Glen Canyon Dam Adaptive Management Work Group
Agenda Item Information
December 5-6, 2006

Agenda Item

Beach/Habitat Building Flow in FY2007

Action Requested

√ Motion requested:
AMWG recommends that the Secretary of the Interior implement a BHBF in the timeframe from mid-January 2007 to March 2007 in accordance with a science plan that will be developed by GCMRC, approved by the TWG, and funded from the experimental fund.

Presenters

Ted Melis, Deputy Chief, Grand Canyon Monitoring and Research Center
Kurt Dongoske, Chair, Technical Work Group

Previous Action Taken

√ By AMWG: During the September 2006 AMWG conference call, the following motion to add a BHBF to the FY2007 budget failed by a vote of 4 yes, 17 no, and 0 abstain.
Add a BHBF in 2007, providing the sediment trigger is met. Cost $900K - $1M. Move this amount from the experimental fund.

√ By TWG: By a vote of 14 yes, 11 no, and 0 abstain, the TWG passed the following motion at its November 2006 meeting:
The TWG recommends to the AMWG that the Secretary of the Interior implement a BHBF in the timeframe from mid-January 2007 to March 2007 in accordance with a science plan that will be developed by GCMRC, approved by the TWG, and funded from the experimental fund.

Relevant Science

Please see the information related to the Sediment portion of the Experimental Research Update Agenda Item Form.

Background Information

The GCMRC provided a briefing to the TWG at the November 9, 2006 meeting about sediment results from the November 2004 High-Flow test, as well as updated information on recent sand inputs from tributaries below Glen Canyon Dam. Additional information was provided about how periodic flood disturbance might condition physical habitats in near-shore areas (backwater maintenance) for possible benefit to native fishes, potentially benefit the aquatic food web through periodic scour and deposition of organic detritus and supply new sand bar deposits for redistribution by wind to cultural preservation sites along the river ecosystem. Following the briefing and discussion, the TWG approved a motion recommending that AMWG consider a BHBF

test during FY2007 on the basis of GCMRC planning and further approval by TWG. The GCMRC now provides additional science planning and budget information related to this topic as the AMWG considers the recommendation forwarded to them by the TWG.

Beach/Habitat Building Flow in FY2007

Overview of Science Recommendations
&
Status of Science Planning

Presented to the Glen Canyon Dam Adaptive Management Workgroup

09:15 - 09:30

December 6, 2006

Sand Bars are Important Elements in the River Restoration Program Because...

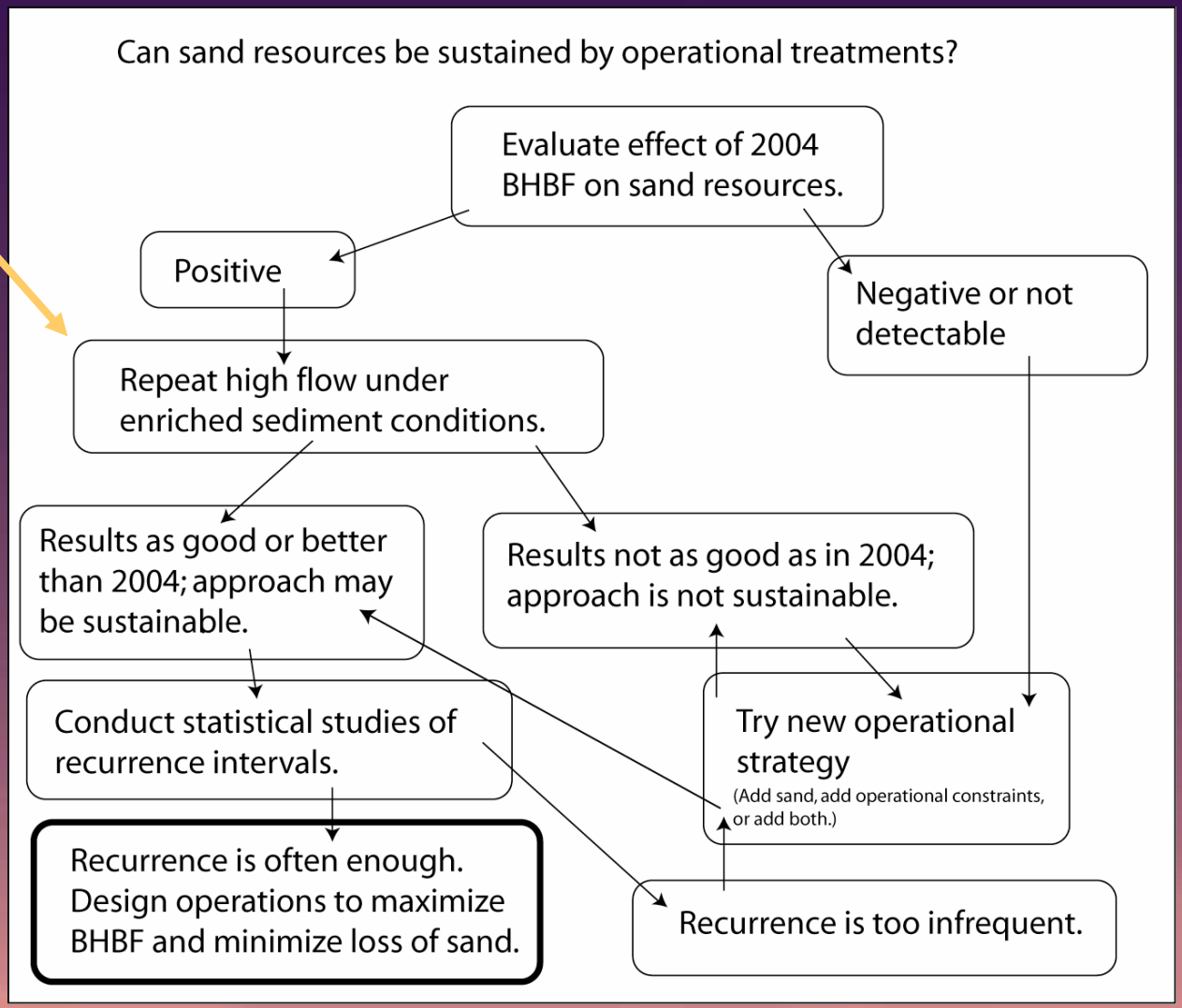
- **Geomorphic Framework** – fundamental part of the pre-dam river
- **Terrestrial Habitat** – substrate for riparian vegetation & assoc. fauna
- **Aquatic Habitats** – nursery habitats that may support native fish
- **In-Situ Preservation** – most archeological sites buried in sand/silt
- **Recreational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

USGS science for a changing world

Can Colorado River Sand Bars be Restored/Maintained by Downstream Sand Inputs + Managed GCD Flows?

Taking a Strategic, Science Based Approach to the Question of BHBFs

Scientists Currently Recommend



BHBF 2007 – Will more sand enrichment result in more sandbar habitat restoration?

Channel is more greatly enriched than 2004

- Will sandbar growth from 2004 and 2007 be cumulative?
- What will be the result of “conditioning” operations prior to BHBF?
- What is cumulative influence of increased water temperatures, mechanical removal of exotic fish and near-shore habitat conditioning on humpback chub?
- Will wind transport new sandbars from near-shore to preservation sites?
- How will flood disturbance influence food web and fishes over short-term?

pre-2004 flood

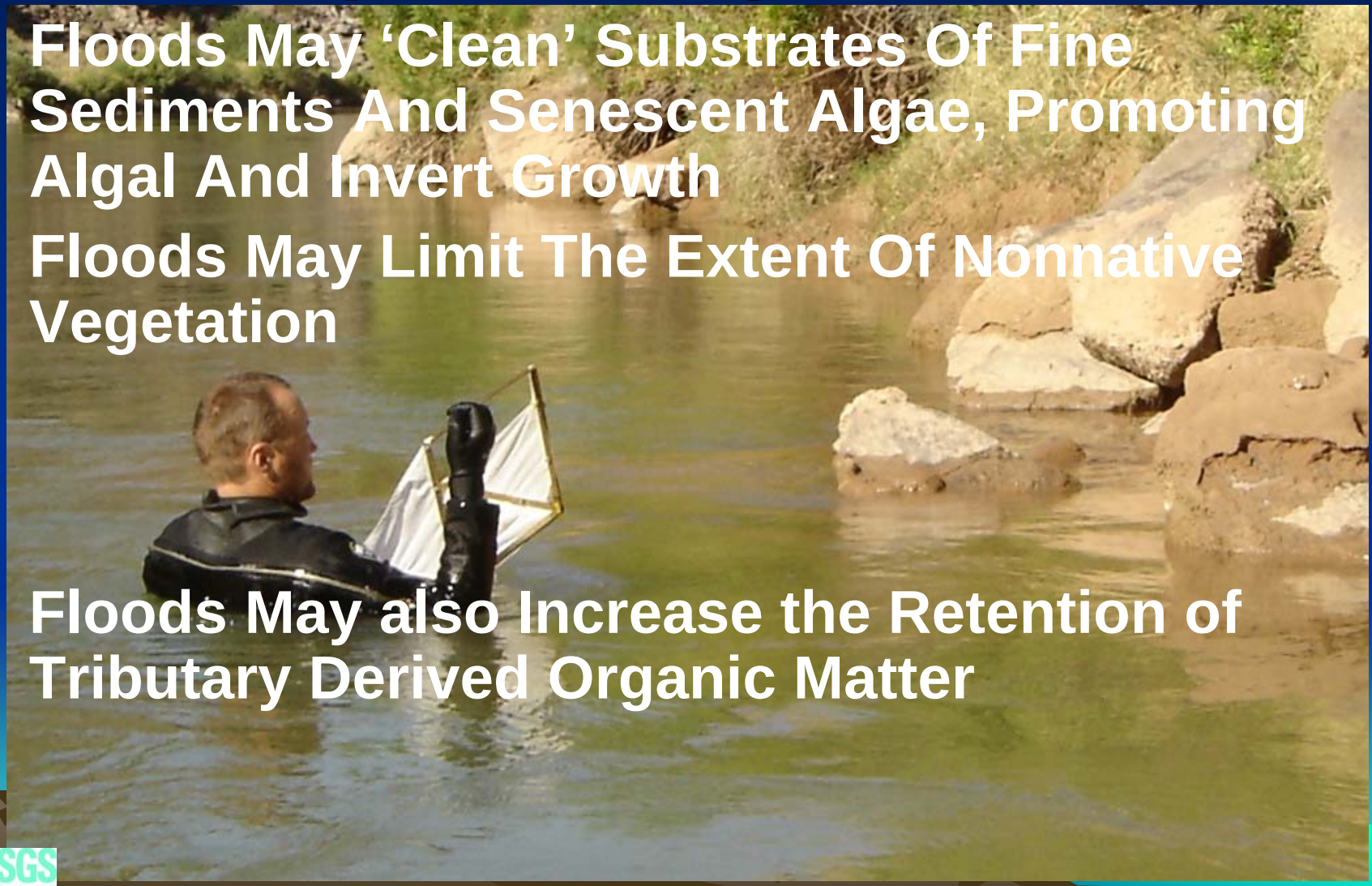
post-2004 flood

Native Fishes

Sand Bars And Backwaters May Benefit Native Fishes, Especially Young Fish

Floods May Displace Nonnative Fishes

Aquatic Food Base and Riparian Vegetation

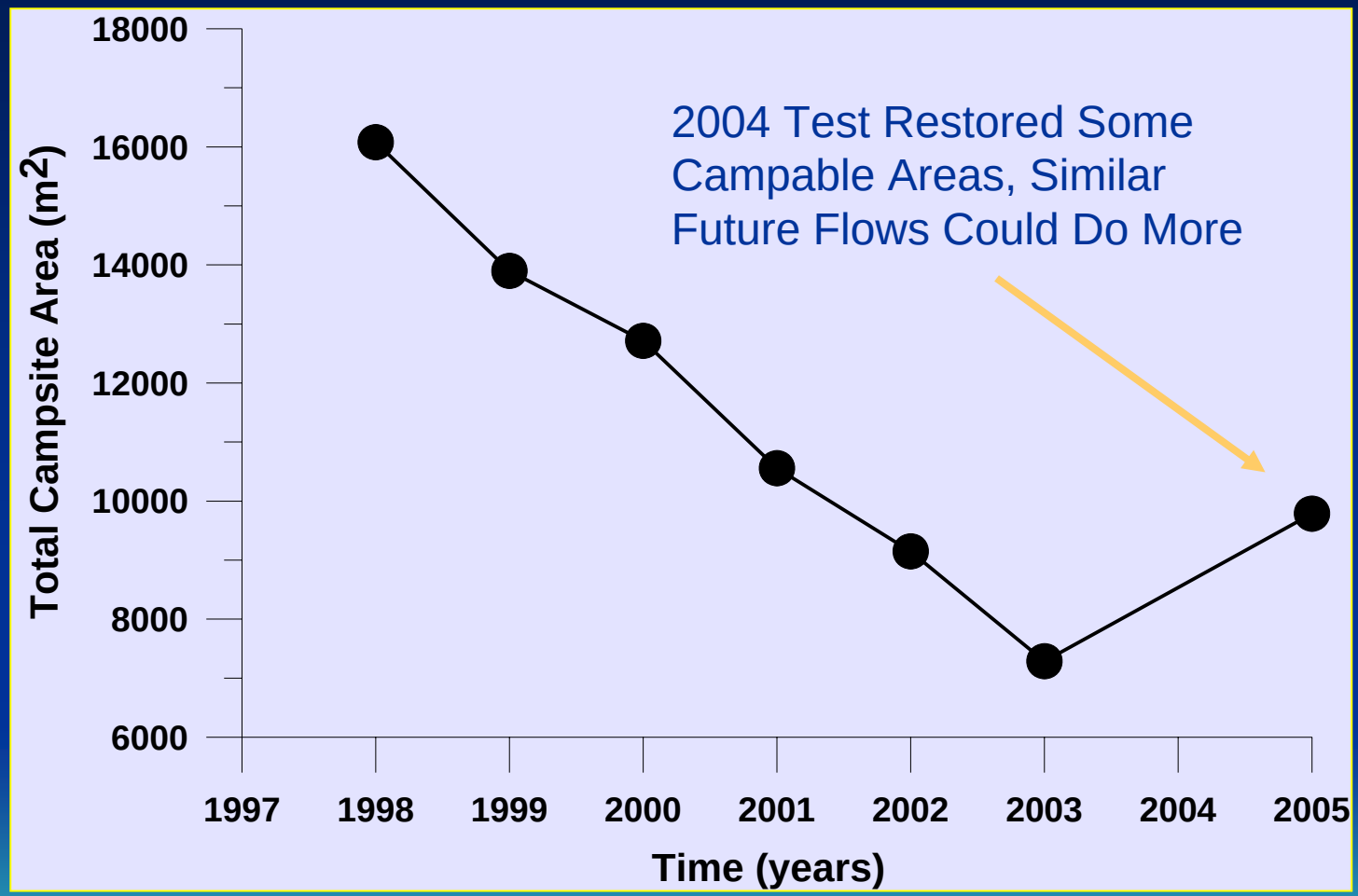


- Floods May 'Clean' Substrates Of Fine Sediments And Senescent Algae, Promoting Algal And Invert Growth
- Floods May Limit The Extent Of Nonnative Vegetation
- Floods May also Increase the Retention of Tributary Derived Organic Matter

Carbon Inputs to Downstream Ecosystem

Source 	Annual Production/Inputs (metric tons)
Particulate Organic Drift from LF (Kennedy, unpublished data)	10,000
Litter inputs from riparian zone (Ralston, unpublished)	520
Algal Production Downstream (estimated from Stevens et al. 1997)	2000
Paria River on Oct 6-7, 2006 (Kennedy, unpublished data)	33,000

Sand Bar Erosion Linked to Recreation Campsite Loss



Without Enriched BHBFs - Archaeological Sites In The Colorado River Ecosystem Continue To Deteriorate Owing To Combined Effects Of:

- **Ongoing loss of sediment from the system**
- **Insufficient high elevation sediment-replenishment**
- **Weather-induced erosion, and**
- **Continuing visitor impacts (social trails, artifact loss, vegetation damage, soil compaction, etc.)**

Additional Benefit: Suppression Of Sand Export By BHBF

• Coarsening of the channel bed and lower parts of bars during BHBFs can reduce the subsequent transport of sand in the Colorado River by about 80% over timescales of months (Rubin et al., 1998, *Geology*; Topping et al., 2000, *WRR*; Rubin and Topping, 2001, *WRR*; Topping et al., in press, *Sedimentary Geology*)

• Sand supplied by tributaries after BHBFs is retained longer than if no BHBF occurred.

CONCLUSIONS

• Current sand enrichment makes 2007 an ideal opportunity to conduct an experiment and utilize limited sand resources to meet managers' goal.

• This situation occurs on average once every 5 years; the last time this level of tributary sand input from the Paria River occurred was 1998.

• Properly timed controlled floods from GCD are the only known flow option for sand bar habitat restoration.

• The fate of new sand inputs without BHBFs is known to be ongoing export and erosion of existing sand bars

SCIENCE RECOMMENDATIONS

- Use new suspended-sediment technologies to monitor fate of recent sand inputs under MLFF winter operations to determine downstream distribution & attempt to combine effort with modeling using new 1-D sand-transport model

- Consider replication of 2004 experimental BHBF hydrograph, but in January to March timeframe, after new sand is more optimally distributed throughout experimental reaches

- Integrated streamlined field science for sediment with biological and socio-cultural field teams

- Evaluate sediment results and revisit strategic flow diagram

INTEGRATED SCIENCE PLANNING FOR BHBFs

- Sediment scientists have been contributing to BHBF science plan revision process since December 2005, while experimental options were developed

- Biological program has also initiated BHBF planning activities in support of experimental planning to better integrate fishery, food web and terrestrial elements of future testing

- Socio-Cultural program has been evaluating recreation and aeolian sediment study results and integrating with sediment program scientists

- Monthly Integrated Science Program meetings have occurred since 2004 at GCMRC to identify new integration strategies

- GCMRC staff are consulting with science advisors and cooperators on both field and laboratory experimental options tied to flood disturbance

Draft Timeline for Implementing 2007 BHBF

- December through January - AMWG recommendation, AOP consultation, DOI Approval

- January 2007 - GCMRC develops integrated science plan for TWG review and approval

- January through February - NEPA Compliance identified and completed, as well as NPS permitting for logistical support

- January through March – Ongoing monitoring of suspended-sediment flux with monthly updates to BuRec and TWG

- February through March – pre-test field studies in preparation for flow test

- March 2007 - Implementation of high-flow test

- July 2007 - preliminary sediment results & others in fall

EXPERIMENTAL FUNDS

- Currently about $900,000 available for experimental flow tests from FY 2006-07 budgets

- Imagery to assess persisting habitat changes to be flown in spring 2009

- Assessments of near-shore changes to occur in 2009-10, compared with 2002 and 2005 imagery

- Additional experimental funds to be added in FY 2008-09 budgets/work plans

- 2009 Remote Sensing Imagery is funded separately from long-term monitoring, but supports experimental evaluations

- Similarly, sediment flux monitoring supports BHBF experimental “events”

•Baseline measurements for sand bars were made in October