Adopt A Beach:
Long-Term Monitoring of Camping Beaches in Grand Canyon

Executive Summary of Results for Years 1996 - 2004

Introduction and Methods

The Adopt-a-Beach (AAB) program has completed its ninth year as a study that monitors camping beaches in Grand Canyon. This program, sponsored by Grand Canyon River Guides, Inc., is implemented by a 100% volunteer force of river guides, scientists, and NPS personnel. Results are submitted to various agencies such as the Cultural Resources Program of the Grand Canyon Monitoring and Research Center (GCMRC). Results are also presented to the Adaptive Management Program so that private and commercial recreational interests are represented as stakeholders in Colorado River management as reported to the Secretary of the Interior.

Methods implement repeat photography and observational comments that document the condition of a selected set of Grand Canyon camping beaches from April through October of each year. The selected beaches lie within three critical reaches (Marble Canyon, Upper Granite Gorge and Muav Gorge) of the river corridor. A critical reach is defined as an extended area in which camping beaches are sparse, small, and/or in high demand. Two critical reaches (Glen Canyon and Lower Granite Gorge) added since the program's inception will also help in understanding long term erosion and system-wide sediment distribution.

The program assesses visible change to beaches resulting from changing regulated-flow regimes, rainfall, wind, and human impacts. Volunteers for this program are unique in that they run the Colorado River many times in one season, and they are able to provide sets of repeat photographs for each study beach. To date, guides have produced over 1500 repeat photographs and associated field sheets having recorded the sequential condition of beaches throughout the commercial boating season, year after year. Research results include total change to beaches after being impacted by certain flow regimes, longevity of the 1996 beach/habitat building flow (BHBF) deposits, change to individual beaches between monitoring seasons, and primary and secondary processes that cause change in camping beach area and quality.

Results and General Conclusions

Results of this study since 1996 show that beaches have continued to decrease in size, system-wide even after the High Maintenance Flows (HMF) of year 2000 and the Winter High Fluctuating Flows (WHFF) of 2003 and 2004. Over years 1996-1999, the net effect of controlled flow releases from Glen Canyon Dam resulted in the continued winnowing of beachfronts, cutbank retreat, and loss of camping area. The highest number of beaches showing negative impacts from fluctuating flows were reported in 1997, at which time flows reached a maximum of 27,000 cfs. Erosion to beaches through years 1998-1999 continued, but effects were not as profound. This decreased magnitude of change through the years since 1996 reflects two geomorphic processes: (1) the increased stability of beach fronts as they attain an angle of repose, and (2) decreased amounts of sediment that can be eroded from beaches. By fall 2001, most beaches that had initially gained area from the HMFs of 2000 had returned to their 1999 condition. These conditions persist today.

Many factors are contributing to long-term erosion of these beaches. Primarily, erosion from medium fluctuating flows that contain low sediment concentrations resulted in conditions that are similar to those before the BHBF of 1996. Secondary processes contributing to erosion are listed here and are ranked according to magnitude of impact: (1) gulling and flash-flooding

from rainfall; (2) beachfront erosion from campers; and (3) wind deflation. Some recreational area loss to is due to encroachment of vegetation, mostly tamarisk and arrowweed.

Campsite area and quality can be greatly enhanced by implementing BHBFs well above power plant capacity, given there is available sediment inputs from the Paria and/or Little Colorado Rivers. Over 80% of guides agreed that camping (useable space and quality) had improved dramatically during the Low Steady Summer Flows (LSSF) that followed the spring HMF of 2000. Moreover, camps that would normally be under water became available for consistent use. By spring 2001, most guides reported worse camping conditions. This is attributed to relatively higher fluctuating flow zones on beaches, rendering lower camping areas difficult to use, and creating eroded beachfronts that presently expose rocks. Lack of a lower camping area will inevitably force camping and recreation into higher zones and into the more fragile xeric desert zone where many archeological sites are located.

The results of 9 years from this monitoring program show that the BHBF of 1996 was the most beneficial management action for replenishing and rebuilding beaches for campsite use. All other subsequent test flows produced small new deposits that only lasted for 7-12 months, at most. These results suggest that any newly deposited sand transported within power plant capacity flows will be quickly eroded if followed by medium to high fluctuating flows. This was evidenced by 3 events: (1) High flows (the high of about 27,000 cfs) following the 1996 BHBF eroded much of the new deposit at all beach sites through the summer of 1997; (2) Medium fluctuating flows following the fall HMF of 1997 stripped away the new deposit entirely by spring 1998; and (3) Medium fluctuating flows following the fall HMF of 2000 eroded most of the new deposit by spring 2001. To date, less than 30% of beaches show evidence of high-elevation sand (above 30,000 cfs line) deposited by the 1996 BHBF.

Annual implementation of HMFs in spring and in fall would help preserve camping beaches by maintaining the beachfront. The WHFF (5,000-20,000 cfs) of 2003 has been the least damaging flow, as beaches did not lose as much beach area over the winter period compared to other winter periods in previous years. The WHFF of 2004, however, did not show encouraging signs of helping to place long-lived beach sediments. WHFFs should not be substituted for beach building and beach maintenance flows. A regimen of BHBFs that exceed power plant capacity followed by low fluctuating flows are needed periodically to rebuild campsite areas above the 30,000 cfs line. However, future BHBFs need to have enough sediment in the system so as to preserve Marble Canyon beaches and lessen impacts on lower beach areas (below the 20,000 cfs line) system wide.

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