Glen Canyon Dam Adaptive Management Work Group
Agenda Item Form
September 20, 2017

Agenda Item

2017 High Flow Experiment Update

Purpose of Agenda Item

To increase understanding of the process to evaluate whether to conduct a high-flow experiment (HFE) in fall 2017.

Action Requested

Information item only; while we will answer questions, no action is requested.

Presenters

Katrina Grantz, Adaptive Management Group Chief, Upper Colorado Region, Bureau of Reclamation
Scott VanderKooi, Chief, Grand Canyon Monitoring and Research Center (GCMRC)

Previous Action Taken

- ✓ By the Secretary of the Interior: In December 2016, the Secretary signed the Long-Term Experiment and Management Plan (LTEMP) Record of Decision (ROD), which included a High Flow Experiment Protocol (http://ltempeis.anl.gov/documents/docs/LTEMP_ROD.pdf, Appendix C, starting on page 62 of the PDF).

Relevant Science

LTEMP EIS, ROD and High Flow Experiment Protocol (http://ltempeis.anl.gov/documents/docs/LTEMP_ROD.pdf , Appendix C, starting on page 62 of the PDF)
2017 GCDAMP annual report:
https://www.usbr.gov/uc/rm/amp/twg/mtgs/17jan26/Annual_Report.pdf

Summary of Presentation and Background Information

The first portion of the presentation will provide an overview of the LTEMP HFE protocol and the process to evaluate whether to conduct a fall high-flow experiment (HFE). Should sufficient sediment to support a fall HFE enter the Colorado River from the Paria River, the HFE Technical Team evaluates existing data and the status of resources that may be impacted or affect by an HFE and arrives at a technical recommendation. The HFE leadership team evaluates the recommendation prior to a final decision being made by the Department of the Interior.

The HFE protocol is experimental in nature and is designed to achieve a better understanding of whether, how, and when to incorporate high releases into future dam operations in a manner that effectively conserves natural resources that are intimately connected to sediment deposits. The HFE

technical team completes an assessment of resources that may be impacted or affected by a fall HFE using the best available science including the most recent information, and in particular, information collected since past HFEs.

The fall HFE implementation window is October 1 through November 30. The potential window for a fall 2017 HFE has been coordinated early to facilitate planning and discussions. Should conditions (sediment and other resources) support implementing an HFE this fall, it would most likely begin Monday November 6th, 2017. Should the Department of the Interior decide to implement an HFE this fall, a final notification regarding an HFE would likely be communicated early the week of October 23rd, or possibly sooner.

The second portion of the presentation will provide a sediment update that will describe the magnitude of fine sediment inputs that have come from the Paria River during the fall HFE accounting period (since July 1, 2017), as well as the quantity of fine sediment that has been retained in Marble Canyon in relation to the amount that has been transported into Grand Canyon and towards Lake Mead.

Sand inputs to date and sandbar update (as of August 25, 2017): Between December 1, 2016, and July 27, 2017, the sand storage in upper Marble Canyon decreased by approximately 310,000 metric tons (mt) (-360,000 to -250,000 mt), while the sand storage in lower Marble Canyon decreased by approximately 120,000 mt (-170,000 to -65,000 mt) and sand storage in eastern Grand Canyon increased by approximately 130,000 mt (2,400 to 250,000 mt). Sand storage has decreased in Marble Canyon because erosion resulting from normal dam operations has not been replaced by inputs from the Paria River or other tributaries. Rates of erosion were highest during winter and summer when fluctuations peaked at 17,000 to 19,000 ft^3/s.

Between December 1, 2016, and March 1, 2017 (the date of the last download at RM166), sand storage in east central Grand Canyon (RM87-RM166) increased by 63,000 mt (13,000 to 110,000 mt), and sand storage in west central Grand Canyon (RM166-RM225) was indeterminate (+7,300 mt with -44,000 to 59,000 mt uncertainty range). The sand budgets for east and west central Grand Canyon will be updated through September 1, 2017, following downloads during the river trip currently on the water.

Between December 1, 2016, and May 25, 2017, approximately 620,000 mt of sand (590,000 to 650,000 mt) were transported past Diamond Creek (RM225) into western Grand Canyon and the Lake Mead Delta. In summary, there was net erosion in upper Marble Canyon and lower Marble Canyon. There was net deposition in eastern Grand Canyon and east central Grand Canyon, and no significant change in west central Grand Canyon.

The Paria River has been relatively inactive so far this season. Between July 1 and August 25, 2017, discharge exceeded 500 ft^3/s on only two occasions and the cumulative sand load has been less than 50,000 mt.

These data are available at http://www.gcmrc.gov/discharge_qw_sediment/reaches/GCDAMP/.

Status of Sandbars: The most recent topographic survey was completed in October 2016, before the November 2016 HFE. At that time, mean sandbar volume among the long-term monitoring sites

was the lowest measured since before the 2012 HFE. However, the volume was still greater than sandbar volumes measured between October 2008 and October 2012.

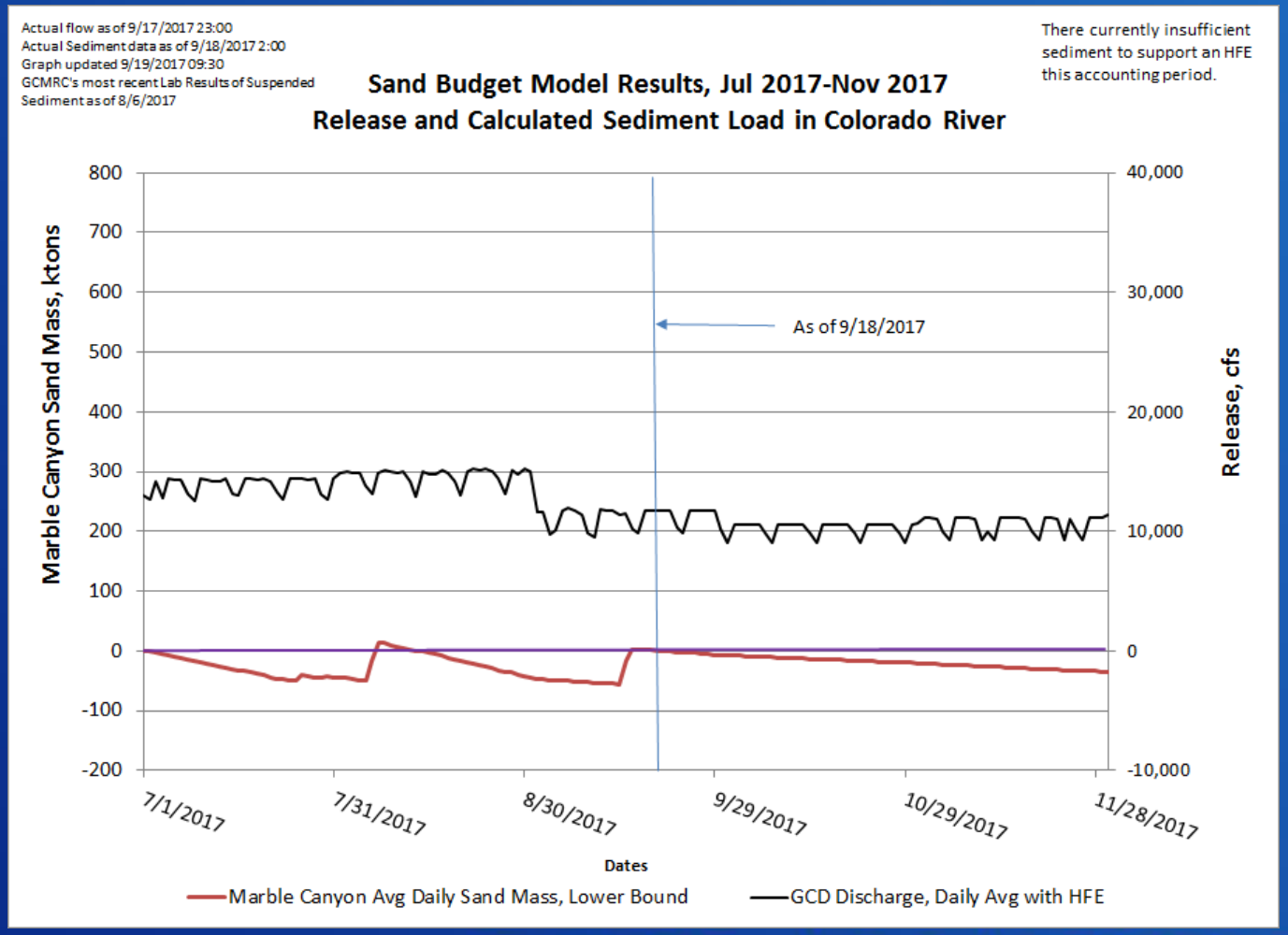
Sandbar volumes increased as a result of the November 2016 HFE and will next be surveyed in October 2017. Images from the remote cameras indicate the HFE resulted in deposition at 56% of the 43 sites monitored, no change at 32% of the sites, and erosion at 12% of the sites. Sandbars eroded following the HFE. By April 2017 (the most recent date that images are available from all cameras), net gains in sandbar volume remained at 14% of the sites. Of the remaining sites, 9% were smaller than before the November 2016 HFE and 77% were similar to the pre-HFE size.

Images and data are available at https://sciencebase.usgs.gov/sandbar/ or https://www.gcmrc.gov/sandbar/.

Sand Budget Model Results

9-18-2017

Currently not sufficient sediment to support an HFE



RECLAMATION

Possible Fall 2017 HFE planning

- **IF DOI Implements HFE: likely Monday Nov 6th**
  - **1 hr up to 96 hrs (4days) OR 192 hrs (8 days, ext duration HFE)**
  - **~36,000cfs (6 hydropower units, 4 bypass tubes)**
- **Final sediment inputs, lab sampling, modeling: likely first week of October**
- **IF enough sediment:**
  - **Notify people**
  - **Assess other resources**
  - **Draft HFE tech team report: Oct 10,11**
  - **TWG meeting: Oct 12**
  - **Final HFE tech team report / recommendation: Oct 17**
  - **Leadership team recommendation: Oct 17, 18, 19**
  - **DOI decision: Oct 17, 18, 19**
  - **Notify people: ~Oct 19, 20**

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NOVEMBER 2017

SUN	MON	TUE	WED	THU	FRI	SAT
			1	2	3	4
5	Possible HFE Start 6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

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Questions?

Katrina Grantz
Bureau of Reclamation
Adaptive Management Group Chief
kgrantz@usbr.gov
801-524-3635

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