	4/20.0	1/5.0	0	15/75.0	20/100.0

IV. SITE-SPECIFIC RESULTS AND RECOMMENDATIONS

This section briefly describes the site type, land ownership, physiographic position, stability, natural and human impacts observed during previous monitoring episodes are provided along with current evaluations of site impacts. A determination of whether the impacts are related to river fluctuations or dam operations is given. Site specific characteristics, tribal considerations, and management and remedial action recommendations are included.

Sixty-nine locations are monitored by Glen Canyon NRA in Reach 0. Fifty-three archaeological sites are present from Glen Canyon Dam down to River Mile 1.6 Right Bank below Lees Ferry. Fifty-one sites have 1 monitoring location, site C:2:11 has 12 monitoring locations, and site C:2:60 has 6 monitoring locations.

AZ C:2:11, Feature 1

This is Lee's Ferry Fort, a portion of the Lee's Ferry Historic District, located on the right bank of the Colorado River just above the Lee's Ferry launch ramp. It was constructed as a trading post in 1874 by members of the Mormon Church. It was later used by Charles H. Spencer as a cook house for miners between 1910-1913. The site is on an old alluvial terrace of the Colorado River.

Previous Evaluations

Feature 1 has been previously monitored once, in FY91 during the initial survey. At that time, the building was in stable condition.

Current Evaluation

The site is still in stable condition. However, the top courses of the west walls have lost some mortar. In addition, the Lee's Ferry Ranger has reported that the north door is often pushed in by visitors wishing to view inside. The wood of the door frame is deteriorated and will not hold the hinges, so when the door gets pushed in it falls to the floor.

Recommendations

The site is not being impacted by operations of the dam or fluctuating water levels, and it is in stable condition. However, the top courses of the west wall should be stabilized, and the frame of the north door should be reconstructed. Monitoring every 3-5 years is recommended.

AZ C:2:11, Feature 3

On the right bank of the Colorado River, on an alluvial terrace, Feature 3 includes the Main Ferry Site, and on the left bank, cable anchor posts are present on a steep talus slope above the Stanton Road. The Main Ferry Site includes 3 partially intact masonry structures, used from 1873-1928.

Previous Evaluations

The feature was monitored during the initial survey in FY91. Bank cutting is impacting the site directly, and bank slumpage and accelerated arroyo cutting have impacted the site indirectly. Surface erosion is also noted. More than two distinct trails are present, and camping evidence includes the rearrangement and clearing of rocks, recent trash, and concentrated soil compaction.

Current Evaluation

On the right bank, the Main Ferry Site is present. Bank slumpage is continuing to impact the site directly. Masonry elements have been added to the west corner of Structure 1, and the cable has been moved along the trail. On Structure 2, collapse of a masonry element on both chimneys is noted. There is no change to Structure 3, although human waste and toilet paper were noted nearby.

On the left bank near the cable anchor posts, bank slumpage and alluvial action will wash away the cable at the bottom of the feature below the Stanton Road. There is a decrease in evidence of camping.

Recommendations

Both the left and right bank portions of this feature should be monitored annually. Elements of the feature on both banks of the river should be instrument mapped as well.

AZ C:2:11, Feature 4

This is a dry laid sandstone corral located on the right bank of the Colorado River 240 meters upstream from Feature 3 on the same alluvial terrace.

Previous Evaluations

The feature was monitored during the initial survey in FY91. Bank cutting impacts the site directly and bank slumpage and arroyo cutting impact the site indirectly. There is evidence of surface erosion. One distinct trail is noted, and other visitor evidence includes the rearrangement and clearing of rocks, recent trash, and concentrated soil compaction.

Current Evaluation

A trail bisects both sides of the corral wall, but the stone elements making up the remaining wall segments are in stable condition.

Recommendations

Annual monitoring is recommended along with instrument mapping.

AZ C:2:11, Feature 5

This is on the left bank of the Colorado River on the Navajo Nation and consists of the Cable Crossing Inscriptions associated with travelers crossing at Lee's Ferry and generally dating to around the turn of the century. They are visible from the river.

Previous Evaluations

The feature was monitored in FYs 91 and 92. No changes to the inscriptions were noted.

Current Evaluation

Feature 5, consisting of inscriptions on boulders, is not affected specifically by the operation of the dam or river fluctuations.

Recommendations

The inscriptions should be monitored every other year due to their extreme visibility from the river. Instrument mapping and sketch drawing of the panels are also recommended.

AZ C:2:11, Feature 6

Located on the left bank of the Colorado River on the Navajo Nationland, Feature 6 includes two enigmatic low masonry wall segments on Cable Crossing Hill. They probably date to the historic period.

Previous Evaluations

The feature was monitored in FYs 91 and 92. No changes were noted.

Current Evaluation

Surface erosion is noted, but the wall segments are in stable condition.

Recommendations

This feature is on the same hill on which a stationary camera sets, and servicing of that camera occurs monthly. The site could be monitored annually with little effort or further trailing impacts.

AZ C:2:11, Feature 11

Located on the right bank of the Colorado River, Feature 11 is the staging area for the Lee's Ferry mining operation and boiler. Many historic artifacts are associated.

Previous Evaluations

The FY91 monitoring activities were restricted to recording the archaeological resources present. The remains are considered to be fairly stable.

Current Evaluation

Surface erosion, gullying, and visitor trailing are noted throughout the area, so displacement of artifacts associated with the mining operation is possible. The boiler is in stable condition.

Recommendations

The stable condition of the remains suggest monitoring every 3-5 years. Instrument mapping of the artifacts present could help to substantiate the written record of activities on the mining operation.

AZ C:2:11, Feature 12

The Charles H. Spencer Steamboat, on the National Register, is a feature of Lee's Ferry Historic District, which sank on the right bank of the Colorado River just above the Lee's Ferry boat launch in 1914. The steamboat is partially submerged in water and present-day shoreline/fluvial deposits.

Previous Evaluations

The feature was monitored in FYs 91, 92, and 93. Overall, the Spencer appears in better condition underwater. Extensive river fluctuations continue to cause wet-dry cycles to the bow of the steamboat. Moss and algae in the center of the boat, growing up from the river bottom and on the port side, is not as abundant as in FY92. Underwater silt buildup in and around the vessel has increased noticeably since FY92 and the amount of algae and vegetation growth has decreased. Human impacts have apparently reduced since FY92, when during low water, visitors have been known to stand on the boiler of the boat to fish. This was not observed in FY93, although it still may have occurred. Litter from picnickers is present on the nearby stream terrace, and visiting tour boats often float over the steamboat; their wakes cause continued movement of sediment. The steamboat is monitored by a stationary camera located on the opposite side of the river.

Current Evaluation

Continuing deterioration of the bow from wet-dry cycling is noted. Since the last monitoring episode in FY93, the amount of algae and sediment is increasing, particularly on the stern of the boat. A trail is nearby on shore and is used by picnickers and people fishing.

Recommendations

Recommendations for best preserving the steamboat include extending the no-wake zone around the Lees Ferry boat launch area to incorporate the Spencer, and keeping the vessel underwater at all times. An "ideal" flow of

12,000 cfs or higher would accomplish the latter recommendation. The steamboat should be monitored annually from the shore, and monitored underwater prior to and following any extremely high or low flows.

AZ C:2:11, Feature 13

This is the USGS Guest House on the right bank of the Colorado River near the Lee's Ferry launch ramp. It is near Lee's Ferry Fort.

Previous Evaluations

The feature was monitored in FY91. Overall, the structure was considered to be in stable condition.

Current Evaluation

Surface erosion, visitor trailing, and trampling are noted around the building. The loss of a shingle on top of the building was noted, but it is otherwise in stable condition.

Recommendations

The feature is stable and it is not being impacted by the operation of the dam or by river fluctuations. A 3-5 year monitoring schedule is recommended.

AZ C:2:11, Feature 14

This feature is located on the left and right banks of the Colorado River just upstream from Lee's Ferry on old alluvial terraces. It consists of the abutments of the USGS Cableway, and is included in the Lee's Ferry Historic District. The remnants on the right bank consist of concrete cable anchors, and the remnants on the left bank are on the Navajo Nationland and consist of concrete cable anchors, a still-standing A-frame tower, and a cable car.

Previous Evaluations

The feature was monitored in FYs 91, 92, and 93. The right bank concrete cable anchors are in stable condition. They do not appear to be threatened by either river fluctuations or dam operations.

The remnants of Feature 14 on the left bank are on the Navajo Nationland and consist of concrete cable anchors, a still-standing A-frame tower, and a cable car. There is no change in the condition of the concrete cable anchors and the tower from previous monitoring episodes. However, the cable car has been humanly impacted since the FY92 monitoring episode. The wooden board frame on the front, back, and right sides of the cable car have been peeled away and rearranged on the ground nearby. More importantly, the terrace on which the remains set is being dissected by side canyon erosion caused by

river fluctuations.

Current Evaluation

The Feature 14 remnants on the right bank of the river are in stable condition. On the left bank of the Colorado River, the towers, artifacts, and ground surface around them are being distributed by surface erosion, gullying, arroyo cutting, bank slumpage, and side canyon erosion. These impacts are in turn being caused by the fluctuating river levels. An example human impact is the movement of loose boards of the cable car.

Recommendations

It is recommended that monitoring of the right bank elements of Feature 14, the concrete cable anchors, be discontinued. The elements of Feature 14 on the left bank of the river are monitored by a stationary camera, and they should be monitored by an archaeologist annually, since they are being disturbed by impacts related to river fluctuations. In addition, instrument mapping of the left bank elements of Feature 14 is recommended. Possible remedial actions include installing check dams and revegetation.

AZ C:2:11, Feature 17

This feature, called the Spencer Steamboat Inscriptions, includes a series of historic and modern inscriptions located on the right bank of the Colorado River. They are inscribed into an unpatinated Wingate sandstone outcrop 15 m south and directly above the downstream end of the Spencer Steamboat. The earliest inscription is of G. M. Wright, Nov. 17, 1892. The panel is visible from the river and from the steamboat.

Previous Evaluations

The feature was monitored in FY91. There is a trail directly below the inscriptions, as well as a viewing area for the Steamboat directly above. The most apparent impact is the addition of modern graffiti. The names Lee Seller and possibly Ramon Albert were added since 1979.

Current Evaluation

Some erosion to the panel surface is noted; otherwise, the inscriptions are intact. The panel is not being impacted by river fluctuations or operations of the dam.

Recommendations

Due to the visibility of the panel from the river, monitoring is recommended every other year.

AZ C:2:11, Feature 20

This feature is a subsurface root cellar located on the right bank of the Colorado River on the colluvial terrace.

Previous Evaluations

The feature was monitored in FY91. The root cellar was noted.

Current Evaluation

The surrounding ground surface is eroding and gullies are present, so displacement of associated artifacts is possible.

Recommendations

There is a possibility of this buried feature becoming exposed. It is near Feature 11 and should be monitored at the same time, every 3-5 years.

AZ C:2:11, Feature 21

This includes historic hogans on the right bank of the Colorado River.

Previous Evaluations

The feature was monitored in FY91. The hogans were noted in stable condition.

Current Evaluation

Surface erosion, gullying, and arroyo cutting are impacting the masonry walls, and vegetation is impacting one of the hogans. These natural impacts are, however, not related to river fluctuations.

Recommendations

A rock line trail leads to the area from the Lee's Ferry launch ramp parking lot nearby, and given the proximity of the site to modern day activities at the launch ramp, monitoring every other year is recommended. The structures should be mapped as a form of data recovery and to manage the erosion.

AZ C:2:12

This historic road is the "Dugway", an alternate route built in 1898 to avoid the Lee's Backbone Road. It is located on the Navajo Nationland just downstream from Lee's Ferry on the left bank of the river on the slopes of the Moenkopi Formation.

Previous Evaluations

The site was monitored in FYs 91, 92, and 93. The gullies and arroyos

crossing the trail continue to cut deeper and wider and are eroding intact retaining wall segments. An aluminum can, probably from visitors walking the trail, was noted. Natural impacts -- sheet washing, gullying, arroyo cutting, and bank slumpage -- are continuing, and further damage to existing retaining walls due to arroyo enlargement is predicted. These impacts are related to the extreme steepness of the Chinle slope on which the road was originally built, they are not caused by river fluctuations or dam operations. There is minimal human impact due to camping and hiking along the trail.

Current Evaluation

Surface erosion, gullying, arroyo cutting, bank slumpage, and side canyon erosion are all increasing since the last monitoring episode in FY93. Side drainages have increased erosion and gullying across the trail, but the retaining walls are still in fairly stable condition. Again, these impacts are related to the extreme steepness of the Chinle slope on which the road was originally built, they are not caused by river fluctuations or dam operations. One stone was added to the cairn located on the trail above the Paria Riffle.

Recommendations

Monitoring every 3-5 years is recommended, since the trail is high above the river corridor and impacts are not related to dam operations or river fluctuations.

AZ C:2:13

This prehistoric site consists of a rock shelter with a low dry-laid wall enclosing the front. A sherd and lithic artifact scatter is present along with a small petroglyph panel. The site is located on the Navajo Nationland on an alluvial terrace and talus slope where it contacts with a low Kayenta sandstone cliff face.

Previous Evaluations

The site was monitored in FYs 91 and 93. It is actively eroding with impacts from sheet washing, gullying, arroyo cutting, and bank slumpage. A small rivulet crosses the site and drains into a Type I stream west of the site. Extensive trampling and trailing are also present. Evidence of camping on the site was noted in FY91, however, no trace of that activity was noted during the FY93 monitoring session.

Current Evaluation

Surface erosion is noted for Features 1 and 3, the structures. Animals have rubbed against the rock art panel, eroding the lower portions of the petroglyphs. The artifact scatter in front of rock art panel 1 and Feature 1, the rock shelter, is continuing to erode through gully washing down the rivulet. Feature 2, on a high cutbank of the Type I stream, is eroding.

Recommendations

Annual monitoring is recommended, since the features are continuing to erode into a Type I stream. Mapping and testing of the cultural resources present are also recommended, since materials are being displaced.

AZ C:2:32

This site is a series of charcoal lenses eroding from a high cutbank of an alluvial terrace on the left bank of the river.

Previous Evaluations

The site is actively eroding with natural impacts including surface erosion, gullying, arroyo cutting, and bank slumpage. The cutbank was undermined by 1983 high CFS releases, causing bank slumpage and steepening and widening of gullies and the arroyo east of the site. These impacts are related to river fluctuations and dam operations, specifically, direct inundation, bank slumpage and steepening adjacent to the current highwater zone, and headward migration of arroyos due to lowering base levels. A Type I arroyo is present 20 m east of the site. Gully and arroyo cutting east of the site datum has not increased since FY92. There are no human-related impacts.

Current Evaluation

Continued loss of the lens and the terrace deposits is occurring. Impacts include surface erosion, gullying, arroyo cutting, and bank slumpage.

Recommendations

The site is being monitored by a stationary camera located on the opposite side of the river. Additionally, on-site monitoring should take place annually.

AZ C:2:33

On the right bank of the Colorado River, this is a small rock shelter with the remains of a crude, wet-laid granary, an associated sherd and lithic scatter, and a possible storage space in a low bedrock shelf. The site overlooks the River Drive near the junction at its southwest end. It is located on prehistoric fluvial deposits at the base of a Kaibab Limestone cliff.

Previous Evaluations

The site was monitored in FY91. Site condition was considered to be poor, being directly impacted by bank slumpage, and surface erosion. It was recommended to monitor the granary because it is visible from the road, and the walls are extremely fragile.

Current Evaluation

The granary is being impacted by surface erosion and two masonry elements have collapsed. The artifacts are being displaced by surface erosion, gullying, and trailing. These impacts are not related to the operation of the Dam, however.

Recommendations

Since the granary is highly visible from the road, biennial monitoring is recommended. Stabilization of the granary wall and testing of the artifact scatter are recommended as well.

AZ C:2:35

This is a PII Anasazi site containing an extremely sparse lithic and ceramic artifact scatter with a low wall. A charcoal stain indicating a hearth is also present. The site is located in old Colorado River alluvium and covered with shallow colluvium.

Previous Evaluations

The site was monitored in FYs 91 and 93. The site sets back away from a high cutbank of the Colorado River. It is moderately stable in that fragile features are present but are not actively eroding. Away from the features, the site exhibits incipient erosion with surface erosion, gullying, and arroyo cutting present. Human impacts consist of a single trail to the site, which was not noted in FY91. These impacts do not appear to be related to river fluctuations or dam operations, however, there is a high potential for slope erosion due to gullying and arroyo cutting. Sherds are being washed down the gully north of the main site area. Gullying occurs on either side of the boulder outcrop/wall area and below the wall. The few artifacts and possible charcoal-stained soil or midden area below the wall are threatened by continuing gully action. More serious undercutting of the river bank directly to the south may add to the site deterioration in the future. The wall appears unchanged from the FY91 to the FY93 monitoring episodes. The successive monitoring episodes evidenced continuing erosion of the midden area.

Current Evaluation

The structure, hearth, and artifacts are being impacted by surface erosion, and gullying and arroyo cutting are impacting the artifact scatter. As noted in the last monitoring episode in FY93, there is a high potential for slope erosion due to gullying and arroyo cutting. Sherds and lithic artifacts are washing down the gully north of the main site area. The cutbank south of the site is slumping as a result of river level fluctuations.

Recommendations

Annual monitoring is recommended due to the proximity of the site to the river cutbank.

AZ C:2:36

This site is an historic mining camp, including mining pits, with a small prehistoric component, a rock alignment and hearth. The site is on the right bank of the river on top of a Navajo sandstone terrace covered with river cobbles and fine sand.

Previous Evaluations

The site was monitored in FYs 91 and 93. The site is stable with only punitive natural impacts effecting the features, such as sheet washing and arroyo cutting. No changes were noted to any of the features between the FYs 91 and 93 monitoring episodes. None of the impacts appear to be related to river fluctuations or dam operations. Surface erosion is deflating the site somewhat.

Current Evaluation

Some surface erosion from a recent seasonal thunder storm has impacted the mining pits, increasing nearby gullying, arroyo cutting, and side canyon erosion. Artifacts are being displaced by surface erosion. A trail is noted across the terrace.

Recommendations

Since the site is not being impacted by fluctuations of the Colorado River, it is recommended that monitoring occur every 3-5 years.

AZ C:2:37

This is Faatz Camp, the Hot Panel, consisting of prehistoric petroglyphs and historic inscriptions situated at the base of a Navajo Sandstone cliff. The glyphs are visible directly from the River.

Previous Evaluations

The site was monitored in FY91. Most of the impacts are natural, exfoliation, erosion, and patination of the rock surfaces. Human impacts are graffiti scratches beneath the middle panel, yet they are not recent. Vandalism and natural erosion/exfoliation of the rock surfaces are long-term threats.

Current Evaluation

The prehistoric rock art and historic inscriptions are being impacted by erosion of the panel surface through exfoliation. Since FY91, new graffiti next to the historic inscription "G.M. Wright" includes the name "Tom" scratched into the panel surface.

Recommendations

Graffiti has been recently added to the rock surface. The panel is visible directly from the River, therefore, biennial monitoring is recommended.

AZ C:2:38

This site is a petroglyph panel situated at the base of a vertical Navajo sandstone cliff face where it joins a fluvial terrace. There are two possible prehistoric components at this site, late Archaic and PI-PIII Anasazi. The terrace in front of the panel probably contains buried cultural materials.

Previous Evaluations

The site was monitored in FYs 91 and 93. There is heavy visitation from guided tours that cause surface erosion to the terrace in front of the panel. Extensive trailing can be seen meandering through the tamarisks and across the terrace to the panel. The rock-lined trail that now leads to the panel has been kicked out and displaced. Graffiti includes a "Helen" inscription on the eastern portion of the panel. Additional graffiti on the western portion of the panel includes an incised circle. The panel surface itself is impacted by wind, rain, and exfoliation.

The modern dry-laid rock wall in front of the panel has been impacted by human visitation. Several of the large rocks from the top of the wall have been knocked to the ground. These impacts are not directly related to the river fluctuations or to dam operations.

Current Evaluation

This rock art site is visited by over 40,000 people per year on guided tours. The surface of the petroglyph panel is being impacted by eolian erosion. The modern rock wall fronting the panel has been impacted by human visitation. The east end of the wall, near the information sign, is undergoing continued collapse and displacement of its top course elements. Continued use of the trail to the rock art panel is causing increased erosion and down cutting of the trail surface. The trampled viewing area in front of the panel has not grown appreciably in size since the last monitoring episode in FY93.

On August 19, 1994, an Italian National on a half day raft trip reported that he had incised his name "Cianni Fausto 1994" into the panel wall to the

north of the prehistoric petroglyphs. This is an ARPA violation, and a damage assessment and cost estimate for repair are being prepared.

Recommended Remedial Actions

The site is monitored by stationary camera on a daily basis. On-site semiannual monitoring is recommended due to the extreme visitation this petroglyph panel receives, and since there are probably buried cultural components in the terrace in front of the panel. It will be monitored once in the spring before guided tours begin, and again in the fall following the tourist season. The site is also visited by an archaeologist on an irregular schedule throughout the tourist season.

As a component of the trail maintenance program at Glen Canyon NRA, the trail to the petroglyph panel is being upgraded by adding geoweb fabric to stabilize the base of the trail. This will reduce the amount of downcutting and erosion to the terrace. The rocks aligning the trail will be reestablished, and other trails that meander across the terrace to the site will be eliminated. Stabilization, involving repointing and restacking of masonry elements, will be conducted on the modern rock wall in front of the petroglyph panel. This project will be completed in spring FY95.

When cultural resources are exposed on the terrace in front of the petroglyph panel, testing to determine the nature and extent of the subsurface cultural deposits is recommended. The site is monitored semi-annually.

AZ C:2:39

This is a lithic reduction and procurement area on two large prominent terraces atop Navajo Sandstone slickrock on the right bank of the Colorado River. The terraces are littered with a variety of river cobble lithic materials.

Previous Evaluations

This site was monitored in FYs 91 and 92. There is some evidence of surface erosion and gullying. A trail leads up from the sand bar camping area directly below the terraces, but visitation appears to be light. These impacts are not related to the operation of the Dam or river fluctuations.

Current Evaluation

Surface and gully erosion are on-going, and trailing and animal burrowing are noted. Two collection piles were noted to have occurred since the last monitoring episode in FY92.

Recommendations

Biennial monitoring is suggested due to the visitor impacts. Mapping as a measure to protect the integrity of the site is recommended for the future.

AZ C:2:40

This site is located on the right bank of the Colorado River and consists of lithic artifacts, including flakes, cores, and a hammerstone, on an old alluvial terrace at the base of the Navajo Sandstone cliff face where a slight bedrock indentation creates a degree of shelter from weather.

Previous Evaluations

This site was monitored in FY91. It is impacted by minimal surface erosion, gullying, and one arroyo. There is evidence of one trail accessing the site from the beach area below. These impacts are not related to river fluctuations.

Current Evaluation

Surface erosion and gullying are displacing artifacts. No human impacts were noted.

Recommendations

The site is not being impacted by river fluctuations or dam operations, but it is being eroded. Therefore, it should be monitored biennially. Instrument mapping is also recommended in the future.

AZ C:2:41

This is located on the left bank of the Colorado River and includes a wall, a small rock art panel, and various artifacts. The arc-shaped wall is below an overhang created by large Wingate sandstone boulders. The rock art panel consists of three small "sandal" tracks ascending a patinated sandstone boulder.

Previous Evaluations

The site was monitored in FYs 91 and 92. Impacts include the gradual deterioration of the masonry feature and surface erosion. Stanton's Road passes through the lower portion of the site, used by hikers and fishermen. The site is in fairly stable condition.

Current Evaluation

The site is stable with only minor surface erosion and some trailing occurring.

Recommendations

Since the site is in stable condition, it should be monitored every 3-5 years.

AZ C:2:48

This is the Lee's Backbone wagon road, an historic trail used in the early 1870s to access the original and upper Lee's Ferry crossings. The trail is located on the left bank of the river on the Navajo Nationland at the base of the Shinarump Conglomerate slope where it joins the Chinle formation. Occasional remnants of the rock work bordering the road and wagon ruts can be discerned. One notable feature is Sentinel Rock, which contains an incised 1878 inscription recording the passing of the "First Mesa Company" under the command of Hyrum S. Phelps.

Previous Evaluations

The site was monitored in FYs 91 and 93. Site condition is considered poor, but fairly stable. There is evidence of surface erosion, gullying and arroyo cutting through the Shinarump Conglomerate. This erosion may threaten the wagon ruts. Evidence of human impact between the FYs 91 and 93 monitoring episodes includes graffiti on the east face of the 'E' boulder at the bottom of the wagon road. These natural and human impacts are not related to river fluctuations and dam operations.

Current Evaluation

No new impacts have occurred since FY93. The site is considered to be in poor, but stable, condition.

Recommendations

The site is stable and it is not being impacted by river fluctuations or dam operations. Recent graffiti has been noted, however. Therefore, biennial monitoring is suggested.

AZ C:2:50

This is a multicomponent camp consisting of two loci situated on the narrow remnant of an alluvial terrace on the right bank of the Colorado River. Locus A contains a fire-cracked rock scatter with charcoal, a cobble concentration and nearby hearth, and artifacts. Locus B contains a cist, fire-cracked rock, charcoal stains, the remains of an eroded structure, and artifacts.

Previous Evaluations

This site was monitored in FY 91. Bank cutting directly impacts the site and accelerated arroyo cutting and bank slumpage are occurring. Type I arroyos are present. Surface erosion and gullying are noted as well. A trail across the site is frequented by day hikers who access the area from the nearby Paria Riffle overlook parking area.

Current Evaluation

Surface erosion, gullying, and arroyo cutting are impacting both loci. The trail is still in use, and a small pothole was noted in Feature 7, a roaster.

Recommendations and Remedial Actions

Since the site is being impacted by fluctuating levels of the Colorado River, annual monitoring is recommended. The trail through the site should be better defined, possibly lined with rocks, to redirect foot traffic away from the features. Instrument mapping and testing of subsurface cultural deposits are recommended for the future.

AZ C:2:53

This site is located on the right bank of the Colorado River and consists of a ceramic and lithic artifact scatter in a flat, fairly denuded area that used to be a plowed field. The site is near the Weaver Ranch House at Lonely Dell Ranch.

Previous Evaluations

The site was monitored in FYs 91 and 92. It is located on the flood plain of the Paria River and could be impacted by high water floods. It is also below the 300,000 cfs level. Farming and ranching activities at Lonely Dell Ranch have impacted the site historically, and artifact collecting by tourists visiting the ranch has probably occurred.

Current Evaluation

The site is not being impacted by river fluctuations or dam operations, but surface erosion is displacing the artifacts. The site is located in a plowed field and has been heavily disturbed over the years.

Recommendations

The site is not being impacted by river fluctuations or dam operations. It is visited by tourists who come to see Lonely Dell Ranch. Therefore, biennial monitoring is recommended. Testing to establish the presence of buried cultural deposits in this alluvial terrace is suggested.

AZ C:2:56

This site is located on the right bank of the Colorado River and consists of two petroglyphs on the southwest face of a large boulder. The boulder is at the bottom of the Chinle talus slope north of the Lee's Ferry launch ramp.

Previous Evaluations

The site was monitored in FY91. It is not being impacted by fluctuating river flows or operation of the dam. Weathering of the panel elements is a long term threat.

Current Evaluation

The petroglyph is in good, stable condition. No human impacts are noted.

Recommendations

The site should be monitored on a 3-5 year cycle.

AZ C:2:57

This is an historic site consisting of six distinguishable structures and associated trash. It is located on the left bank of the river on the Navajo Nationland where the fluvial terrace contacts Moenkopi sandstone bedrock exposures.

Previous Evaluations

This site was monitored in FYs 91, 92, and 93. There is extensive surface erosion, gullying, minor arroyo cutting, and trailing. Several gullies continue to run directly into Features 1 and 2, and a fairly active arroyo drains directly northwest of Feature 5. Also, artifacts are being washed away from the site by arroyo/gully runoff and surface erosion. None of these impacts are related to river fluctuations or dam operations.

Current Evaluation

In general, surface erosion, gullying, arroyo cutting, and trailing are impacting the structures. Since the last monitoring episode in FY93, Feature 1 exhibits collapse of its wooden wall elements on its south side. Feature 2 exhibits loss of a piece of milled wood from the south wall. Feature 3 exhibits erosion of its basal elements on the inside fence near the lambing? pen, undercutting the foundation. There is no change to Features 4, 5 and 7. On the south end of the exterior east wall of Feature 6, a sandstone slab is broken in two.

Recommended Remedial Actions

The site is not being impacted by river fluctuations or dam operations. Biennial monitoring is recommended to record continuing non-river-related erosion. Feature 1 and the main habitation structure, Feature 2, should be stabilized soon, and all the structures should be mapped in detail. Surface collection of historic diagnostic items is also suggested.

AZ C:2:58

This site consists of four loci, three on the left bank on the Navajo Nationland and the fourth on the right bank. Resources include historic inscriptions, ephemeral masonry rooms, and cement cable anchors for the Bureau of Reclamation cableway on both sides of the river. The loci are located on narrow alluvial terraces and colluvial slopes above the river. Locus A, LB: Reclamation Cableway Features and Inscriptions. Locus B, LB: Masonry Rooms. Locus C, LB: Concrete Slab w/Trash. Locus D, RB: portion of the Cableway.

Previous Evaluations

The site was monitored in FYs 91 and 93. Impacts include surface erosion, gullying, and arroyo cutting. Between FYs 91 and 93, however, no changes were noted. Human impacts are limited to trails on both sides of the river. None of these impacts are related to river fluctuations or dam operations.

Current Evaluation

No changes are noted at any of the loci, although the ground surfaces the features lie upon are impacted by surface erosion, gullying, arroyo cutting, and side canyon erosion. The surfaces of the inscription panels are being eroded by eolian forces.

Recommendations

The erosional impacts are not related to river fluctuations or dam operations. Biennial monitoring is recommended to record non-river-related erosion.

AZ C:2:59

This site is the Lee's Ferry gauging station on the Navajo Nationland across from Lee's Ferry. The concrete tower structure is on colluvial deposits on the edge of the river. The bottom of the gauging station is ca. 0.5 m under water.

Previous Evaluations

The site was monitored in FYs 91 and 93. It is in excellent condition and is eminently stable. Though the gauging station rests directly on the Colorado River, it is not threatened by the river fluctuations or dam operations. No natural or human impacts are evident.

Current Evaluation

This site is eminently stable. Though the gauging station rests directly on the Colorado River, it does not seem threatened by any impacts.

Recommendations

Monitoring at the concrete gauging station should be discontinued.

AZ C:2:60, Feature 1

Feature 1 is an historic forge and inscriptions on a Pleistocene terrace along the Stanton Road on the left bank of the river. The feature is located on the Navajo Nationland.

Previous Evaluations

The feature was monitored in FYs 91 and 93. The site is considered stable with only slight wind deflation occurring. Minor exfoliation of the bedrock ledges may impact the feature in the future. A trail is located just below the feature, but it is not directly impacting the feature. There are fire scars and rearrangement of rocks, suggestive of camping, but no new graffiti, human foot prints, or other evidence of recent visitation is noted. The inscription panel is visible from the trail below.

Current Evaluation

The surface of the inscription panel is eroded by wind, and some modern graffiti has impacted the historic graffiti. Some deposition has occurred inside the forge.

Recommendations

The feature is not being impacted by river fluctuations or dam operations. Biennial monitoring is recommended to record non-river-related impacts.

AZ C:2:60, Feature 2

Feature 2 is a remnant masonry structure on the edge of a narrow alluvial terrace along the Stanton Road. The feature is on the left bank of the river on the Navajo Nationland.

Previous Evaluations

The site was feature in FYs 91 and 93. Active erosion is occurring. Pre-dam floods have cut the river bank precariously close to the structure, and fluctuating water levels may cause further bank slumpage. Surface erosion, wind deflation, and trailing also occur. There were fewer human impacts observed in FY93 than there were in FY91.

Current Evaluation

Surface erosion and trailing are noted impacts, and the river bank is precariously close to the structure. Continued bank slumpage will impact the site.

Recommendations and Remedial Actions

The structure is near an eroding cutbank of the Colorado River. Therefore, it should be monitored annually. Additionally, the structure should be stabilized.

AZ C:2:60, Feature 4

Feature 4 is a stock gate located along the Stanton Road on the left bank of the river on the Navajo Nationland. The feature is on the road along a steep slope below sandstone bedrock and above the alluvial terrace.

Previous Evaluations

The feature was monitored in FYs 91 and 93. In FY91, the gate did not appear disturbed, except for some minor surface erosion, and it would probably still function with a little rebuilding. The Stanton Road passes through the gate. If undercutting continues to the base of the north wall segment, it could fall off the retaining wall. In FY93, the site was considered stable. Minor surface erosion was present eastward along the road following the bedrock bench. The stock gate is perpendicular to the road and the bench, so surface erosion may cause buildup of sediment on the upslope, or west, side of the feature. Since the last monitoring episode in FY91, the top course rock elements on the river side of the gate have been rearranged. Wooden timbers of the gate have also been moved. Some surface erosion and trailing through the gate feature are noted impacts, which are not related to river fluctuations or dam operations.

Current Evaluation

The stock gate is in fairly stable condition with minor impacts from surface erosion and trailing noted.

Recommendations and Remedial Actions

A 3-5 year monitoring schedule is suggested. The north and south masonry wall segments of the gate should be stabilized.

AZ C:2:60, Feature 6

Feature 6 is the remains of two structures along the Stanton Road on the left bank of the river on the Navajo Nationland. The remains are located on the second terrace above the river, which is covered with sandstone boulder debris from the adjacent wash. Sandy deposits are also present. The first

structure remnant includes an east wall wood log foundation. This is joined at its north end by a north wall rock foundation. Two displaced timbers are located on the inside of the L-shaped structure remnant. To the north is a scatter of large round logs with notched ends, suggestive of another structure, possibly a collapsed hogan.

Previous Evaluations

This feature was monitored in FYs 91 and 93. Although the feature is in poor condition, it is stable. Trailing is the most noted impact, which is not related to river fluctuations or dam operations.

Current Evaluation

The wooden elements of the wood/masonry structure have shifted due to trailing. The logs of the hogan have not moved, and there is an increase in sediment around them.

Recommendations

Since the feature is stable, a 3-5 year monitoring schedule is recommended.

AZ C:2:60, Feature 7

Feature 7 is a series of corrals and stock pens along the Stanton Road. The feature is located on a Pleistocene terrace on the left bank of the river on the Navajo Nationland.

Previous Evaluations

This feature was monitored in FYs 91 and 93. The structures are stable. Some incipient erosion, surface erosion and trailing are noted. There appears to be no increase in the impacts from FY91 to FY93. These impacts are not related to river fluctuations or to dam operations.

Current Evaluation

These large stoned alignments are extremely stable.

Recommendations

The site is a good candidate for instrument mapping. A 3-5 year monitoring schedule is recommended.

AZ C:2:60, Feature 8

Feature 8 is an historic petroglyph located on a steep Pleistocene terrace on the left bank of the river on the Navajo Nationland.

Previous Evaluations

This feature was monitored in FYs 91 and 93. The rock art element is in stable condition with no natural or human impacts evident, except for some slight surface erosion of the stone. The glyph can be seen from a nearby trail.

Current Evaluation

Other than some surface erosion to the panel, it is not impacted by natural or human agents.

Recommendations

The panel is not being impacted by river fluctuations or dam operations. A biennial monitoring schedule is recommended due to the proximity of the panel to the trail.

AZ C:2:70

This site is on the right bank of the Colorado River and consists of a small Kaibab limestone rockshelter with a light scatter of lithics and sherds on the talus slope below. The site is above River Drive.

Previous Evaluations

The site was monitored in FY91. Impacts include pack rat activity in the shelter. Artifacts are eroding down the talus slope. The impacts are not related to river fluctuations or dam operations.

Current Evaluation

Surface erosion and trailing are displacing the artifacts.

Recommendations

A biennial monitoring schedule is recommended to record non-river-related erosional patterns.

AZ C:2:71

This site consists of an artifact scatter and petroglyph. It is located on an alluvial terrace on the left side of the river.

Previous Evaluations

The site was monitored in FYs 91 and 93. The FY91 monitoring results suggest that overall, the site has been heavily impacted. Locus A is impacted by humans collecting, piling, and stashing artifacts. A pot hole was dug at the base of a large boulder. Surface erosion is also evident. At Locus B,

the anthropomorphic petroglyph panel surface is highly eroded from wind and rain. Small spalls have broken away from the cliff face on and around the figure. In FY93, the previously noted collection pile was gone. Recent trash includes one aluminum can and one plastic fork. These impacts are not related to river fluctuations or dam operations.

Current Evaluation

Surface erosion is displacing the artifacts, and the surface of the rock art panel is eroding from eolian forces. A previously unnoted can is present, however, given its rusty condition and the fact that it is partially buried suggests it is not recent.

Recommendations

A biennial monitoring schedule is recommended to record ongoing non-river-related impacts.

AZ C:2:72

This site is a prehistoric artifact scatter with associated buried hearth features. It is located on the left bank on the Navajo Nationland on a Pleistocene alluvial terrace.

Previous Evaluations

The site was monitored in FYs 91, 92, and 93. Surface erosion, gullying, arroyo cutting, and bank slumpage are all ongoing impacts. Trailing is also noted. The headward migration of arroyos is extremely active on and around the site. The main arroyo at the east-northeast site boundary drains to the Colorado River. The site is being impacted by fluctuating river flows. The majority of the site is highly eroded. There are no human impacts.

Current Evaluation

The buried hearth near the arroyo has collapsed; it is not present. Surface erosion, gullying, arroyo cutting, bank slumpage, and side canyon erosion have all increased since the last monitoring episode in FY93. These same agents are displacing the artifact scatter. A visitor trail has also impacted one of the hearths.

Recommendations and Remedial Actions

Due to the active erosion, it is recommended that monitoring continue annually. Monitoring efforts should concentrate on the migration of side arroyos that drain into the main arroyo noted above. Recommended remedial actions to reduce site impacts include planting vegetation and the installation of check dams. Mapping as a form of data recovery is suggested for the near future.

AZ C:2:73

This is a single prehistoric petroglyph and an historic inscription situated at the base of a Navajo sandstone cliff on the left bank of the river.

Previous Evaluations

This site was monitored in FYs 19 and 93. The rock art elements are stable. The ground surface below the panel exhibits surface erosion, gullying, and trampling. These are not the result of river fluctuation or dam operations. No human impacts are noted. No features or artifacts were noted on the heavily vegetated terrace surface; it is unknown if artifacts are buried. The rock art is well hidden from view.

Current Evaluation

The surface of the rock art panel is being eroded by eolian forces and by water run-off down the cliff. Gullying is present on the ground surface below the panel.

Recommendations

The panel is fairly stable, its surface being eroded somewhat. A 3-5 year monitoring schedule is recommended.

AZ C:2:74

This site is an alcove shelter containing six flakes and a fragmented mano. Other remains are probably still buried. It is located on an upper stream terrace at the base of a Navajo sandstone cliff.

Previous Evaluations

The site was monitored in FYs 91 and 92. It is being impacted by surface erosion, gullying, and animal burrowing.

Current Evaluation

Surface erosion and gullying are displacing the artifacts. These impacts are not related to fluctuating river flows or dam operations. The mano fragment was relocated. None of the flakes noted as being previously present were observed. However, an increase in vegetation may be obscuring the artifacts.

Recommendations

The site should be monitored on a biennial schedule to record continuing non-river-related impacts.

AZ C:2:75

This is a prehistoric camp and artifact scatter located on the alluvial terrace at the base of the Navajo sandstone cliff on the left bank of the river.

Previous Evaluations

The site was monitored in FYs 91, 92, and 93. The site is actively eroding. Surface erosion, bank slumpage, dune migration, gullying, and arroyo cutting are noted impacts. Since the FY91 monitoring episode, additional undermining and surface erosion has occurred below Locus B. These impacts are directly related to river fluctuations and dam operations. A deep arroyo continues to cause heavy impact with major undercutting of the terrace bank, which has caused the loss of most of the site. Slickrock runoff from the side canyons is impacting the site as well. There are no human impacts.

Current Evaluation

The artifacts in Locus B are being displaced by surface erosion, gullying, arroyo cutting, bank slumpage, and side canyon erosion. New evidence of bank slumpage is present in Locus B, increasing the size of the arroyo. A trail from the Ferry Swale camp site climbs through Locus A.

Recommendations

The site should be monitored annually. Recommended data collection measures include mapping, surface collection of the entire site, and testing for subsurface deposits.

AZ C:2:76

This is a single slab-lined hearth with an associated artifact scatter located on the left bank of the river on the Navajo Nationland. The site is located on top of a sandy alluvial terrace near the base of Navajo sandstone cliffs.

Previous Evaluations

The site was monitored in FYs 91 and 93. The hearth is intact with vegetation growing from its center. Surface erosion and gullying are noted nearby. A small gully 6 m to the northeast of the site runs north to the drainage down Waterholes Canyon, thence to the Colorado River. Extreme fluctuations in flows may result in impacts from arroyo cutting and bank slumpage. The FY91 monitoring episode noted modern campsite remains and trash." These impacts were not observed in FY93. A trail is also nearby.

Current Evaluation

The hearth is filling with sediment from recent rain storms. Eventually, the nearby gully will erode headward to the hearth.

Recommendations

Consultation with the Navajo Nation Historic Preservation Department resulted in a biennial monitoring schedule initially and then every 3-5 years. The trail should be obliterated. Recent rain storms have created a gully that will eventually erode headward to the hearth. The installation of a check dam to fill the gully would help to reduce the potential of this impact.

AZ C:2:77

This prehistoric artifact scatter on the left bank of the river is spread over the first alluvial terrace and is eroding from the cutbank of the second alluvial terrace.

Previous Evaluations

The site was monitored in FYs 91 and 93. In FY91, gullying was noted along the terrace edge, and one arroyo was present 50 m south of the site. The terrace slope was eroding from sheetwashing and human foot traffic. No trails were present, just random foot prints. Gullying from heavy runoff could cause the terrace margin to retreat. The FY93 monitoring results showed similar minor impacts caused by surface erosion, gullying, wind deflation, and bank slumpage. There was also recent camper trash. The impacts are not related to river fluctuations and dam operations.

Current Evaluation

Surface erosion, gullying, and bank slumpage are displacing artifacts.

Recommendations

The site should be monitored biennially to record non-river-related impacts. Total station mapping and testing for subsurface cultural deposits are also recommended.

AZ C:2:78

This site, on the right bank of the Colorado River, is beneath a small Navajo sandstone rockshelter at the head of a major arroyo that cuts through the uppermost river terrace. Lithic artifacts are eroding out of the floor and down a loose soil slope below the shelter.

Previous Evaluations

The site was monitored in FY 91. The site is not currently being impacted by the Colorado River, but the arroyo through the terrace is cutting headward 4 m west of the site.

Current Evaluation

Surface erosion, arroyo cutting, and side canyon erosion are displacing the artifacts. All artifacts plotted on the original site map were relocated, however.

Recommendations

The site should be monitored annually. Instrument mapping and testing for subsurface deposits is also recommended.

AZ C:2:79

This site is located on the left bank of the Colorado River in and around a rockshelter on a talus ridge at the contact with a Navajo sandstone cliff face. Ceramic and lithic artifacts and a masonry wall segment are present and suggest an early-mid PII Anasazi affiliation.

Previous Evaluations

The site was monitored in FY 91. Natural impacts include surface erosion and gullying next to the cliff face. An arroyo is present near the site.

Current Evaluation

The wall is being impacted by surface erosion, gullying, and vegetation. The artifacts are being displaced by surface erosion, gullying, and arroyo cutting. The arroyo is a Type I stream, draining to the Colorado River. Impacts are related to river fluctuations and dam operations.

Recommendations

The site should be monitored annually.

AZ C:2:80

This site is on the right bank of the Colorado River and consists of a lithic scatter at the base of the Navajo sandstone slickrock on a terrace. The artifacts occupy a 40 x 30 m area, having been dispersed by runoff from the slickrock.

Previous Evaluations

The site was monitored in FYs 91 and 92. The site is impacted by surface erosion, gullying, and there are two small arroyos on each side of the site. There are no human impacts.

Current Evaluation

The artifacts are being displaced by surface erosion, gullying, and arroyo cutting, however, all artifacts plotted on the site map were relocated. The impacts are not the result of fluctuating river flows or dam operations.

Recommendations

The site should be monitored biennially. Mapping as a form of data recovery is also recommended.

AZ C:2:81

This is a prehistoric artifact scatter buried in the uppermost alluvial terrace on the left bank of the river. Artifacts are exposed along the visitor trail to AZ C:2:38.

Previous Evaluations

The site was monitored in FYs 91 and 93. Natural impacts include surface erosion and wind deflation. Visitor impacts have cut the trail deeply, increasingly exposing the site. The trail leads to AZ C:2:38, a large petroglyph panel just downstream. In FY 91, the trail ranged from 10-50 cm deep. In FY 93, the trail was 70 cm deep in some places. Since the monitoring episode in FY91, maintenance crews lined the trail with a rock boundary to help direct visitor traffic to the petroglyph site. None of the impacts appear to be related to river fluctuations or dam operations. This site is impacted by foot traffic from 40,000 visitors per year. Continued exposure of artifacts and buried components is likely.

Current Evaluation

The trail has increased in width and depth since the site was monitored in FY93. In addition, other trails funneling into the main trail have been established. A recent rain storm has aggravated the erosion problem along the trail, downcutting it as much as 50 more cm. Maximum depth of the trail cut is now over 1 m in some places. Continuing use of the trail is exposing more of the site. More artifacts are noted on the surface, but so far, the are no buried cultural materials noted in the trail cuts.

Recommendations and Remedial Actions

As part of the trail maintenance program at Glen Canyon NRA, the trail through AZ C:2:81 to the petroglyph panel is being repaired and upgraded by adding geoweb fabric to stabilize the base of the trail. This will reduce the amount of downcutting and erosion to the terrace and through the site. The rocks aligning the trail will be reestablished, and other trails that meander across the terrace to the site will be eliminated. This project will be completed in spring FY95.

As an element of Section 106 Compliance for the trail maintenance program, Site AZ C:2:81 was tested to determine the nature and extent of any buried deposits (Burchett in preparation). No subsurface artifacts were recovered. As a part of the testing program, surface artifacts were mapped and collected, however. Another element of Compliance will include monitoring of the trail rehabilitation activities by an archaeologist.

Due to the amount of visitation, the site should be monitored semi-annually.

AZ C:2:82

This prehistoric rock shelter with associated masonry wall and artifact scatter is located in a small overhang of Navajo sandstone adjacent to the first alluvial terrace above the river. The site is on the left bank of the river on the Navajo Nationland.

Previous Evaluations

The site was monitored in FYs 91, 92, and 93. Impacts include surface erosion, gullying, arroyo cutting, bank slumpage, and trailing. The deepening and widening of arroyos from side canyon flooding is a possible threat. The trailing appears to have dwindled since FY92. These impacts are not related to river fluctuations or dam operations.

Current Evaluation

The wall and artifacts are being impacted somewhat by surface erosion.

Recommendations

The site should be monitored biennially to record non-river-related impacts. Testing is also recommended.

AZ C:2:83

This is a prehistoric artifact scatter with associated hearth located on the left bank of the river on the Navajo Nationland. The remains are on a talus slope at the base of the Shinarump Conglomerate above the fluvial terrace.

Previous Evaluations

The site was monitored in FYs 91 and 93. This area has seen much activity in the last century, including construction associated with Lee's Ferry, the dugway road, and a gauging station. Hikers trail through the site as well. Surface erosion is extensive, and a cutbank is on the eastern side of the site. The exposed surface hearth will continue to erode. A Type I arroyo is below and northwest of the artifact scatter. Headward migration of the arroyo will eventually cut into the scatter. The presence of the arroyo

is related to river fluctuations, but surface erosion will displace the surface expression of the site prior to that. Continued use of the trail to the USGS gauging station is noted. The hearth has been extensively impacted by trampling. It is a light charcoal stained lens of sand. Three small flecks, but no chunks, of charcoal were noted.

Current Evaluation

There has been an increase in the surface erosion impacts to the hearth and artifacts since the last monitoring episode in FY93. The thin veneer of fine well-sorted sands that was capping the hearth stain has eroded away to expose a deposit of coarse gravelly sands, and gullying has begun eroding downslope through the cultural deposit. The charcoal staining is still present but is eroding downslope. These most recent impacts are due to late summer rains in the area. Evidence of the trail passing through the site to the U.S.G.S. Gauging Station has eroded away.

Recommendations

Active surface erosion is creating gullies, which drain into the arroyo. The arroyo has been caused by fluctuating river levels. Annual monitoring is recommended.

AZ C:2:84

This prehistoric site consists of a shallow overhang with a collapsed wall, a midden, and artifact scatter located at the base of a Navajo sandstone cliff face above an alluvial terrace. The site is on the right bank of the river.

Previous Evaluations

The site was monitored in FYs 91 and 93. The site is actively eroding; gullying, wind deflation, and surface erosion are the primary impacts. Surface erosion is impacting the midden, and one gully and one arroyo are developing. Human visitation is evident from trailing and recent trash. In FY 91, one small collector's pile of lithic artifacts was noted. The collector's pile was also noted in FY 93. A distinct trail recorded during the FY91 monitoring episode was not present during this monitoring episode. These impacts are not related to river fluctuations or dam operations.

Current Evaluation

The wall is being impacted slightly by surface erosion, and the artifacts are being displaced slightly by surface erosion and gullying. One collector's pile is noted, and there is no change to it since the last monitoring episode in FY93.

Recommendations

The site should be monitored biennially. It is also a candidate for

instrument mapping.

AZ C:2:86

This prehistoric site consists of a cist, a masonry wall, and artifact scatters located on the left bank of the river on the Navajo Nationland at the mouth of Fall Canyon. The remains are on a sandy alluvial terrace next to an arroyo and under an outcropping bedrock ledge.

Previous Evaluations

The site was monitored in FYs 91 and 93. Surface erosion is the most predominant impact, the features and artifacts are exposed from downslope sheetwashing. Trailing through the site is also displacing artifacts and causing erosion. These impacts do not appear to be related to river fluctuations or dam operations. Bank slumpage from side canyon flooding is a definite threat, and the deepening and widening of a Type I arroyo from side canyon flooding was occurring, but was not yet impacting the site.

Current Evaluation

Feature 1 (cist), Feature 2 (wall), and Feature 3 (fire-cracked rock scatter) all are being impacted by trailing, and Feature 3 is being impacted by increased surface erosion. These impacts are not related to river fluctuations or dam operations.

Recommendations and Remedial Actions

The site should be monitored biennially. The trails should be obliterated, and testing to determine the nature and depth of buried cultural deposits is recommended.

AZ C:2:87

This site consists of historic and modern artifacts and the remains of a tower located on the alluvial terrace on the left bank of the river on the Navajo Nationland.

Previous Evaluations

This site was monitored in FYs 91 and 93. Surface erosion is impacting the northeast end of the site, and one arroyo is cutting the southwest side. These impacts do not appear to be related to river fluctuations or dam operations. No human impacts are noted.

Current Evaluation

The artifacts are being displaced slightly by surface erosion, gullying, and arroyo cutting.

Recommendations

The site should be monitored biennially to record non-river-related impacts. It is a candidate to instrument mapping.

AZ C:2:88

This site is located on the right bank of the Colorado River within an overhang shelter at the contact between a Navajo sandstone cliff face and a talus slope. The shelter contains a grinding slab enclosed by two expedient parallel walls extending from the back of the overhang. A single sherd below the shelter suggests a possible PII Anasazi affiliation.

Previous Evaluations

The site was monitored in FY 91. Natural impacts include surface erosion and gullying caused by runoff from a dripline at the top of the overhang. Recent trash is present, and a trail ascends the talus slope to the site. Recent graffiti was scratched into the wall above the site.

Current Evaluation

A 3 m deep Type I arroyo is located 3 m west of the shelter, and surface erosion is causing minor displacement of artifacts and is beginning to undermine the wall. One stone wall element has been moved from below the wall to the back of the wall. Visitor trampling of vegetation has occurred in the rock shelter, although no foot prints were present.

Recommendations

The site should be monitored annually to record enlargement of the encroaching arroyo. The site is a candidate for instrument mapping.

AZ C:2:90

The site consists of a group of massive sandstone boulders under which were built prehistoric dry-laid structures, a few petroglyphs, and a ceramic artifact scatter. The remains are located at the base of the Chinle Formation overlooking a narrow alluvial terrace on the left bank of the river on the Navajo Nationland.

Previous Evaluations

The site was monitored in FYs 91 and 93. It is poorly preserved and exhibits spalling of the petroglyph panel surface, surface erosion, gullying, trailing, and modern camping evidence including fire scars and recent trash. The Stanton Road is nearby. These impacts do not appear to be related to river fluctuations or dam operations. Exposure and destabilization of the features by visitation is a definite threat.

Current Evaluation

Surface erosion and gullying are causing minor impacts, undermining the structure and displacing artifacts. The surface of the rock art panel is being eroded by wind and water. A visitor trail and evidence of camping are present as well.

Recommendations

Biennial monitoring to record non-river-related impacts is recommended. The trail should be obliterated.

AZ C:2:91

This prehistoric site consists of two loci with charcoal lenses and an associated artifact scatter on top of an alluvial terrace on the left bank of the river on the Navajo Nationland.

Previous Evaluations

The site was monitored in FYs 91 and 93. Natural impacts are extensive and include arroyo cutting, gullying, surface erosion, wind deflation, and bank slumpage. A 6 m deep Type I arroyo bisects the site and is eroding through the charcoal lenses. An ephemeral game-foot trail is present, little use is noted. Bank slumpage and deepening and widening of the arroyo is actively occurring at this time. This is causing exposure and destabilization of the charcoal lenses and artifacts.

Current Evaluation

Surface erosion, gullying, arroyo cutting, bank slumpage, and side canyon erosion are all increasing in severity. Recent seasonal rains have caused a debris flow that has scoured the Type I arroyo, removing all vegetation and causing collapse of the arroyo walls. In addition, gullying on top of the terrace into the arroyo has increased.

Recommendations

The site should be monitored annually. The trail should be obliterated.

AZ C:2:95

This prehistoric site consists of a small rockshelter at the base of a low Shinarump Conglomerate cliff with an associated artifact scatter eroding down an ephemeral drainage below the shelter. The site is on the right bank of the river.

Previous Evaluations

The site was monitored in FYs 91, 92, and 93. Natural impacts include gullying, animal burrowing, wind deflation, and surface erosion. Human impacts include two nearby trails and the rearrangement of rocks. There appear to be no impact changes since FY 91. These impacts are not related to river fluctuations or dam operations. The site is visible from the launch ramp road.

Current Evaluation

Minor impacts to the artifact scatter include surface erosion and gullying.

Recommendations

The site should be monitored biennially to record non-river-related impacts.

AZ C:2:99

This site has both prehistoric and historic components, artifact scatters and a rock alignment, located on a sandy dune above a flood plain. The remains are on the left bank of the river on the Navajo Nationland.

Previous Evaluations

The site was monitored in FYs 91 and 93. Natural impacts include surface erosion, wind deflation, and gullying. Eolian deflation is a major impact. Artifacts are exposed and buried quickly. A gully passes by the rock alignment, but is not directly impacting it. A distinct trail passes nearby. Since the first monitoring episode in FY91, one rock near a metate is newly exposed due to eolian deflation.

Current Evaluation

Surface erosion has increased, undermining the retaining wall and displacing artifacts. The trail noted during the last monitoring episode in FY93 has been filled in by eolian deposition. Gullying is still noted, but has not increased in severity. Out of four black-on-red sherds noted during recording, one was noted during this monitoring episode. The impacts do not appear to be related to river fluctuations.

Recommendations and Remedial Actions

A biennial monitoring schedule is recommended to record non-river-related impacts. The installation of check dams would reduce the amount of surface erosion and gullying. The site should be mapped and tested.

AZ C:2:100

This is a prehistoric site consisting of buried charcoal features and artifact scatters located on an alluvial terrace. The remains are on the left side of the river on the Navajo Nationland.

Previous Evaluations

This site was monitored in FYs 91, 92, and 93. The site is actively eroding from side draining Type I arroyos. Natural impacts include arroyo cutting, gullying, surface erosion, wind deflation, and bank slumpage. These impacts are related to river fluctuations and dam operations, based on headward migration of arroyos due to the lowering of the base level. A gear and a bicycle frame have been plotted on a revised site map. Artifacts are expected to move downslope. Trampling and trailing through the site also occurs.

Current Evaluation

There is no change noted to Feature 1, the charcoal lens in the cutbank. The bicycle frame has collapsed. Feature 2, a set of sandstone slabs, is more dispersed since the last monitoring episode in FY93. The cutbank near the gear has receded 12 cm since FY93. Bank slumpage has therefore increased.

Recommendations and Remedial Actions

The site is being monitored by stationary camera, and on-site monitoring is recommended annually. The installation of check dams and planting vegetation could help to reduce the erosion. Mapping as a form of data recovery is recommended.

AZ C:2:102

The site is on the right bank of the Colorado River on a vertical cliff face and consists of an historic inscription: "I.C. Spencer 1925".

Previous Evaluations

The site was monitored in FY 91. The panel is stable.

Current Evaluation

The surface of the inscription panel is undergoing some wind and water erosion. Otherwise, the panel is stable.

Recommendations

The panel should be monitored on a 3-5 year basis. It is not being impacted by river fluctuations or dam operations. There are no visitor impacts.

AZ C:2:103

This site is on the left bank of the Colorado River and consists of two historic inscriptions solid and stipple-pecked into the Navajo sandstone cliff face.

Previous Evaluations

The site was monitored in FY 91. The dune below the inscription has one major gully. Wind and water erosion are apparent. The panel itself is not impacted by graffiti, but some erosion to the panel surface has occurred.

Current Evaluation

The surface of the inscription panel is undergoing some wind and water erosion. The panel itself is stable and is well hidden from view.

Recommendations

The panel should be monitored every 3-5 years.

AZ C:2:104

The site is on the right bank of the Colorado River and consists of a sandstone boulder with three pecked petroglyphs: a circle or zero, a circle with a tangent line, and an anthropormorph. The site is on a sandstone boulder on a large alluvial terrace directly behind the rest rooms at the Lee's Ferry launch ramp. The boulder is visible from the rest rooms.

Previous Evaluations

The site was monitored in FY 91. The boulder itself is in good condition, as are the petroglyphs. A gully a adjacent the boulder, and there is a major wash a few meters east. There are no human impacts.

Current Evaluation

The surface of the petroglyph panel is undergoing some wind and water erosion, but it is in stable condition.

Recommendations

The site should be monitored biennially for non-river-related impacts due to its proximity to the Lee's Ferry launch ramp.

AZ C:2:105

This site is on the left bank of the Colorado River on the Navajo Nationland. It is a large Navajo sandstone alcove that contains the "1889 Hislop" historic inscription. The alcove is visible from the river.

Previous Evaluations

The site was monitored in FY 91. The main impacts are from visitors and roof spalling. Visitors have made several hearths on the east side of the alcove. A pot hole was noted in the floor fill. The back east wall has numerous recent scratched and charcoal names, many of which are superimposed. Several modern wall segments and rock piles are noted, presumably from the occupation of the cave in the 1960s by a hippie.

Current Evaluation

There are no natural impacts to the historic inscription. There is no graffiti on the inscription rock, but there is considerable graffiti on the cave walls and on other nearby boulders. Since FY91, graffiti includes "Nick 92"; "Sena 92";, and "MMS 93 9E". Charcoal from a recent hearth is noted on the cave floor. These impacts are not related to river fluctuations or dam operations.

Recommendations

The site should be monitored biennially to record non-river-related impacts.

AZ C:2:106

This prehistoric site consists of a roasting feature and associated artifact scatter located near the base of a dune on an alluvial terrace. Colluvial debris from a nearby Navajo sandstone cliff is also present. The site is on the left bank of the river on the Navajo Nationland.

Previous Evaluations

The site was monitored in FYs 91, 92, and 93. Surface erosion and trailing are noted impacts. These impacts do not appear to be related to river fluctuations or dam operations.

Current Evaluation

Minor surface erosion is noted for the roaster and artifacts.

Recommendations and Remedial Actions

The site should be monitored on a biennial basis to record non-river-related impacts. The trail should be obliterated, and testing of the terrace for buried deposits is recommended.

AZ C:2:108

This site is on the left bank of the Colorado River on the Navajo Nationland. It consists of a large sandstone boulder located on a dune-

covered talus slope with several stipple-pecked petroglyph elements on its south face. The boulder is visible from a trail below.

Previous Evaluations

The site was monitored in FY 91. The figures have faded from the erosion of the panel, are repatinated, and are somewhat difficult to define. The panel face itself is in good condition, there is no spalling or major freeze/thaw cracking. The surrounding sand slope is impacted by surface erosion, gullying, arroyo cutting, and trampling. There are no human impacts. These impacts are not related to river fluctuations or dam operations.

Current Evaluation

The surface of the petroglyph panel is undergoing some wind and water erosion.

Recommendations

The site should be monitored biennially for non-river-related impacts.

AZ C:3:3

This is the trail built during the time of the construction of Glen Canyon Dam as part of the development plan for a proposed marina below the dam site. The route is on the right bank of the river.

Previous Evaluations

The trail was monitored in FYs 91 and 93. Natural impacts include surface erosion, gullying, and arroyo cutting. The top of the stairway has been eroded by alluvial forces and talus slope wash. Culverts are exposed in several places. Stone elements of the trail retaining walls have been misplaced. A rockslide has taken out a portion of the trail. Little or no change is noted on the photographic records between FYs 91 and 93. These impacts are not related to river fluctuations or operations of the dam. There are no human impacts.

Current Evaluation

Surface erosion, gullying, and arroyo cutting are impacting the culverts and retaining walls of the trail. The culvert at the top of the stairs exhibits more eolian deposition than noted during the FY93 monitoring episode.

Recommendations and Remedial Actions

The impacts are not related to river fluctuations or dam operations. A biennial monitoring schedule is recommended to record non-river-related impacts. The retaining walls should be stabilized as needed.

AZ C:3:4

This site is on the right bank of the Colorado River and consists of a petroglyph panel 10 m long and 1 m high at the base of a Navajo sandstone cliff on top of a talus slope. Fifteen figures are Glen Canyon Style 5 elements.

Previous Evaluations

The site was monitored in FY 91. Natural impacts include erosion of the panel surface. The sediment directly below the panel is slowly eroding downslope.

Current Evaluation

Ongoing wind and water impacts are occurring to the surface of the rock art panel. Natural impacts also include spalling of the panel surface. These impacts are not related to river fluctuations or dam operations. There are no human impacts.

Recommendations

The site is visible from the river. A biennial monitoring schedule is recommended to record non-river-related impacts. The rock art elements should also be sketched.

AZ C:3:6

This site is located on the right bank of the Colorado River and consists of a large, southeast-facing sandstone cliff face with 23 petroglyph elements and three historic inscriptions. It is known as the Bullet Hole Panel.

Previous Evaluations

The site was monitored in FY 91. Natural impacts include surface erosion to the panel from wind and rain, spalling, and exfoliation. The panel has been shot at, it has been abraded by scratches and graffiti. A campsite is nearby.

Current Evaluation

The surface of the panel has been impacted by wind and water. Continued vandalism of the petroglyph panel is noted with incising and eradication of historic signatures. It appears that most vandalism occurred prior to FY91. Only mihor incised scratches have been placed since then. Camping trash noted includes toilet paper and aluminum cans. These impacts are not related to river fluctuations or dam operations.

Recommendations

The site should be monitored on a biennial schedule to record non-river-related impacts.

AZ C:3:10

This prehistoric site includes a hearth with charcoal staining and an associated artifact scatter. It is located on top of a dune remnant that caps an alluvial terrace on the left side of the river.

Previous Evaluations

The site was monitored in FYs 91, 92, and 93. Surface erosion, gullying, and arroyo cutting are impacting the entire site, and runoff is impacting the hearth. Artifacts southwest of the site are eroding down the terrace slope. These impacts are related to river fluctuations, i.e., direct inundation of the site has occurred, but the site is also threatened by surface erosion and eolian deflation. The charcoal lens exposed in the cutbank is eroding and getting smaller. A system of trails is nearby, and foot prints were noted on site. Human visitation has increased since the FY92 monitoring episode.

Current Evaluation

Surface erosion, gullying, arroyo cutting, and bank slumpage have all impacted the artifacts and the hearth. Two trails are present, servicing the pit toilet off site to the northwest.

Recommendations

The site should be monitored annually. The site should be surface collected and tested. Excavation of the site is also recommended.

IV. MANAGEMENT SUMMARY

This management summary includes site-specific measures to reduce impacts, measures to protect site integrity, a work plan for FY95, and an assessment of the monitoring program.

Measures to Reduce Site Impact

Table 8 lists the FY94 site-specific recommendations designed to reduce site impacts. The FY95 work plan outlined below prioritizes these actions based on what sites need immediate attention. One site is recommended for three impact reduction measures, four sites are recommended for two impact reduction measures, and 13 sites are recommended for one impact reduction measure. These methods include retrailing, obliterating trails, planting vegetation, installation of check dams, and stabilization. Closing the site to visitors is also an option within the remedial action plan, but this recommendation was not applied to a site within Glen Canyon NRA.

Eighteen monitoring locations are recommended for some form, or combination of, remedial action. Stabilization of the cultural features is the most commonly recommended method for reducing site impacts. In several cases masonry walls are under the threat of collapse. Remortaring of top course elements is recommended in one case, while reconstructing a door frame is suggested for another.

Trail obliteration is recommended in six cases. Where sites are difficult to detect, trails are the result of inadvertent visitor use. Many sites are traversed by multiple trails, and they are formed by private and guided boaters hiking and fishing within the canyon. Until these trails are obliterated, people will continue walking on them, thus impacting site features. If these trails are not eliminated, they tend to become entrenched, making shallow to deep gullies that connect, in some circumstances, with Type I or Type II drainages. Trails exacerbate the effects of all classes of erosion, from surface erosion to arroyo cutting and bank slumpage.

The installation of check dams is recommended in five cases where, using traditional methods, dams made from sticks or branches can reduce the downcutting on alluvial terraces cut by shallow gullies. The planting of vegetation is suggested in three cases where increased vegetation on terrace surfaces would reduce the amount of surface erosion and gullying.

Retrailing is recommended in three cases where established trails exist, but need maintenance -- such as replaced stone borders -- to redirect traffic from ancillary paths toward the desired trail.

Table 8. Site-specific recommended measures to reduce site impacts.

AZ Site Number, Feature	Retrail	Obliterate Trail	Plant Vegetation	Install Check Dam	Stabilize
C:2:11, Feature 1	0	0	0	0	1
C:2:11, Feature 14	0	0	1	1	0
C:2:33	0	0	0	0	1
C:2:38	1	1	0	0	1
C:2:50	1	0	0	0	0
C:2:57	0	0	0	0	1
C:2:60, Feature 2	0	0	0	0	1
Feature 4	0	0	0	0	1
C:2:72	0	0	1	1	0
C:2:76	0	1	0	1	0
C:2:81	1	0	0	0	0
C:2:86	0	1	0	0	0
C:2:90	0	1	0	0	0
C:2:91	0	1	0	0	0
C:2:99	0	0	0	1	0
C:2:100	0	0	1	1	0
C:2:106	0	1	0	0	0
C:3:3	0	0	0	0	1
Totals	3	6	3	5	7

Measures to Protect Site Integrity

After all measures of reducing site impacts are exhausted and deterioration continues, methods to protect a site's integrity are activated. Generally, these are methods used to collect archaeological data before they are irretrievable. The four measures suggested to protect site integrity are: mapping, surface collection of the entire site, subsurface testing, and excavation.

Table 9 lists site-specific recommendations for protecting site integrity. Some form, or combination of, data collection is recommended at 29 monitoring locations. Twenty-one locations are recommended for total station mapping. This process of data recovery is essential prior to several methods of reducing site impact, or data collection. Testing a site for subsurface cultural deposits, including the collection of radiocarbon and ethnobotanical samples, could be the most affective and efficient option for collecting archaeological data. Fourteen monitoring locations are recommended for testing.

Surface collecting the entire site is recommended at three monitoring locations. It is recommended that prior to implementing the total collection of artifacts, methods of reducing site impacts have been attempted. Excavation is warranted at one site, C:3:10. The FY95 Work Plan below prioritizes these recommendations depending on whether the sites are in immediate, moderate or minor danger of deterioration.

Table 9. Site-specific recommended measures to protect integrity.

AZ Site Number, Feature	Map	Surface Collect	Test	Excavate	Other
C:2:11, Feature 3	1	0	0	0	0
Feature 4	1	0	0	0	0
Feature 5	1	0	0	0	0
Feature 11	1	0	0	0	0
Feature 12	0	0	0	0	1
Feature 21	1	0	0	0	0
C:2:13	1	0	1	0	0
C:2:33	0	0	1	0	0
C:2:38	0	0	1	0	0
C:2:39	1	0	0	0	0
C:2:40	1	0	0	0	0
C:2:50	1	0	1	0	0
C:2:53	0	0	1	0	0
C:2:57	1	0	0	0	0
C:2:60, Feature 7	1	0	0	0	0
C:2:72	1	0	0	0	0
C:2:75	1	1	1	0	0
C:2:77	1	0	1	0	0
C:2:78	1	0	1	0	0
C:2:80	1	0	0	0	0
C:2:81	0	1	1	0	0
C:2:82	0	0	1	0	0
C:2:84	1	0	0	0	0
C:2:86	0	0	1	0	0
C:2:87	1	0	0	0	0
C:2:88	1	0	0	0	0
C:2:99	1	0	1	0	0
C:2:100	1	0	0	0	0
C:2:106	0	0	1	0	0
C:3:10	0	1	1	1	0
Totals	21	3	14	1	1

FY95 Monitoring Work Plan

The FY95 scope of work includes monitoring activities, site mapping, continuing terrestrial photogrammetry, remedial actions, and reporting.

Monitoring Activities

The intent of the Monitoring Plan is for sites to be visited to the minimal extent necessary in order to identify and prevent erosional processes and human impacts. Given the monitoring data base generated to date, patterns of continuing impacts have been established at sites, and based on that patterning, beginning in FY95, recommendations concerning the cycle of monitoring at specific sites will be adhered to. The recommendations include monitoring only sites that are actively eroding or receiving human impacts based on FY94 observations and on the results of a consultation trip conducted on July 25, 1994 with representatives from the Navajo Nation Historic Preservation Department concerning sites on Navajo Nation lands. But, the Monitoring Plan holds that there is flexibility in cases of site impacts such as intense local seasonal monsoon rains and debris flows caused by them.

Site Selection Process. Glen Canyon NRA has developed site selection criteria that justify five desired monitoring schedule categories for our 69 monitoring locations. These categories are based most importantly on whether erosional impacts are related to river fluctuations and/or dam operations. Lesser issues for site selection include erosion not related to the river or dam, visitor impacts such as graffiti on rock art panels, visibility of the sites from the river or trails, and proximity of sites to heavy use areas. The monitoring schedule categories follow:

Semi-annual Monitoring. Two sites are being impacted by extensive visitor traffic, over 40,000 people per year. A semi-annual monitor schedule, twice per year, is recommended. Episodes will be conducted prior to and following the visitor season;

Annual Monitoring. Sites (N=21) that are currently being impacted by river fluctuations or dam operations will be monitored annually;

Biennial Monitoring. Sites (N=31) that are being impacted by erosion not related to river fluctuations or dam operations will be monitored biennially, every 2 years. Included are sites containing recent graffiti, sites visible from the river or trails, and sites near visitor impact areas;

Monitoring 3-5 Years. Sites (N=14) that are stable or not being impacted by river fluctuations, dam operations, other erosion, or visitor impacts will be monitored every 3 years initially, and if warranted, less frequently in the future;

Discontinue Monitoring. Past monitoring episodes have shown that one location does not need to be monitored. This feature is the concrete Bureau of Reclamation Gauging Station at Lee's Ferry.

Level of Effort. Table 10 lists all 69 locations monitored by Glen Canyon NRA and their monitoring schedule. For FY95, 23 locations will be monitored. Twenty-one locations will receive one monitoring episode and two locations will receive two episodes. Sites are accessible by boat on day trips. It is estimated that an average of five locations can be monitored per two-person day. Conducting the 25 monitoring episodes will require 10 person days. As a part of the monitoring effort, comparison data will be gathered at the surface artifact recording units on five artifact scatters to document changes in artifact counts and erosion patterns. Drafting these maps in the lab will require 2 person days. A total of 12 person days are required to perform the monitoring activities.

Monitoring activities are scheduled to begin in March 1995 for the 21 annual monitor locations. The two locations to be monitored on a semi-annual basis will be inspected in the spring prior to high visitor season and then in the fall following the visitor season.

Reporting. Reporting includes completing the monitoring and photographic record forms and updating computer files. A Trip Report immediately following completion of the FY95 field work will be provided to all signatories for review. An annual report synthesizing FY95's monitoring results will be completed by August 1, 1995.

Table 10. Sixty-nine locations are monitored by Glen Canyon NRA in Reach 0. Fifty-three archaeological sites are present from Glen Canyon Dam down to River Mile 1.6 Right Bank below Lees Ferry. Fifty-one sites have 1 monitoring location, site C:2:11 has 12 monitoring locations, and site C:2:60 has 6 monitoring locations. NN = Navajo Nation, GLCA = Glen Canyon NRA.

AZ Site Number, Feature	FY94 Monitor	Monitoring Schedule	Land Owner
C:2:11, Feature 1	x	3-5 years	GLCA
Feature 3	x	Annual	GLCA, NN
Feature 4	x	Annual	GLCA
Feature 5	x	Biennial	NN
Feature 6	x	Annual	NN
Feature 11	x	3-5 years	GLCA
Feature 12	x	Annual	GLCA
Feature 13	x	3-5 years	GLCA
Feature 14	x	Annual	GLCA, NN
Feature 17	x	Biennial	GLCA
Feature 20	x	3-5 years	GLCA
Feature 21	x	Biennial	GLCA
C:2:12	x	3-5 years	NN
C:2:13	x	Annual	GLCA
C:2:32	x	Annual	GLCA
C:2:33	x	Biennial	GLCA
C:2:35	x	Annual	GLCA
C:2:36	x	3-5 years	GLCA
C:2:37	x	Biennial	GLCA
C:2:38	x	Semiannual	GLCA
C:2:39	x	Biennial	GLCA
C:2:40	x	Biennial	GLCA
C:2:41	x	3-5 years	NN
C:2:48	x	Biennial	NN
C:2:50	x	Annual	GLCA

AZ Site Number, Feature	FY94 Monitor	Monitoring Schedule	Land Owner
C:2:53	x	Biennial	GLCA
C:2:56	x	3-5 years	GLCA
C:2:57	x	Biennial	NN
C:2:58	x	Biennial	GLCA, NN
C:2:59	x	Discontinue	NN
C:2:60, Feature 1	x	Biennial	NN
Feature 2	x	Annual	NN
Feature 4	x	3-5 years	NN
Feature 6	x	3-5 years	NN
Feature 7	x	3-5 years	NN
Feature 8	x	Annual	NN
C:2:70	x	Biennial	GLCA
C:2:71	x	Biennial	GLCA
C:2:72	x	Annual	NN
C:2:73	x	3-5 years	GLCA
C:2:74	x	Biennial	GLCA
C:2:75	x	Annual	GLCA
C:2:76	x	Biennial	NN
C:2:77	x	Annual	GLCA
C:2:78	x	Annual	NN
C:2:79	x	Annual	GLCA
C:2:80	x	Biennial	GLCA
C:2:81	x	Semiannual	GLCA
C:2:82	x	Biennial	NN
C:2:83	x	Annual	NN
C:2:84	x	Biennial	GLCA
C:2:86	x	Biennial	NN
C:2:87	x	Biennial	NN
C:2:88	x	Annual	GLCA

AZ Site Number, Feature	FY94 Monitor	Monitoring Schedule	Land Owner
C:2:90	x	Biennial	NN
C:2:91	x	Annual	NN
C:2:95	x	Biennial	GLCA
C:2:99	x	Biennial	NN
C:2:100	x	Annual	NN
C:2:102	x	3-5 years	GLCA
C:2:103	x	3-5 years	GLCA
C:2:104	x	Biennial	GLCA
C:2:105	x	Biennial	GLCA
C:2:106	x	Biennial	NN
C:2:108	x	Biennial	NN
C:3:3	x	Biennial	GLCA
C:3:4	x	Biennial	GLCA
C:3:6	x	Biennial	GLCA
C:3:10	x	Annual	GLCA
Totals	69	Discontinue = 1 Semiannual = 2 Annual = 21 Biennial = 31 3-5 years = 14	GLCA=40 NN=26 GLCA, NN=3

Detailed Site Mapping

Detailed site mapping at 5 selected sites using total station equipment and Bureau of Reclamation personnel will require 5 person days. The 5 sites are located on Ferry Swale Camps terrace and include AZ C:2:71, C:2:73, C:2:75, C:2:77, and C:2:79.

Terrestrial Photogrammetry

Film retrieval and replacement every 34 days at the camera locations will continue. The following is a tentative schedule of camera change days for the rest of FY95: January 4, February 7, March 9, April 12, May 16, June 19, July 21, August 24, and September 27. These day trips are opportunities for any signatories wishing to travel between Lee's Ferry and Glen Canyon Dam. GLCA requests that arrangements be made with Tim W. Burchett, (602) 645-8278, at least one month in advance. The NPS river boat has a capacity of 6 people, 5 visitors and the driver.

Remedial Actions

Part of the long-term monitoring program includes the implementation of management assessments and recommendations to protect and preserve site information. To facilitate the recommendations, a stabilization work shop for the application of remedial actions such as traditional erosion control methods is planned for spring FY95. Once this training is completed, a remedial action plan identifying a limited number of sites most appropriate for immediate remedial action and including field methods will be submitted to all signatories.

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

Table 11 lists site type, impacts, priority rank, and recommendations for 37 monitoring locations. The other 32 sites monitored by Glen Canyon NRA have thus far not received remedial action/data recovery recommendations. Sites with extensive impacts are given a priority rank of 1 (N=11), and remedial actions should take place on these sites first, preferably beginning in FY95. Moderate impacts are given a priority rank of 2. These sites (N=9) are not endangered by any immediate impact, therefore, remedial actions will be conducted following the completion of remedial actions at Priority 1 sites. A priority rank of 3 (N=17) is recommended when there are very minor impacts, and remedial action will occur following the completion of remedial actions at Priority 2 sites. All remedial actions will be preceded by a reassessment of the site to insure that previous recommendations are still necessary and/or appropriate.

When the need for remedial actions are identified, a proposal describing the impacts and remedial actions will be sent to the members of the Programmatic Agreement. Response is requested within 30 days. In the case of retrailing and trail obliteration, a memorandum will be substituted for the proposal. This will provide for immediate attention to those two impacts.

Table 11. Summary of the Sites that were Monitored in FY94 and the Impacts, Recommendations, and Priority Ranks They Received.

AZ Site Number, Feature	Site Type	Impacts	Rank	Recommendations
C:2:11, Feature 3	Lee's Main Ferry Site	Bank slumpage, wall collapse	3	Map
Feature 4	Sandstone corral	Trailing	3	Map
Feature 5	Cable Crossing Inscriptions		3	Map
Feature 11	Lee's Ferry Mining Operation	Surface erosion, gullying, trailing	3	Map
Feature 12	Spencer Steamboat	Wet-dry cycling	2	Extend no-wake zone around steamboat
Feature 14	USGS Cableway	Surface erosion, gullying, arroyo cutting, bank slumpage	1	Plant vegetation, install check dam
Feature 21	Hogans	Surface erosion, gullying, arroyo cutting, growing vegetation	3	Map
C:2:13	Rock shelter w/wall	Surface erosion, gullying	2	Map, test
C:2:33	Rock shelter w/granary	Surface erosion, gullying, trailing, wall collapse	3	Stabilize, test
C:2:38	Petroglyph panel	Panel surface erosion, trailing, graffiti	1	Retrail, obliterate trail, stabilize, test
C:2:39	Lithic scatter	Surface erosion, gullying, trailing, animal burrowing	2	Map
C:2:40	Lithic scatter	Surface erosion, gullying	2	Map
C:2:50	Camp	Surface erosion, gullying, arroyo cutting, trailing	2	Retrail, map, test
C:2:53	Artifact scatter	Surface erosion	3	Test

AZ Site Number, Feature	Site Type	Impacts	Rank	Recommendations
C:2:57	Historic habitation	Surface erosion, gullying, arroyo cutting, trailing	2	Stabilize, map
C:2:60, Feature 2	Masonry structure	Surface erosion, trailing	3	Stabilize
Feature 4	Stock gate	Surface erosion, trailing	3	Stabilize
Feature 7	Corrals, stock pens		3	Map
C:2:72	Camp	Surface erosion, gullying, arroyo cutting, bank slumpage	1	Plant vegetation, install check dam, map
C:2:75	Camp	Surface erosion, gullying, arroyo cutting, bank slumpage	1	Map, surface collect, test
C:2:76	Camp	Gullying, trailing	1	Obliterate trail, install check dam
C:2:77	Artifact scatter	Surface erosion, gullying, bank slumpage	1	Map, test
C:2:78	Rock shelter w/artifacts	Surface erosion, arroyo cutting	2	Map, test
C:2:80	Lithic scatter	Surface erosion, gullying, arroyo cutting	3	Map
C:2:81	Artifact scatter	Surface erosion, gullying, trailing	1	Retrail, surface collect, test
C:2:82	Rock shelter w/wall, artifacts	Surface erosion	3	Test
C:2:84	Overhang w/wall, midden	Surface erosion, gullying, collecting	3	Map
C:2:86	Cist, wall, artifacts	Surface erosion, trailing	2	Obliterate trail, test
C:2:87	Historic artifacts, tower	Surface erosion, gullying, arroyo cutting	3	Map

AZ Site Number, Feature	Site Type	Impacts	Rank	Recommendations
C:2:88	Shelter w/walls, artifacts	Surface erosion, wall collapse, trailing	2	Map
C:2:90	Structures, petroglyphs, ceramics	Surface erosion, gullying, panel surface erosion, trailing	3	Obliterate trail
C:2:91	Camp	Surface erosion, gullying, arroyo cutting, bank slumpage, trailing	1	Obliterate trail
C:2:99	Artifact scatters, rock alignment	Surface erosion, gullying, trailing	1	Install check dam, map, test
C:2:100	Camp	Surface erosion, gullying, arroyo cutting, wind deflation, bank slumpage	1	Plant vegetation, install check dam, map
C:2:106	Roaster	Surface erosion, trailing	3	Obliterate trail, test
C:3:3	Glen Canyon Dam Trail	Surface erosion, gullying, arroyo cutting	3	Stabilize
C:3:10	Camp	Surface erosion, gullying, arroyo cutting, bank slumpage, trailing	1	Surface collect, test, excavate
Totals	37		1 = 11 2 = 9 3 = 17	

Monitor Program Assessment

The FY94 GCES monitoring program within Glen Canyon NRA is complete. By the end of the FY93 program, 126 monitoring episodes had been conducted at 69 locations from Glen Canyon Dam to the Paria Riffle -- one at 24 sites, two at 33 sites, and 3 episodes at 12 sites. This suggests fairly comprehensive monitoring coverage during the first three years of the ongoing monitoring program. The FY94 monitoring program has filled the holes in the data base at the 24 sites with only one monitoring record. One-hundred ninety-five monitoring episodes have been conducted thus far.

Since the monitoring program began in FY91, field logistics have been modified to optimize the time spent on the river, while recording methodologies have been adjusted to obtain the most important and interesting data on natural and human impacts present.

The long-term monitoring and remedial action program has successfully completed several tasks. The program has determined what impacts occur at what sites. It has determined what kinds of impacts are related to river fluctuations and dam operations, and what impacts are related to other factors. Rates of erosion are beginning to be understood. The next task involves operationalizing the methods for remedial actions and then implementing those actions at sites, with follow up monitoring at those sites to assess the success or failure of the remedial actions.

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