

***CREDA Comments/Questions on 2008 High Flow Experimental Science Plan
December 2007, with GCMRC responses***

CREDA Comment/Question #1. *There is inadequate information about specifically where the Sediment is currently stored (or will be in March 2008 when the release would occur) to be certain that the release will not do more harm than good with respect to building eddy sand bars throughout the Marble and Grand Canyon reaches. In fact, as I discussed in some detail in my December memo, the available information indicates to me that the reaches downstream from Phantom Ranch (RM 87), and perhaps even downstream from the Little Colorado River (RM 61), are not sufficiently sediment-enriched to rebuild eddy sand bars in these reaches, and in fact, the proposed high flow would likely cause additional loss of sand bars in these reaches.*

GCMRC Response: About 1/2 to 2/3 of the cumulative sand inputs that entered the system in the 18 months prior to the 2008 HFE were above Phantom Ranch gage. Another 300,000 to 500,000 tons were likely between that point and Diamond Creek. About 1/3 of the input sand had already passed the Diamond Creek gaging site. Although there was likely more sand in all reaches at the start of the 2008 test than existed prior to the 2004 test, it is possible that without enough sand below phantom ranch that sandbar erosion may have occurred and that the mass balance of sand below phantom could have become negative by the end of the 2008 test flow.

CREDA Comment/Question #2. *Related to the above point, the Working Hypotheses section of Experimental Study 1.A (p18) includes the following statement: If reaches downstream from river mile 30 are sand enriched relative to their condition before the 2004 high flow, then sandbar building in these downstream reaches will be greater than was observed in these reaches during the 2004 high flow [emphasis added]. On the other hand, one of the conclusions in "The Importance of Tributary Floods" section (p4) is that the 2004 experiment resulted in an increase of total sandbar area and volume in the upper half of Marble Canyon, but further downstream, where sand was less abundant, a net transfer of sand out of eddies occurred that was similar to that observed during the 1996 experiment. The latter conclusion is consistent with the concern expressed in 1. Above.*

GCMRC Response: We will request additional clarification from CREDA on April 8th regarding this question and will be happy to provide further response to this concern/question afterward. We admit that less sand in western Canyon could result in erosion of sandbars there.

CREDA Comment/Question #3. *The science plan should include more effort to quantify where the sand is stored along the reach prior to the high flow release. This should be done by adding the August 2007 and later data to the analysis presented in Slide 4 of Topping and Melis' WY2007 Sand Supply Update presentation and Figure 1 from my December memo. If similar data are available farther downstream (e.g., at Diamond Creek), these data should also be added to the analysis. In addition, because the depositional response at a specific sand bar appears to be strongly related to the amount of sand storage in the pool(s) immediately upstream from that sand bar, detailed bathymetric surveys should be completed prior the high flow release to quantify local conditions in the vicinity of the bars at which detailed studies are to be performed.*

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(This may already be part of their plan, but I cannot tell for sure from the description.)

GCMRC Response: It was not feasible to add this information to the HFE science plan before the plan was completed in late December; mostly owing to the fact that the scientists who would have needed to provide the additional requested information were completely encumbered with preparation for the pre-HFE fieldwork and other preparations needed for during-HFE activities. This information will be presented to the TWG in 2008 and will be included in results once they are completely finalized and reported to the GCD-AMP.

CREDA Comment/Question #4. Continued detailed studies at the sand bars in Marble Canyon associated with Experimental Study 1B should provide valuable information for understanding eddy-sandbar dynamics. I appreciate the reasoning for limiting these studies to one specific area of the river, but I believe similar studies should be conducted farther downstream where the river is less (or perhaps NOT) sediment-enriched. In fact, one could argue that a relatively large body of data is already available at the proposed sites from the previous high flow releases, and more value could be gained by performing these studies farther downstream. If the studies were moved downstream to a suitable location in Grand Canyon, they would very likely provide data on the specific processes by which sand is depleted from sandbars during high flows in areas that are not sand-enriched, and this may actually show that the high flow releases are detrimental through a large portion of the Grand Canyon, even under sand-enriched conditions in the upstream part of the reach.

GCMRC Response: The primary objective of the research is to focus on how sandbars are formed under sand enriched conditions so that eventually "prescriptions" may be available to managers from modeling outcomes that optimize those responses. Hence, the 1.B studies were focused with limited available resources and staff on sites in a reach where we knew sand enrichment was relatively great (mid-marble canyon). We already have some data and understanding of how high flows under sand depleted conditions work to evacuate existing sandbars from eddies when the upstream sand supply is insufficient to deposit new sand in eddies.

CREDA Comment/Question #5. The abstract for Experimental Study 1.A says that sediment concentrations and grain size will be measured at 7 fixed measurement sites, but the Methods section lists 5. Is this a typo, or are there actually 7 locations? If there are 7 locations, where are the other two?

GCMRC Response: The 1.A study measured those attributes at the following 6 locations: lees ferry, 30-mile, 61-mile, 88-mile, 166-mile and 226-mile gaging sites. Project 1 actually obtained these data at 7 locations overall owing to the fact that study 1.B measured these attributes [and others] at 45-mile "Eminence Break" site. The study 1.A "Lagrangian" sampling trips measured these attributes throughout the entire CRE from two boats during the 2008 HFE.