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

Executive Summary of Results for Years 1996 - 2001

The Adopt-a-Beach (AAB) program has completed its sixth year as a study that monitors annual 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.

Adopt-a-Beach is a program of repeat photography that documents 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 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. 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 1000 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 a change in camping beach area and quality.

The most recent high flow experiments were conducted during spring and fall of 2000. Habitat maintenance flows (HMF) of 30,000 cfs were released for 4 days in early May and again in early September. The intervening period was subjected to moderately high fluctuating flows of 16,000-18,000 cfs throughout May, followed by low steady summer flows (LSSF) of 8000 cfs until early September.

The spring HMF showed that 63% of studied beaches (n = 32) gained area within the 20,000 to 30,000 cfs zone. Most of the changes, determined from photographs, resulted in extension of beachfront area toward the river. About half of the beaches showed a small increase in elevation of about 0.10 meters (as estimated from reference points in photos). The rest of beaches remained the same size and only one beach decreased in area. The highest percent of increases (87%) appeared in the Marble Canyon reach (n = 8), although the other reaches showed increases of 50% and 65%, respectively. Many guides reported that their adopted beaches gained new sand primarily below the 20,000 cfs line. Morphological changes resulted in new low-elevation benches and sand bars that covered pre-existing gravel-and-boulder bars.

The fall HMF did not show as much gain above 20,000 cfs compared to the spring HMF. Fifty-five percent of beaches (n = 20) gained campsite area. Mostly, beach areas increased if they had been previously eroded by the high fluctuating flows (3 1/2-week duration) immediately following the spring HMF, or if recent rainfall from the monsoon season caused flash flooding and gully cutting. Beaches not affected by these factors showed very little change in beach area after the fall HMF. In assessing cumulative changes from both HMFs, Muav Gorge showed the highest percentage of increases.

Observations from the 2000 summer season show an overall increase in beach size from the previous years of 1997-1999 but a substantial decrease from the BHBF deposit of 1996. This result implies that HMF releases help to maintain an acceptable beach size for camping when low steady flows or low fluctuating flows are imposed. However, they are inadequate for maintaining overall beach elevation above the 30,000 cfs line.

In analyzing longevity of the HMF deposits , over 70% of beaches had lost most of this deposit by September of 2001. Decreases in beach size were reported to be primarily impacts from fluctuating flows, secondly impacts from rain, and thirdly impacts from people.

The longevity of the BHBF deposit since 1996 shows varying results. As of fall 1999, 59% of camps had returned to their pre-BHBF condition (O'Brien and others 2000). Results of the 2000 HMF flows showed that 78% of beaches were again larger than their pre-BHBF condition, within the 20,000 to 30,000 cfs zone. Then by September 2001, 45% of the adopted beaches had returned to conditions similar to that before the BHBF. Campsite areas within the 30,000 and 45,000 cfs zone have continued to decrease overall throughout the years. At least 30% of beaches have apparently developed quasi-stable deposits within this zone, as they show no to very little change. The status of 20% of beaches could not be determined due to inconsistent data.

The Low Steady Summer Flows (LSSF) provided more diverse camping, both upstream and downstream of campsites within the study set, and within the campsite itself, according to guide response for 31 beaches. The combination of the HMF followed by the LSSF proved beneficial to 78% of all studied beaches.

These results contrast with those of the 1999 river season, during which a high percentage of beaches lost area due to flash floods, and a small percentage were affected by fluctuating flows. Before 1999, beaches had been eroding at a decreasing rate, mostly from fluctuating flows, as reported by guides and supported by visual cutbank retreat in photographs (O'Brien and others 2000). Typically, rapid adjustment of newly aggraded beaches to fluctuating flows following a high release leads to initial high rates of erosion. These rates then fall off over time (Hazel and others 2001). According to many guide remarks, campsite beaches were "primed and ready" for the HMF and LSSF regime of 2000. Then by September 2001, guides reported that camping had become harder on about 50% of the beaches. This loss of campsite quality directly relates to beach erosion. Other reported influences include tamarisk encroachment .

These results suggest that any newly deposited sand will be quickly eroded if subsequent high fluctuating flows are released from Glen Canyon Dam. This was evidenced by 3 events: 1) High steady flows (of about 27,000 cfs) following the 1996 BHBF eroded much of the new deposit at all beach sites through the summer of 1996 and 1997; 2) High 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, at least 30% of beaches show evidence of high-elevation sand (above 30,000 cfs line) deposited by the 1996 BHBF. However, the amount of sand appears to be diminishing from year to year. Annual implementation of HMFs in spring and in fall would help preserve this deposit by maintaining the beachfront. A regimen of Beach Habitat Building Flows followed by low fluctuating flows is 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) systemwide.

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