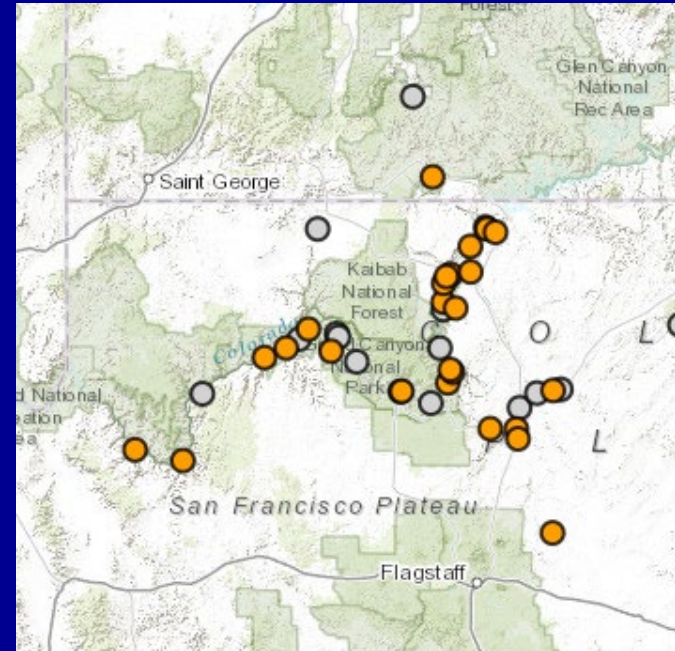


Project A: Streamflow, Water Quality, and Sediment Transport and Budgeting in the Colorado River Ecosystem

Project A collects the physical data that directly link dam operations to all resources in the downstream Colorado River; data inform 10 LTEMP goals

- **Element 1: Stream gaging**
 - Stage
 - Discharge
- **Element 2: Water quality**
 - Water temperature
 - Salinity (specific conductance)
 - Turbidity
 - Dissolved Oxygen
- **Element 3: Sediment transport and budgeting**
 - Suspended- and bed-sediment data
 - Sediment loads (silt and clay loads and sand loads)
 - User-interactive sand budgets in 6 reaches from Lees Ferry to Lake Mead
- **All elements**
 - Database and website (**currently UNSUPPORTED**)



Evaluation of LTEMP sand management

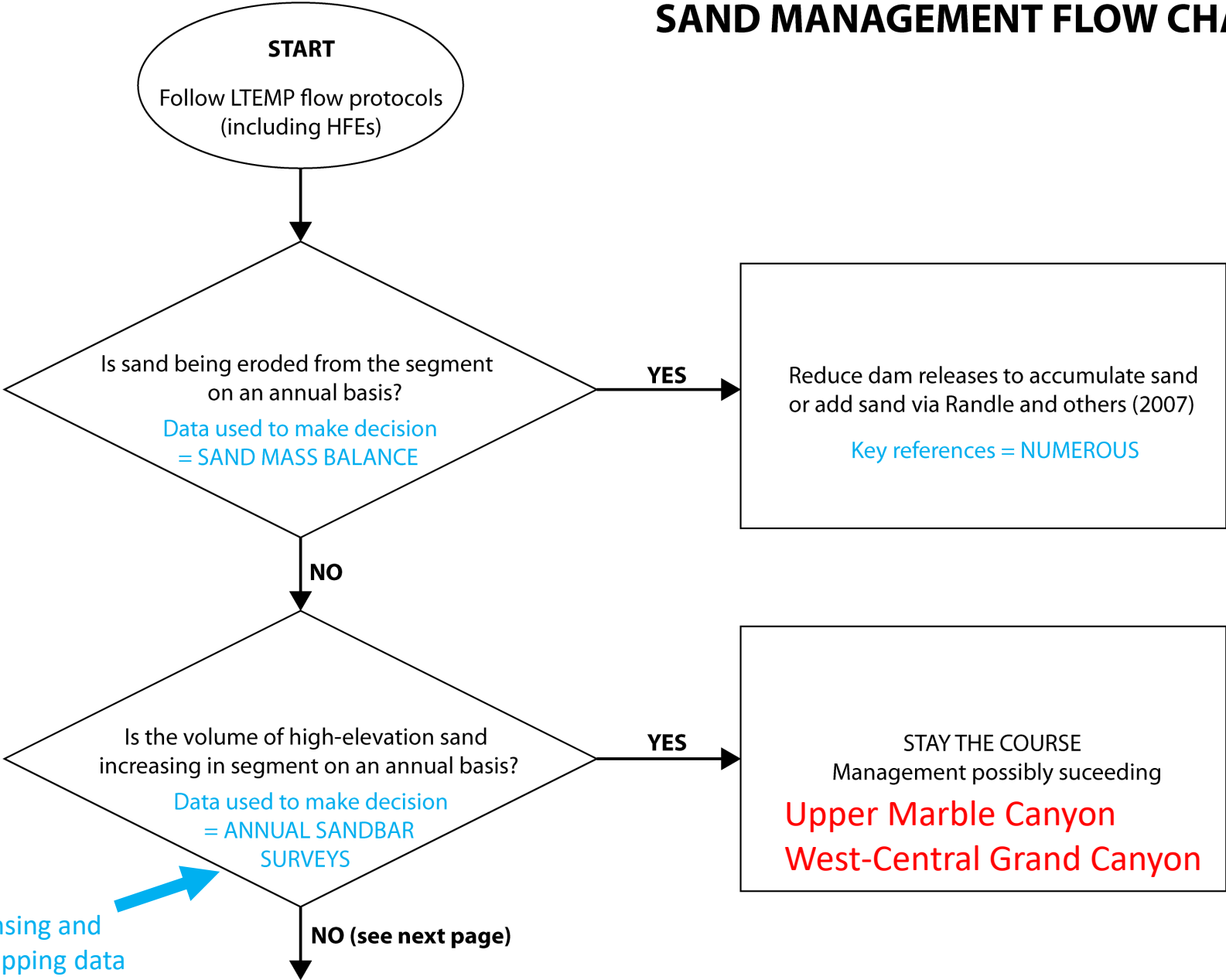
David J. Topping¹
Paul E. Grams¹
Ronald E. Griffiths¹
Matt Kaplinski¹
Joel A. Unema²
David J. Dean¹
Katie A. Chapman¹

¹U.S. Geological Survey
Southwest Biological Science Center
Grand Canyon Monitoring and Research Center

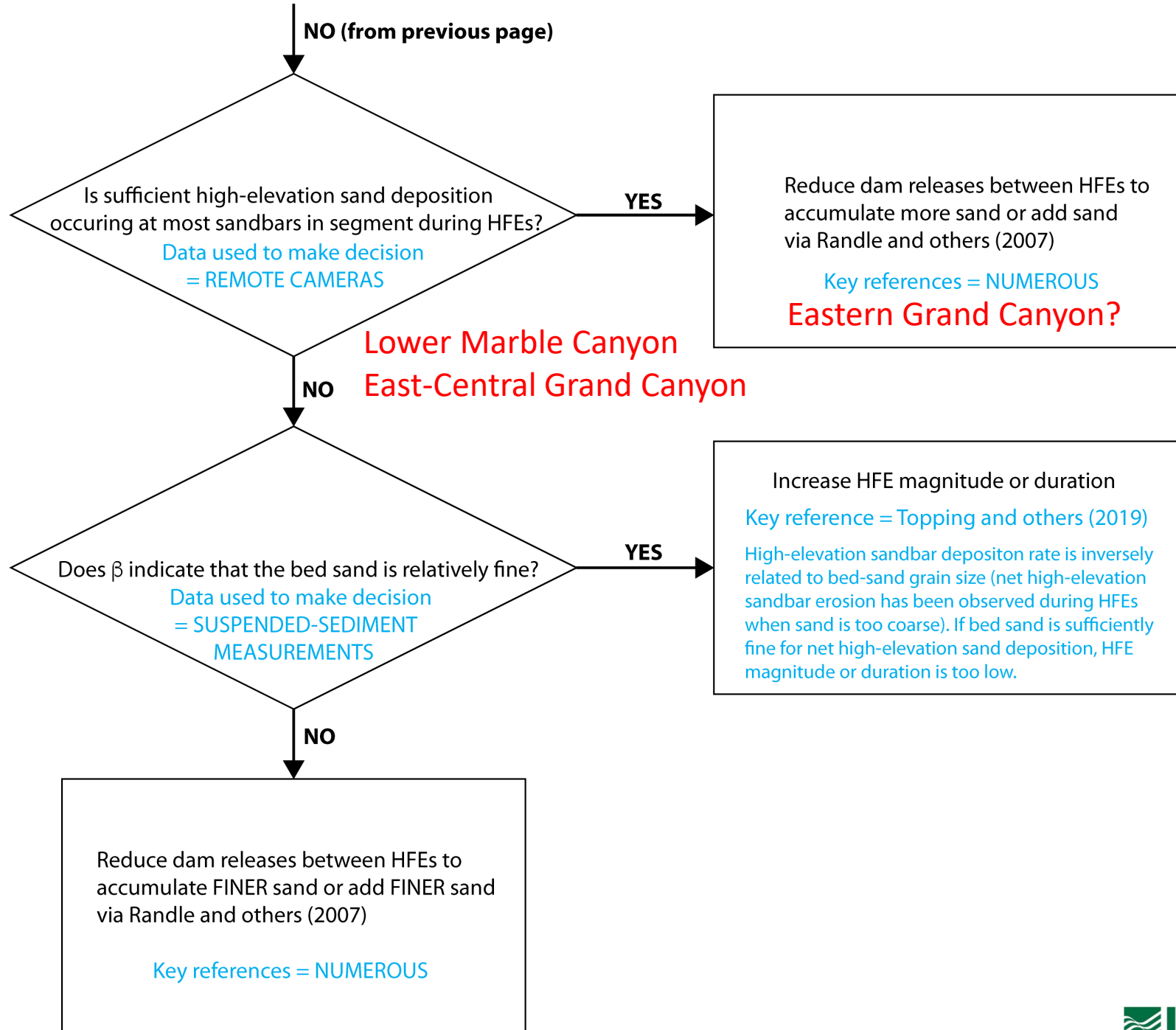
²U.S. Geological Survey
Arizona Water Science Center

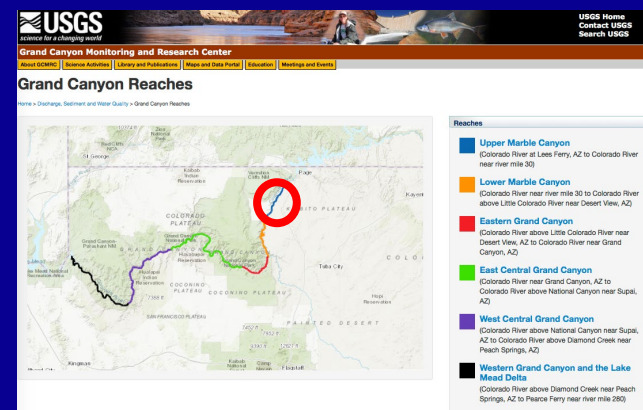
The information in several of these slides is preliminary and is subject to revision. It is being provided to meet the need for timely best science. The information is provided on the condition that neither the U.S. Geological Survey nor the U.S. Government shall be held liable for any damages resulting from the authorized or unauthorized use of the information.

SAND MANAGEMENT FLOW CHART

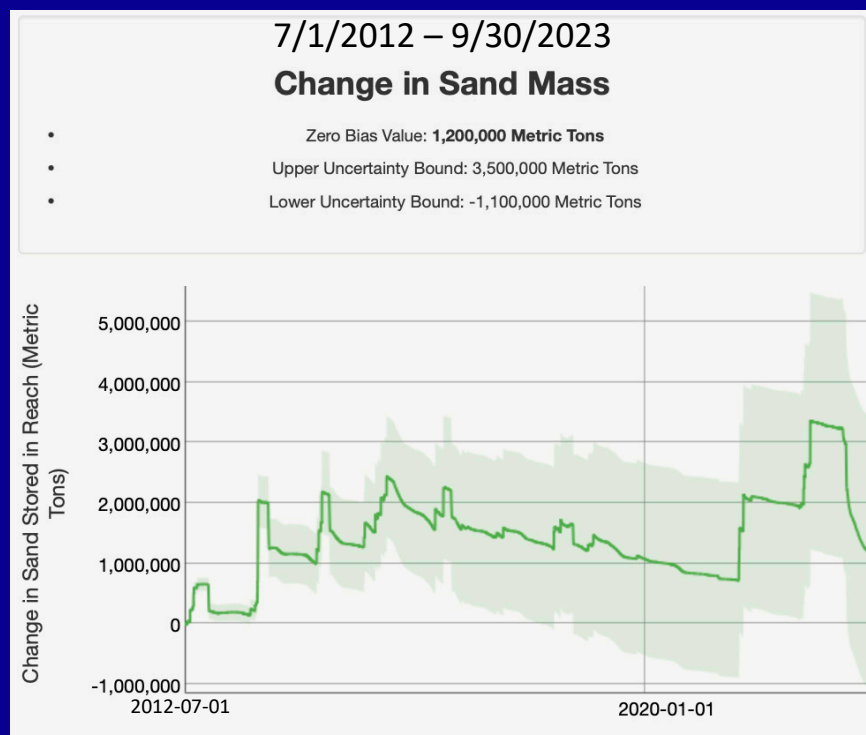


Remote-sensing and channel-mapping data can also inform here

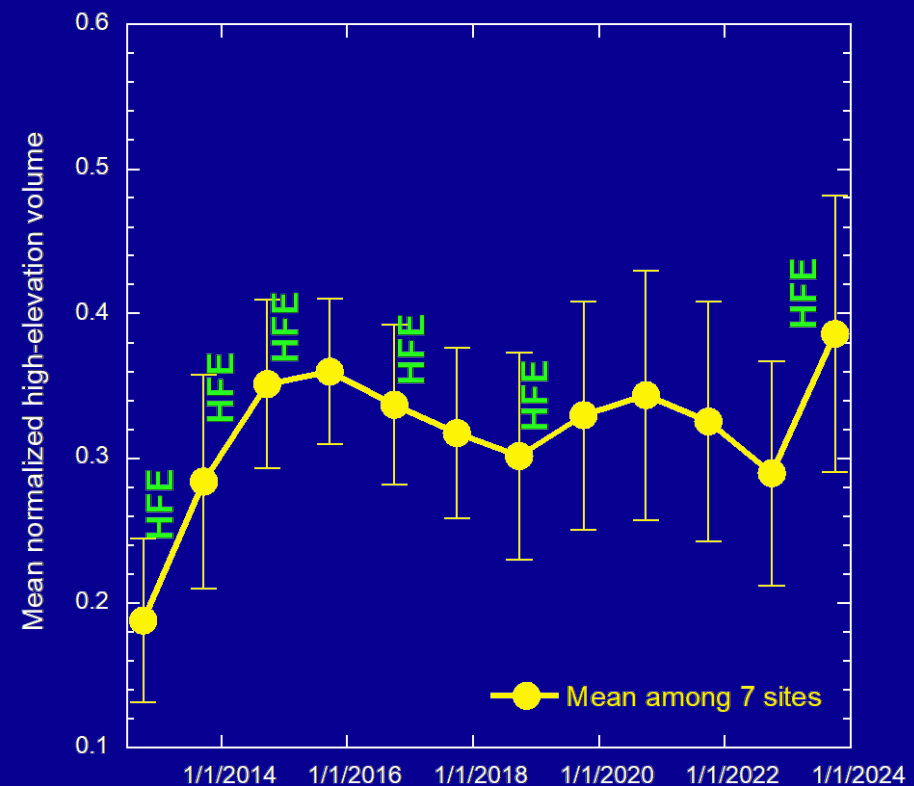




HFE-Protocol/LTEMP Period Upper Marble Canyon



POSITIVE

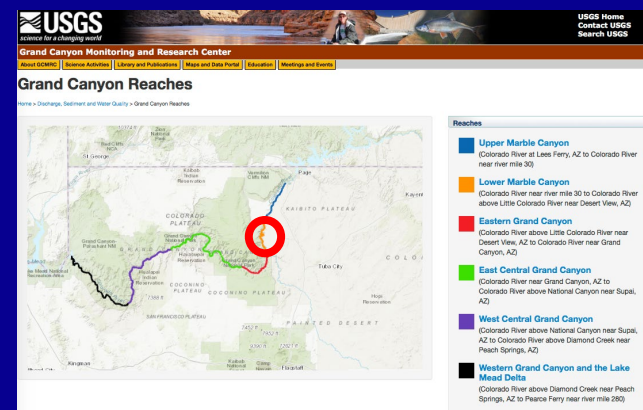


POSITIVE

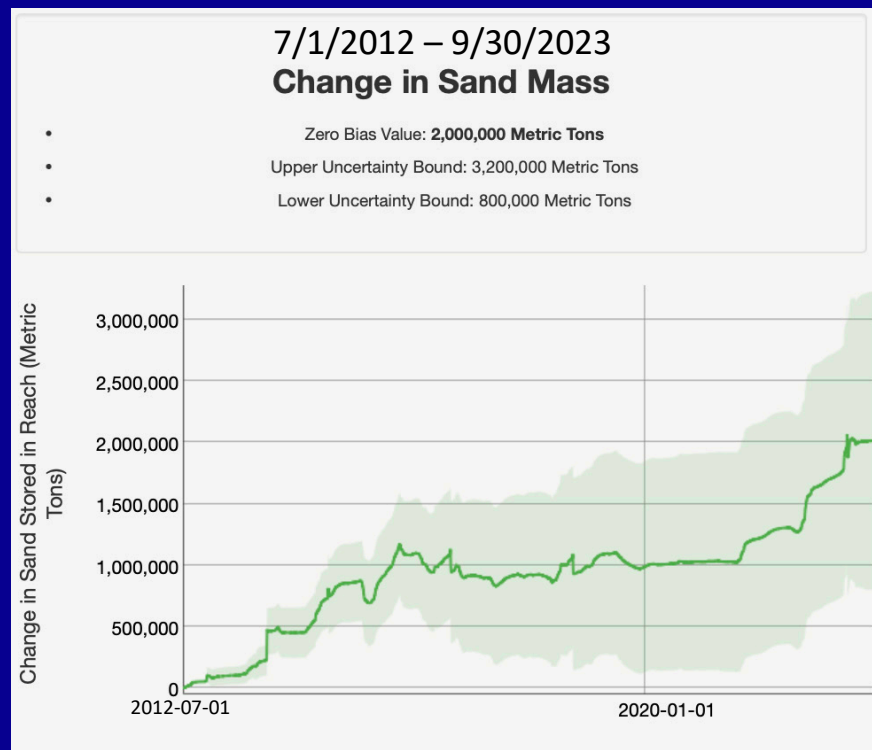
Possibly sustainable

Data from USGS (2024a, b)

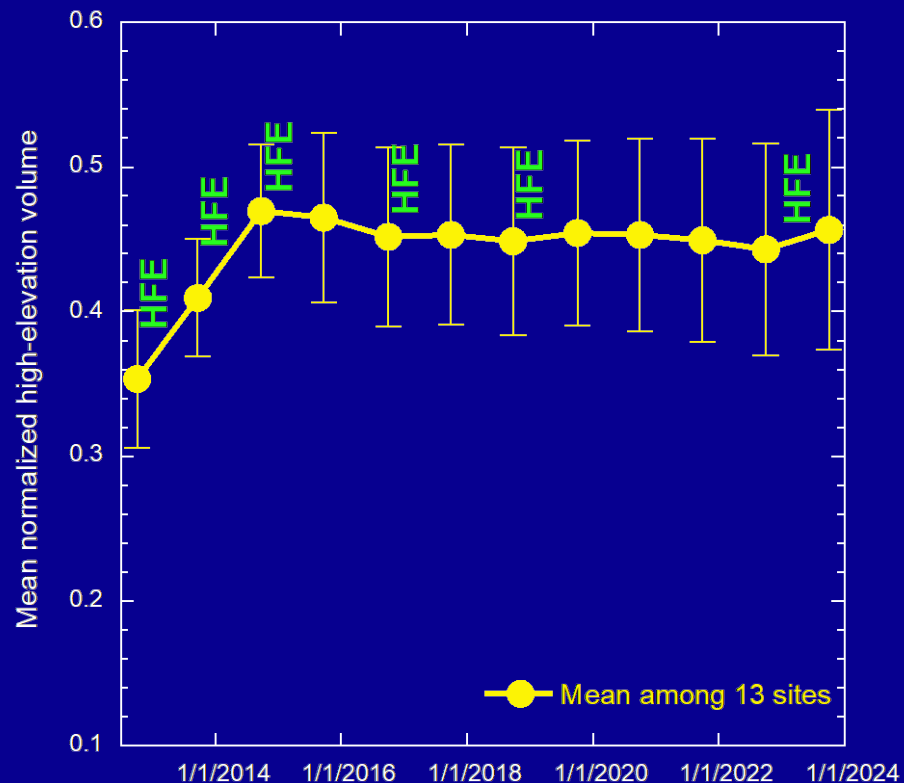




HFE-Protocol/LTEMP Period Lower Marble Canyon



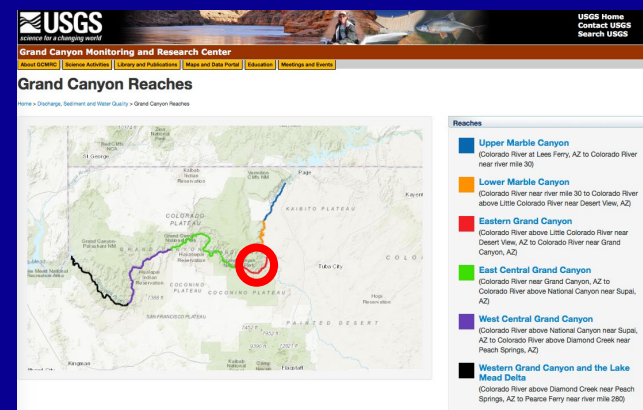
POSITIVE



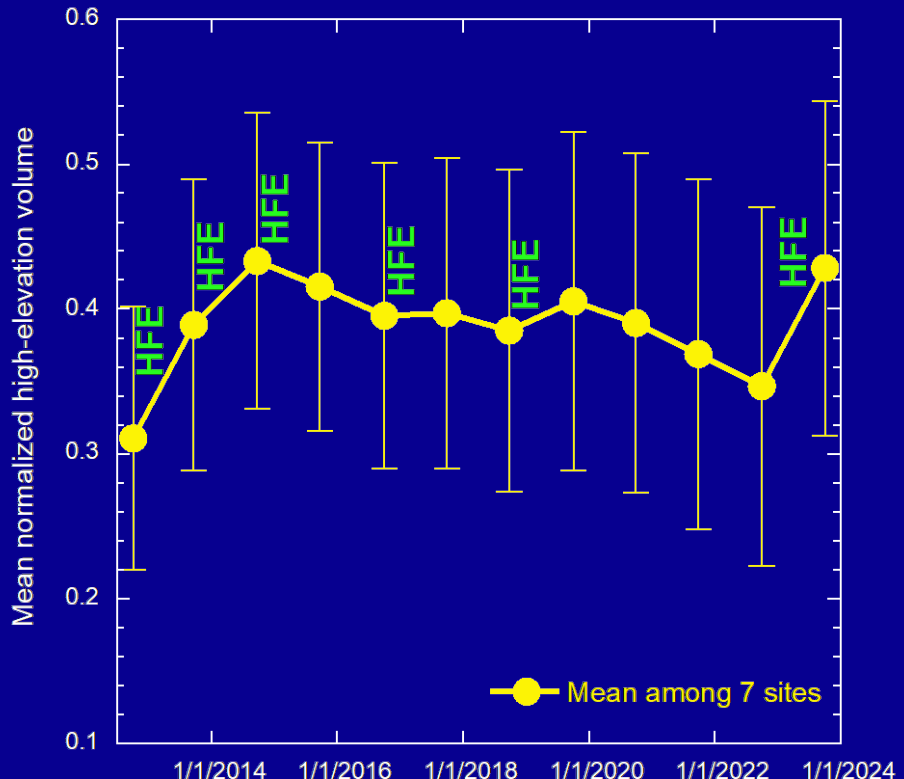
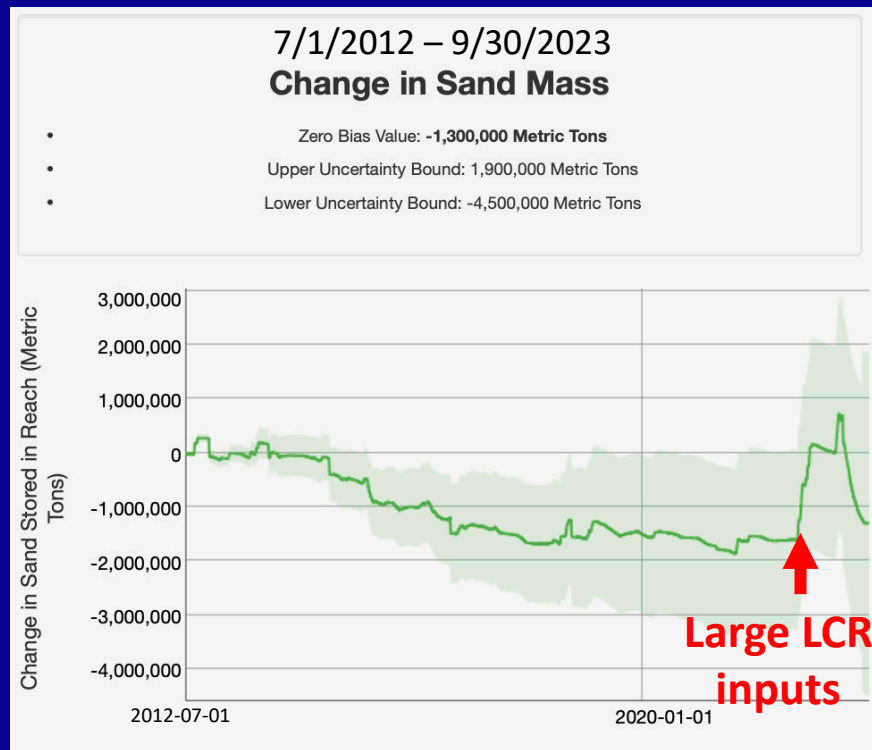
POSITIVE(?)

Insufficient HFE magnitude/duration or intervening flows too high

Data from USGS (2024a, b)



HFE-Protocol/LTEMP Period Eastern Grand Canyon

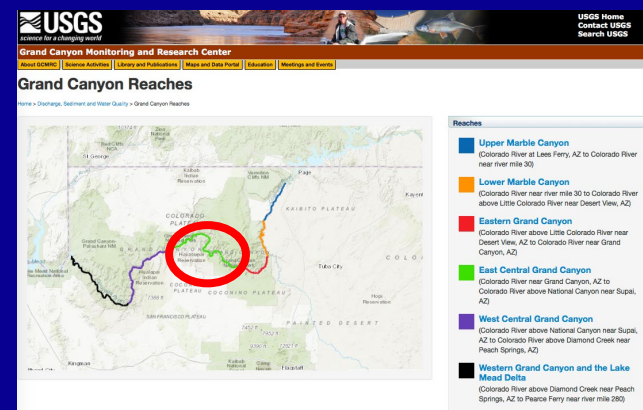


INDETERMINATE

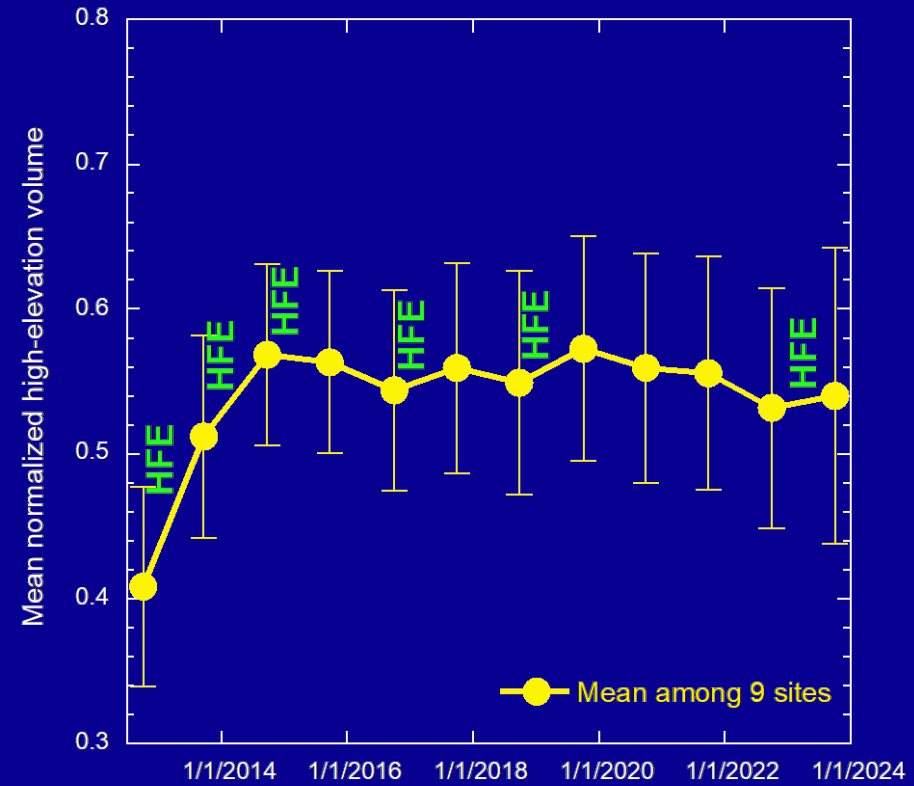
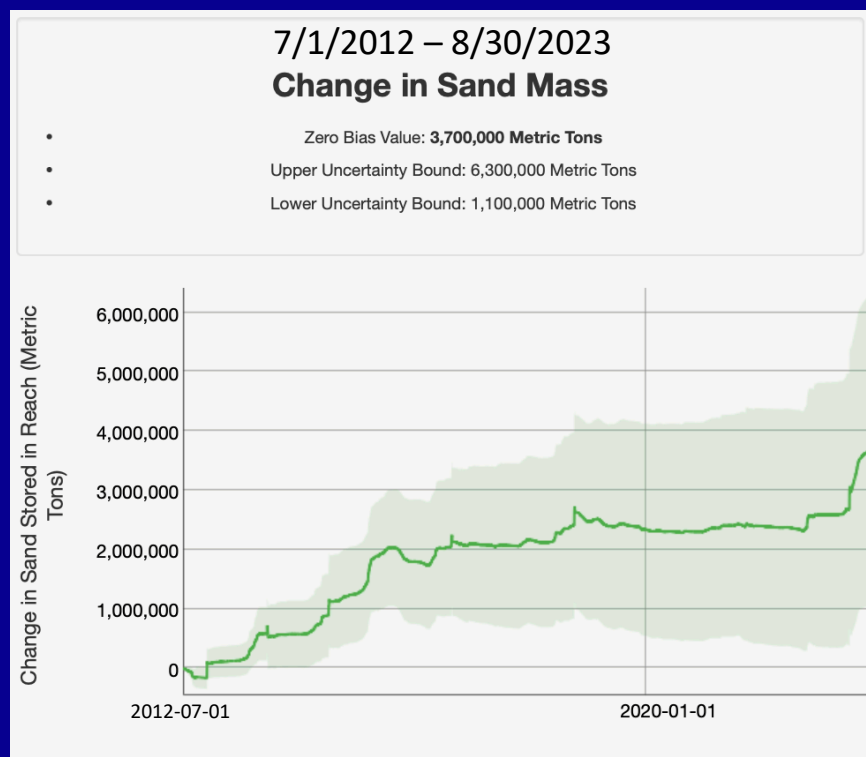
POSITIVE(?)

Intervening flows likely too high (SAVED BY THE LCR)

Data from USGS (2024a, b)



HFE-Protocol/LTEMP Period East-Central Grand Canyon

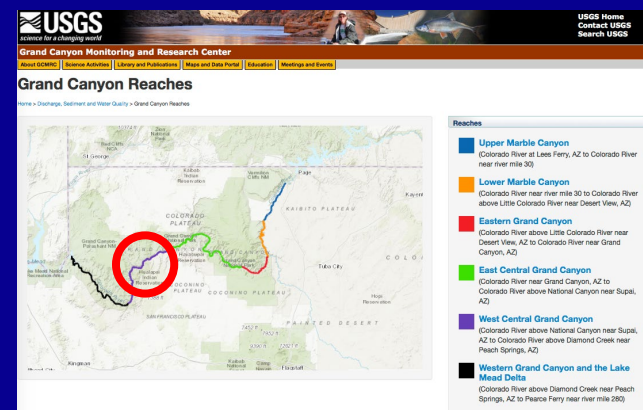


POSITIVE

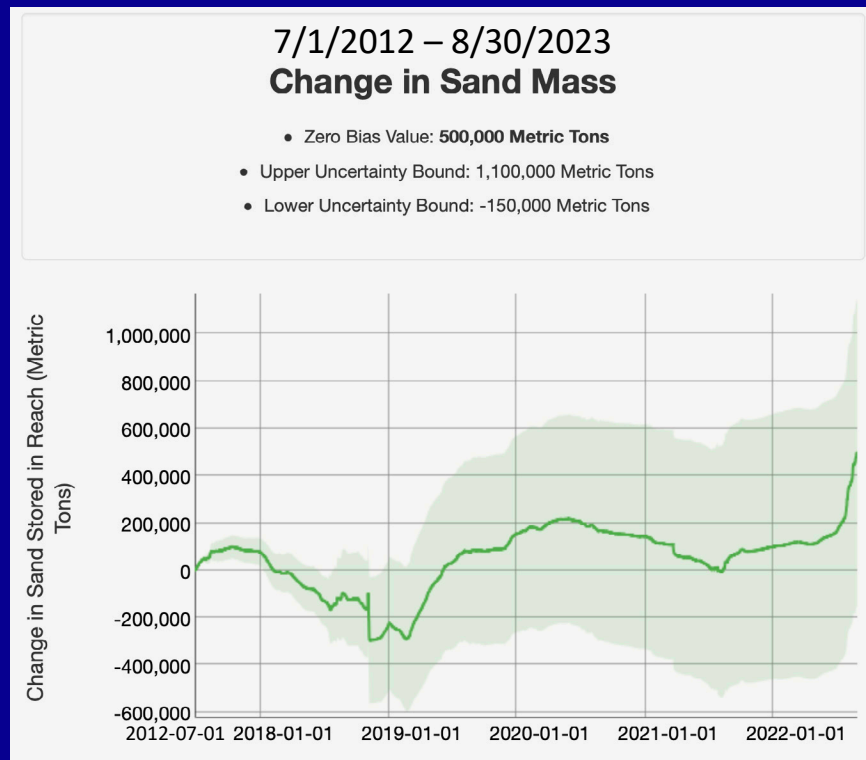
POSITIVE(?)

Insufficient HFE magnitude/duration or intervening flows too high

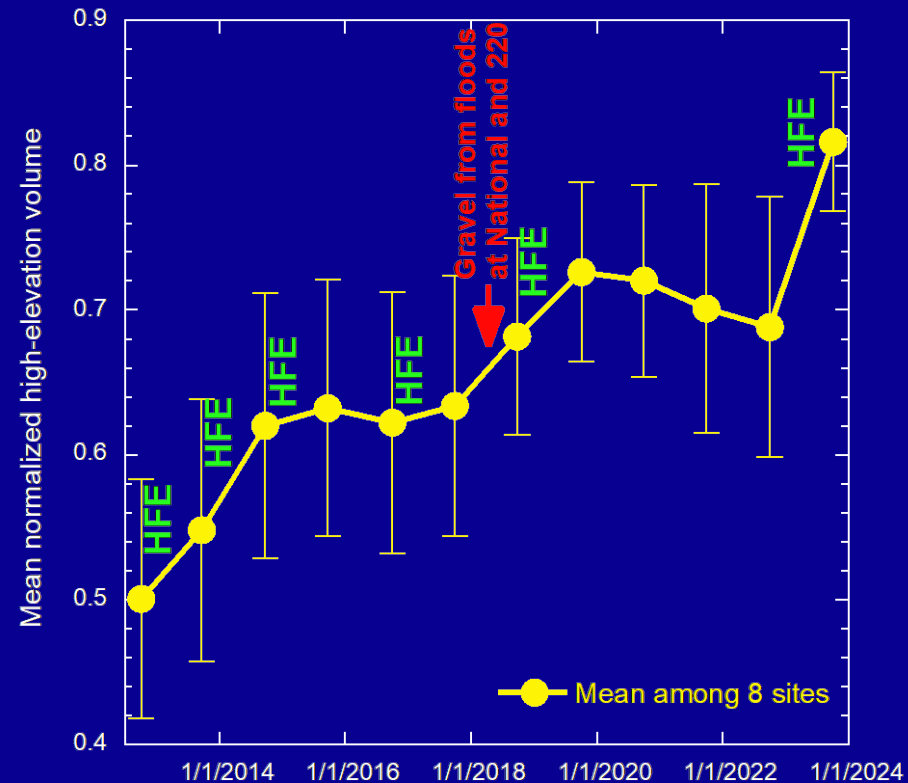
Data from USGS (2024a, b)



HFE-Protocol/LTEMP Period West-Central Grand Canyon



POSITIVE



POSITIVE

Possibly sustainable

Data from USGS (2024a, b)

Project A References

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