Grand Canyon Monitoring and Research Center

WY 2004 Experimental Fine-Sediment Update Between Lees Ferry & Diamond Creek

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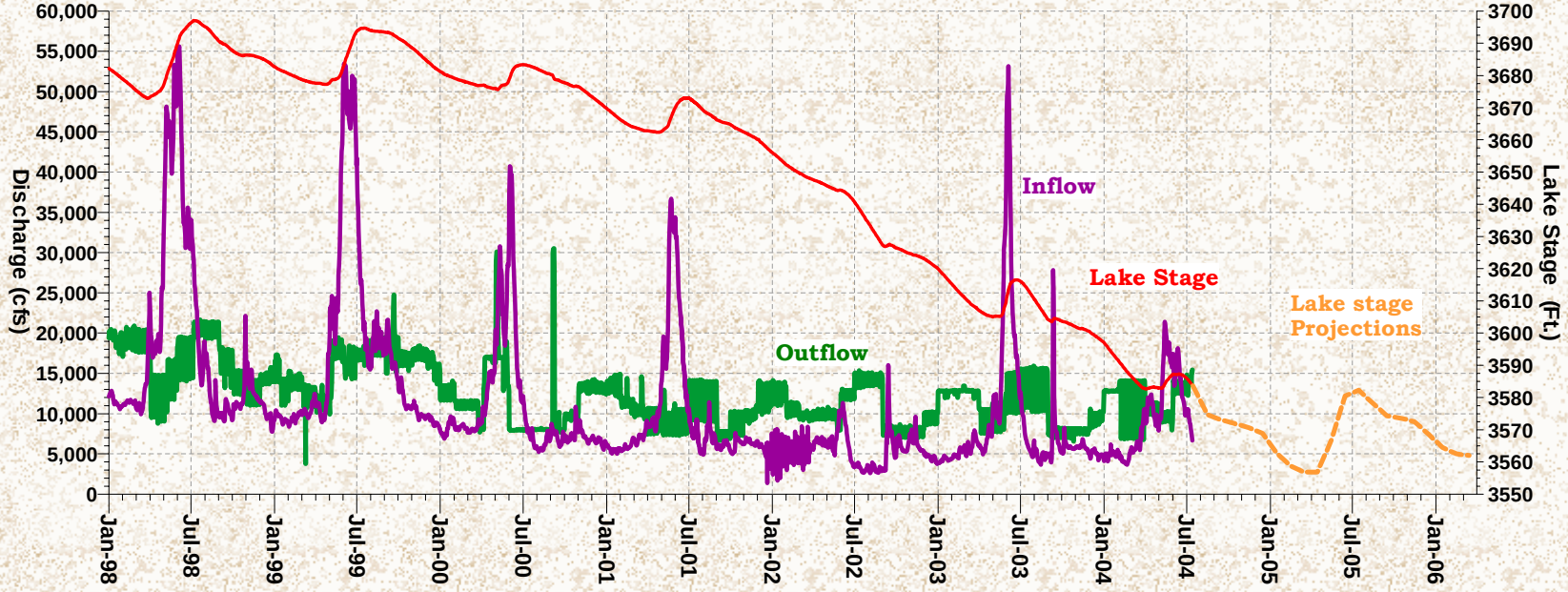
Let's Start With Lake Powell

Lake Powell Stage
Inflow & Outflow Hydrograph for Glen Canyon Dam
Mean Daily Values



Preliminary Data – Subject to Review and Revision 08/09/04

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What's Going on in Lake Powell?

- Declining Reservoir Levels
  - Current Elevation – 3578.60 ft
    - lowest elevation since 5/27/70
  - Current Storage 9.82 MAF (44.7%)
  - Projected Low (March 2005) – 3556.9 ft
  - Projected High (July 2005) – 3582.3 ft
- Warming Releases
  - Maximum observed temperature 11/14/03 – 13.2°C(58°F)
  - 15°C (59°F) possible by 10/1/04

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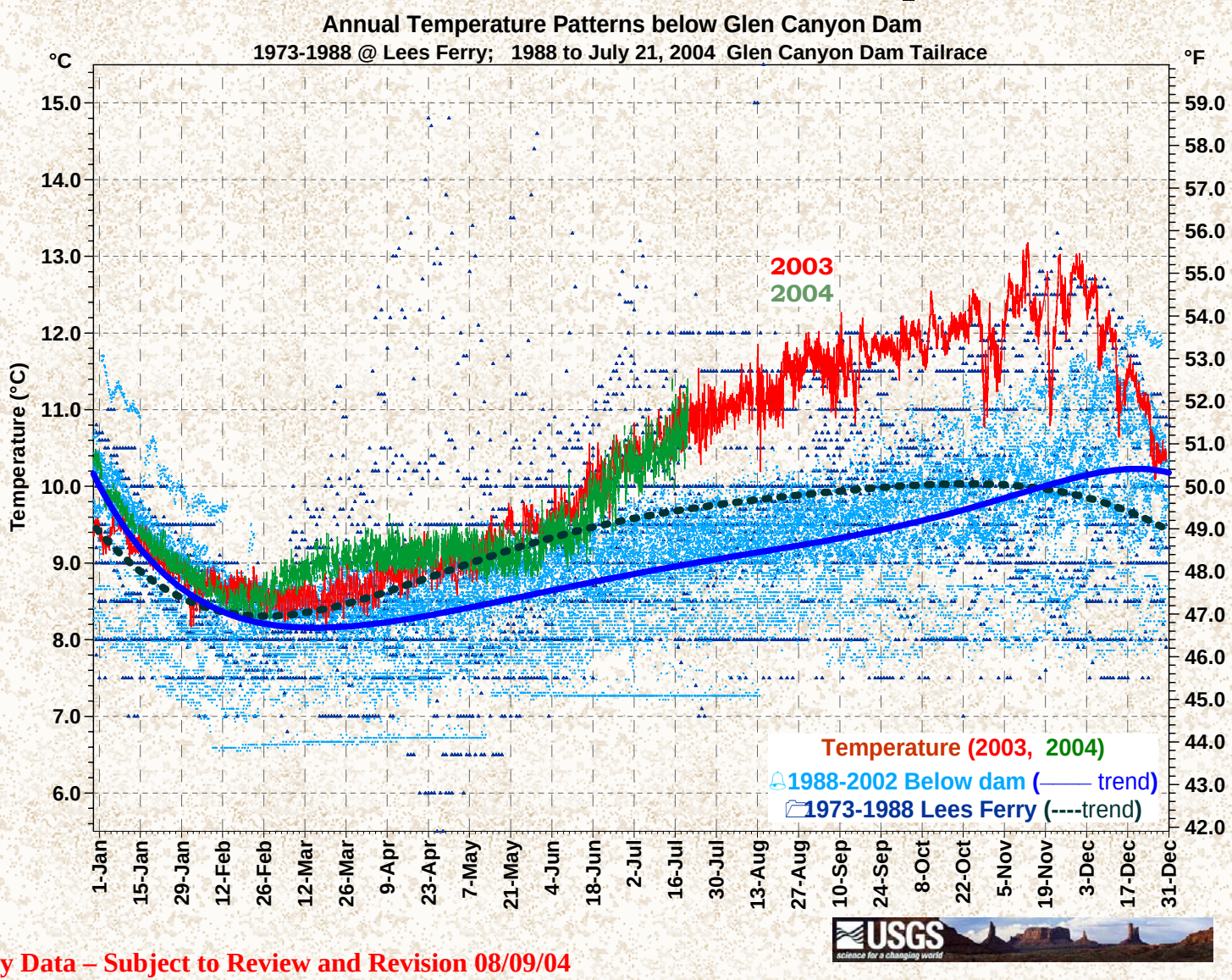
Lake Powell and GCD Release Temperatures



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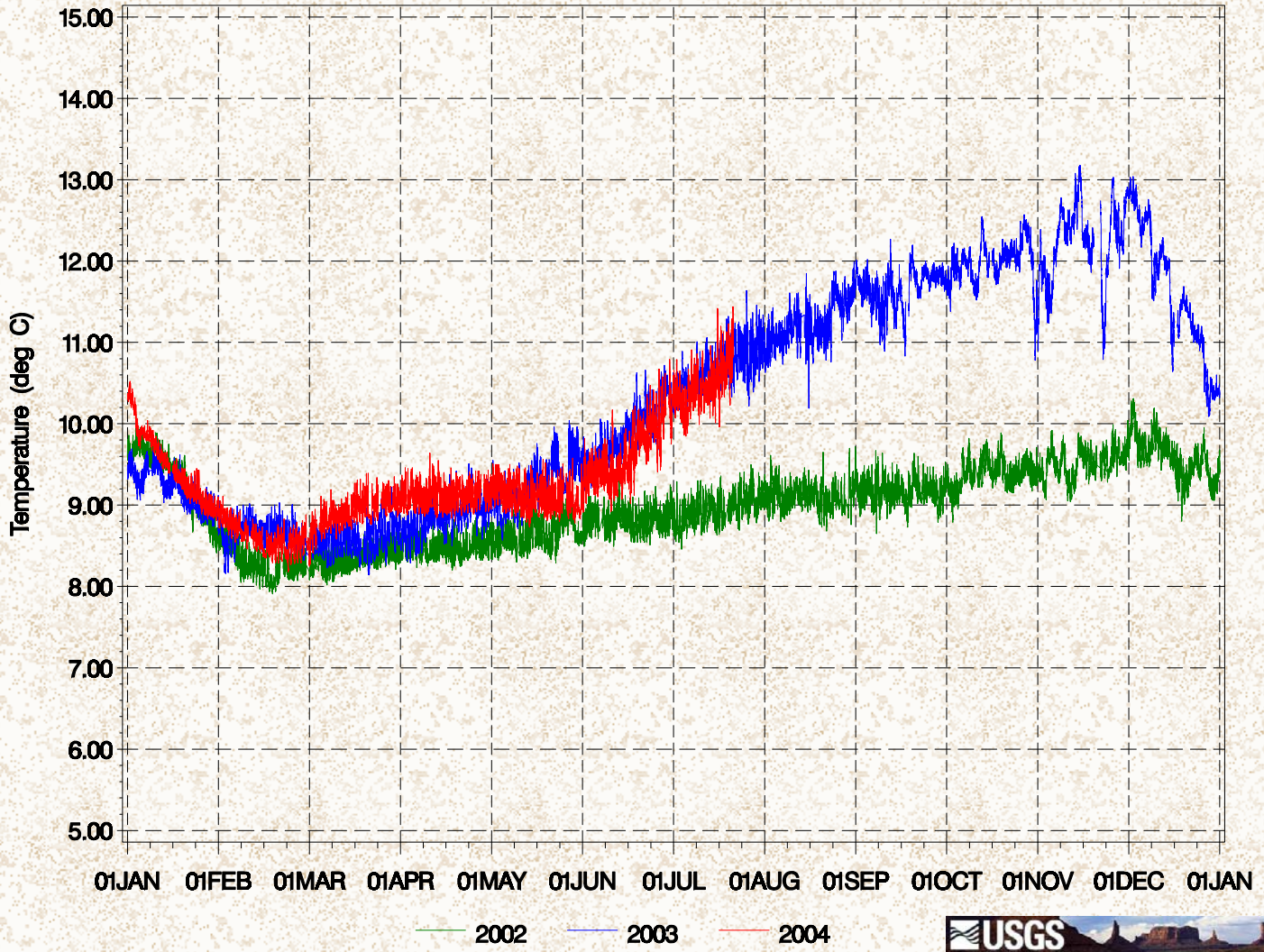
GCD Release Temperatures Significantly Up Since 2002



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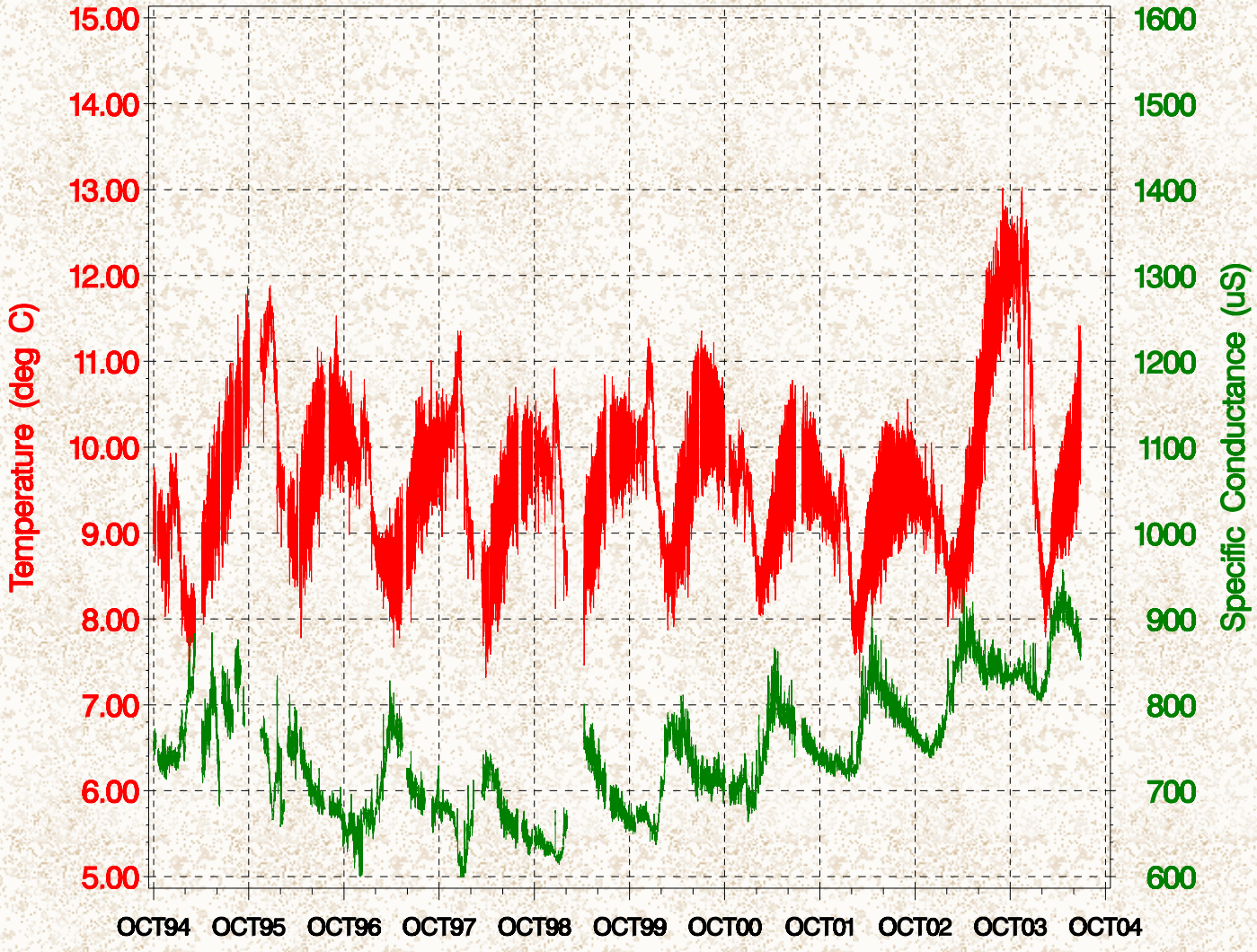
GCD Release Temperatures & SC (1994 – 2004)



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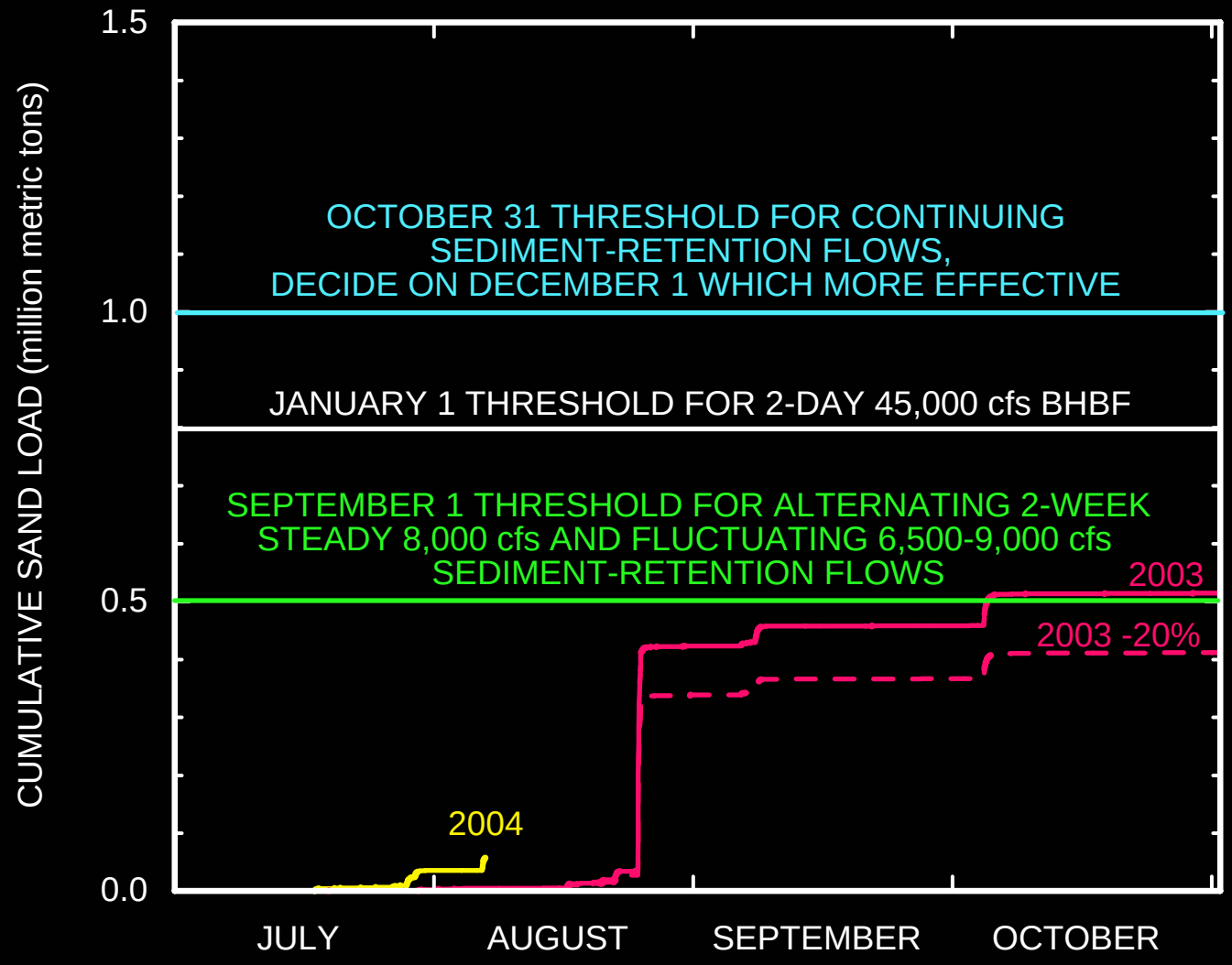
Paria River Sand Inputs From July - October (2003 versus 2004)

PARIA RIVER EXPERIMENT UPDATE



SAND SUPPLY IS AHEAD OF LAST YEAR

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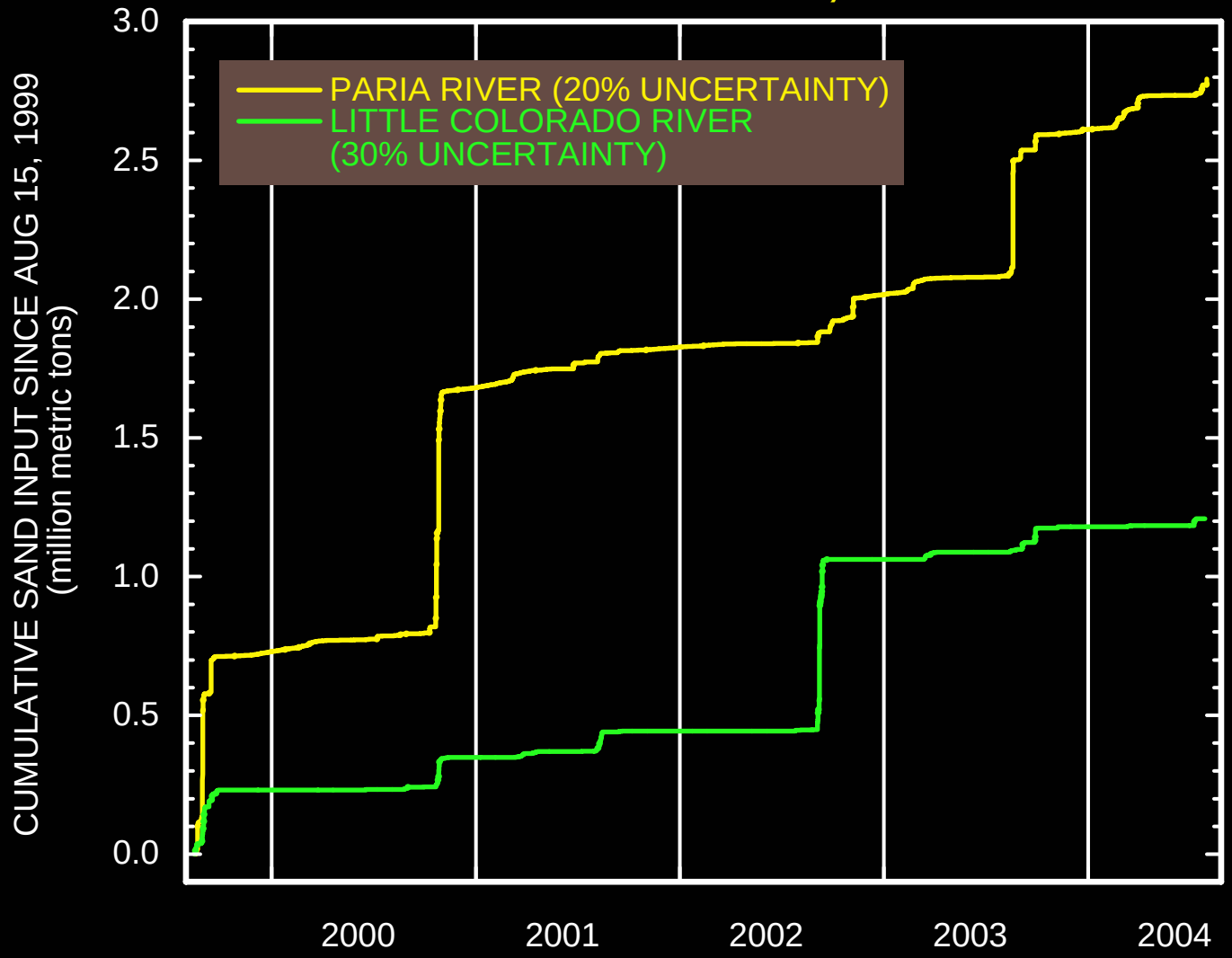
TRIBUTARY SAND INPUT BETWEEN THE LEES FERRY AND GRAND CANYON GAGES SINCE AUGUST 1, 1999



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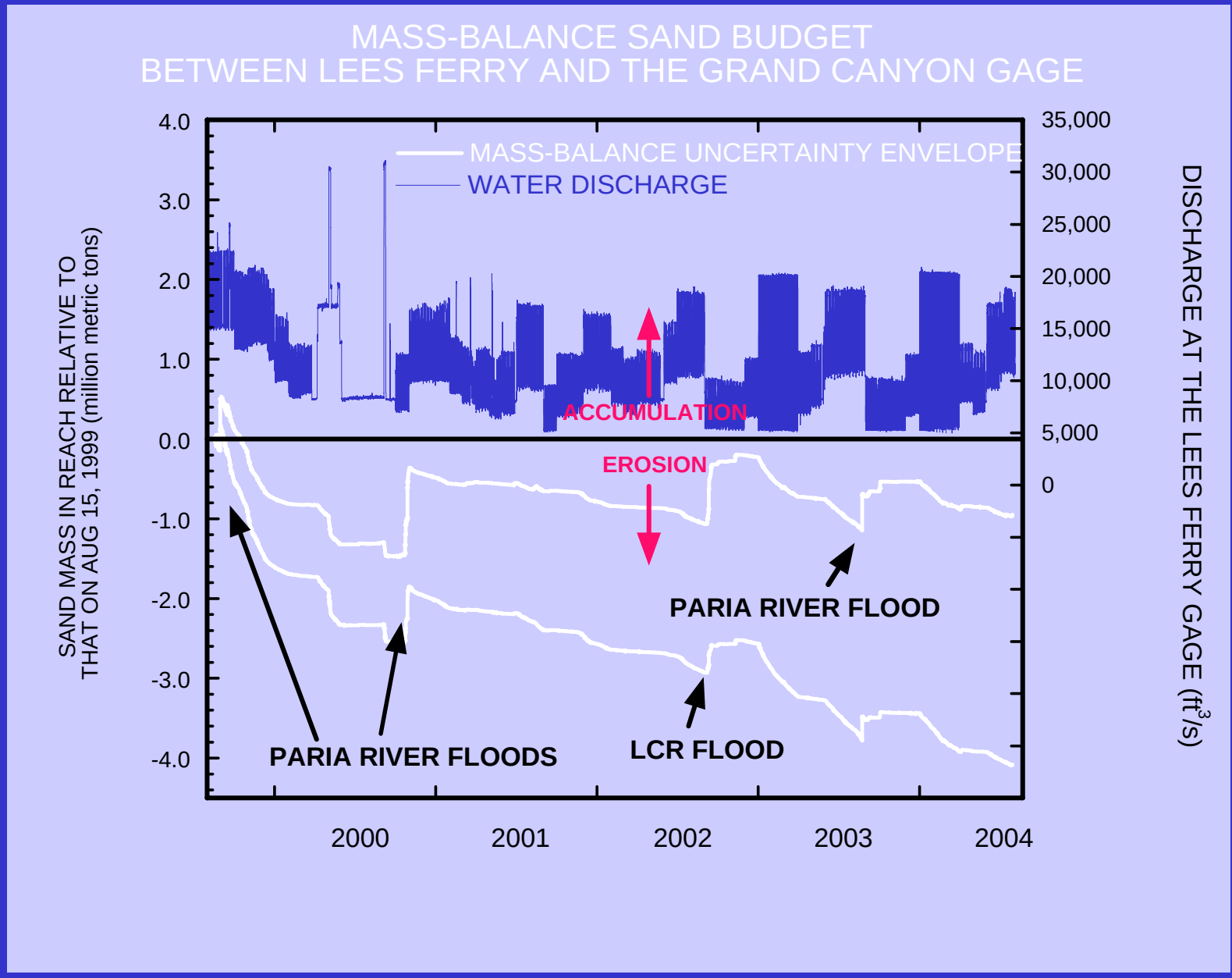
Sand Mass Balance From August 1999 to August 2004



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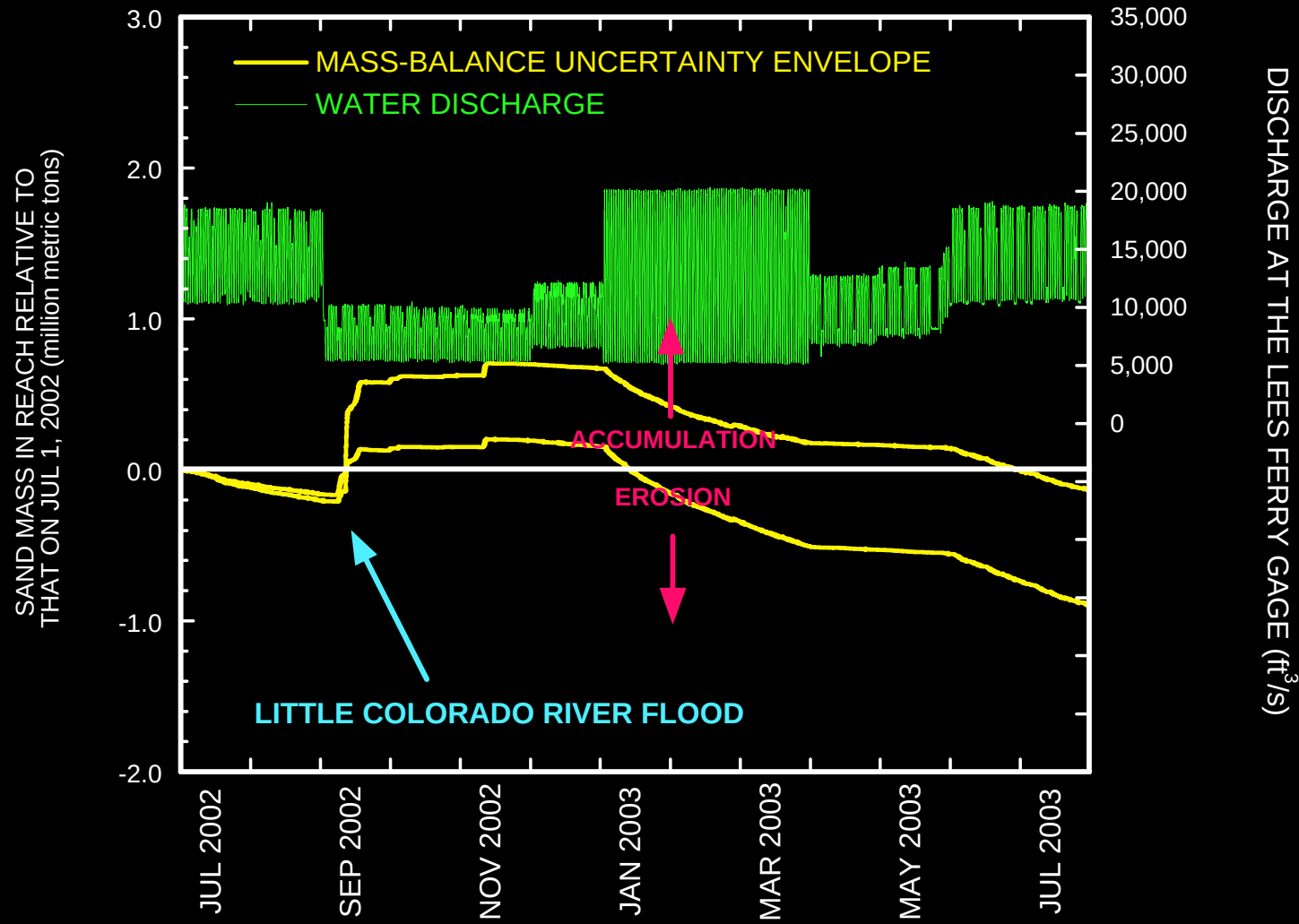
SEDIMENT-YEAR 2003 MASS-BALANCE SAND BUDGET BETWEEN LEES FERRY AND THE GRAND CANYON GAGE



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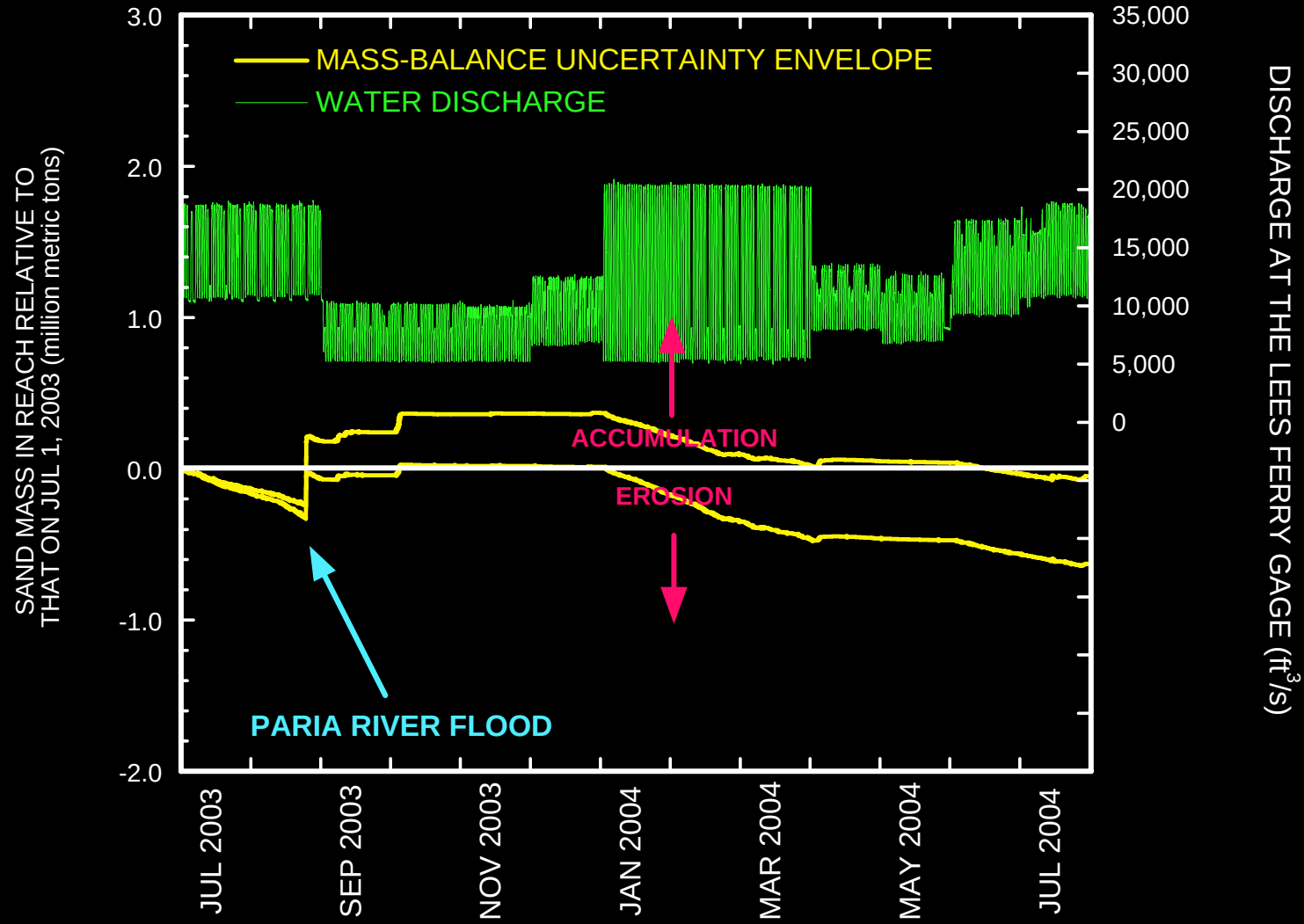

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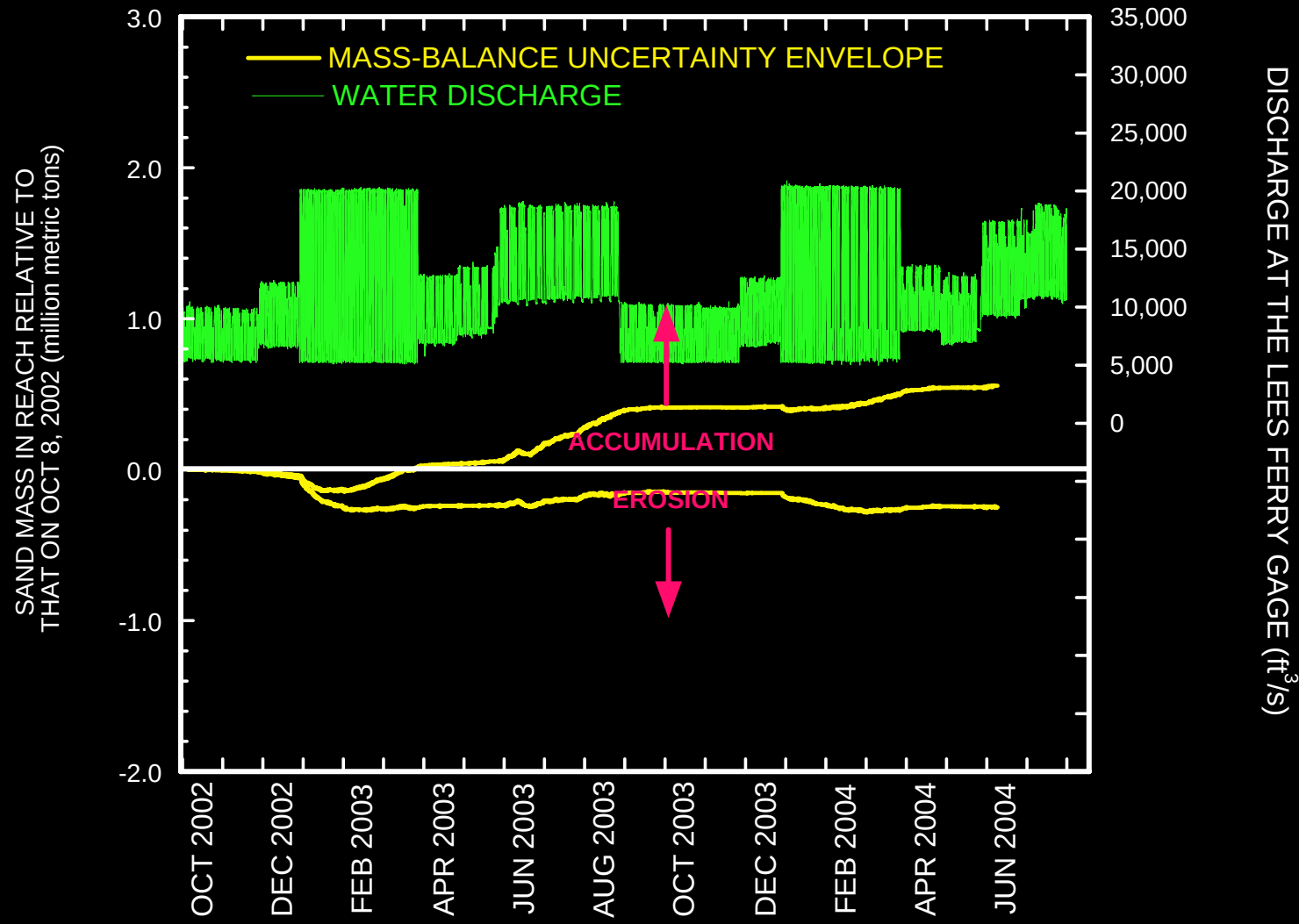
MASS-BALANCE SAND BUDGET
BETWEEN THE GRAND CANYON GAGE AND DIAMOND CREEK



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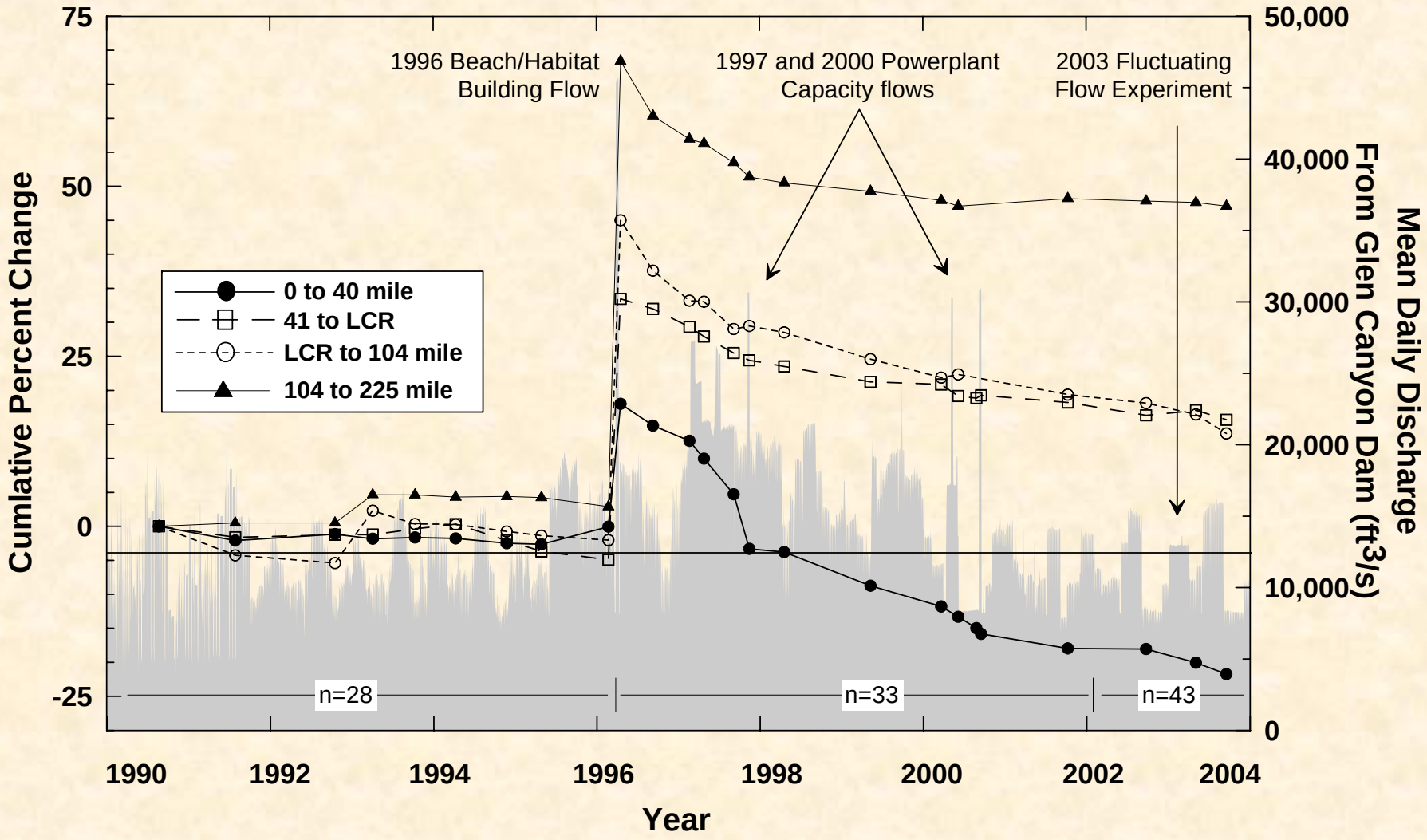
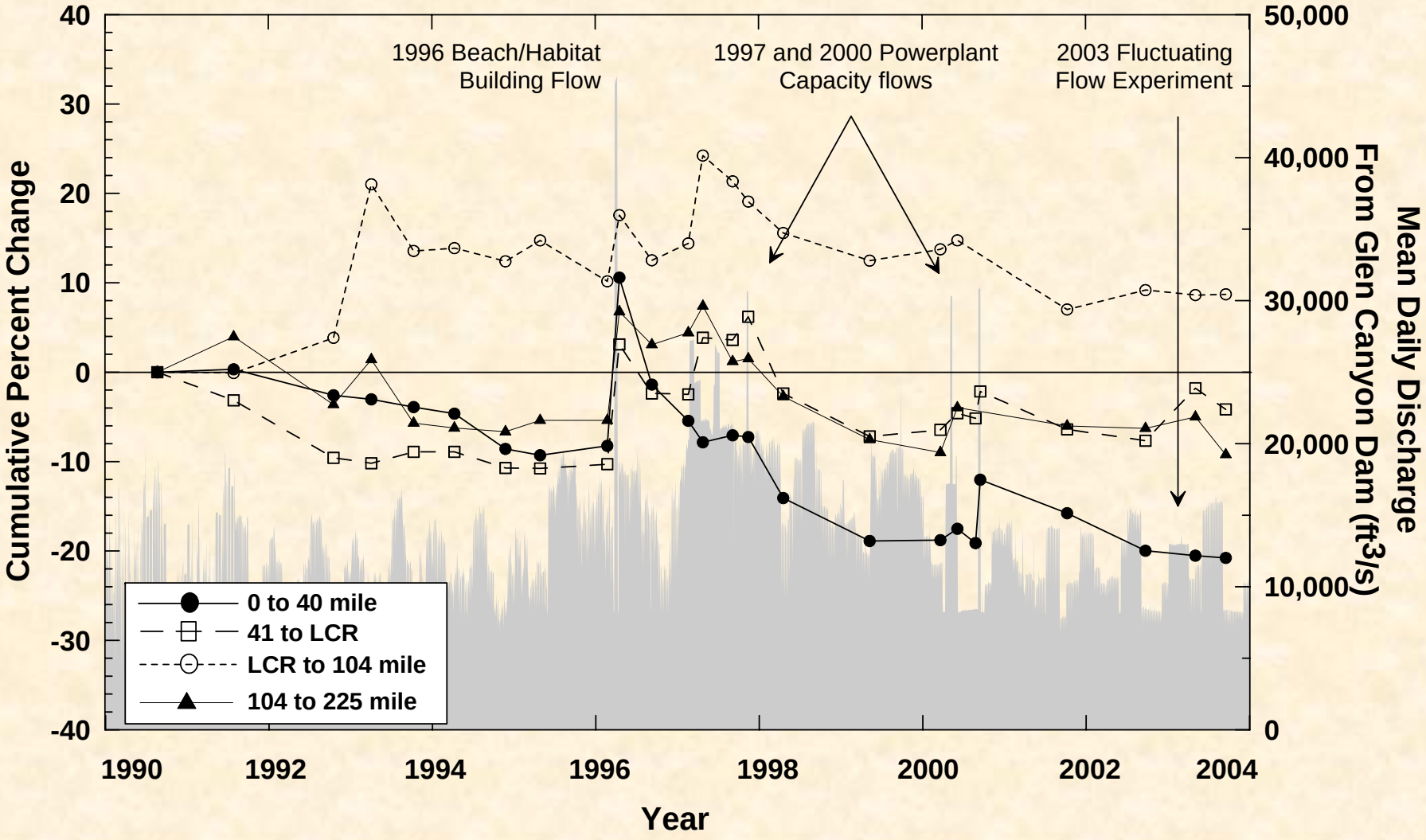
Time Series of Cumulative Median Sand Bar Volume Change At High Elevation (> 25,000 ft3/s)



Preliminary Data – NAU Geology Dept. – Subject to Review and Revision 08/09/04

Time Series of Cumulative Median Sand Bar Volume Change In the Fluctuating Zone (8,000 – 25,000 ft^3/s)



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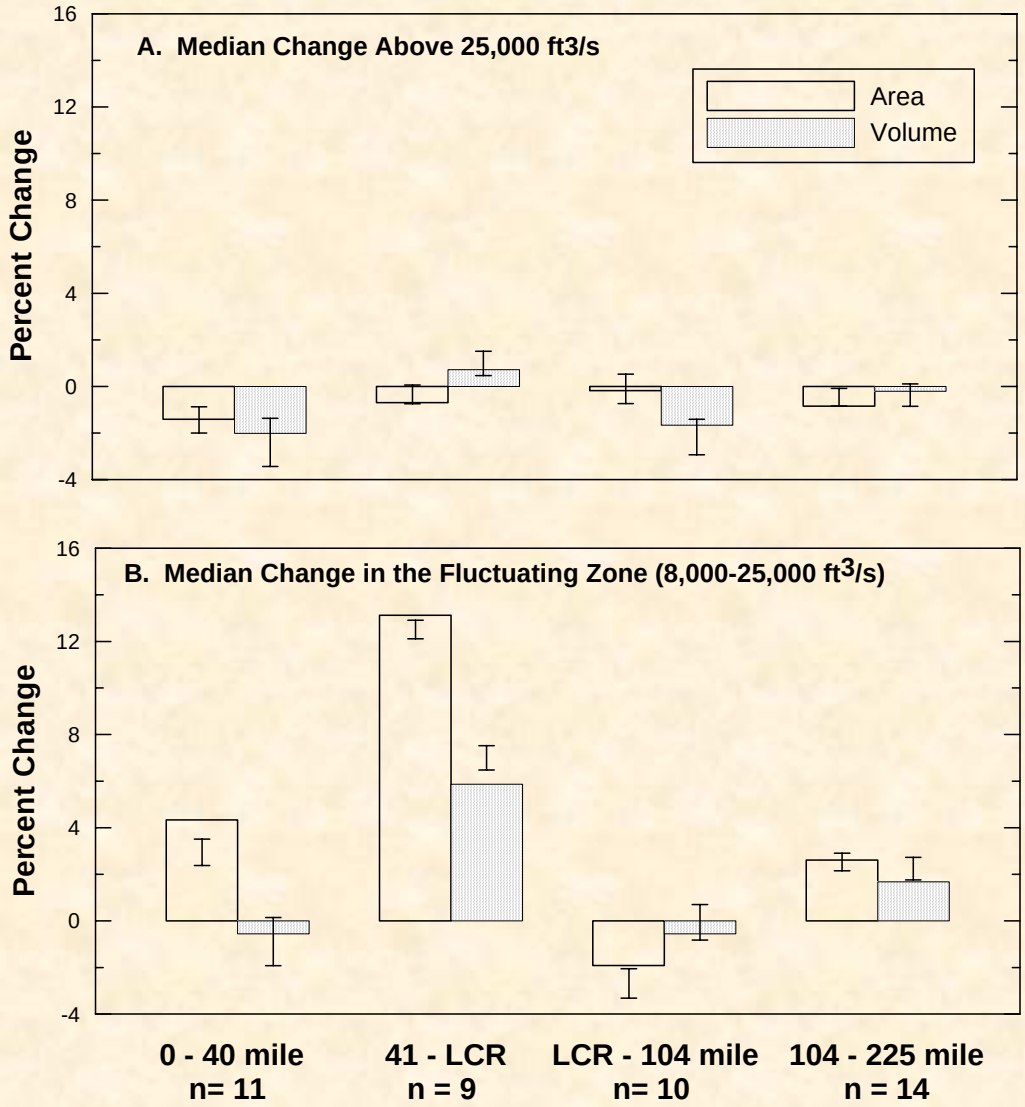
Median sand bar area and volume changes at 44 long-term monitoring sites

Following the 2003 (January-March) Experimental Fluctuating Flows



Percent change defined as change between surveys relative to the largest area or volume measured from 1990-2003

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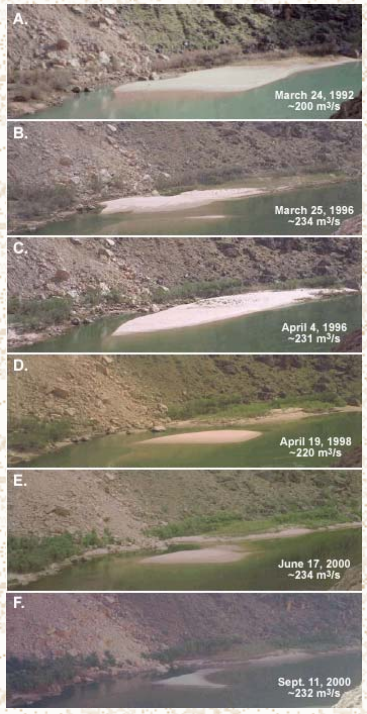
Take Home Messages



EXPORT OF SAND RESOURCES - Continues unabated in 2004, under 8.23 MAF, despite minimum release operations – further evidence refuting the EIS hypothesis for sand conservation strategy under MLFF.

SAND INPUTS & TRIGGERS - Paria River sand inputs are ahead of levels at this time in 2003, but still well below levels required for EHF trigger or that required for 8,000 cfs vs low fluctuating flow comparison in Sept. & October

SAND BAR UPDATE - As supported by both the sand Mass Balance and NAU surveys, bar volumes have been reduced throughout the study areas by the WY2003 Experimental Fluctuations, while low-elevation sand-bar areas have increased, resulting in a combined "Smear & Export" scenario

TIMING OF INPUTS vs. OPERATIONS – Recent tributary sand inputs that have occurred in the months of July or August were exported from the Marble Canyon reach prior to low-volume release months of Sep. & Oct.

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Backwater Habitats?
Marble Canyon - Mile 44

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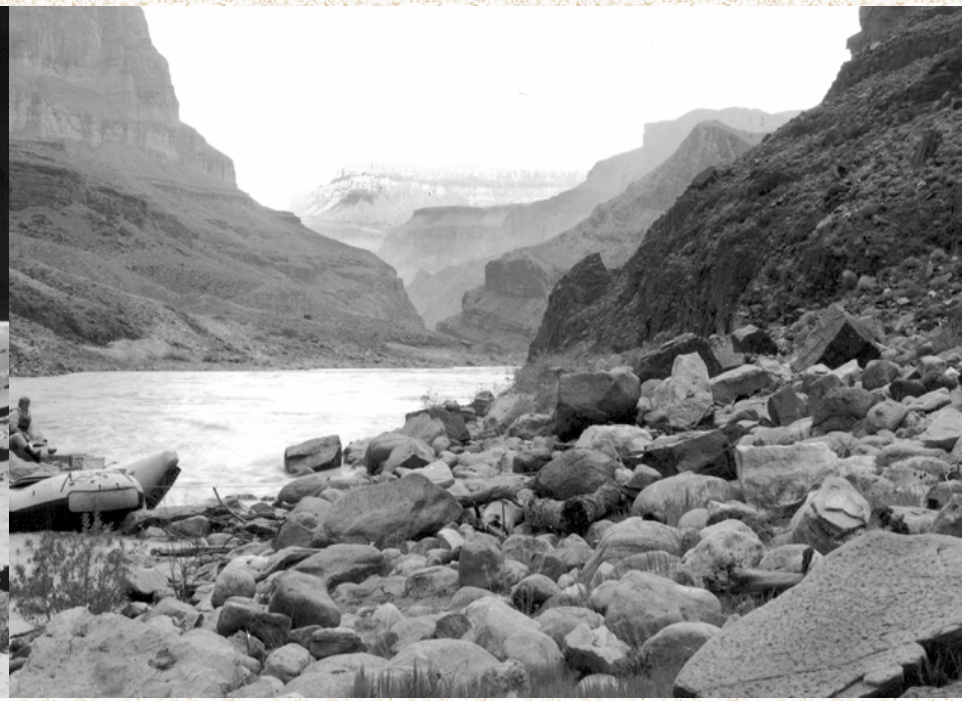
So What About the Camping Beach Areas?



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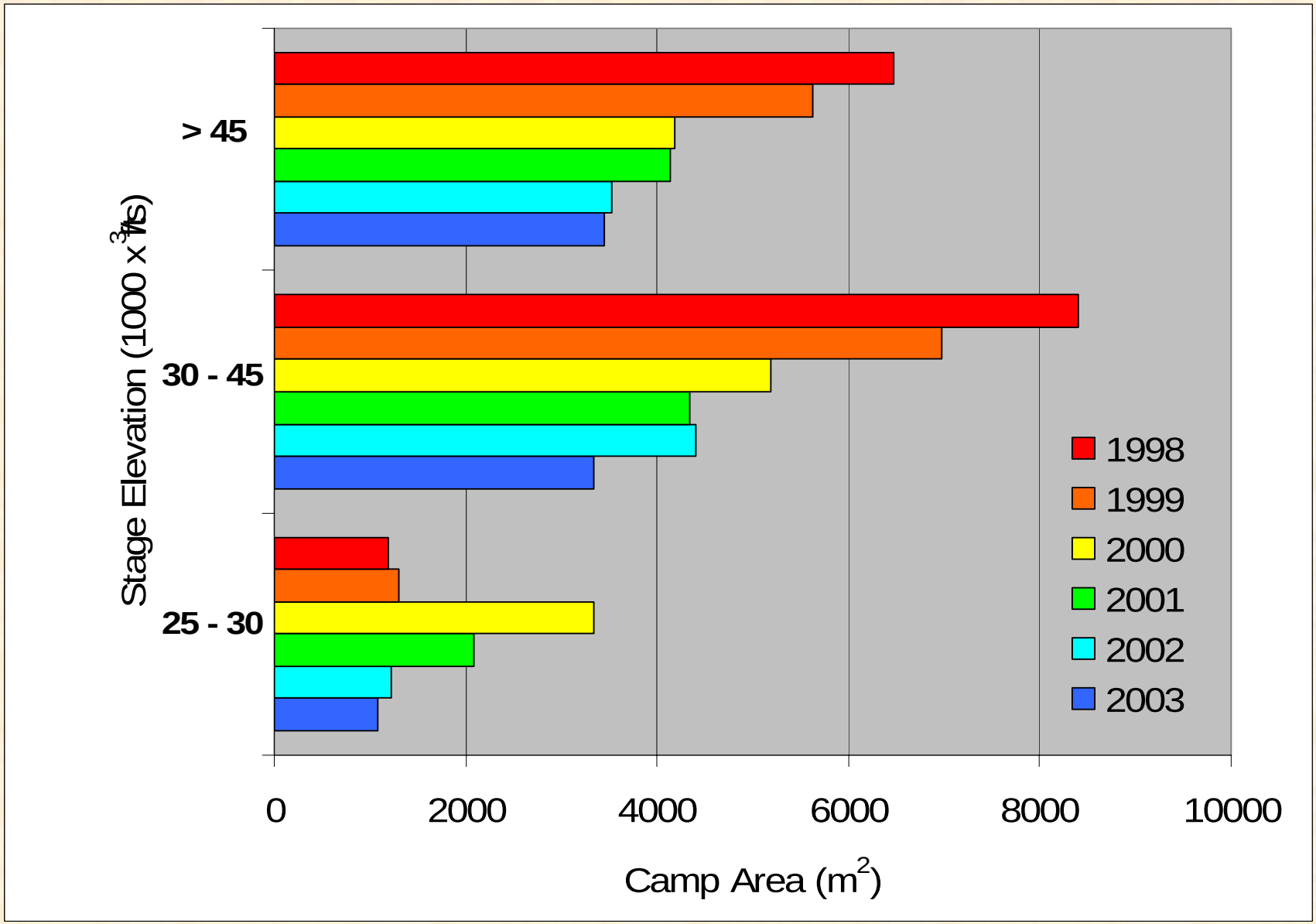
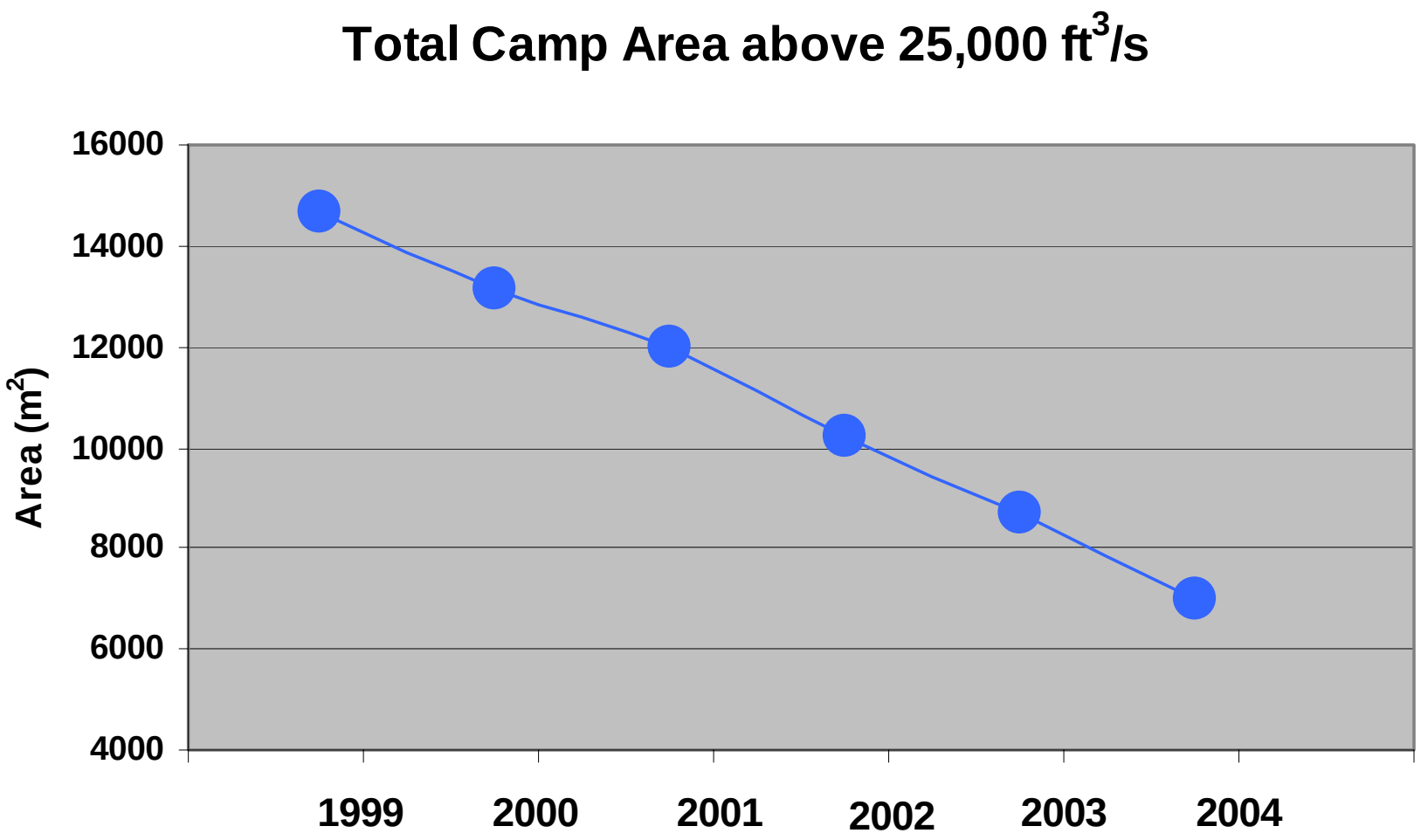
Cumulative Camping Areas (> 25,000 ft^3/s) Are at An All-Time Low, Owing to both Sand Bar Erosion & Vegetation Colonization



Preliminary Data – NAU Geology Dept. – Subject to Review and Revision 08/09/04

Time Series of Cumulative Camping Beach Area Shows Linear Decline During Running Sand Mass Balance – A Trend Related to Both Sand Export & Encroachment by Riparian Vegetation



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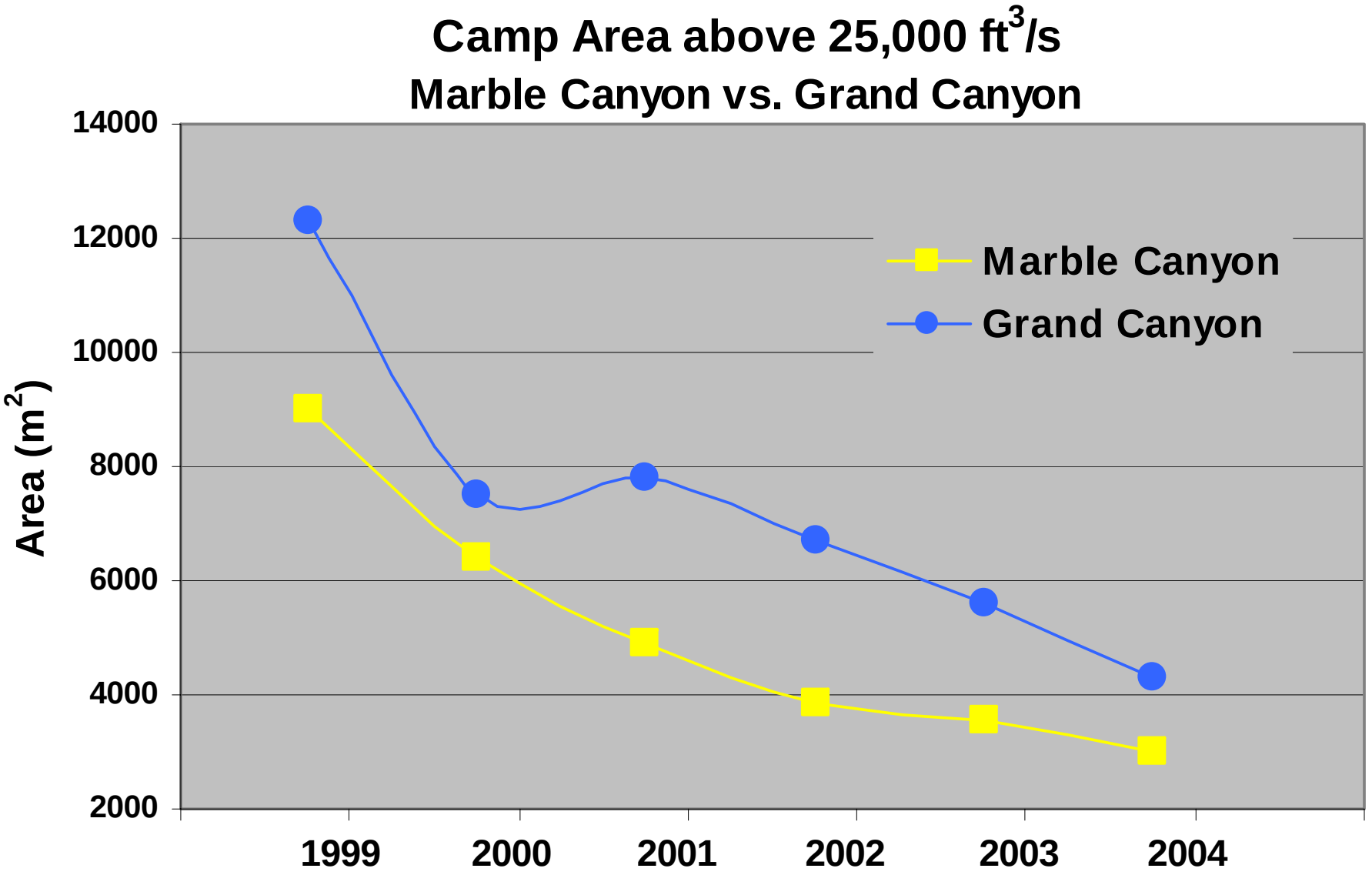

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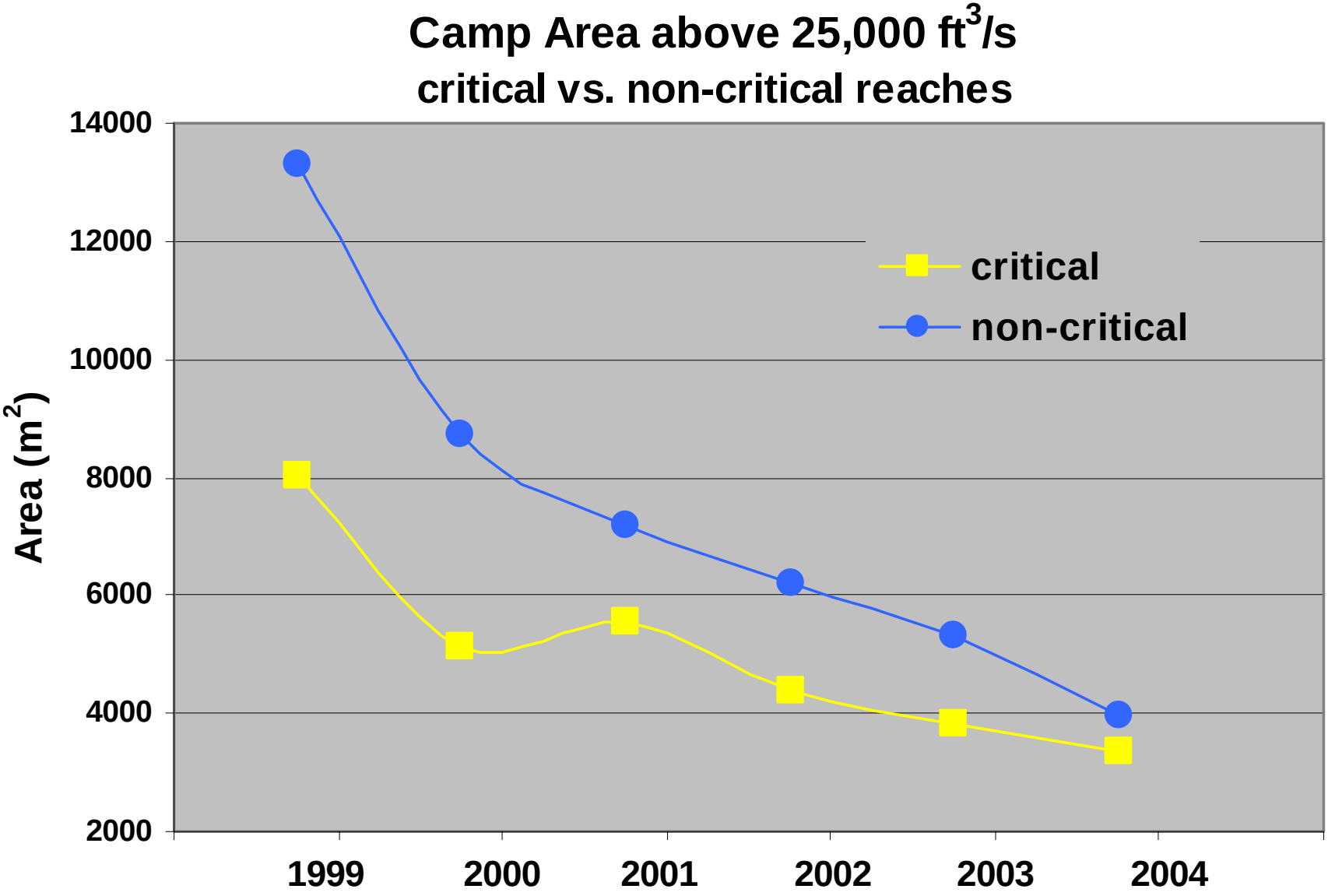
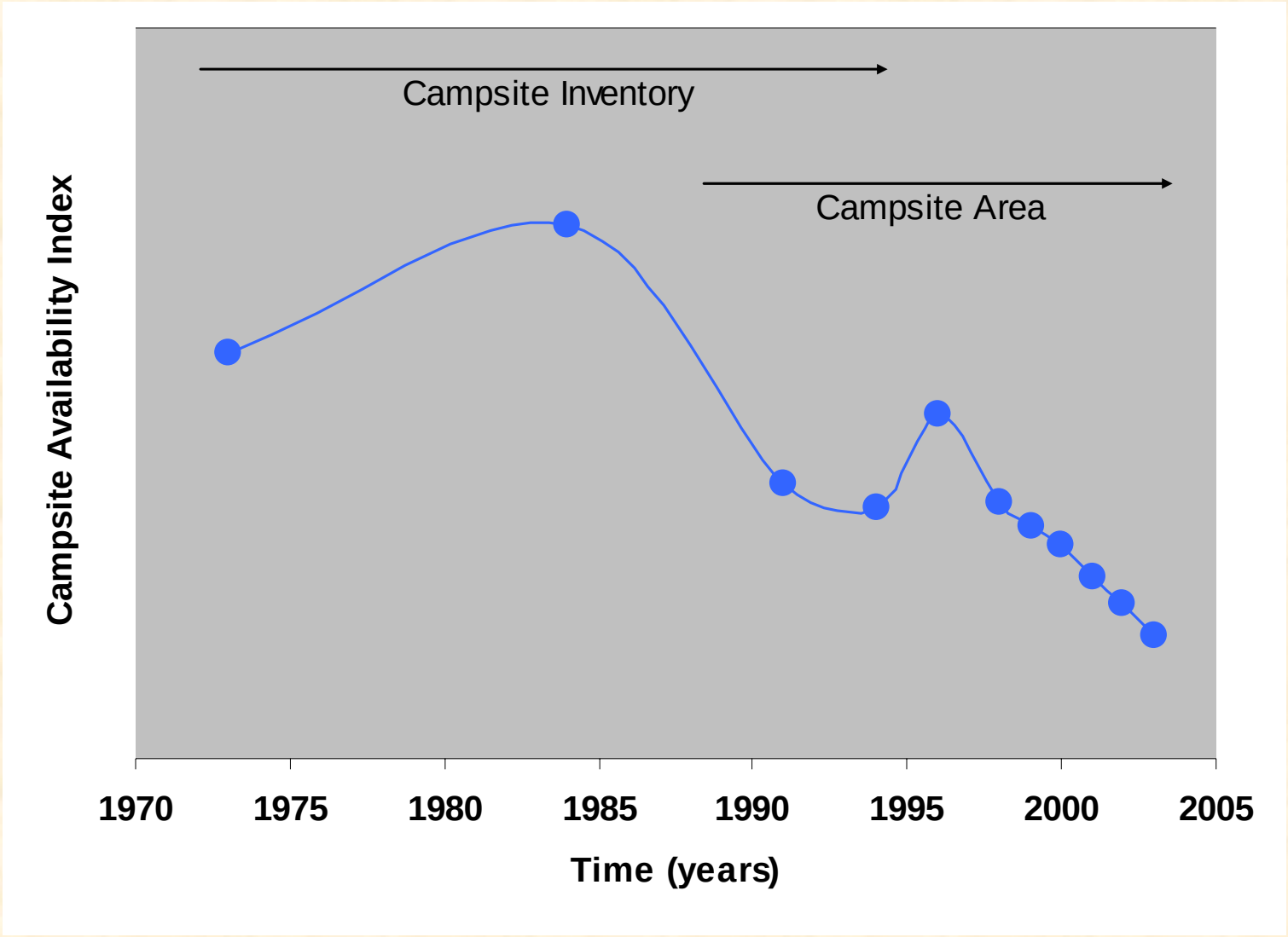


Composite Time Series Showing "Campsite Availability Index" as Derived from Both Inventories and Campsite Area Surveys



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More Take Home Messages

Ongoing Loss of Camping Areas

- Camping area availability continues to decline in the absence of sand-supply enrichment by tributary inputs and Beach/Habitat-Building Floods above 25,000 cfs.

- Absence of floods combined with reduced power plant operating range has allowed for expansion of the Sand/Beach riparian community down into the 25,000 to 31,500 cfs stage range.

- In 2003, camping area was estimated to be at its lowest level since 1972.

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Considerations for Future Experimental Operations & Management

How Could WY2005 Experimental Operations be Improved for Resources

- Consider changing to stable flows with onset of significant tributary inputs from Paria and LCR in July & August, to limit rapid sand export prior to BHBF implementation & provide benefit to YoY native fishes in the mainstem.

- Consider option of sediment trigger being decision point in late October, with implementation of BHBF testing in November, as a means of further limiting export of tributary inputs and capitalizing on enrichment periods.

- Consider releasing short duration BHBF, prior to any period in which diurnal operations will be peaking at 15,000 to 25,000 cfs (as pre-emtive strategy to mitigate sand export).