

**DRAFT RESEARCH AND MONITORING PLAN FOR AN
ADAPTIVE MANAGEMENT PROGRAM
EXPERIMENTAL 45,000 cfs BEACH/HABITAT BUILDING FLOW
FROM GLEN CANYON DAM, JANUARY TO JULY 1998**

A 45,000 cfs beach/habitat building-flow (BHBF) from Glen Canyon Dam may be considered by the Adaptive Management Work Group for January-July 1998. This experiment would be used to test and confirm existing and new hypotheses surrounding the use of dam releases to manage sediment distribution and ecosystem resources in Glen and Grand canyons. This document outlines the research, monitoring, and flow-related synthesis activities planned before, during and after the BHBF event, and the budget associated with those activities.

The duration, magnitude and ramping of the BHBF hydrograph is subject to discussion by the Technical Work Group (TWG) and the Adaptive Management Work Group (AMWG). Based upon information developed from the 1996 BHBF, 2 to 4 days of high flows are expected to be sufficient to balance benefits to sediment, biological and cultural resources (Figure 1). Prior and subsequent constant flows are recommended for aerial photographic purposes, at the lowest normally-achieved level of pre-event fluctuating flows. Field studies are planned prior to, after and six months following this BHBF.

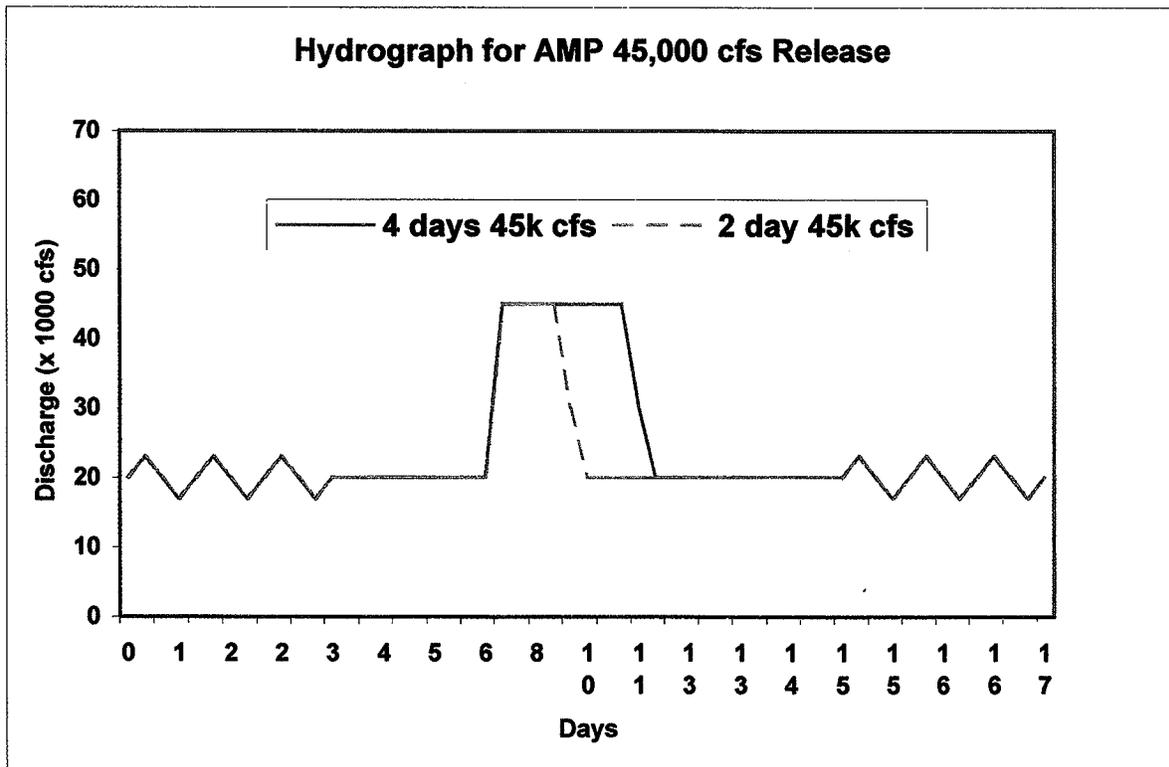


Figure 1: Potential hydrograph for an experimental 45,000 cfs BHBF from Glen Canyon Dam.

The duration of the BHBF may be determined in real time by sediment and drift researchers stationed at three sites: in Marble Canyon, upstream from the mouth of the Little Colorado River and near Phantom Ranch. Sediment deposition rates and Secchi depth analyses or other appropriate sediment or turbidity tests, may be used to evaluate when a reduction in sediment and drift transport occurs. Concurrence on these measurements among the field researchers will signal the conclusion of the experiment.

Ongoing monitoring efforts will be incorporated to minimize the research costs associated with this BHBF. Research and monitoring activities will be coordinated and logistically supported by GCMRC, pending discussions by the TWG and AMWG, and approval of proposals. Given the short time frame surrounding planning and implementation of research activities for this BHBF, GCMRC will not pursue a competitive funding approach to accomplish research and monitoring tasks, but will use a variety of mechanisms, including modification of existing contracts and in-house expertise.

Results of the monitoring and research activities conducted in 1996 are the basis for developing the hydrograph proposed for this BHBF. The subset of monitoring and research activities presented here will ensure sufficient information to assess the effects of this hydrograph. In addition, each project undertaken here will also include a review and analysis of other alternative flow regime impacts (high or low, constant or fluctuating) on each resource category. This information will be used by the Center in an existing science review of impacts of differing flow regimes on resources. This assessment will be used to plan subsequent future research on impacts from differing flow regimes.

The following research and monitoring studies are suggested as appropriate for this event, pending discussions by the TWG and AMWG.

- 1) Fixed wing aerial photography during the BHBF, and associated analyses, will provide a precise, system-wide documentation of stage level. Protocol comparison between the traditional Reclamation videography and multi-spectral videography prior to and after the BHBF, and associated analyses, will permit evaluation of existing data and potential new remote sensing analyses.

- 2) Changes in the limnological structure of Lake Powell will be assessed by measurements upstream, in and downstream from the dam before, during and after the BHBF.

- 3) Flow and/or sediment concentration and storage data will be provided by monitoring of mainstream (including a temporary gage in near mile 40) and tributary (Paria and Little Colorado rivers) stream gage, and by monitoring of established mainstream cross-sections.

- 4) A subset or all of the 34 sand bars under intensive study since 1990 will be monitored before and after the BHBF, and grain size and stratigraphy will be measured following the BHBF.

5) High-resolution channel bathymetry (SuperHydro 10x10 m coverage), sand storage in channel margins, and velocity is proposed in selected reaches and at selected sites in Glen, Upper and Lower Marble Canyon and Eastern Grand Canyon.

6) Some potential rapid bar degradation under continuing high flows following the BHBF will be monitored and refining of stereo-view daily photographic analyses is proposed.

7) Pre- and post-BHBF water chemistry, drift and benthos data is recommended to evaluate nutrient and aquatic food base impacts in lower Lake Powell and the downstream river.

8) Monitoring the impacts of the BHBF on native fish populations and their habitats is necessary, pending discussion with Reclamation and the U.S. Fish and Wildlife Service (FWS).

9) Trout population, redd disturbance, and diet analyses are recommended to determine commercial fishery impacts.

10) Endangered Kanab ambersnail habitat and population monitoring and mitigation is required, pending discussion with Reclamation and FWS.

11) Endangered southwestern willow flycatcher habitat and population monitoring is required, pending discussion with Reclamation and FWS.

12) Monitoring of riparian biota is necessary to determine longer-term impacts on native fauna.

13) Monitoring of sedimentation of arroyo channels in the vicinity of archaeological sites will be undertaken.

14) Tribal monitoring of cultural resource sites at risk will be undertaken.

15) Safety, recreational and other socio-economic analyses are necessary to respond to river management issues.

16) Results of the review and analysis of flow impacts will be compiled for each research category and used to develop an integrated plan.

Table 1. Draft field research and monitoring activities budget¹ for an experimental 45,000 cfs flow event, March/April 1998.

Scientific Activities	Estimated Individual Activity Costs (x \$1000)	Estimated Total Cost By Activity Area (x \$1000)
General Activities:	\$140	\$140
Aerial Photography and Analyses		
1 fixed wing flight during the event	\$70	
Comparative videography (pre and post)	\$70	
Flow and Sediment:	\$300	\$300
Lake Powell analyses	\$30	
Streamgage analyses and cross-sections	\$150	
Mainstream flow and sediment at LF, LCR, PR, DC, new gage; and the Paria R and LCR		
Sandbar erosion and stratigraphy	\$75	
Bathymetry, velocity and channel storage	\$20	
Steroview oblique analyses, daily photography	\$25	
Biology:	\$210	\$210
Drift, benthos and nutrient dynamics	\$75	
Native fish (distribution, flow experiments)	\$35	
Native fish habitat	\$15	
Trout (redd distribution, diet, electroshocking)	\$25	
Riparian vegetation and biota	\$30	
Kanab Ambersnail	\$15	
Southwestern Willow Flycatcher	\$15	
Cultural/Socioeconomic:	\$140	\$140
Sedimentation in arroyo channels	\$40	
Tribal monitoring of cultural sites	\$60	
Economic Analyses	\$40	
Logistics:	\$300¹	\$300
Pre-BHBF (5 trips)	\$130	
During event	\$40	
Post-BHBF (5 trips)	\$130	
GRAND TOTAL	\$1090	\$1090

