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

Additional Information, Grand Canyon River Guides Motion #1:
Prepare for a possible high flow experiment in FY10-11

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 a high flow experiment be conducted if and when sediment-enriched conditions are reached, as described in U.S. Geological Survey, 2006.

Presenter

Andre Potochnik, Grand Canyon River Guides

Previous Action Taken

√ By TWG:
At its early 2009 meeting, discussion with GCMRC on budgeting for the next experimental flow.

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

For motion #1: Preparation for a next potential high flow experiment in WY 10-11.

The AMWG and the science community recognize the critical importance of sand bars as an essential ecosystem component for many natural resources, including, near shore habitat for native fishes, availability of nutrients for the aquatic food base, camping beaches for recreational users, and reducing the erosion of archeological sites. It has been shown that high releases from the dam can rebuild sandbars most effectively when conducted under sediment-enriched conditions [5]. Although much has been learned from previous experiments, we still do not know the optimal preconditions to conduct a future high flow experiment, nor do we know the best hydrograph for bar building, nor do we know the optimal flows for conserving the new sand bars once they are built.

A large influx of tributary sediment below the dam will certainly occur in the future [3]. Decisions will be made on whether to run a high flow experiment. It is far more cost-effective to complete all necessary activities prior to an anticipated high flow experiment [2]. The AMP should prepare in advance for the following activities; GCMRC science planning, AMP budgeting, NEPA compliance, and NPS permits. Following the next occurrence of sediment enriched conditions, a high flow experiment can be conducted efficiently to test and refine our knowledge in furtherance of AMP ecosystem goals. The TWG in consultation with GCMRC can provide additional refinements to the next high flow experiment that would advance our understanding of this important tool [2].

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#1

AMWG recommends to the Secretary of the Interior that during FY10-11 a high flow experiment be conducted if and when sediment-enriched conditions are reached, as described in U.S. Geological Survey, 2006

Why plan for another ‘flood’?

-Sand bars are crucial for fish habitat
-High flows needed to sustain sand bars
-Sediment trigger conditions will occur
-Must plan for:
    -AMP budgeting
    -BOR compliance
    -GCMRC/TWG science plan
    -NPS permits
-Accomplish goals of AMP and GCPA of 1992

Sand Bars are Important Elements in the Adaptive Management Program Because...

Geomorphic Framework – fundamental part of the pre-dam river
Terrestrial Habitat – substrate for riparian vegetation & assoc. fauna
Aquatic Habitats – nursery habitats that may support native fish
In-Situ Preservation – most archeological sites buried in sand/silt
Recreational Campsites - for boaters and backpackers

USGS science for a changing world

EXAMPLE OF BEACH LOSS
The Camping Beach Downstream From Tapeats Creek (River Mile 133)

1952 (Kent Frost). Everyone would want to camp here now.

1995. The beach reappeared briefly after the 1996, 2004, and 2008 floods.

USGS science for a changing world

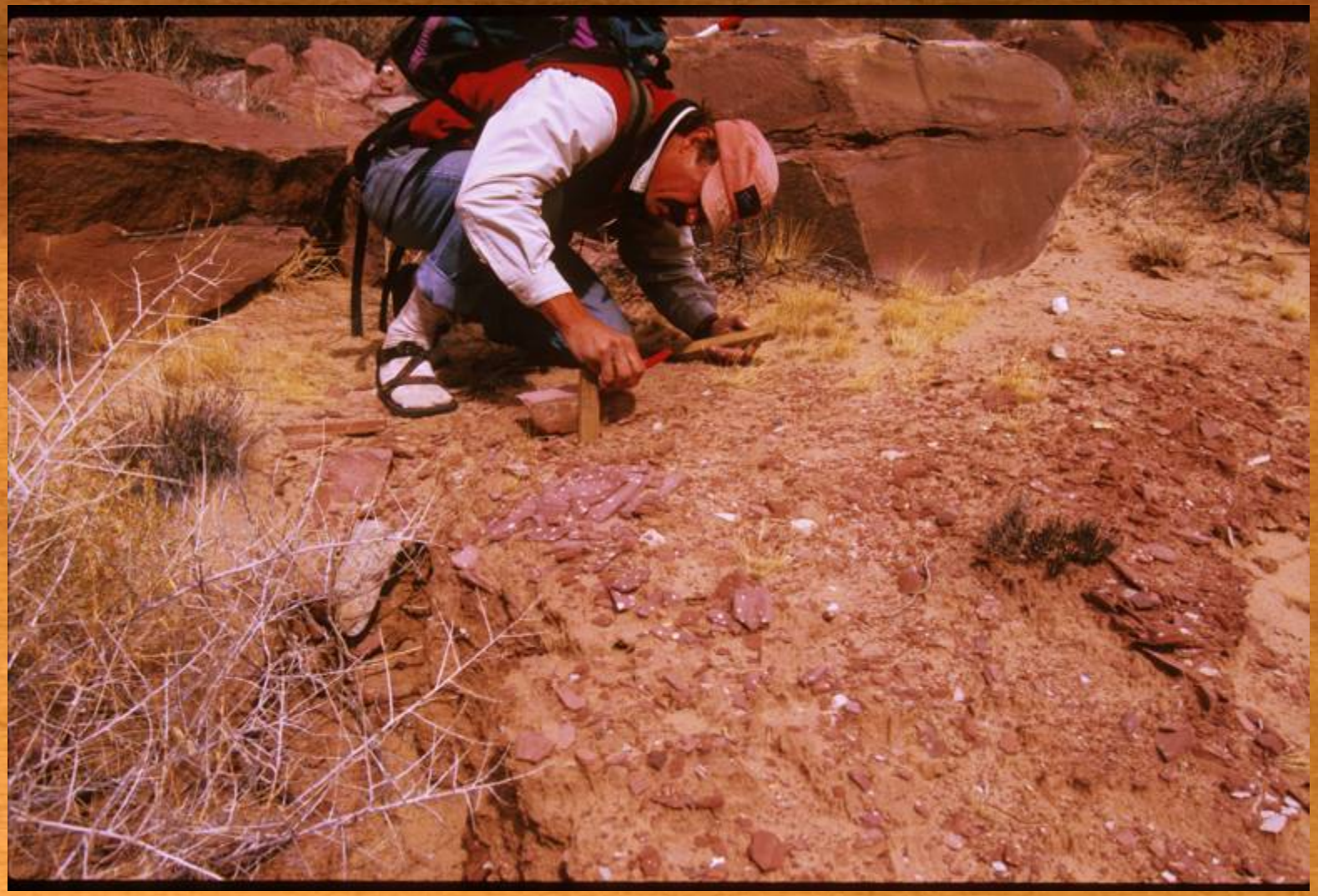
Natural landscape feature
Expansive pre-dam sand bars

Backwater habitat for endangered fish

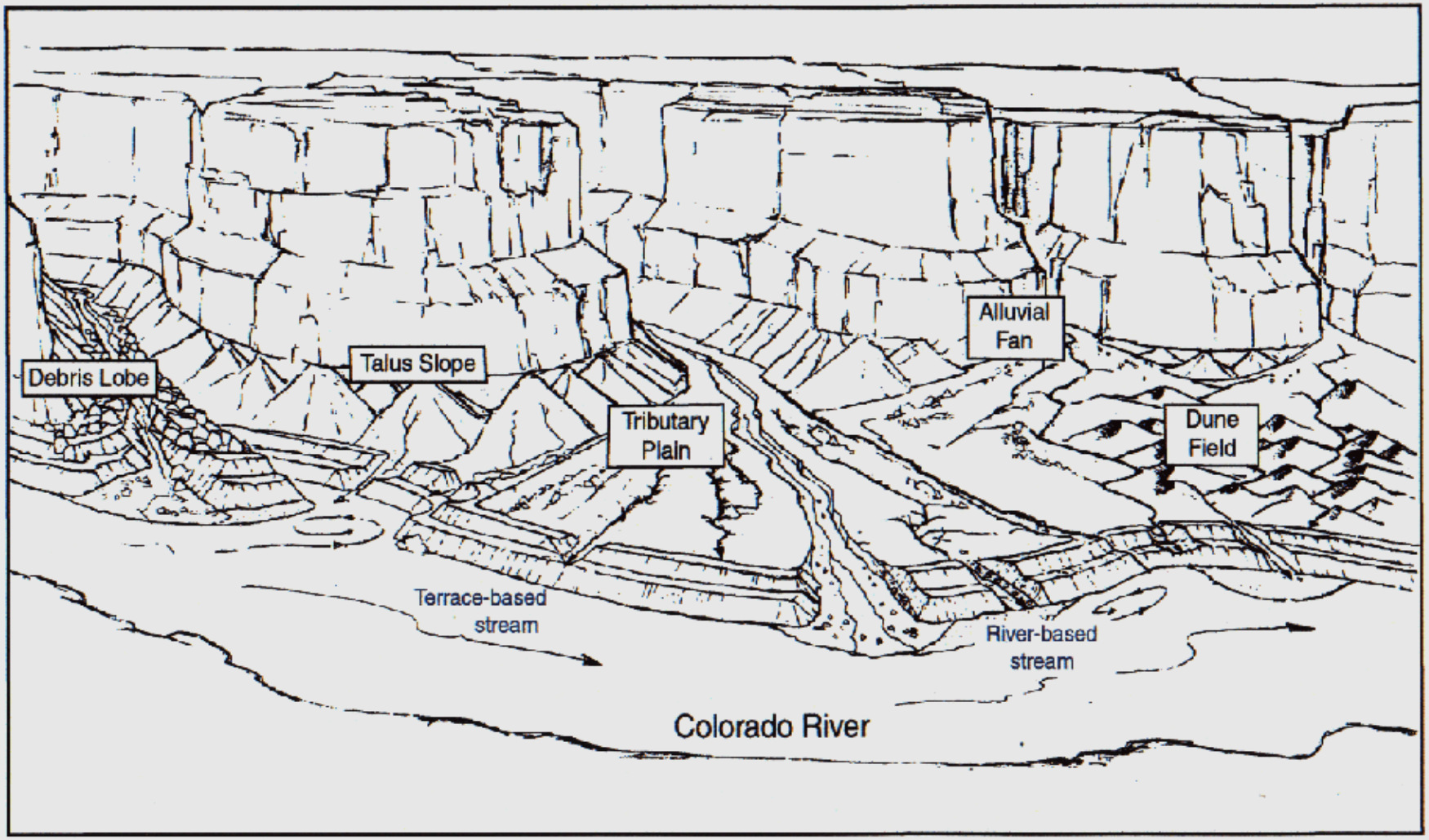
Terrestrial habitat for native species

Camps for hikers and boaters

Preservation of archeological sites



Geomorphic Settings



Illustrated by Gary O'Brien

Multi-use sand bars

High flow releases needed to:

-rebuild backwater fish habitat

-protect cultural resources

-store nutrients for aquatic food base

-provide adequate camping beaches

Mass Balance Sand Budget Between the Lees Ferry and Grand Canyon Gages, Oct. 2006 – Mar. 2009