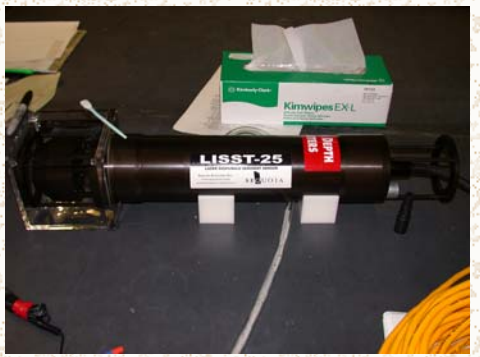
Grand Canyon Monitoring and Research Center

WY 2004 Experimental Fine-Sediment Update
Paria River Inputs & 41,000 vs. 45,000 cfs
Sand Bar Simulations



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Paria River Sand Inputs
July 1 – Sept. 24, 2004

Dr. David J. Topping, Sediment Expert

Paria River – has produced 284,000 + 20% metric tons of sand since July 1st, with the majority of this coming from 2 September floods

Lesser Tributaries – Marble Canyon tributaries have produced about 50,000 to 100,000 metric tons of sand since July 1st

First Sand Trigger – currently, 56 to 88% of the way to the first trigger for dam re-operation (8,000 cfs constant vs. 6,500-9,000 cfs fluctuations) for a flow test to identify the most conservative sand transport release pattern for retaining tributary inputs

Muddy Waters

BHBF Sand Trigger – currently, 25 to 43% of the way toward the 800,000 metric ton flood trigger for the BHBF test

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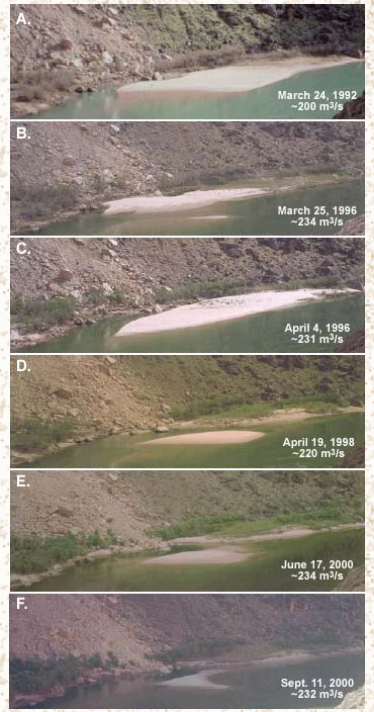
41,000 vs. 45,000 cfs BHBF Simulations of Sand Bar Responses



BHBF of 60-hour Duration – the QUESTION: "How different will the sand bar responses be in Marble Canyon with a high-flow test that is 4,000 cfs lower in discharge and stage than would occur if magnitude matched the 1996 experiment?"

Sand Supply Assumed to be Greater than 2000 LSFF or 1996 BHBF –

"For the sediment input, I've looked over Topping's rating curves at Phantom and chosen values for the first day of the '96 release, which corresponds closely with the 1956 fine bed rating curve David has for 25% bed coverage. For grain size, I'm using 0.12 mm, which is the value for the '56 condition. I'll use the longitudinal variation Scott determined from your Lagrangian sampling to estimate the local sand discharges from the Phantom rating curves, as before. This approach probably yields a conservative estimate of the sand supply if the high flow is triggered, especially closer to the mouth of the Paria, but is higher than either the '96 or LSSF supplies."

Preliminary Results - Dr. Stephen M. Wiele (USGS – WRD)

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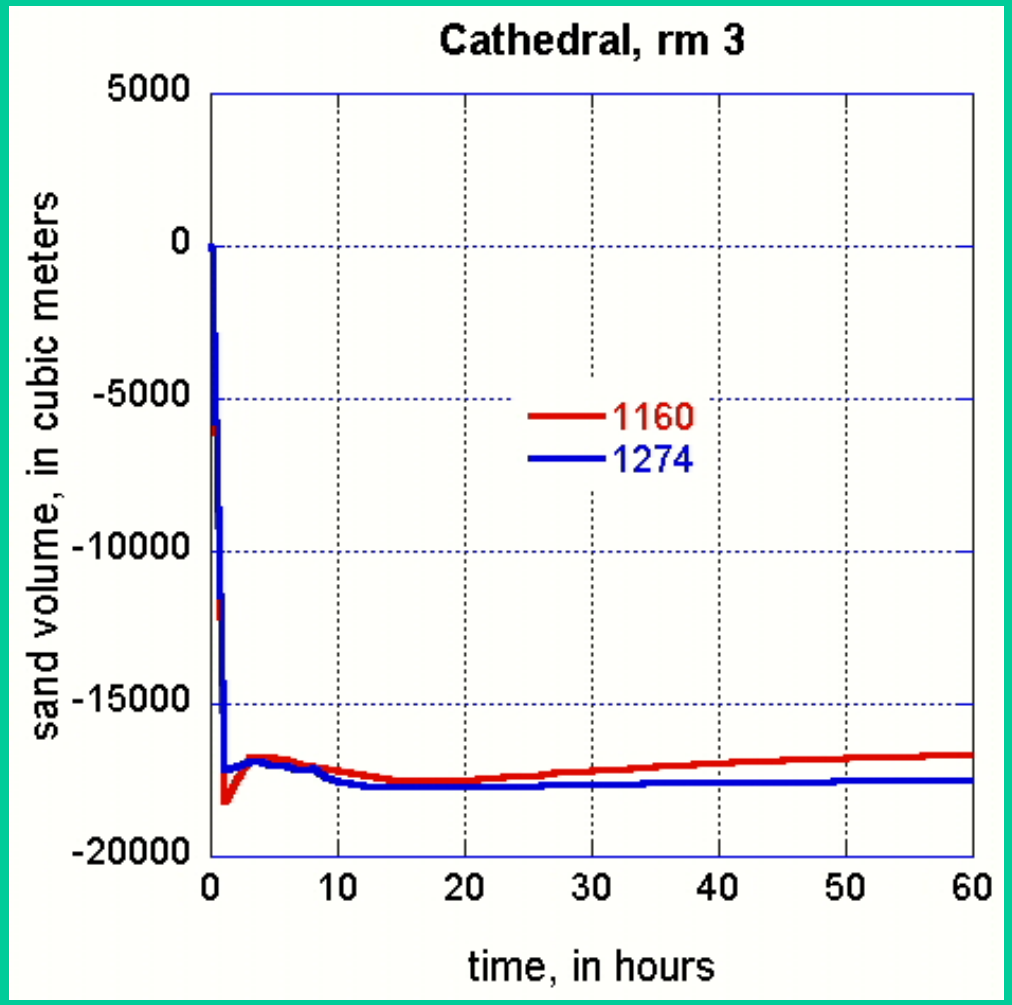
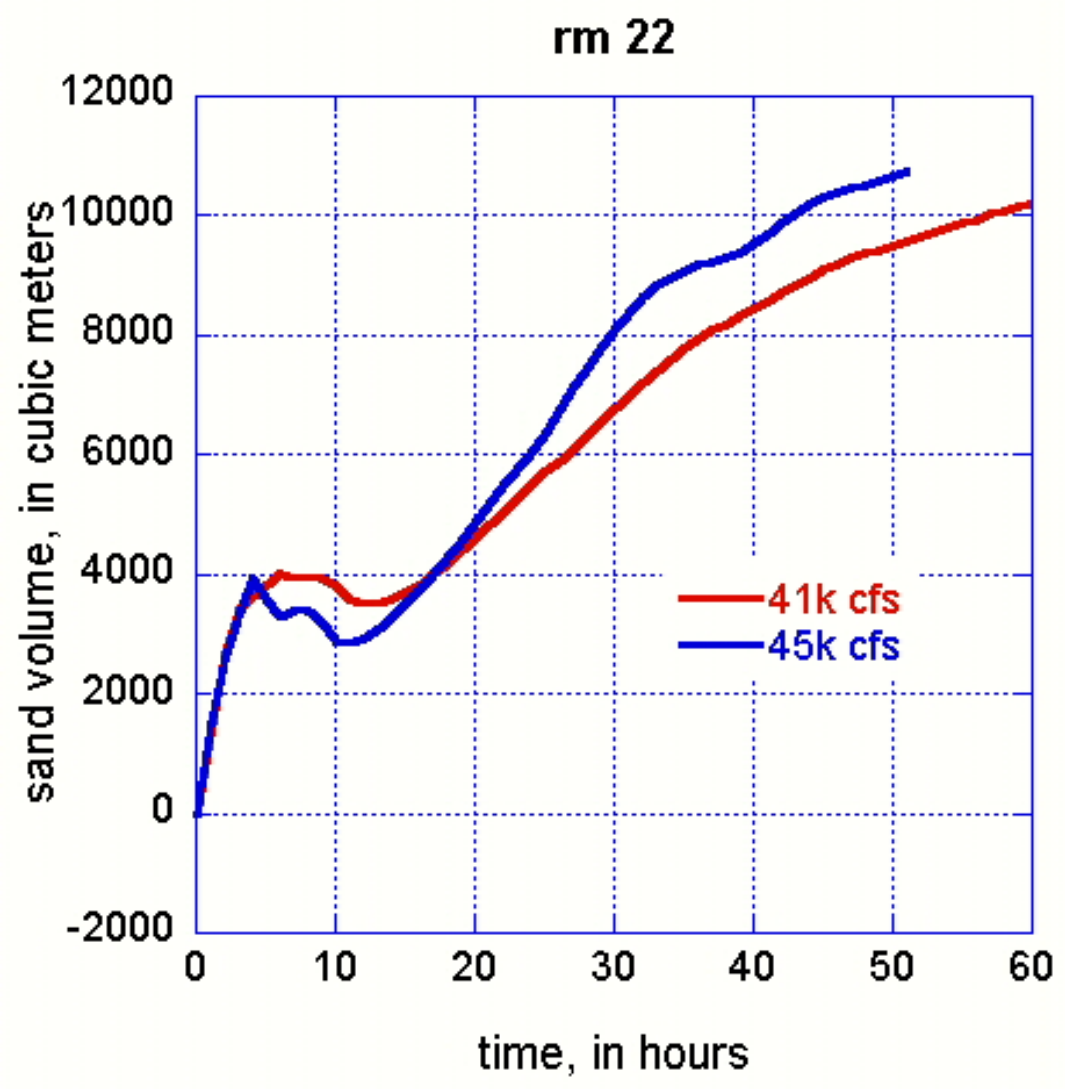
Steve Wiele's Preliminary Sand-Bar Simulations suggest. . .



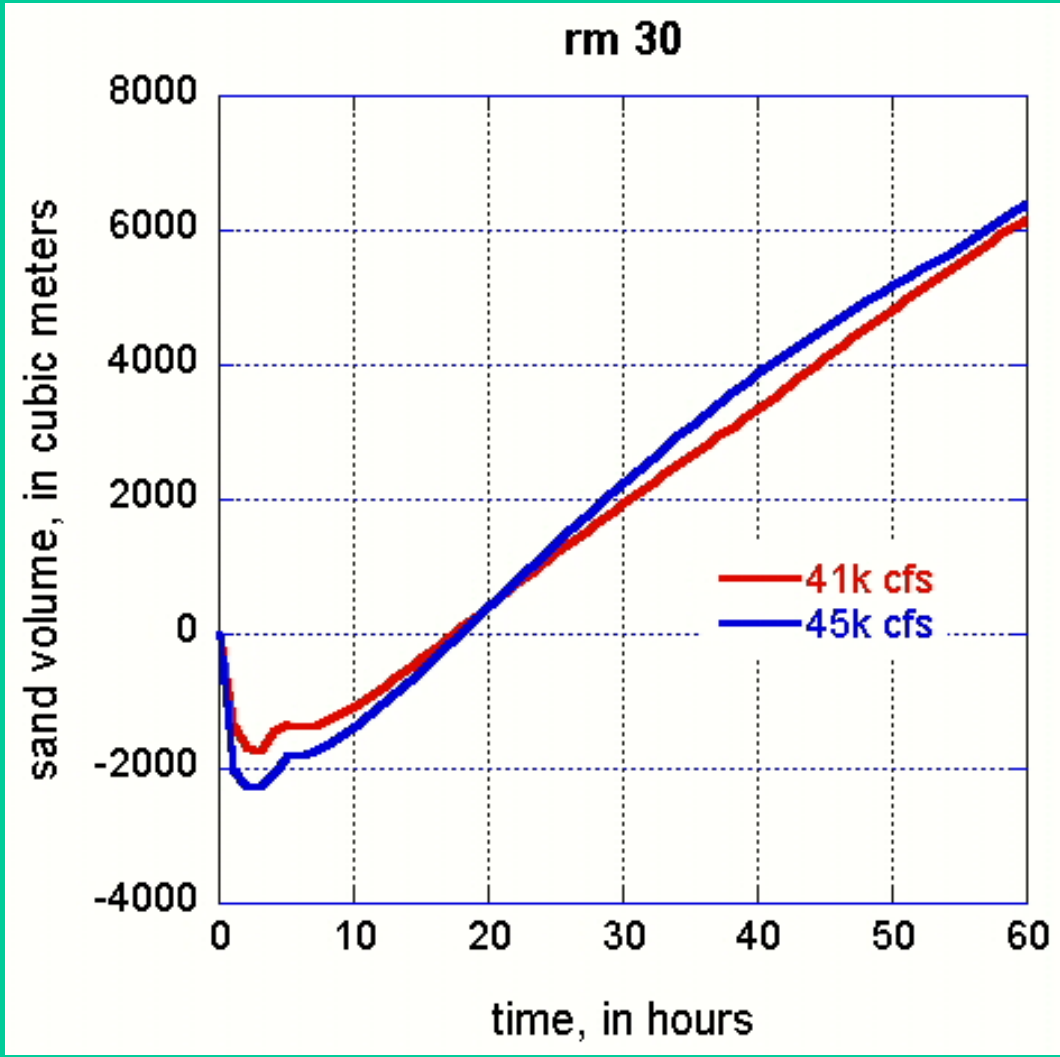
At River Mile 2, (1.5 miles below the Paria River confluence) both the 41,000 & 45,000 cfs simulations suggest that the Cathedral Wash Eddy will dramatically lose sand from the existing bar complex (this is the ultimate "canary" study site)

Steve Wiele's Preliminary Sand-Bar Simulations suggest. . .



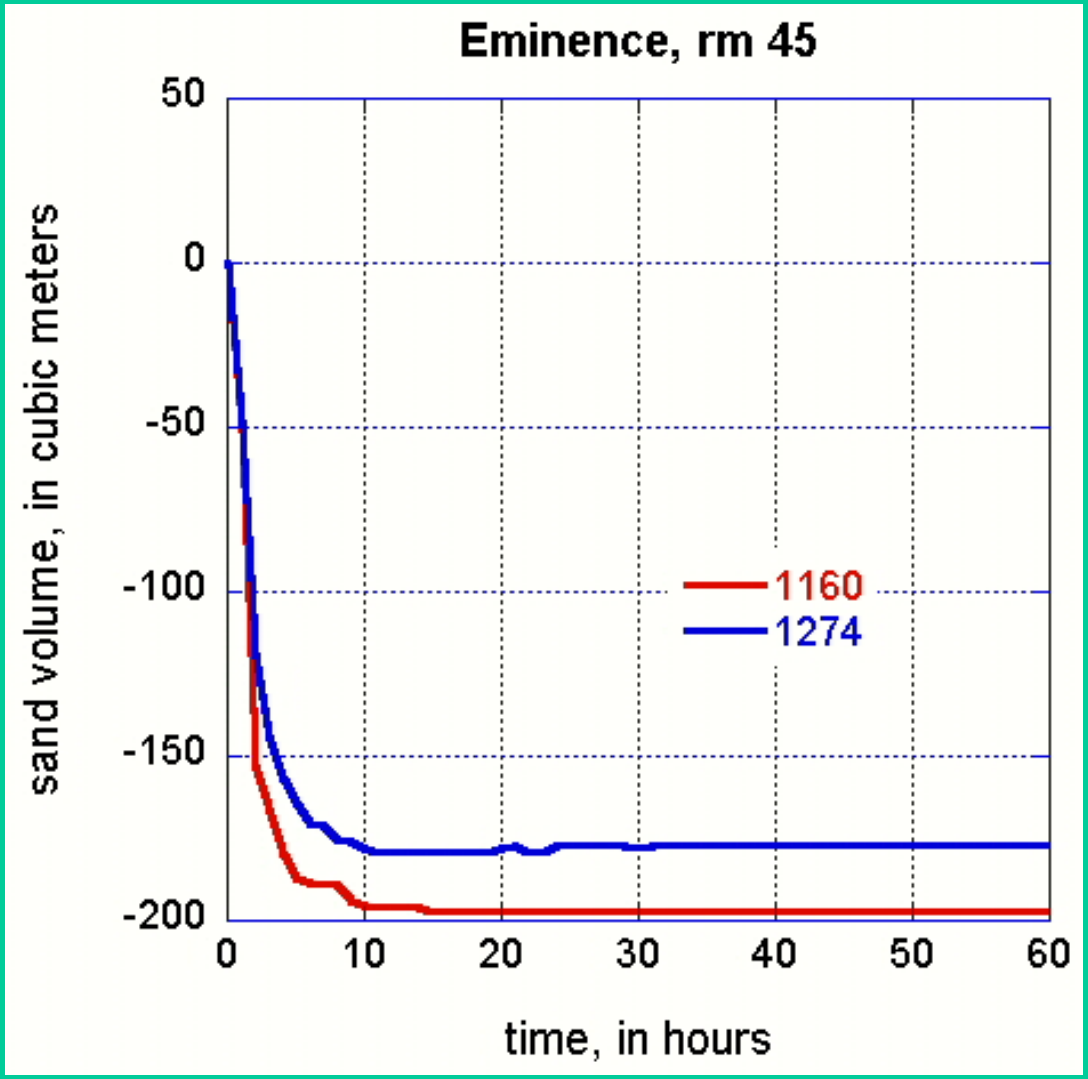
However, at River Mile 22, (21 miles below the Paria River confluence) the 41,000 cfs simulation suggests that the 22-Mile Eddy will add substantial sand to the existing bar complex, but to a slightly lesser degree than would occur under a 45,000 cfs BHBF

Steve Wiele's Preliminary Sand-Bar Simulations suggest. . .



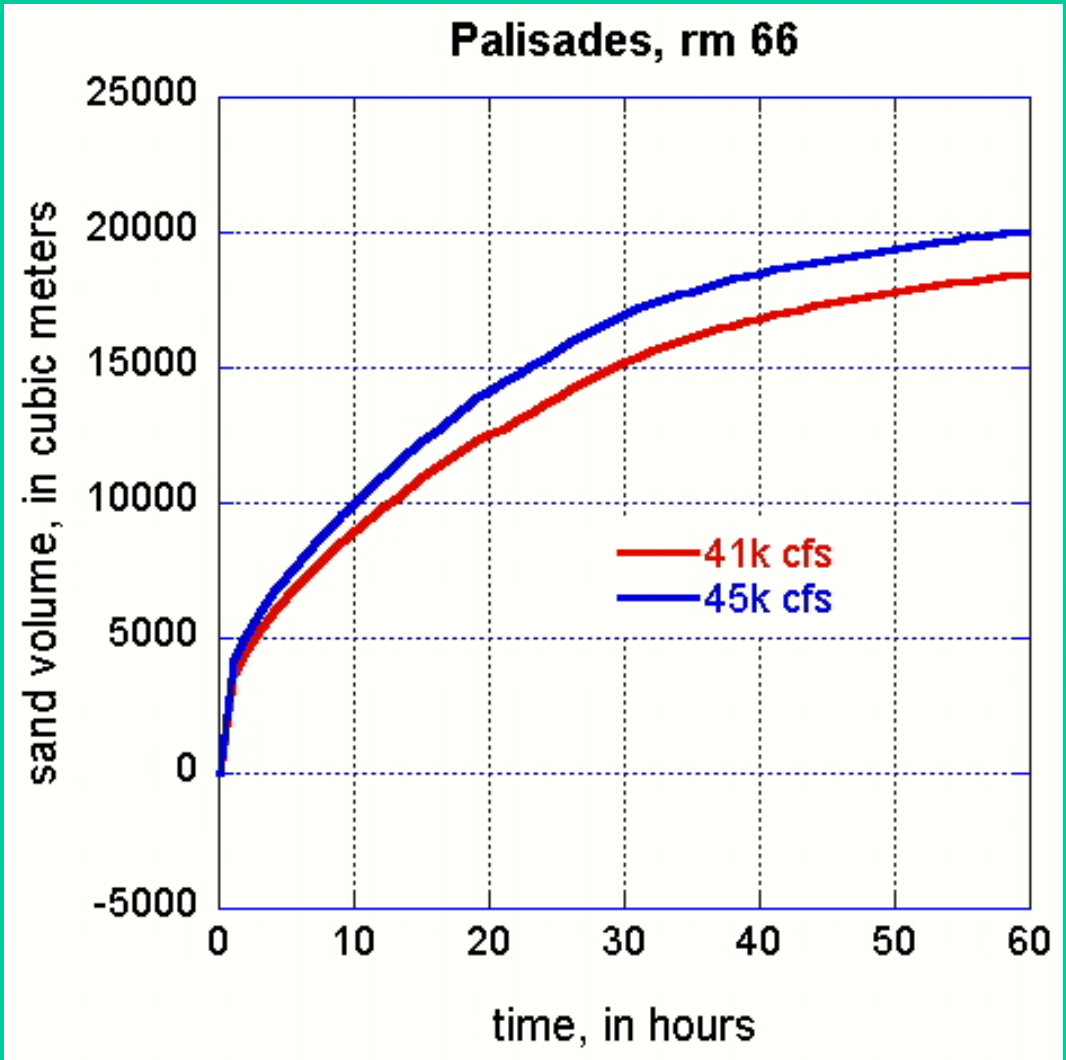
And at River Mile 30, (29 miles below the Paria River confluence) the 41,000 cfs simulation suggests that the 30-Mile Eddy will add sand to the existing bar complex, and the response will be nearly identical to that which would occur under a 45,000 cfs BHBF (Note scour before deposition)

Steve Wiele's Preliminary Sand-Bar Simulations suggest. . .



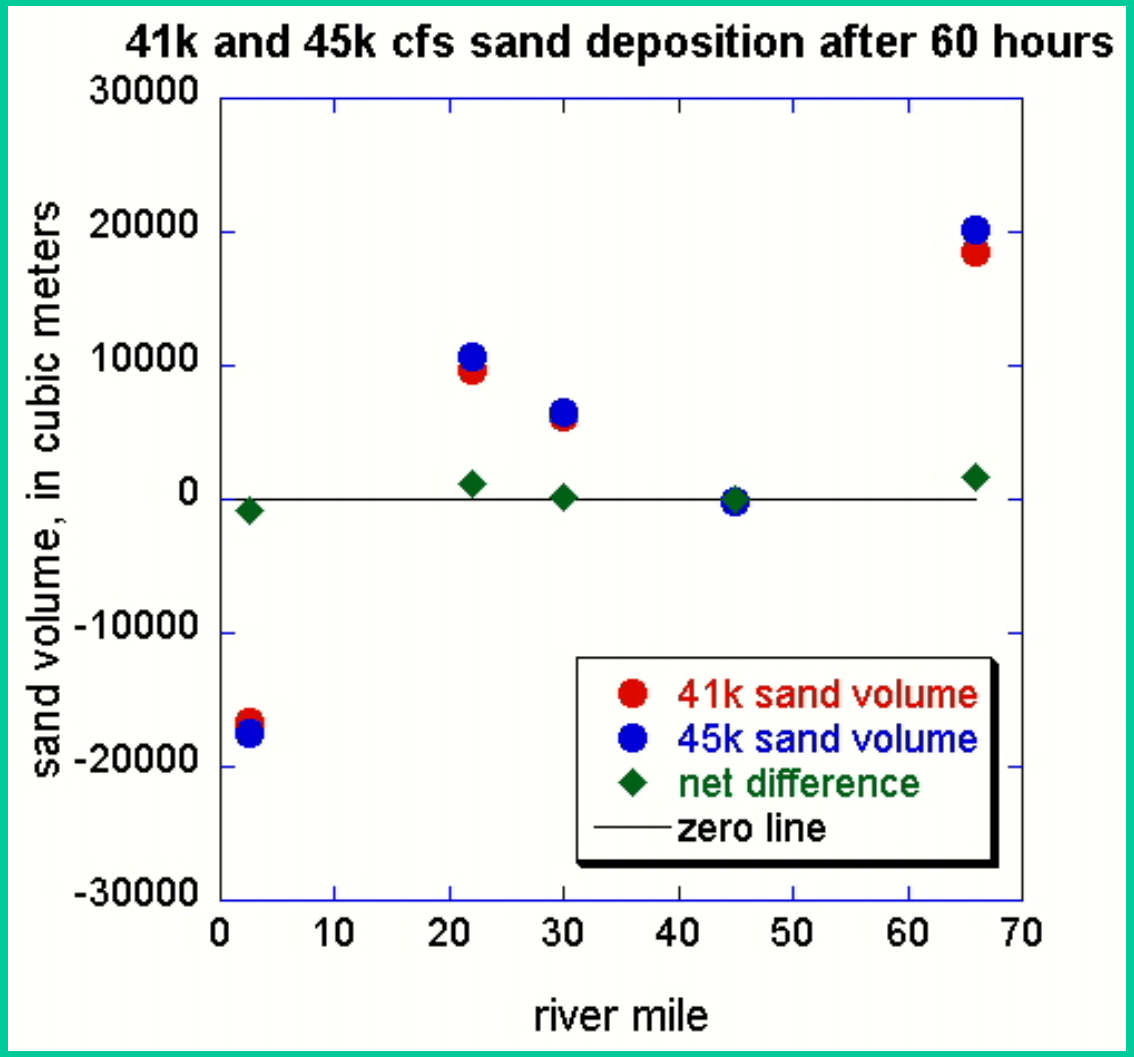
While at River Mile 43, (42 miles below the Paria River confluence) both the 41,000 & 45,000 cfs simulations suggest that the Eminence Eddy will lose a slight amount of sand from the existing bar complex – No bar building under either flow!

Steve Wiele's Preliminary Sand-Bar Simulations suggest. . .



At River Mile 65, (64 miles below the Paria River confluence & 4 miles below the LCR confluence) the 41,000 cfs simulation suggests that the Palisades Eddy will dramatically add sand to the existing bar complex, but to a slightly lesser degree than would occur under a 45,000 cfs BHBF!

Preliminary Conclusions on the BHBF Simulations



The "net" difference between the 41,000 and the 45,000 cfs BHBF is predicted to be small with respect to individual sand bar responses, but the variability in bar-building response longitudinally below the dam is potentially large.

A positive bar response in Upper Marble Canyon without completely exhausting the sand supply in 60 hours would be encouraging