



Update on 2010 and 2011 Sand Input and Sand Mass Balance

GCDAMP AMWG Meeting
February 9, 2011

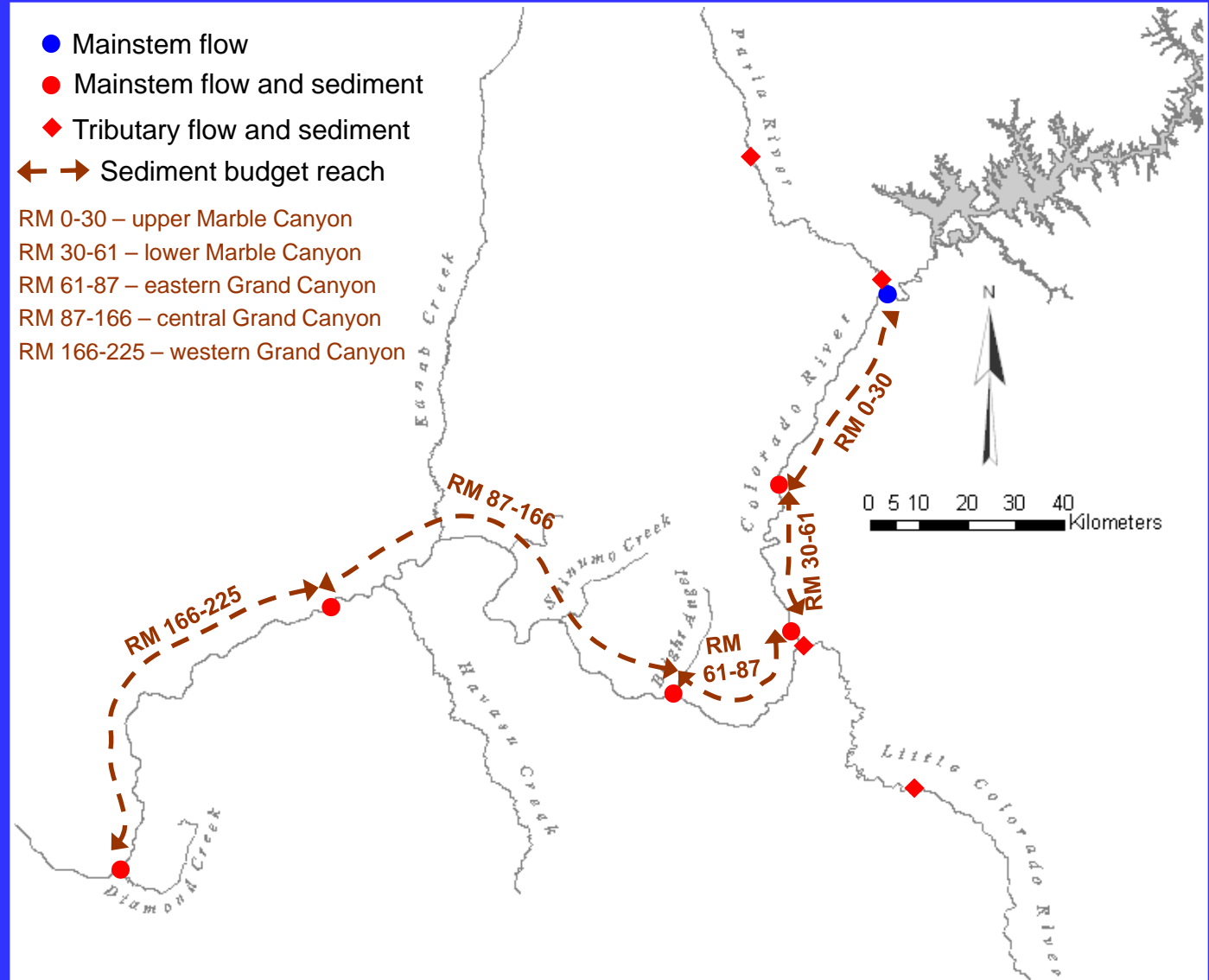
Paul Grams and David Topping

Flux monitoring for managing sediment and sandbars

- Flux monitoring:
 - Tracks tributary sediment inputs and mainstem transport at five locations to track status of the sediment “bank account.”
 - Provides the information needed to time high flows for building sandbars to follow periods of sand accumulation.

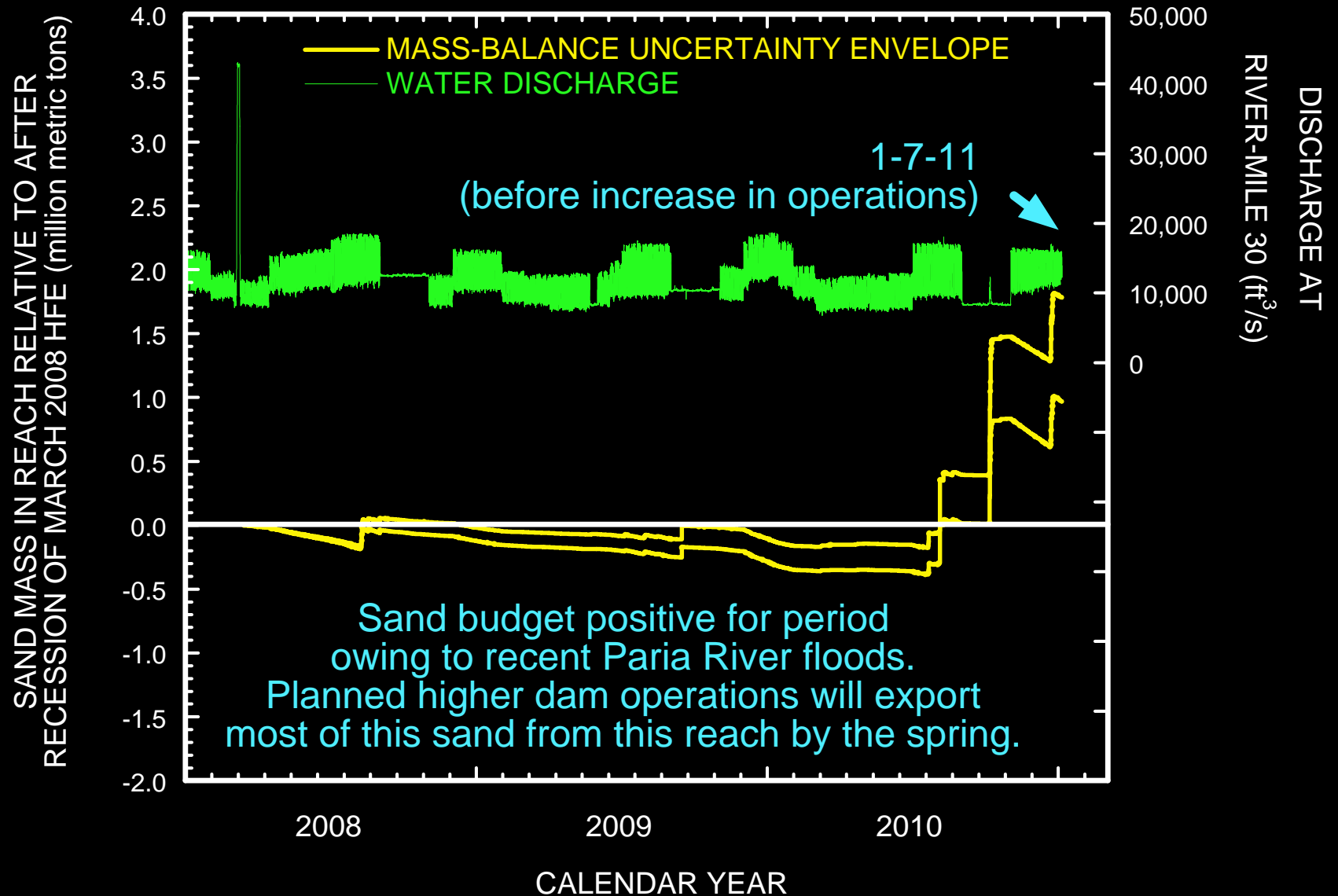


USGS Sediment Flux Monitoring Program in Grand Canyon



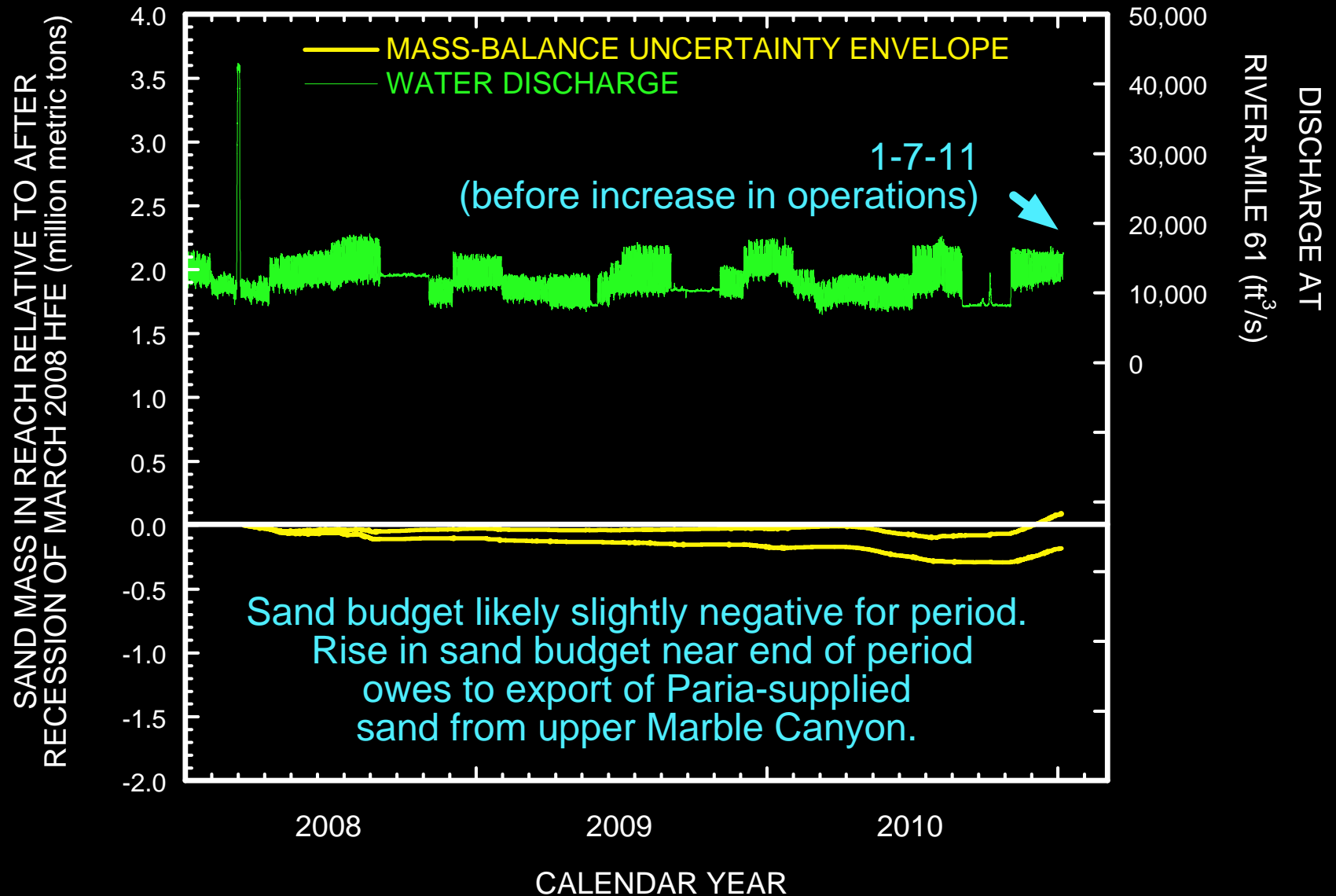
David Topping
Ronald Griffiths
Thomas Sabol
Nicholas Voichick
Karen Vanaman

POST-2008 HFE MASS-BALANCE SAND BUDGET BETWEEN RIVER-MILES 0 AND 30



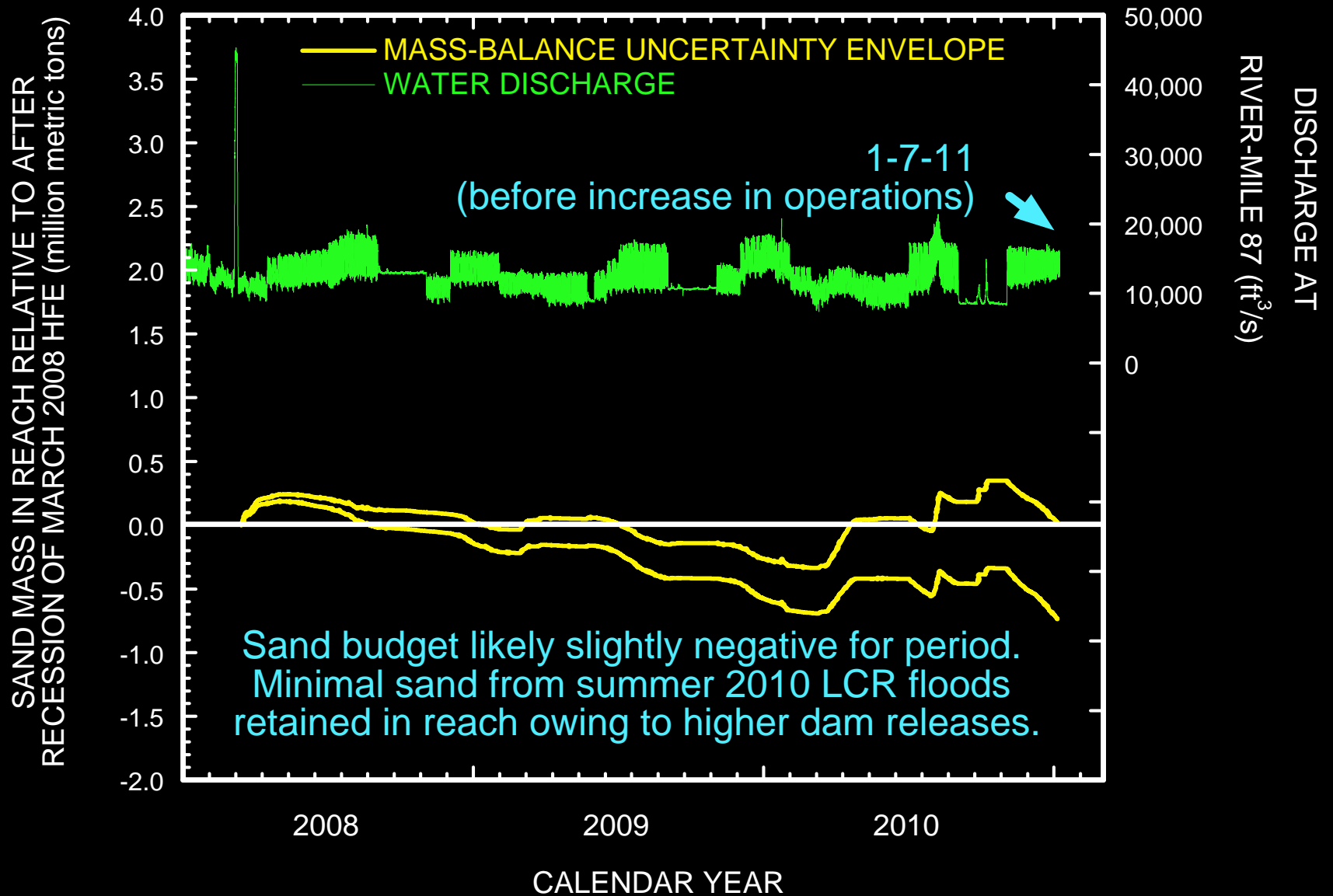
Preliminary results – subject to review and revision

POST-2008 HFE MASS-BALANCE SAND BUDGET BETWEEN RIVER-MILES 30 AND 61



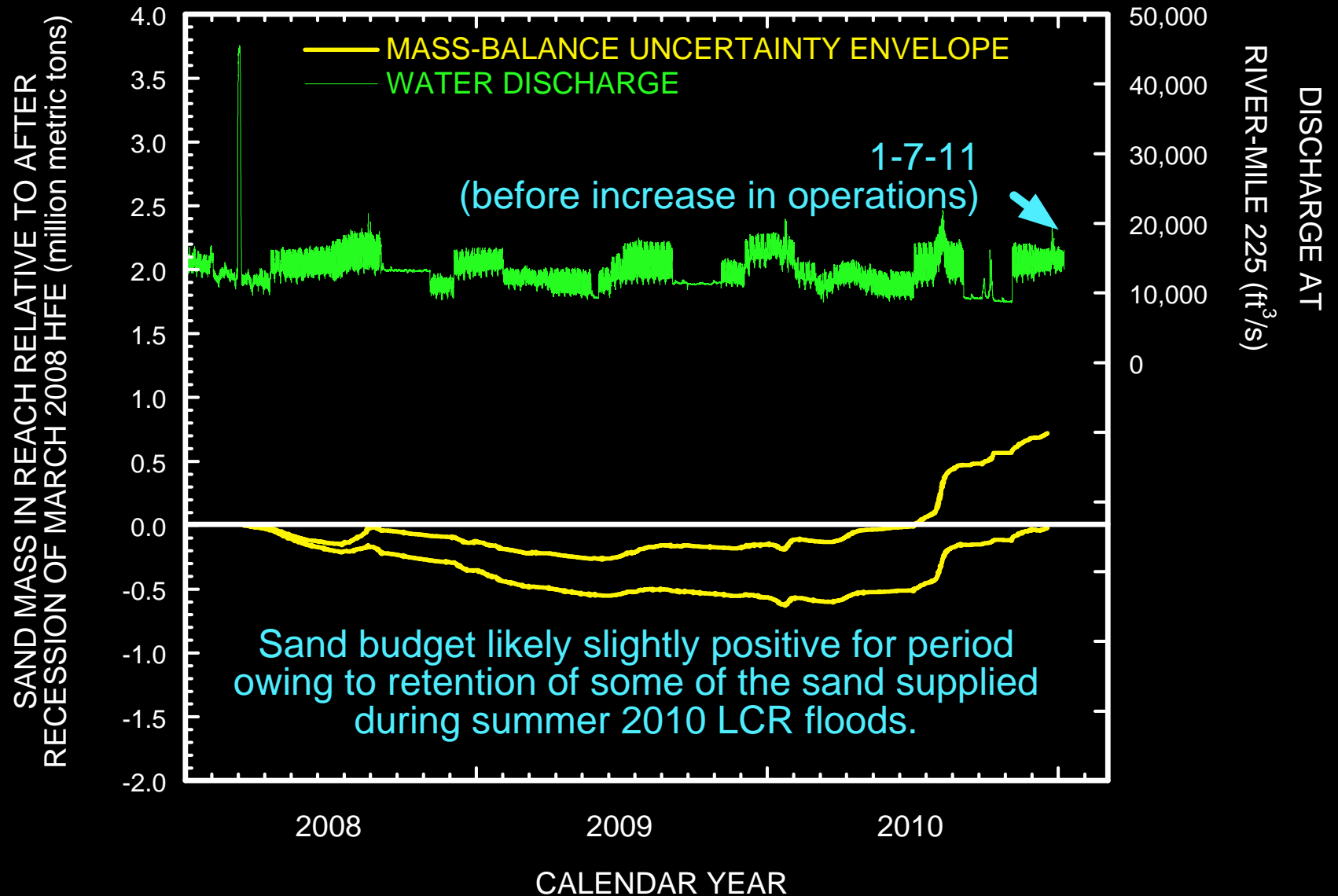
Preliminary results – subject to review and revision

POST-2008 HFE MASS-BALANCE SAND BUDGET BETWEEN RIVER-MILES 61 AND 87



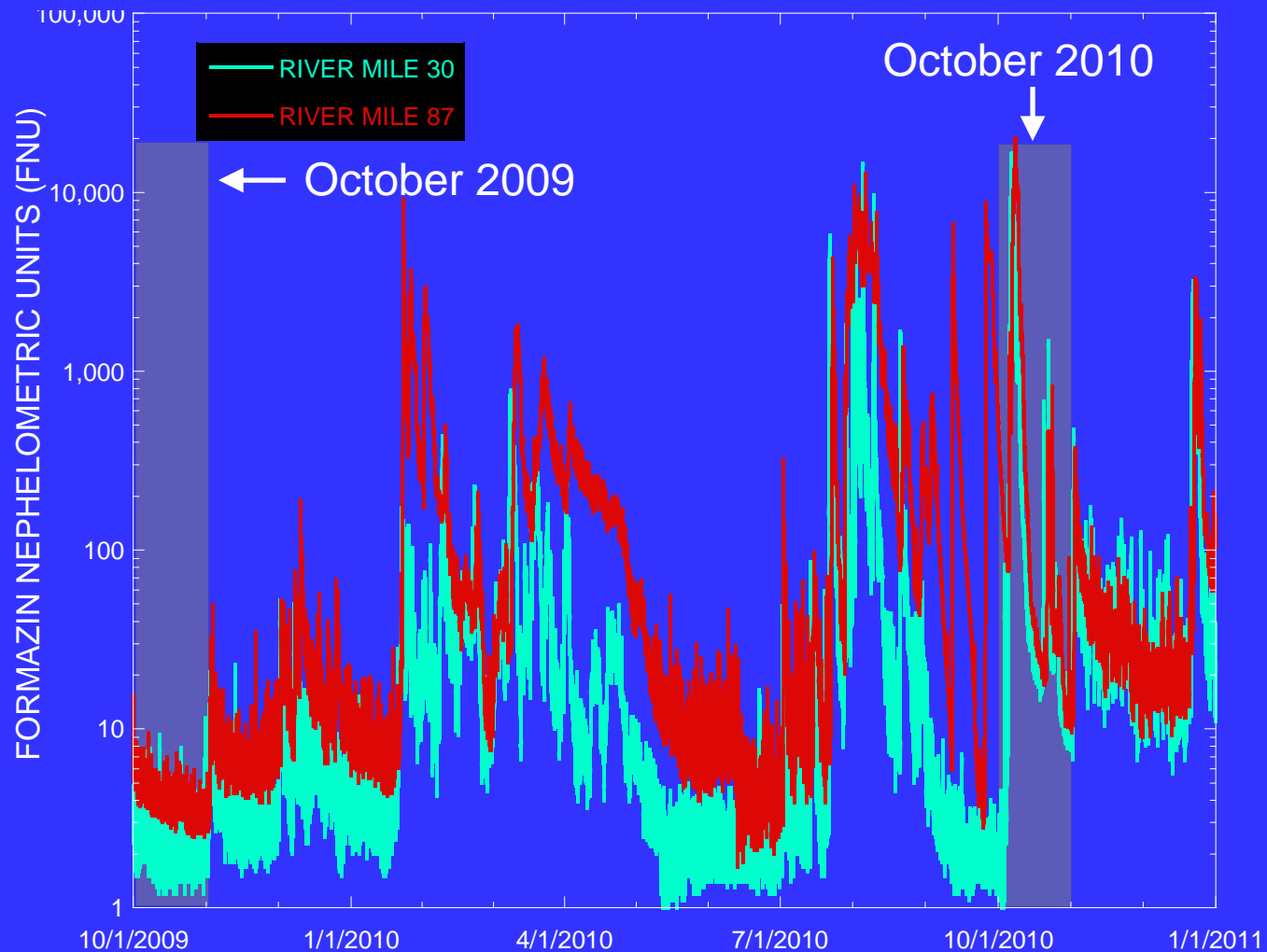
Preliminary results – subject to review and revision

POST-2008 HFE MASS-BALANCE SAND BUDGET BETWEEN RIVER-MILES 87 AND 225



Preliminary results – subject to review and revision

Relatively high turbidity at RM 30 and RM 87 in fall 2010



Sand update: January 7, 2011

- **RM 0 to RM 30,**
 - Budget is currently positive (Jan. 7, 2011) between 1.0 and 1.8 million metric tons.
 - Does not include recent change in operations
- **RM 30 to RM 61**
 - Budget is currently slightly negative, between -0.2 and 0.1 million metric tons.
 - Slight rise at end of period is transfer of fall 2010 inputs from upper to lower Marble Canyon.
- **RM 61 to 87**
 - Budget is currently slightly negative, between -0.7 and 0.0 million metric tons.
 - Not much retention of summer 2010 Little Colorado River inputs.
- **RM 87 to 225**
 - Budget is currently positive (Jan. 7, 2011) between 0.0 and 0.7 million metric tons.
 - Retention of some of the summer 2010 Little Colorado River floods.

Comparison of January 2011 status with status leading up to 2004 and 2008 high flows

Reach	July 1, 2004 to start of 2004 HFE	End of 2004 HFE to start of 2008 HFE	End of 2008 HFE to Jan. 7, 2011	Status
RM 0 to 30	0.4 ± 0.1	1.2 ± 0.6	1.4 ± 0.4	Definitely positive
RM 30 to 61	0.1 ± 0.05	0.5 ± 0.3	-0.05 ± 0.15	Likely negative
RM 61 to 87	0.0 ± 0.05	0.8 ± 0.7	-0.35 ± 0.35	Likely negative
RM 87 to 225	0.2 ± 0.1	0.9 ± 0.4	0.35 ± 0.35	Likely positive

All values in million metric tons.



Preliminary results – subject to review and revision

Summary

- There were above average sand inputs in July through October 2010.
 - As of January 7, 2011, most of those inputs were still in upper Marble Canyon (above RM 30)
- **October 15, 2010 to January 7, 2011 (2 weeks of steady 8,000 cfs and 2 months of 10,000-16,000 cfs fluctuations)**
 - Was a period of sand loss from RM 0 to 87 (about 300,000 tons of sand was transported out of upper Marble Canyon)
 - Sand loss was partially offset by late December Paria River inputs (~350,000 tons of new sand in upper Marble Canyon)
- Turbidity in Marble Canyon has been relatively high
- **Winter fluctuating flows (currently 13,000 to 20,000 cfs) will accelerate rate of sand export**