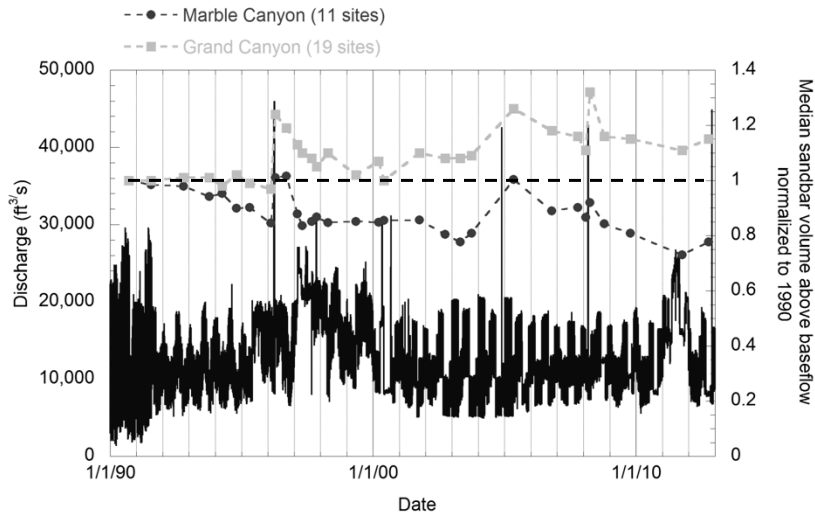
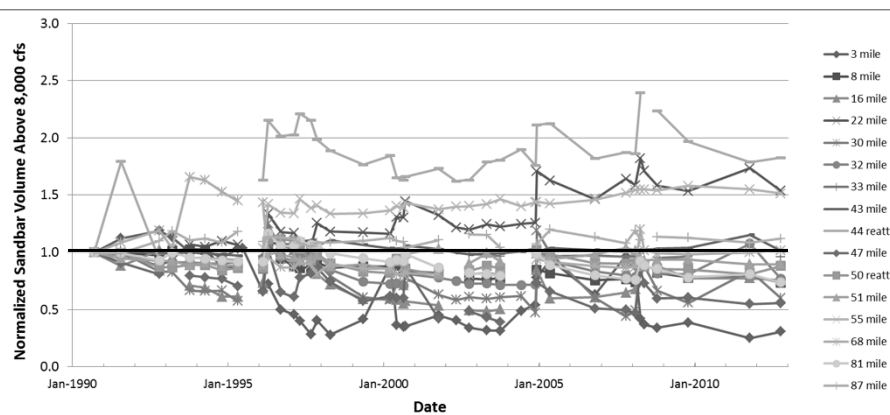
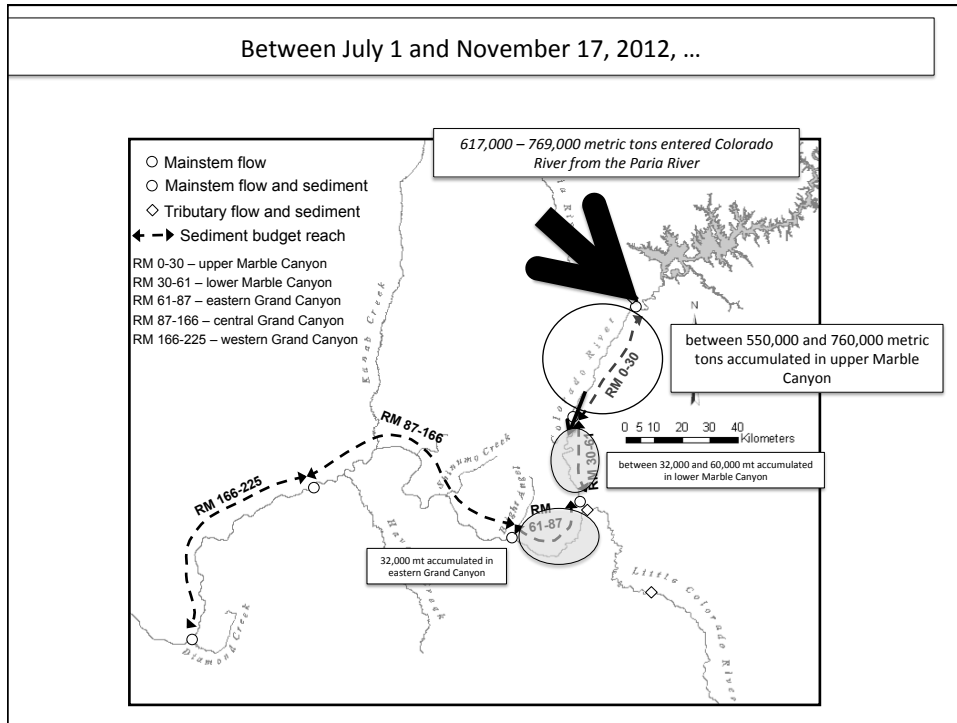


Immediately before the 2012 HFE, sand bars in Marble Canyon were as small as they had been since monitoring began in 1990; bars were larger in Grand Canyon

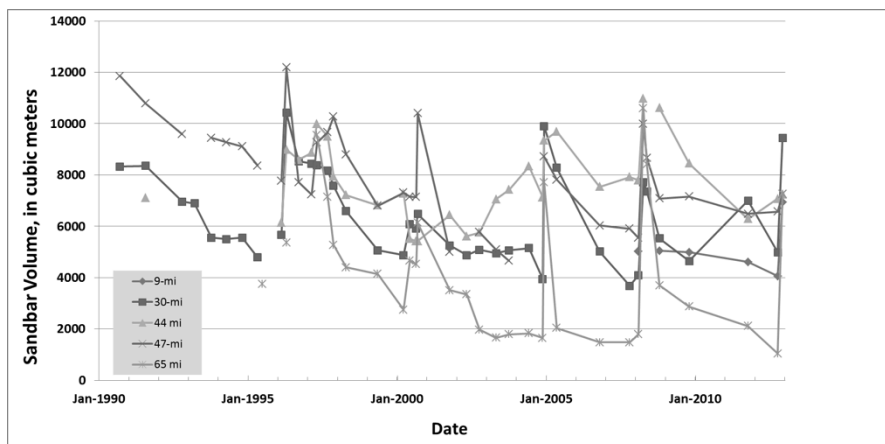


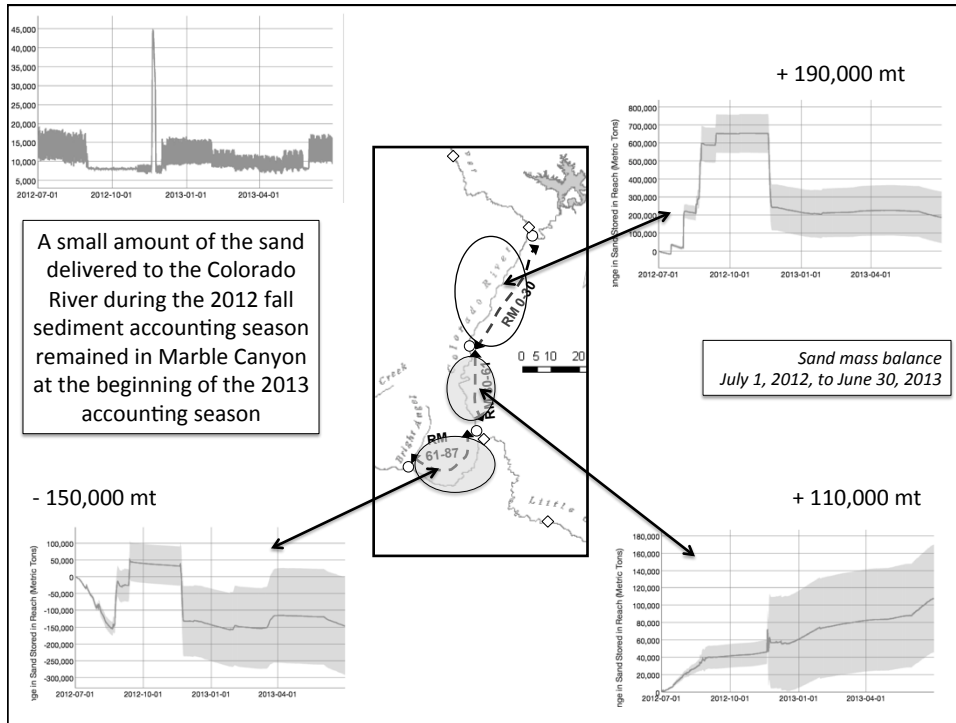
Although the median trend in Marble Canyon is negative, there are sites that have increased since 1990





5 sandbars surveyed immediately after the 2012 HFE
all increased in volume



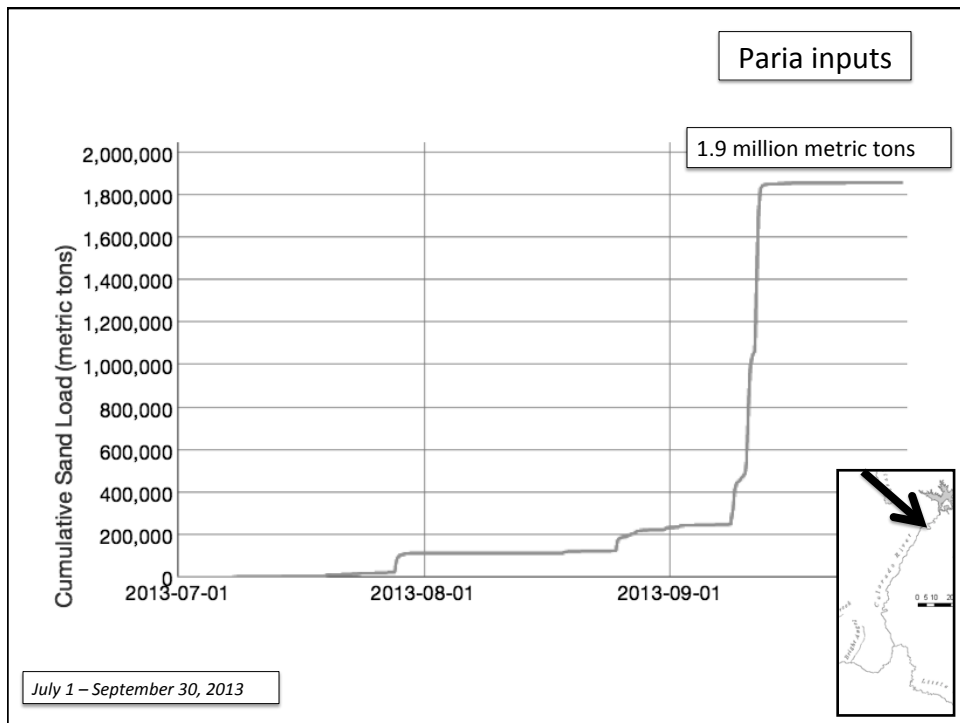
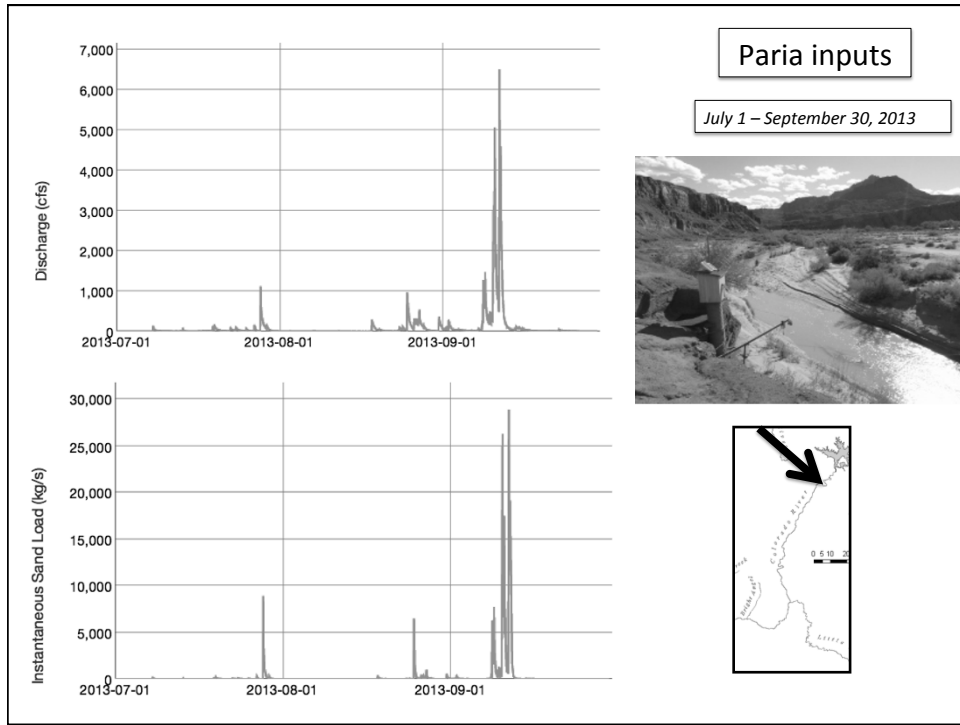


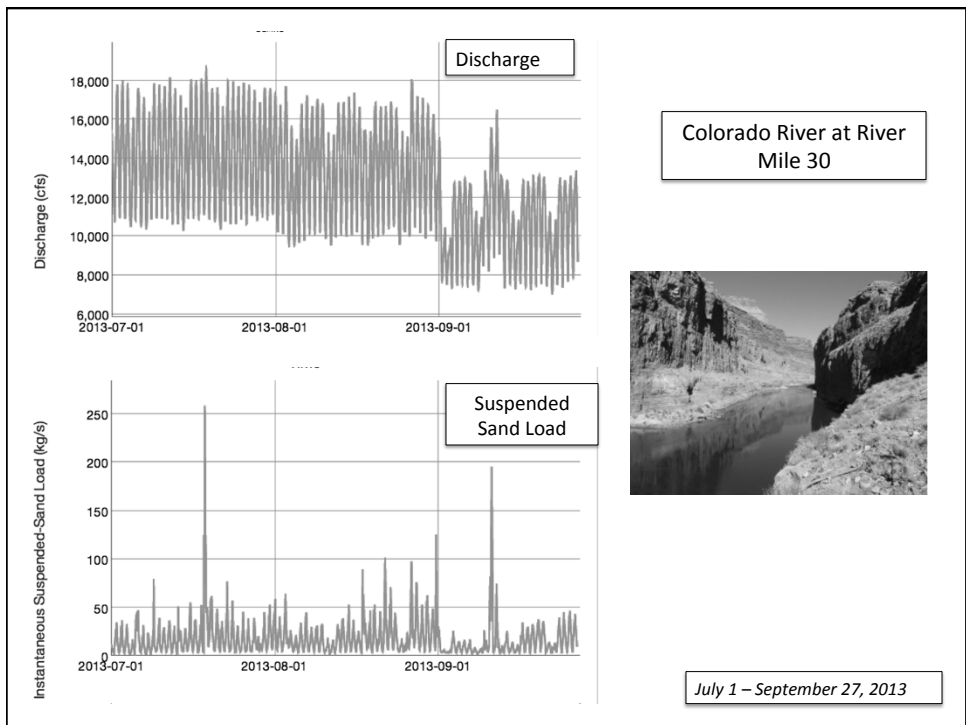
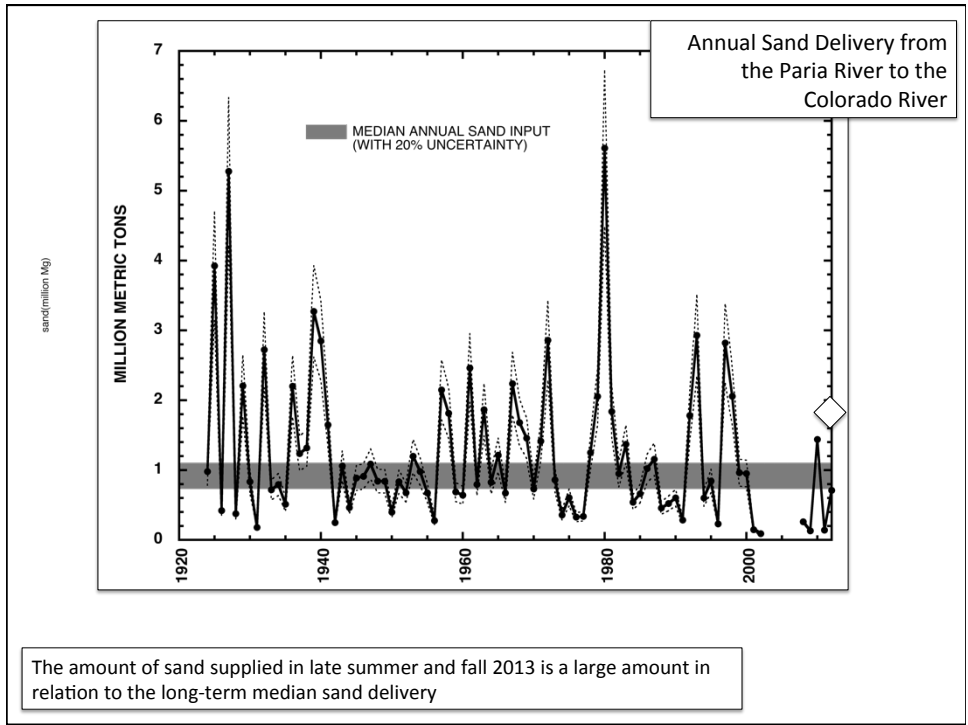
Most sandbars constructed by the 2012 HFE were subsequently eroded

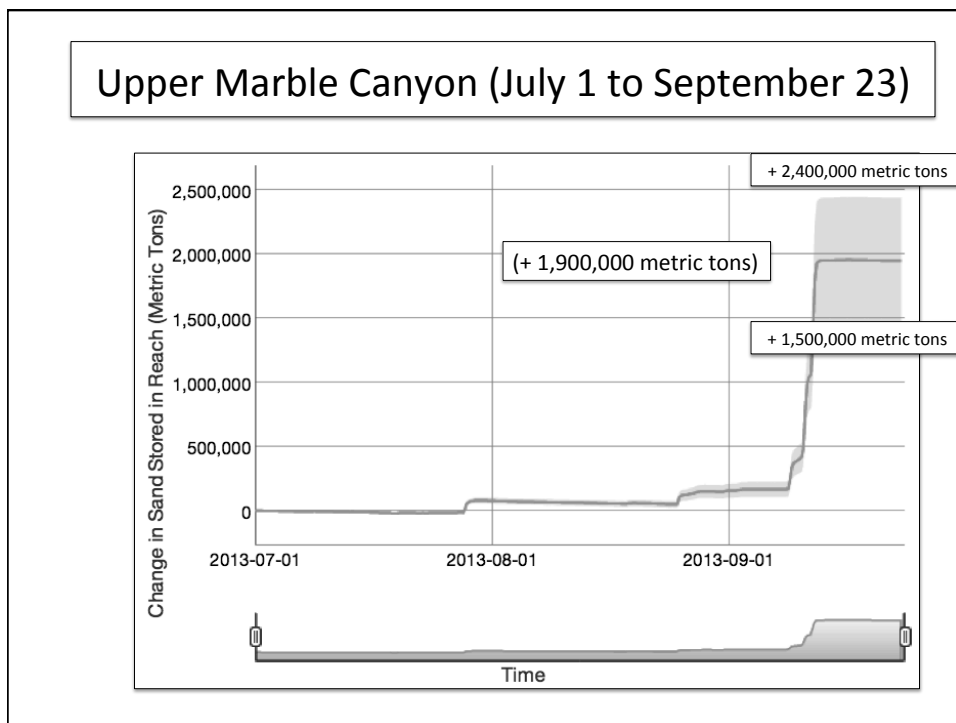
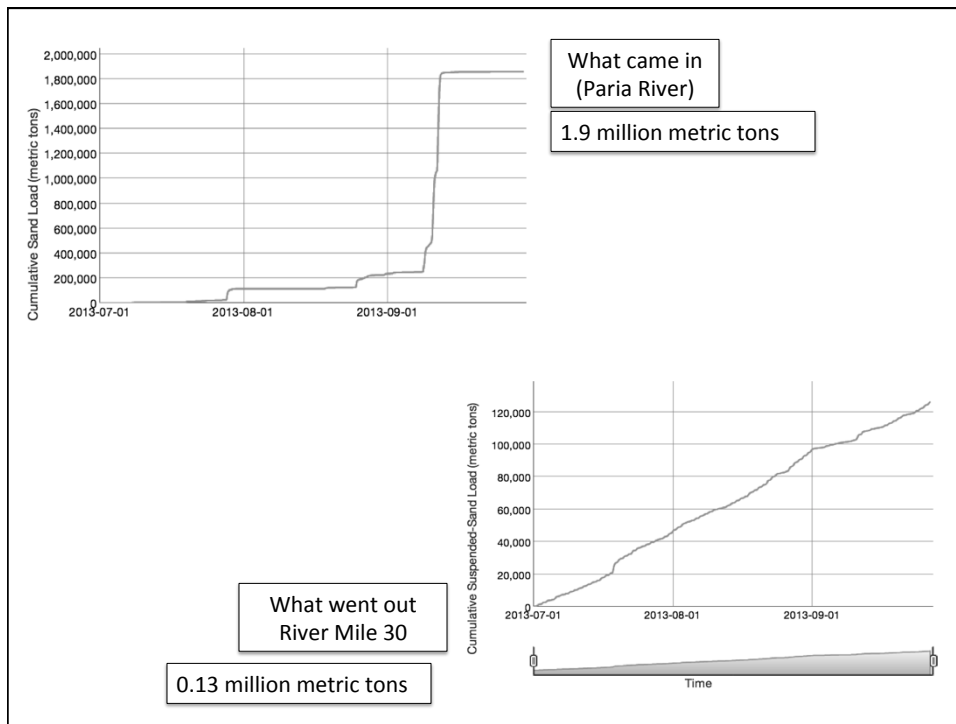
- **Response immediately after HFE**
 - **Substantial Gain (deposition): 18 sandbars (55% of sites)**
 - No substantial change: 12 sandbars (36% of sites)
 - Substantial Loss (erosion): 3 sandbars (9% of sites)
- **Sandbar condition in May 2013 (before summer fluctuations peaking at 18,000 ft³/s)**
 - Still somewhat larger (8 sites)
 - **About the same as pre-HFE size (14 sites)**
 - Smaller than pre-HFE (7 sites)

Preliminary data based on analysis of time lapse cameras

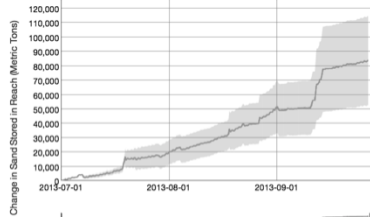




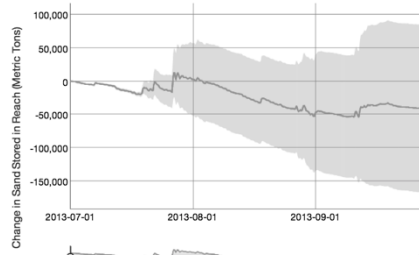




Sand Mass Balance Elsewhere (July 1 to September 27)



lower Marble Canyon (+ 84,000 metric tons)



eastern Grand Canyon (- 40,000 metric tons)

Between July 1 and September 27, 2013, ...

1,900,000 mt entered Colorado River from the Paria River

- RM 30-61 – lower Marble Canyon
- RM 61-87 – eastern Grand Canyon
- RM 87-166 – central Grand Canyon
- RM 166-225 – western Grand Canyon

