

Glen Canyon Dam Adaptive Management Work Group
Budget Agenda Item
8:05 am, April 30, 2009

Additional Information, Grand Canyon River Guides Motion #2:
Test and refine models of sediment transport under various monthly release patterns.

*Note: The proposed motion language has been slightly amended from what was sent out
in the original AMWG agenda and packet.*

Action Requested

√ **Motion requested.** The following motion is proposed by Grand Canyon River Guides. More information on this motion is included under “Background Information,” below.

AMWG recommends to the Secretary of the Interior that during FY10-11, an equalized monthly volume experiment be conducted to: test and improve sediment transport models; and, determine if sediment can be sustained and near shore habitat stabilized for the benefit of the ecosystem.

Presenter

Andre Potochnik, Grand Canyon River Guides

Previous Action Taken

√ By TWG:
At its early 2009 meeting GCMRC presented the preliminary report of modeled results.

Relevant Science

¹ Grand Canyon Monitoring and Research Center, 2006, Protocols Evaluation Program (PEP-Seds III), Final report of the physical resources monitoring peer review panel October 6, 2006
U.S. Geological Survey Field Center, Flagstaff, AZ.

² Lovich, S. and T.S. Melis, 2007, The state of the Colorado River ecosystem in Grand Canyon: Lessons from 10 years of adaptive ecosystem management. Intl. J. River Basin Management; v.5:3, pp. 207-221.

³ Schmidt, J.C., D.J. Topping, P.E. Grams, and J.E. Hazel, 2004, System-wide changes in the distribution of fine sediment in the Colorado River corridor between Glen Canyon Dam and Bright Angel Creek, Arizona. Final Report to Grand Canyon Monitoring and Research Center, Co-operative agreement 1425-98-FC-40-22640, 117 p.

⁴ United States Geological Survey, 2006, Assessment of the Estimated Effects of Four Experimental Options on Resources Below Glen Canyon Dam Draft Report dated Oct. 27, 2006; Attachment 10a, p. 5-6 at the following link:

<http://www.usbr.gov/uc/rm/amp/twg/mtgs/06nov08/index.html>

⁵ Wright, S.A., J.C. Schmidt, T.S. Melis, D.J. Topping, and D.M. Rubin, 2008, Is there enough sand? Evaluating the fate of Grand Canyon sandbars. GSA Today, v.18:8, pp. 4–10.

Background Information

Scientists emphasize the importance of smoothing and/or eliminating the abrupt changes in monthly volumes released from the dam to reduce sand bar erosion and move toward a sustainable sediment flux through the CRE ^{2,5}. Preliminary results of recent modeling by GCMRC shows a 20% reduction of sand transport with equalized monthly volumes (EMV) compared to monthly volumes as released in WY2008. The large numerical uncertainties around this number can be reduced with an experiment that actually measures the results. An EMV experiment could be conducted following the next HFE as a direct comparison with the 2008 HFE and its subsequent releases. Or, a different EMV experiment could be designed by the GCMRC in consultation with the TWG to better understand its usefulness for sustaining fine sediment in the CRE. This experiment would not affect the annual water volume transferred between the two reservoirs as determined by existing criteria.

Below is supporting language excerpted from two important GCMRC reports.

Strategic Science Questions developed cooperatively by scientists and managers as a result of the Knowledge Assessment Workshops in 2005.

“4.1 Physical Resources

- 4.1.1 Is there a “Flow-Only” (non sediment augmentation) operation that will restore and maintain sandbar habitats over decadal time scales?
- 4.1.2 Is there an optimal strategy for BHBF implementation to manage tributary inputs on an annual to inter-annual time scale?
- 4.1.3 What are the short-term responses of sandbars to BHBFs?
- 4.1.4 What is the rate of change in eddy storage (erosion) during time intervals between BHBFs?
- 4.1.5 How does the grain-size distribution of the deposits affect sandbar stability? Main channel turbidity?
- 4.1.6 What are the effects of ramping rates on sediment transport and sandbar stability?
- 4.1.7 Can we develop a relationship between suspended sediment concentration and turbidity to support fisheries research?”

Grand Canyon Monitoring and Research Center, 2006, Protocols Evaluation Program (PEP-Seds III)

“The panel stresses the need for more experimental releases in order to assess the adequacy of any model that program scientists use to predict changes in bar distribution and size. Continued experimental flows are critical to resolving the complex uncertainties of bar dynamics in terms of how variations in flow magnitude, duration, and timing influence sand transport and storage. The lack of experimental flows constrains the ability of scientists and managers to learn and predict because experimental flows are not solely research tools, but also function as monitoring and management tools that reflect

the outcome of alternative strategies of dam management. Monitoring of system responses to experimental flows will allow identification of flexibility within the river ecosystem with respect to parameters such as ramping rates and daily fluctuations. Experimental flows may provide a better, faster, and cheaper alternative than using a sediment pipeline to restore declining sand bars within the Colorado River ecosystem. Because scientists studying this ecosystem are not yet able to specify the characteristics of experimental floods necessary to preserve or restore sand bars, experimental flows remain critical to monitoring how the system responds to high flows. The crux of adaptive management is to experiment, monitor, design management, and experiment again until the desired state is achieved and, in the Colorado River ecosystem, this process requires experimental flow releases.”

Motion #2

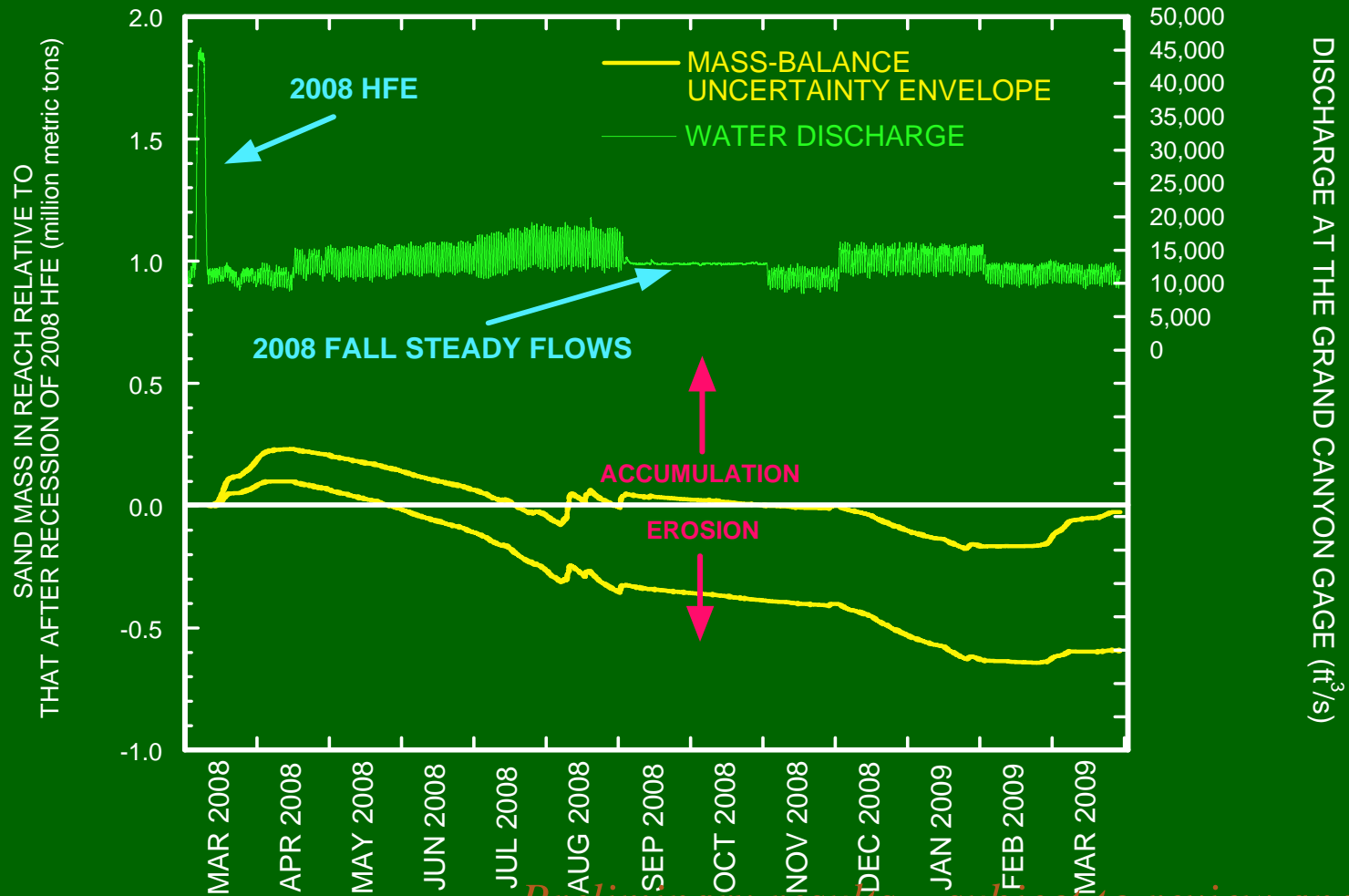
AMWVG recommends to the Secretary of the Interior that during FY10-11, an equalized monthly volume experiment be conducted to: test and improve sediment transport models; and, determine if sediment can be sustained and near shore habitat stabilized for the benefit of the ecosystem.

Stable monthly releases may:

- Test and refine sediment transport models
- Reduce rate of sand bar erosion
- Stabilize & warm near shore habitat
- Increase time for aeolian sand transport to archaeological sites
- Make more campsite area available

Mass Balance Sand Budget Between the Lees Ferry and Grand Canyon Gages, Mar. 2008 – Mar. 2009

MASS-BALANCE SAND BUDGET BETWEEN LEES FERRY AND THE GRAND CANYON GAGE



Preliminary results – subject to review and revision

Sand bar change-short term

Some visual examples, May to July,
after High Flow Experiment of
March, 2008

Trinity camp RM 92R



- 5/13/08



- 7/30/08

Talking Heads camp RM 132L



- 5/16/08



- 7/12/08

Back Eddy camp RM 136L



- 5/17/08



- 8/3/08

RM 160R camp



- 5/18/08



- 7/13/08

Upper National camp RM 165L



■ 5/19/08



■ 7/14/08

RM 202R camp



- 7/16/08



- 8/6/08

Stable monthly volumes may:

- Reduce need for frequent BHBFs
- Stabilize near shore habitat for chub
- Mitigate archaeological site erosion
- Provide more stable and predictable camping beaches



Thank you

Grand Canyon River Guides Inc.

Officers and Board of Directors,

AMP guys Andre Potochnik, John O'Brien, and Matt
Kaplinski