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GLEN CANYON NATIONAL RECREATION AREA

**GLEN CANYON ENVIRONMENTAL STUDIES
FISCAL YEAR 1996 TRIP REPORT**

**GLEN CANYON ENVIRONMENTAL
STUDIES OFFICE**

AUG 19 1996

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FLAGSTAFF, AZ**

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United States Department of the Interior
NATIONAL PARK SERVICE

Glen Canyon National Recreation Area
Box 1507

Page, Arizona 86040
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Memorandum

To: John Ritenour, Chief, Resource Management
Glen Canyon National Recreation Area (NRA)

From: Tim W. Burchett, Archaeologist

Subject: Glen Canyon Environmental Studies Fiscal Year 1996 Trip Report

On various days between October 5, 1995, and July 9, 1996, 56 monitoring episodes were conducted to record erosional and human impacts at 53 locations between Glen Canyon Dam and the Paria Riffle. Glen Canyon NRA personnel included Archaeologists Tim W. Burchett, Christine Goetze, and Nancy Mueller. Other Glen Canyon NRA personnel included Joseph Garrotto, Angie Leach, and O.J. Redhair.

Sites are accessible by boat on day trips. The monitoring form developed in FY94 was used. It greatly increased the efficiency in recording impacts. Photographic recording using GLCA archival procedures continued.

The site mapping program was to continue this year at five selected sites using total station equipment and Bureau of Reclamation personnel. The five sites were chosen for mapping based on their Priority Ranks on Table 10 (Burchett 1995). The five sites included AZ C:2:72, C:2:91, C:2:99, C:2:100, and C:3:10. Due to the increased work load associated with the beach building habitat flow, only one site was mapped, C:3:10, prior to and following that flow in March-April, FY96.

Film retrieval and replacement every 34 days at the camera locations continued. This effort is recording, on a daily basis, terrace cutbank erosion at sites C:2:38 and C:2:100.

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 workshop for the application of remedial actions such as traditional erosion control methods was held in spring FY95. Following the training, a remedial action plan identifying a limited number of sites most appropriate for immediate remedial action, and including field methods, was to be submitted to all signatories this fiscal year. This was begun, and is scheduled for completion in FY97.

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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 one monitoring location, site C:2:11 has twelve monitoring locations, and site C:2:60 has six monitoring locations. Reported here are the results of the FY96 monitoring effort, which included monitoring 53 locations once and 3 locations twice.

AZ C:2:11, Feature 3

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

Previous Evaluations

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

In FY94, masonry elements were added to the west corner of Structure 1, and the cable was moved along the trail. On Structure 2, collapse of a masonry element on both chimneys was noted. There was 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 erosion will eventually wash away the cable at the bottom of the feature below the Stanton Road. There was a decrease in evidence of camping.

In FY95, on the right bank of the river, there were no changes to any of the structures at the main ferry site. The cable was moved, however, indicating some visitation. There was no visible evidence of camping. On the left bank, some bank slumpage occurred below the Stanton Road.

Current Evaluation

In FY96, no changes were noted. Visitor impacts noted in past years are reduced.

Recommendations

Both the left and right bank portions of this feature should be monitored annually, and instrument mapping should be conducted.

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 was evidence of surface erosion. One distinct trail was noted, and other visitor evidence includes the rearrangement and

clearing of rocks, recent trash, and concentrated soil compaction. In FY94, the trail bisected both sides of the corral wall, but the stone elements making up the remaining wall segments were in stable condition. In FY95, surface erosion was still evident, but the walls were in stable condition. The trail through the walls was no more pronounced than during the FY94 monitoring episode.

Current Evaluation

In FY96, no changes were noted. The site remains in relatively stable condition.

Recommendations

The stable condition of this site suggests that it could be monitored less frequently than annually. Monitoring every other year 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 Lees 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, 92, and 94. No changes to the inscriptions were noted.

Current Evaluation

For FY96, Feature 5, consisting of inscriptions on boulders, is not affected specifically by the operation of the dam or river fluctuations. Surface erosion of the rock faces does occur, however.

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 Nation, 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, 92, 94, and 95. Surface erosion is noted, but the wall segments are in stable condition.

Current Evaluation

There are no changes noted in FY96.

Recommendations

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

AZ C:2:11, Feature 12

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

Previous Evaluations

The feature was monitored in FYs 91, 92, 93, 94, and 95. Overall, the Spencer appears in better condition underwater than above. Extensive river fluctuations continue to cause wet-dry cycles to the bow of the steamboat.

In FY93, moss and algae in the center of the boat, growing up from the river bottom and on the port side, was not as abundant as in FY92. Underwater silt buildup in and around the vessel increased noticeably from FY92 to FY93, and the amount of algae and vegetation growth decreased. In the same period, human impacts were reduced. 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 was present on the nearby stream terrace, and visiting tour boats often float over the steamboat; their wakes cause continued movement of sediment.

From FY94 through FY95, continuing deterioration of the bow from wet-dry cycling was noted. The amount of algae and sediment increased, particularly on the stern of the boat. A trail was nearby on shore and was used by picnickers and people fishing.

Current Evaluation

The Charles H. Spencer Steamboat was monitored twice, before and after the beach building habitat flow in March-April FY96. On the first dive, monitoring points were established in several places from stern to bow to measure the depth of sediment. These measurements were compared with others taken on the second dive after the beach building habitat flow. These

observations indicated that anywhere from 2 to 6 inches of sediment was deposited on the steamboat.

In addition, on the first dive, photographs were taken moving from stern to bow for comparison with photographs taken following the beach building habitat flow. These indicated an increase in sediment and a decrease in the amount of algae, which has since grown back. With the exception of the gear box, fire box, boiler, and bow sprits, three deck board widths of the starboard side of the boat are all that remains totally uncovered at this time.

Attempts were made to locate objects previously recorded on the starboard side of the boat. But nothing was found, suggesting these items were either covered with silt, or they could have dropped into the bottom of the channel, which is adjacent to the starboard side of the boat. These items include a Sampson post cap, throttle valve, heater and exhaust pipe, smoke stack funnel collar, bilge pump, several truss rods, several sections of pipe, and several disarticulated pieces of wood and decking.

Recommendations

The steamboat is monitored by a stationary camera located on the opposite side of the river. 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. In addition, to prevent people from fishing from on top of the boiler, we have directed the placement of a sign on shore just above the steamboat to inform visitors of the significance of the steamboat and asking their cooperation not to climb onto the boiler.

AZ C:2:11, Feature 14

This feature is located on the left and right banks of the Colorado River just upstream from Lees Ferry on old alluvial terraces. It consists of the abutments of the USGS Cableway, and is included in the Lees 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 Nation 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, 93, and 94. The monitoring episodes indicate that 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 monitoring episodes have recorded no change in the condition of the concrete cable anchors and the tower on the left bank of the river. 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. The towers, artifacts, and ground surface around them were being distributed by surface erosion, gullying, arroyo cutting, bank slumpage, and side canyon erosion.

Due to the stable condition of the concrete cable anchors on the right bank, monitoring was discontinued in FY95. On the left bank, the FY95 monitoring effort has indicated an increase in surface erosion near the cable car. The loose boards continue to be moved.

Current Evaluation

As in previous monitoring episodes, the FY96 results were that the loose boards from the cable car are continuing to be displaced.

Recommendations

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 FYs 91 and 94. 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. In FY94, some erosion to the panel surface was noted; otherwise, the inscriptions are intact.

Current Evaluation

Random trailing down from the main trail above the panel was noted in FY96. There were no other changes noted. 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 21

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

Previous Evaluations

The feature was monitored in FYs 91 and 94. In FY91, the hogans were noted in stable condition. In FY94, surface erosion, gullying, and arroyo cutting were impacting the masonry walls, and vegetation was impacting one of the hogans, but the hogans remained in stable condition. These physical impacts are not related to river fluctuations.

Current Evaluation

In FY96, vegetation is still growing in one of the hogans.

Recommendations

A rock line trail leads to the area from the Lees 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. The vegetation within the hogan should be carefully removed to eliminate that impact.

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 Nation 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, 93, 94, and 95. 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 river-based 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. In FY94, surface erosion was 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 river-based stream, was eroding. In FY95, surface erosion did not increase.

Current Evaluation

In FY96, movement of the wooden logs of Feature 2 was noted. There was no change to Features 1 and 3. Surface erosion is present on the structures and the rock art, but there does not appear to have been an increase in erosion.

Recommendations

Annual monitoring is recommended, since the features, particularly Feature 2, are continuing to erode into a river-based 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 physical 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 high water zone and headward migration of arroyos due to lowering base levels. A river-based arroyo is present 20 m east of the site. An increase in gully and arroyo cutting east of the site datum was not noted between FYs 92 and 93. There were no human-related impacts. In FY94, the continued loss of the lens and the terrace deposits was noted. Impacts included surface erosion, gullying, arroyo cutting, and bank slumpage. An increase in bank slumpage occurred in FY95.

Current Evaluation

In FY96, no changes were noted. The lenses were not impacted by the beach building habitat flow conducted in the spring. However, sections of the cutbank just upstream and downstream from the lenses did collapse into the river.

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 FYs 91 and 94. Site condition was considered poor, being directly impacted by bank slumpage, and surface erosion. The granary is being impacted by surface erosion and two masonry elements have collapsed. The artifacts are being displaced by surface erosion, gullyng, and trailing. It was recommended to monitor the granary because it is visible from the road, and the walls are extremely fragile.

Current Evaluation

The FY96 monitoring program noted no further change in site condition. The impacts noted above are not related to the operation of the Dam.

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, 93, 94, and 95. 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, gullyng, 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 gullyng and arroyo cutting. Sherds are being washed down the gully north of the main site area. Gullyng occurs on either side of the boulder outcrop/wall area and below the wall. The few artifacts and a 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.

The FY94 monitoring effort showed that the structure, hearth, and artifacts were being impacted by surface erosion, and gullyng and arroyo cutting were impacting the artifact scatter. As noted in the FY93 monitoring episode, there was a high potential for slope erosion due to gullyng and arroyo cutting. Sherds and lithic artifacts were washing down the gully north of the main site area. The cutbank south of the site was slumping as a result of river level fluctuations.

As in previous evaluations, FY95 monitoring showed that there is a high potential for slope erosion due to gullyng and arroyo cutting. The slumping cutbank on the south side of the site has not caused any damage as of yet, however. The surface sample unit was checked, and there was no change in the position of the artifacts. The collector's pile shows evidence of human visitation. A flake was moved and replaced in a different position. A light trail is still discernable along the terrace.

Current Evaluation

In FY96, surface erosion was evident on the wall, the hearth, and artifacts. A light trail is still noticeable, but no footprints were present. No other changes were noted.

Recommendations

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

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 FYs 91 and 94. Most of the impacts are physical, exfoliation, erosion, and patination of the rock surfaces. Human impacts are graffiti scratches beneath the middle panel, yet they are not recent. Vandalism and physical erosion/exfoliation of the rock surfaces are long-term threats. 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.

Current Evaluation

In FY96, no change was noted to the prehistoric petroglyphs. However, the graffiti "km" is noted just east of the historic inscription.

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, 93, 94, and 95. This rock art site is visited by over 40,000 people per year on guided tours. This causes surface erosion to the terrace in front of the panel. In earlier monitoring episodes, extensive trailing could be seen meandering through the tamarisk and across the terrace to the panel, and the rock-lined trail that leads to the panel was kicked out and displaced.

The panel has undergone continuing impacts from graffiti, and 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.

The site was visited twice during the FY95 monitoring effort. The first visit in March indicated that the dry-laid wall in front of the panel had been impacted by visitors displacing masonry elements. The second visit in June indicated no further change. The graffiti problem is under control for the present. A more concerted effort has been made to train tour guides about the importance of controlling this impact, and an NPS interpretive ranger is on site during much of the week.

Current Evaluation

In FY96, the site was monitored twice. The first monitoring episode, in October, 1995, noted the addition of a "B" near the FY94 "Danny Foust" graffiti. The petroglyph panel itself was not impacted. The second monitoring episode, in June, 1996, noted no changes.

On May 16, 1996, this site was monitored by members of the Zuni Tribe. They noted that there seems to be an increase in the amount of sediment loss at the base of the petroglyph panel, and they noted a number of footprints inside the stone wall built to keep people out.

Recommended Remedial Actions

The site is monitored by stationary camera on a daily basis. On-site semiannual monitoring will continue 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.

To reduce the loss of sediment at the base of the petroglyph panel caused by heavy visitation, the Zuni Tribe has recommended that the stone wall be augmented by adding more courses of stone and by the addition of poles and sticks to build the fence up to 3-4 feet high. Also, they recommended to plant more desert cactus inside the fence to deter access.

As a component of the ongoing trail maintenance program at Glen Canyon NRA, the trail to the petroglyph panel was upgraded by stabilizing the base of the trail. This has reduced the amount of downcutting and erosion to the terrace. Other trails that meandered across the terrace to the site have been reduced.

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 will be recommended.

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, 92, and 94. 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. Surface and gully erosion are on-going, and trailing and animal burrowing are noted. Two collection piles were noted since the monitoring episode in FY92.

Current Evaluation

In FY96, the collection piles noted in FY94 were not seen. Surface and gully erosion are ongoing, but have not increased in intensity.

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 FYs 91 and 94. It is impacted by minimal surface erosion, gulying, 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, but surface erosion and gulying are displacing artifacts. No human impacts were noted in FY94.

Current Evaluation

In FY96, no changes 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:2:48

This is the Lees Backbone wagon road, an historic trail used in the early 1870s to access the original and upper Lees Ferry crossings. The trail is located on the left bank of the river on the Navajo Nation 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, 93, and 94. Site condition is considered poor, but fairly stable. There is evidence of surface erosion, gulying 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 physical and human impacts are not related to river fluctuations and dam operations. No new impacts occurred between FYs 93 and 94.

Current Evaluation

In FY96, recent bank slumping of the south cutbank above a section of the road was noted, causing this portion of the road to be buried. The site

is considered to be in poor condition, but the road itself is in stable condition. No recent graffiti was noted.

Recommendations

The site is stable and it is not being impacted by river fluctuations or dam operations. 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 FYs 91, 94 and 95. Bank cutting directly impacts the site and accelerated arroyo cutting and bank slumpage are occurring. river-based 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. The FY94 monitoring effort recorded a small pothole in Feature 7, a roaster. The FY95 monitoring recorded that surface erosion, gullying, and arroyo cutting were impacting both loci. Trailing through the site has caused movement of three stone elements in Feature 6.

Current Evaluation

In FY96, no change was noted for Features 1, 2, 4, 5, 6, 7, and 8. Feature 1.5 exhibited the displacement and removal of some stones and some rodent damage. Feature 3 exhibited the loss of some sandstone elements.

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.

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, 92, and 94. 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

No changes were noted during FY96 monitoring. 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:2:57

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 Nation where the fluvial terrace contacts Moenkopi sandstone bedrock exposures.

Previous Evaluations

This site was monitored in FYs 91, 92, 93 and 94. There is extensive surface erosion, gulying, 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. In FY94, surface erosion, gulying, arroyo cutting, and trailing were impacting the structures. Feature 1 exhibited collapse of its wooden wall elements on its south side. Feature 2 exhibited 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 was no change to Features 4, 5 and 7. On the south end of the exterior east wall of Feature 6, a sandstone slab was broken in two.

Current Evaluation

In FY96, several changes are noted. The fill on the exterior north wall of Feature 2 exhibits increases in rodent/cattle caused erosion. Surface erosion is also undercutting the northwest corner of the structure. Feature 2

also shows evidence of human visitation. There is a newly started collection pile of historic wood behind the south wall. These are actually removed roof beams. Some south wall stone elements have also been removed or collapsed. South of Feature 3, a lambing pen, gulying is severe, it is undercutting the wall.

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. The gulying underneath the wall of Feature 3 should be eliminated.

AZ C:2:58

This site consists of four loci, three on the left bank on the Navajo Nation 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, 93 and 94. Physical impacts include surface erosion, gulying, 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. No changes were noted at any of the loci in FY94, although the ground surfaces the features lie upon are impacted by surface erosion, gulying, arroyo cutting, and side canyon erosion. The surfaces of the inscription panels are being eroded by eolian forces.

Current Evaluation

In FY96, Loci A, B and C exhibited no changes. Locus D, on the north side of the river, received heavy disturbance from a side-channel debris flow. Movement and displacement of large boulders in the bottom of the channel adjacent to the iron anchor occurred. The pipe that was semi-buried and the tin cans are no longer present, and the section of cable noted in previous monitoring episodes is gone. In addition, there appears to be new graffiti on the wall next to the iron anchor.

Recommendations

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

erosion at Loci A, B, and C. For Locus D, not much is left of the artifacts following the debris flow, therefore, monitoring should be limited to every 3-5 years at the maximum.

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 Nation.

Previous Evaluations

The feature was monitored in FYs 91, 93 and 94. 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. In FY94, the surface of the inscription panel was being eroded by wind, and some modern graffiti had impacted the historic graffiti. Some deposition occurred inside the forge. The inscription panel is visible from the trail below.

Current Evaluation

In FY96, no changes were noted.

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 Nation.

Previous Evaluations

The site was monitored in FYs 91, 93 and 94. 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. No changes were noted in FY94.

Current Evaluation

In FY96, no changes were noted. There is a lack of vegetation due to the drought, however.

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 8

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

Previous Evaluations

This feature was monitored in FYs 91, 93, 94 and 95. The rock art element is in stable condition with no physical or human impacts evident, except for some slight surface erosion of the stone. The glyph can be seen from a nearby trail.

Current Evaluation

In FY96, no changes were noted. Other than some surface erosion to the panel, it is not impacted by physical or human agents.

Recommendations

The panel is not being impacted by river fluctuations or dam operations. A biennial monitoring schedule is recommended due to its visibility from and proximity 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 FYs 91 and 94. 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. In FY94, surface erosion and trailing were displacing the artifacts.

Current Evaluation

In FY96, no further impacts affected the site.

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, 93 and 94. 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 included one aluminum can and one plastic fork. These impacts are not related to river fluctuations or dam operations. In FY94 surface erosion was displacing the artifacts, and the surface of the rock art panel is eroding from eolian forces.

Current Evaluation

In FY96, impacts include rodent activity, which has moved some sticks and further exposed 2 stones in back of the shelter. The can noted in FY93 is in its same position outside the overhang.

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 Nation on a Pleistocene alluvial terrace.

Previous Evaluations

The site was monitored in FYs 91, 92, 93, 94 and 95. Surface erosion, gullyng, arroyo cutting, bank slumpage, and side canyon erosion have all increased. 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. A buried hearth has collapsed into the arroyo, and these same agents are

displacing the artifact scatter. A visitor trail has also impacted one of the hearths. No changes were noted during the FY95 monitoring episode.

Current Evaluation

In FY96, animals have trampled the center of the hearth disturbing the charcoal deposit. There is an increase in arroyo cutting and bank slumpage at the check dam.

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:2:74

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, 92 and 94. It is being impacted by surface erosion, gulying, and animal burrowing. In FY94, surface erosion and gulying were 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 have been obscuring the artifacts.

Current Evaluation

In FY96, displacement of the mano fragment is noted, caused by animals. Again, none of the flakes noted in FY92 were observed.

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 an 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, 93, 94 and 95, and it is actively eroding. Surface erosion, bank slumpage, dune migration, gullying, and arroyo cutting are noted impacts. A trail from the Ferry Swale camp site climbs through Locus A. Since the FY91 monitoring episode, the artifacts in Locus B are being displaced by surface erosion, gullying, arroyo cutting, bank slumpage, and side canyon erosion, and new evidence of bank slumpage is present in Locus B, increasing the size of the arroyo.

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.

In FY95, bank slumpage in Locus B increased. There was also an increase in arroyo cutting and side canyon erosion. There were no changes in a surface sample unit placed to measure the movement of artifacts.

Current Evaluation

In FY96, monitoring noted an increase in bank slumpage in both Loci A and B. In Locus B the terrace margin has retreated back to the edge of the surface sample unit, although no artifacts on the surface of the sample unit have moved. Some charcoal staining is noted around the northwest corner of the surface sample unit.

Recommendations

The site should be monitored annually. Recommended data collection measures include surface collection of the entire site and testing for subsurface deposits. The site was instrument mapped on April 13, 1995.

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 Nation. 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, 93 and 94. 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 was noted, however. In FY94, the hearth was filling with sediment from recent rain storms. Eventually, the nearby gully will erode headward to the hearth.

Current Evaluation

In FY96, more sediment is noted in the hearth. The gully noted in FY94 is increasing in size and is moving headward toward the hearth from the north. The trail on top of the terrace is fading. There is no evidence of visitation.

Recommendations

Consultation with the Navajo Nation Historic Preservation Department resulted in a biennial monitoring schedule initially and then every 3-5 years. The trail is being obliterated physically. In FY94, rain storms created a gully that is migrating headward toward the hearth. The installation of a small 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, 93, 94, and 95. 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. The FY94 monitoring effort documented the displacement of artifacts by surface erosion, gullying and bank slumpage. The FY95 monitoring effort documented no further impacts. In FY94, a surface sample unit was placed to record the movement of artifacts by surface erosion. The monitoring effort recorded that no movement of artifacts occurred.

Current Evaluation

In FY96, some minor surface erosion is documented in the lithic concentration. The surface sample unit exhibits fewer flakes. Collection from visitors may have occurred. Ferry Swale Camp is nearby and is often occupied.

Recommendations

The site should be monitored biennially to record non-river-related impacts. Testing for subsurface cultural deposits is recommended. The site was instrument mapped on April 13, 1995.

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 slope below the shelter.

Previous Evaluations

The site was monitored in FYs 91, 94 and 95. 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. Surface erosion, arroyo cutting, and side canyon erosion are displacing the artifacts. In FY95, surface erosion increased since FY94, but all artifacts plotted on the original site map were relocated.

Current Evaluation

In FY96, eolian deposition has increased and surface erosion has decreased, thus slowing the eroding impacts to the site.

Recommendations

The site should be monitored annually. Instrument mapping, surface collection, 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 FYs 91, 94 and 95. The wall is being impacted by surface erosion, gulying, and vegetation. The artifacts are being displaced by surface erosion, gulying, and arroyo cutting. The arroyo is a river-based stream, draining to the Colorado River. Impacts are related to river fluctuations and dam operations. As noted during the FY94 monitoring episode, vegetation was still impacting the structure wall in FY95, but there were no increase in impacts.

Current Evaluation

No changes were noted in FY96.

Recommendations

The site should be monitored annually. It was mapped by total station equipment on April 13, 1995.

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, 92, and 94. The site is impacted by surface erosion, gullyng, and there are two small arroyos on each side of the site. There are no human impacts. In FY94, the artifacts were being displaced by surface erosion, gullyng, and arroyo cutting, however, all artifacts plotted on the site map were relocated.

Current Evaluation

In FY96, physical surface erosion of a sherd was noted near one metate, but the impacts are not the result of fluctuating river flows or dam operations.

Recommendations

Some active erosion is occurring. However, the gullies are terrace-based and do not extend to the Colorado River. The monitoring schedule is being changed from biennially to every 3-5 years. 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, 93, 94, and 95. Visitor impacts have cut the trail deeply, further exposing the site. The trail leads to AZ C:2:38, a large petroglyph panel just downstream. In FY91, the trail ranged from 10-50 cm deep. In FY93, the trail was 70 cm deep in some places. After the FY91 monitoring episode, maintenance crews lined the trail with a rock boundary to help direct visitors to the petroglyph site.

Through FY93, the trail increased in width and depth. In addition, other trails funneling into the main trail were established. Physical impacts

included surface erosion and wind deflation, and a rain storm aggravated the erosion problem along the trail, downcutting it as much as 50 more cm.

Maximum depth of the trail cut was over 1 m in some places. Continuing use of the trail exposed more of the site. Artifacts were noted on the surface, but there were no buried cultural materials noted in the trail cuts. None of the impacts were directly related to river fluctuations or dam operations, instead, the site was impacted by foot traffic from 40,000 visitors per year. Continued exposure of artifacts and buried components was anticipated.

The site was monitored twice in FY95. The trail through the site developed into a terrace-based stream. The trail did not increase in width or depth since the tremendous downcutting episode in FY94.

Current Evaluation

The site was monitored twice in FY96, just prior to trail rehabilitation and following it. Prior to trail rehabilitation, the trail eroded another 5 cm in depth since the last monitoring episode in FY95. No further artifacts have eroded from the deposits, however.

Following the trail rehabilitation, local erosion has stopped. So far, there is a decrease in the amount of surface erosion, gullyng, arroyo cutting, bank slumpage, and alluvial erosion.

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 was repaired and regraded by adding geoweb fabric to stabilize the base of the trail. This reduced the amount of downcutting and erosion to the terrace and through the site. The rocks aligning the trail were reestablished, and other trails that meander across the terrace to the site are being eliminated. This project will be completed by Fall FY96.

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 1995). No subsurface artifacts were recovered. As a part of the testing program, surface artifacts were mapped and collected, however. Another element of Compliance included monitoring of the trail rehabilitation activities by an archaeologist. No further cultural resources were exposed. 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 Nation.

Previous Evaluations

The site was monitored in FYs 91, 92, 93, and 94. 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. In FY94, the wall and artifacts were being impacted somewhat by surface erosion.

Current Evaluation

In FY96, no change was noted other than a reduction in the amount of vegetation due to the recent drought.

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 Nation. 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, 93, 94, and 95. This area has seen much activity in the last century, including construction associated with Lees 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 river-based 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.

The FY94 monitoring effort recorded an increase in the surface erosion to the hearth and artifacts. 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.

The FY95 monitoring recorded no changes to the condition of the feature or of impacts since FY94.

Current Evaluation

In FY96, there was an increase in the amount of surface erosion, bank slumpage, and animal-caused erosion to the artifact scatter and to the thermal feature, and arroyo cutting has increased on the artifact scatter. Some artifacts have eroded into the arroyo. There also is an increase in the amount of trailing from humans in the artifact scatter and on the thermal feature.

Recommendations

Annual monitoring is recommended to record ongoing impacts from surface erosion.

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, 93, and 94. The site is actively eroding; gullyng, 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 the FY93 monitoring episode. These impacts are not related to river fluctuations or dam operations.

In FY94, the wall was being impacted slightly by surface erosion, and the artifacts were being displaced slightly by surface erosion and gullyng. One collector's pile was noted, and there was no change to it since the last monitoring episode in FY93.

Current Evaluation

In FY96, no new physical impacts were noted. However, human impacts have increased. In the collection pile, flakes have been moved, and another flake has been added.

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 Nation 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, 93, and 94. 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 river-based arroyo from side canyon flooding was occurring, but was not yet impacting the site.

In FY94, Feature 1 (cist), Feature 2 (wall), and Feature 3 (fire-cracked rock scatter) all were being impacted by trailing, and Feature 3 was being impacted by increased surface erosion.

Current Evaluation

In FY96, impacts noted for Features 1, 2, and 3 are ongoing. 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 Nation.

Previous Evaluations

This site was monitored in FYs 91, 93, and 94. Surface erosion was 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 were noted. In FY94, the artifacts were being displaced slightly by surface erosion, gullyng, and arroyo cutting.

Current Evaluation

No increases in impacts were noted in FY96.

Recommendations

The site should be monitored every three-five years 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 FYs 91, 94, and 95. Physical impacts include surface erosion and gullying caused by runoff from a dripline at the top of the overhang. A 3 m deep river-based 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. Recent trash is present, and a trail ascends the talus slope to the site. Recent graffiti is scratched into the wall above the site. This graffiti includes a "P" and wavy lines. Visitor trampling of vegetation has occurred in the rock shelter, although no foot prints were present.

In FY95, the monsoon thunderstorms noted the previous fall hit this site as well. A storm cleaned out the river-based arroyo and formed a new debris flow below the site on the shore of the river. Trailing and trampling were reduced.

Current Evaluation

In FY96, there are increases in surface erosion and gullying to the structure, and an increase in surface erosion to the artifact scatter. But the metate is less exposed due to deposition of sediment. The wall segment is intact. A gully below the dripline is in front of the rockshelter. There are no new human impacts. A trail is present below the shelter.

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 Nation.

Previous Evaluations

The site was monitored in FYs 91, 93, and 94. It is poorly preserved and exhibits spalling of the petroglyph panel surface, surface erosion, gullyng, 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.

In FY95, surface erosion and gullyng were causing minor impacts, undermining the structure and displacing artifacts. The surface of the rock art panel was being eroded by wind and water. A visitor trail and evidence of camping were present as well.

Current Evaluation

In FY96, surface erosion and gullyng are increasing impacts to the artifacts. Sherds below the furthest downstream petroglyph panel are eroding downslope. Trampling is adding to the erosional impacts. No new human impacts are present.

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 Nation.

Previous Evaluations

The site was monitored in FYs 91, 93, 94, and 95. Physical impacts are extensive and include arroyo cutting, gullyng, surface erosion, wind deflation, and bank slumpage. These impacts increased in severity from FY93 to FY94. A 6 m deep river-based arroyo bisects the site and is eroding through the charcoal lenses. Recent seasonal rains have caused a debris flow that has scoured the river-based arroyo, removing all vegetation and causing collapse of the arroyo walls. An ephemeral game-foot trail was present, though little use was noted.

In FY95, arroyo cutting, bank slumpage, and side canyon erosion increased, causing more material in the charcoal lenses to collapse into the arroyo. The trail across the terrace was almost unnoticeable.

Current Evaluation

In FY96, gullyng, arroyo cutting, bank slumpage, and side canyon erosion increased. Bank slumpage increased particularly on the north side of

the hearth. The top left portion of the lens has eroded away. The right portion is still present, but it is on a block of sediment at the top of the terrace that is surrounded by gullies, which are eroding. There are no human impacts.

Recommendations

The site should be monitored annually.

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, 93, and 94. Physical 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

In FY96, no changes were noted.

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 Nation.

Previous Evaluations

The site was monitored in FYs 91, 93, and 94. Physical 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. The FY93 monitoring episode recorded one newly exposed rock near a metate.

In FY 94, surface erosion increased, undermining the retaining wall and displacing artifacts. The trail noted during the FY93 monitoring episode has

been filled in by eolian deposition. Gullying did not increase in severity. Out of four black-on-red sherds noted during FY91, one was noted during this monitoring episode. The impacts do not appear to be related to river fluctuations.

Current Evaluation

In FY96, an increase in eolian surface deposition has occurred. Sherds that were previously noted on the surface were not found. They are assumed to have been covered up by blowing sand. The wind also exposed a previously unrecorded sandstone grinding slab. No human impacts were noted.

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 Nation.

Previous Evaluations

This site was monitored in FYs 91, 92, 93, 94, and 95. The site is actively eroding from side draining river-based arroyos. Physical 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.

The FY94 monitoring noted no changes to Feature 1, the charcoal lens in the cutbank. The bicycle frame collapsed. Feature 2, a set of sandstone slabs, was more dispersed since the monitoring episode in FY93. The cutbank near the gear receded 12 cm since FY93. Bank slumpage had therefore increased.

The FY95 monitoring results note no changes to Feature 1, the lens in the cutbank, or to the bicycle frame. Feature 2, the set of sandstone slabs, has a new gully eroding into it. The bicycle gear has collapsed into the arroyo, indicating an increase in bank slumpage and arroyo cutting.

Current Evaluation

In FY96, surface erosion has increased. The gear noted in FY95 to have collapsed into the arroyo is now being covered by terrace sediments deposited

by bank slumpage. The charcoal lens is more fully exposed now. Trampling continues. There are no human impacts.

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:2:104

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 anthropomorph. The site is on a sandstone boulder on a large alluvial terrace directly behind the rest rooms at the Lees Ferry launch ramp. The boulder is visible from the rest rooms.

Previous Evaluations

The site was monitored in FYs 91 and 94. The boulder itself is in good condition, as are the petroglyphs. A gully adjacent the boulder, and there is a major wash a few meters east. There are no human impacts. The surface of the petroglyph panel is undergoing some wind and water erosion, but it is in stable condition.

Current Evaluation

In FY96, no changes were noted.

Recommendations

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

AZ C:2:105

This site is on the left bank of the Colorado River on the Navajo Nation. 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 FYs 91 and 94. 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.

In FY94, there were no physical 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.

Current Evaluation

In FY96, no impacts were noted.

Recommendations

The monitoring schedule at this site is being lengthened to every three to five years 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 Nation.

Previous Evaluations

The site was monitored in FYs 91, 92, 93, and 94. Surface erosion and trailing are noted impacts. These impacts do not appear to be related to river fluctuations or dam operations. In FY94, minor surface erosion was noted for the roaster and artifacts.

Current Evaluation

In FY96, no changes were noted.

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 Nation. 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 FYs 91 and 94. 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, gullyng, arroyo cutting, and trampling. There are no human impacts. These impacts are not related to river fluctuations or dam operations.

Current Evaluation

In FY96, no new impacts were noted on the petroglyph panel. Trampling around the panel was noted, causing downslope surface 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, 93, and 94. Physical impacts include surface erosion, gullyng, 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 was 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. In FY94, surface erosion, gullyng, and arroyo cutting were impacting the culverts and retaining walls of the trail. The culvert at the top of the stairs exhibited more eolian deposition than noted during the FY93 monitoring episode.

Current Evaluation

In FY96, there was an increase in deposition of sediment on the lower exposed culvert. There was no change to the higher culvert. A stone wall element has been displaced, and there is an increase in vegetation. A utility pole at the bottom of the steps has been moved, indicating human visitation.

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 FYs 91 and 94. Physical impacts include erosion of the panel surface. The sediment directly below the panel is slowly eroding downslope.

In FY94, ongoing wind and water affected the surface of the rock art panel. Physical impacts also include spalling of the panel surface. These impacts are not related to river fluctuations or dam operations. There are no human impacts.

Current Evaluation

In FY96, no further impacts were noted.

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 FYs 91 and 94. Physical 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.

In FY94, the surface of the panel was being impacted by wind and water. Continued vandalism of the petroglyph panel was noted with incising and eradication of historic signatures. It appears that most vandalism occurred prior to FY91. Only minor 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.

Current Evaluation

In FY96, trailing increased on the terrace below the panel. A camping area is nearby, but no new graffiti or other impacts to the panel were noted.

Recommendations

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

AZ C:3:10

This prehistoric site included a hearth with charcoal staining and an associated artifact scatter. It was 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, 93, 94, and 95. Surface erosion, gullyng, and arroyo cutting impacted the entire site, and runoff was impacting the hearth. Artifacts southwest of the site were eroding down the terrace slope. These impacts were related to river fluctuations, i.e., direct inundation of the site occurred, but the site was also threatened by surface erosion and eolian deflation. The charcoal lens exposed in the cutbank was eroding and getting smaller. A system of trails was nearby, and foot prints were noted on site.

The FY95 monitoring episode recorded that bank slumpage around the hearth increased. One new trail was present in the arroyo and on the north side of the hearth. A previously noted trail was also present on the south side of the hearth.

Mitigation

The site was instrument mapped, collected, and excavated prior to its inundation from the FY96 beach building habitat flow. The data recovery program will be reported in the beach building habitat flow report due this fall.

Recommendations

The site has been removed from the monitoring schedule.

REFERENCE CITED

Burchett, Tim

1995 FY95 Glen Canyon Environmental Studies Monitoring of
Archaeological Sites from Glen Canyon Dam to the Paria Riffle.
Glen Canyon National Recreation Area, National Park Service, Page,
Arizona.