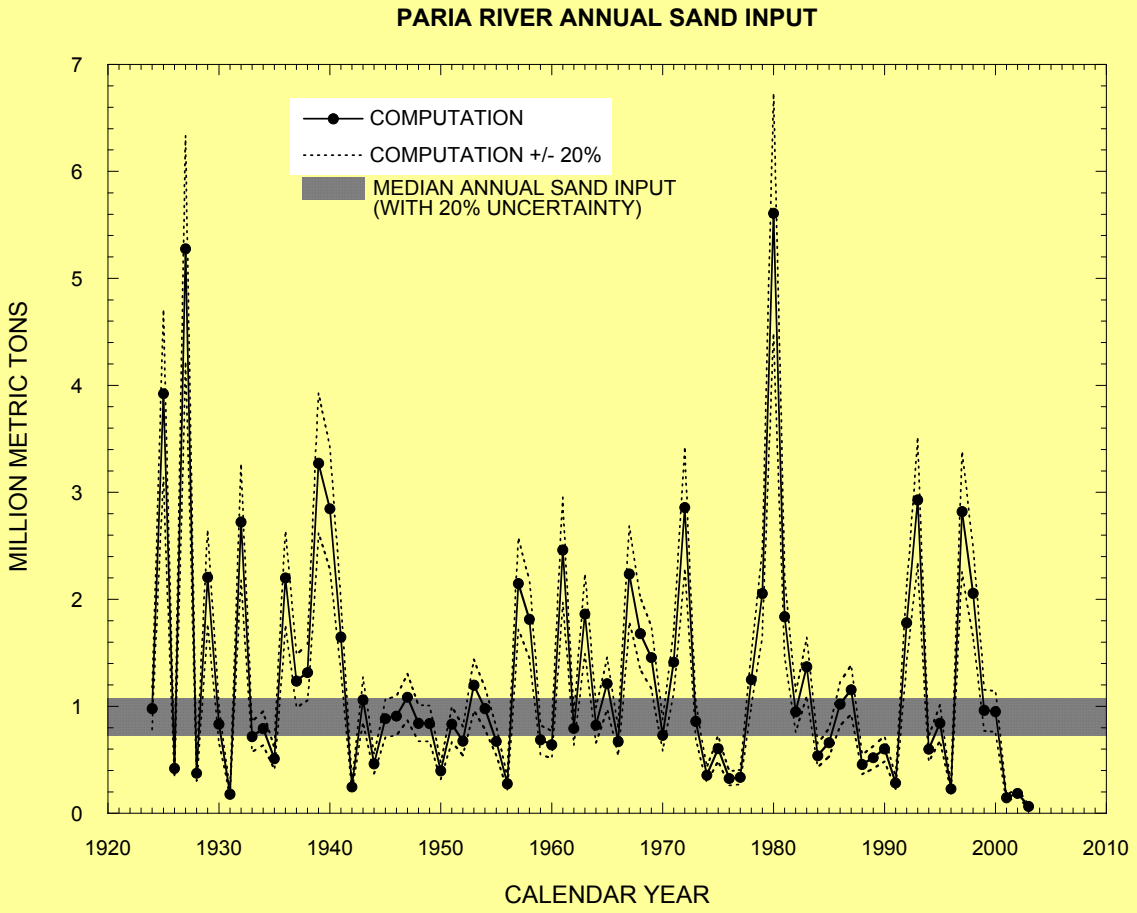
Grand Canyon Monitoring and Research Center

"WY 2003 Fine-Sediment Resources Update on Status of Sand Inputs vs. Export & Sand Storage Changes"

Preliminary Results & Data – Subject to Review and Revision 08/13/03

USGS science for a changing world

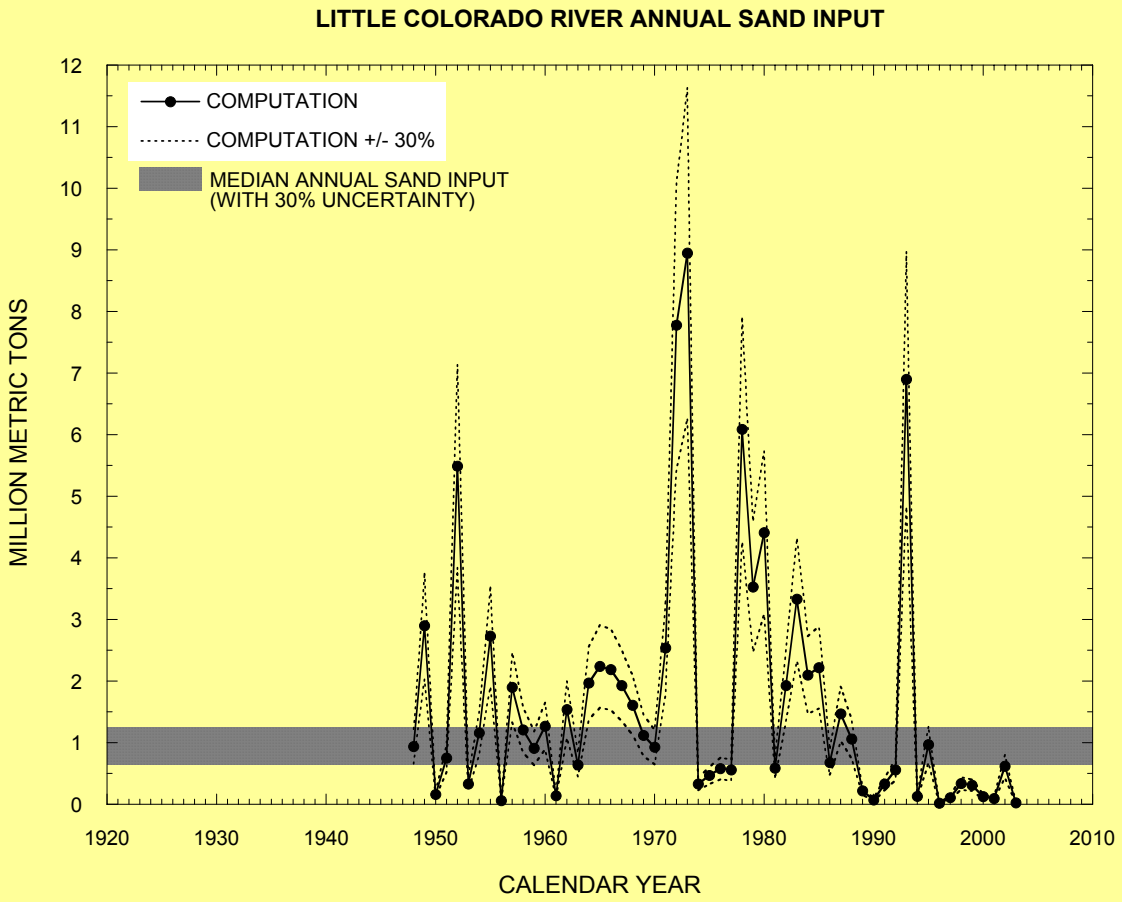
Annual Paria River Sand Inputs
Jan. 1923 – Jul. 2003



Preliminary Data – Subject to Review and Revision 08/13/03

USGS science for a changing world

Annual Little Colorado River Sand Inputs Jan. 1948 – Jul. 2003

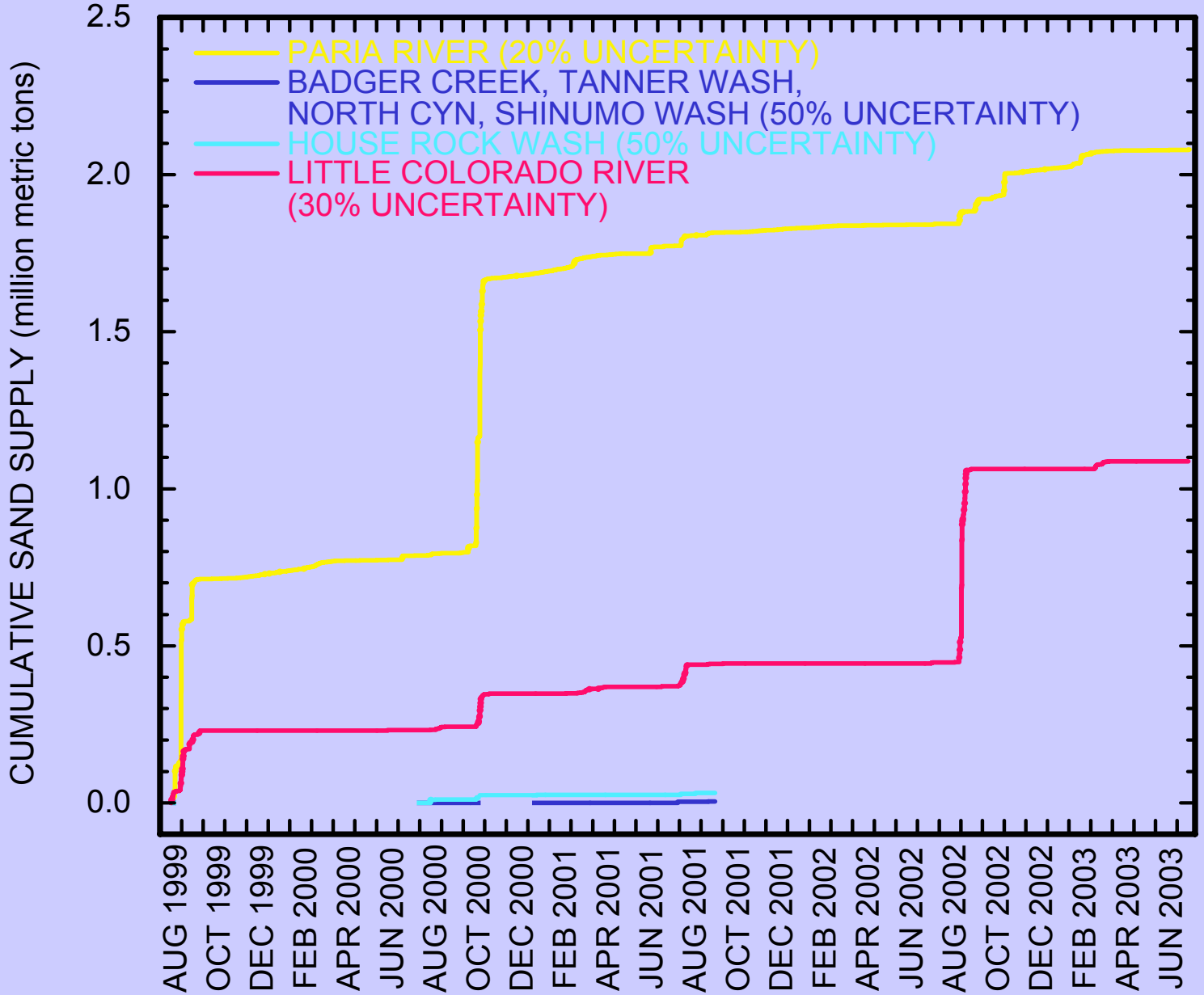


Preliminary Data – Subject to Review and Revision 08/13/03

USGS science for a changing world

Preliminary Data – Subject to Review and Revision 08/13/03

SAND SUPPLY BETWEEN THE LEES FERRY AND GRAND CANYON GAGES



Grand Canyon Monitoring and Research Center

Review of Sand Export for 01/01/02 through 09/01/02

SAND MASS-BALANCE "Efflux"

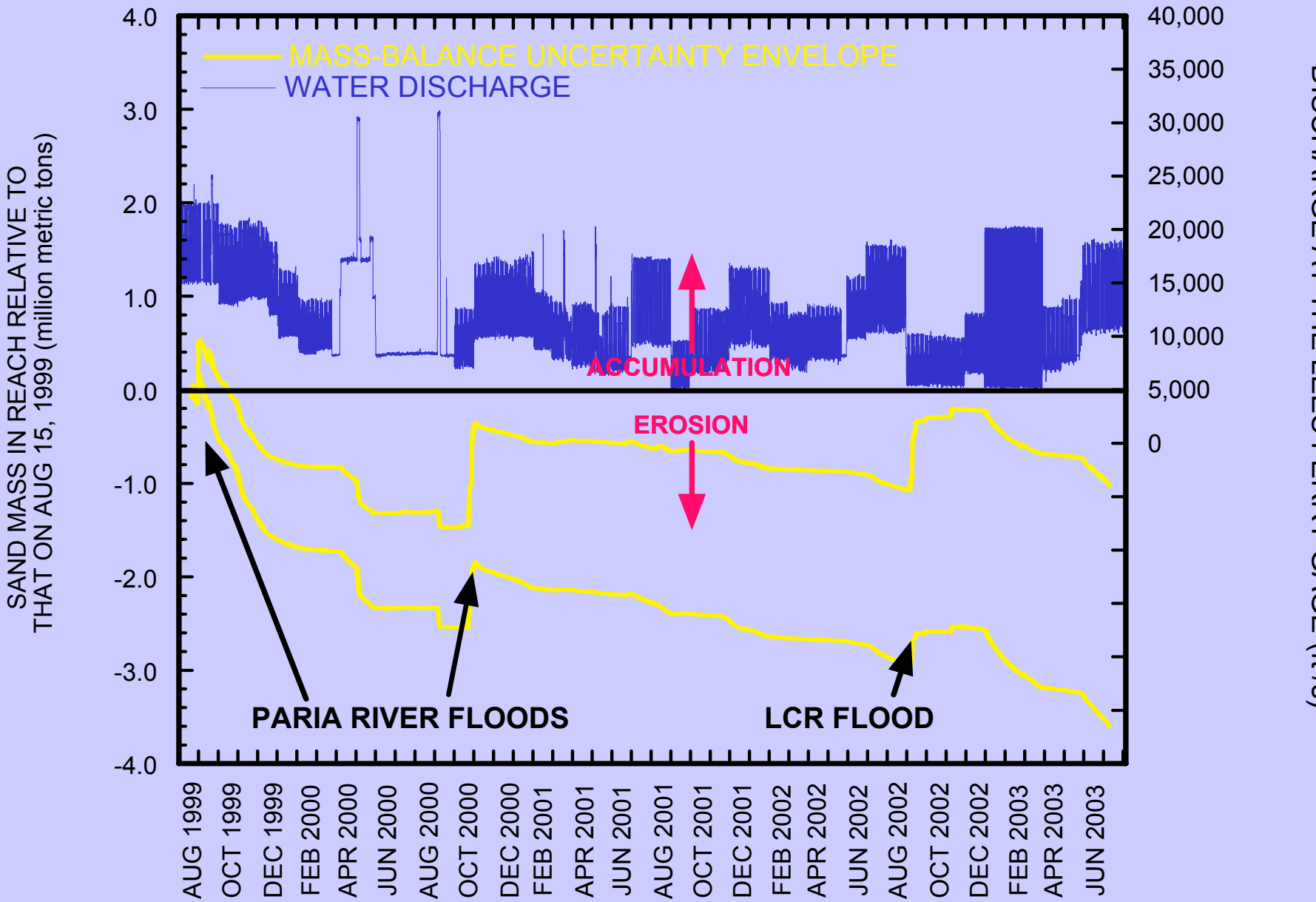
Lees Ferry to Phantom Ranch: rm 0-87

-160,000 (± 20,000)
metric tons lost downstream
(~93,000 m^3)

USGS science for a changing world

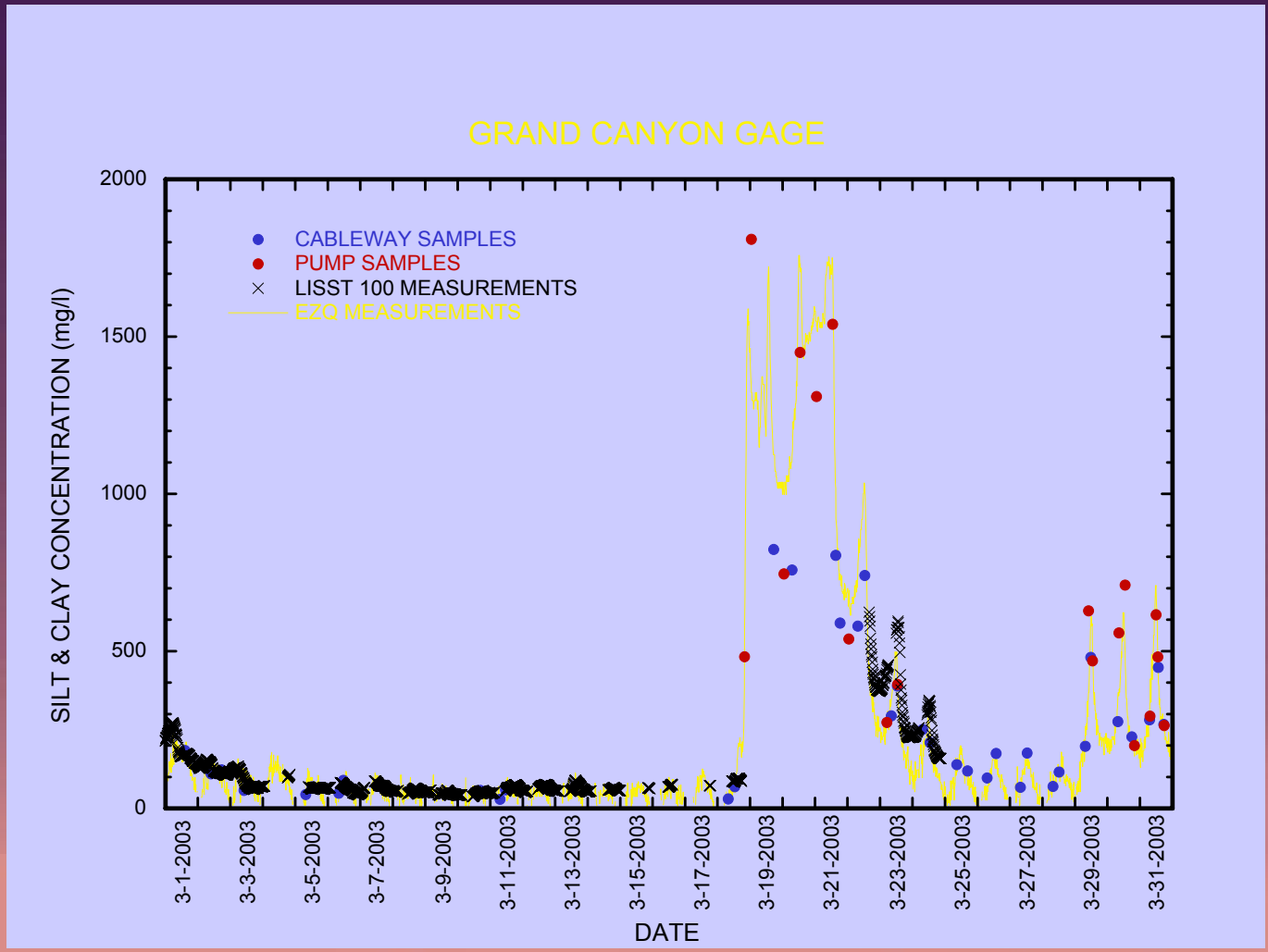
Preliminary Results – Subject to Review and Revision 08/13/03

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



Preliminary Data – Subject to Review and Revision 08/13/03

Update on Effectiveness of New Sediment Technologies Below Glen Canyon Dam

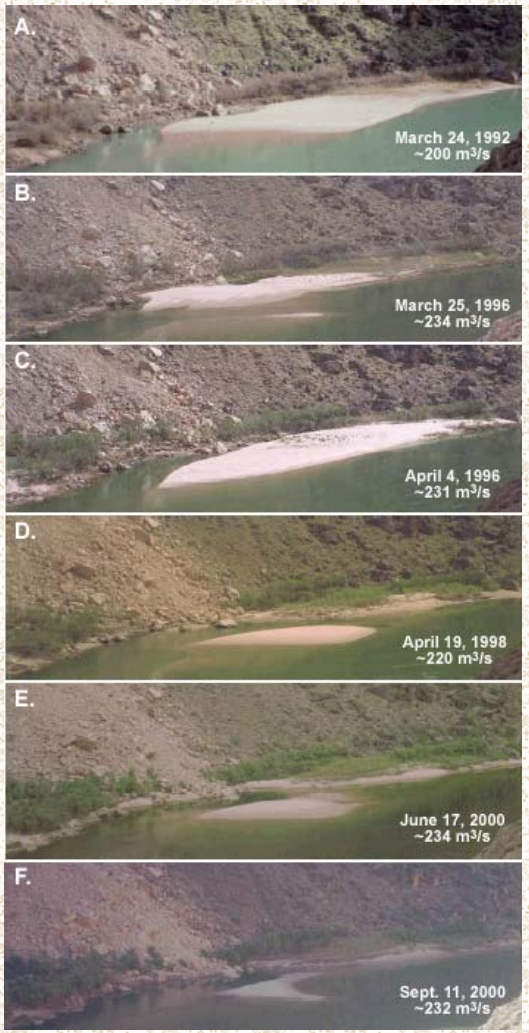


Preliminary Data – Subject to Review and Revision 08/13/03

USGS science for a changing world

Grand Canyon Monitoring and Research Center

Latest Estimates of Reach-Scale Sand Export for 9/01/02 through 07/31/03



SAND MASS-BALANCE "Efflux"

Lees Ferry to Phantom Ranch: rm 0-87

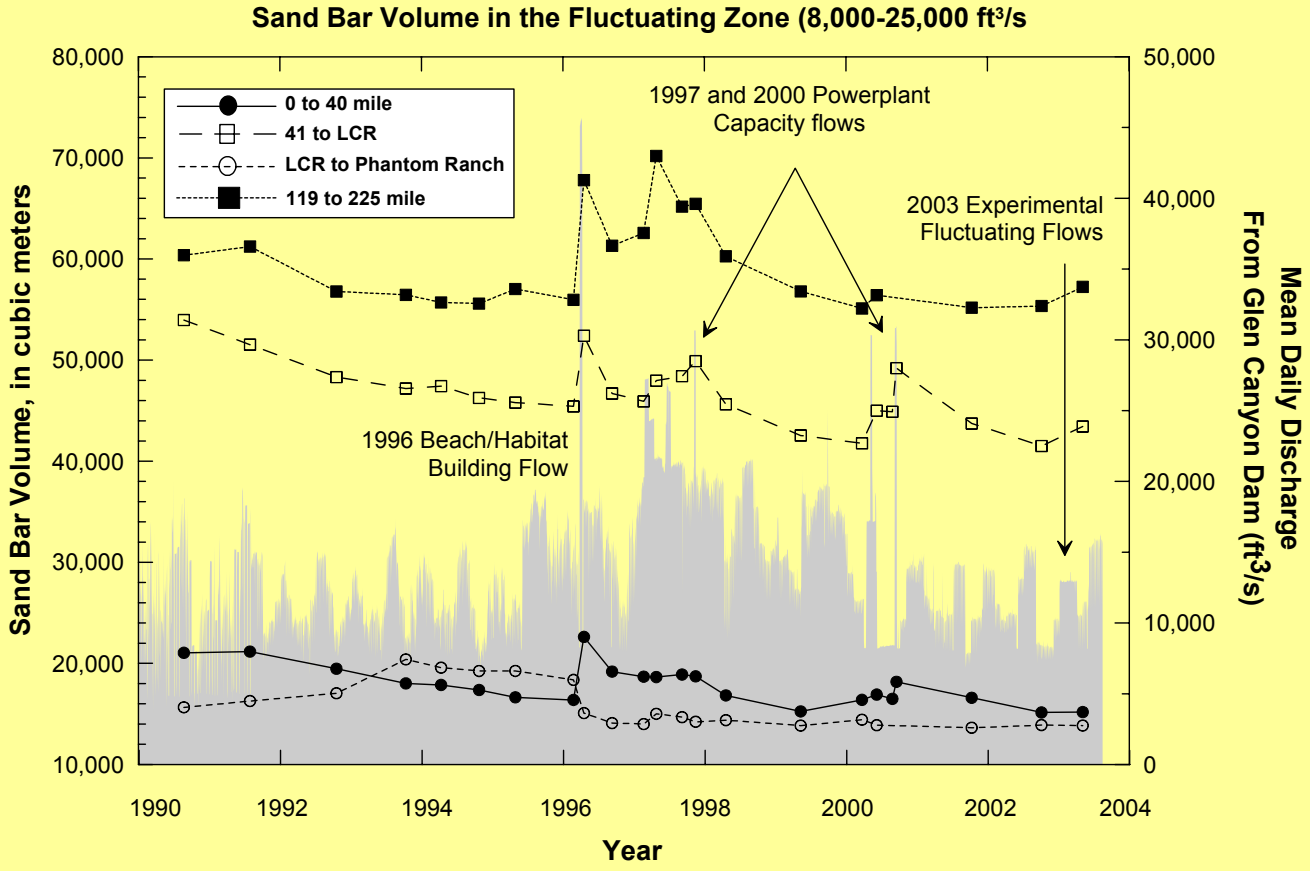
Total Sand Export = -1,000,000 (± 150,000) metric tons past Phantom Ranch through July '03

Sediment scientists estimate that ~ 130,000 tons came from Marble Canyon's antecedent storage, Jan.-Apr. 03, and that total export from Marble Canyon through July was about 300,000 (± 45,000) tons. This represents about 5% of estimated sand storage in that critical upstream reach of the ecosystem.

Preliminary Results – Subject to Review and Revision 08/13/03

Cumulative Sand Bar Volume in Marble & Grand Canyon Eddies (Active Zone) Jun. 1990 – Sep. 2002

(Data: Northern Arizona University – Geology Department)

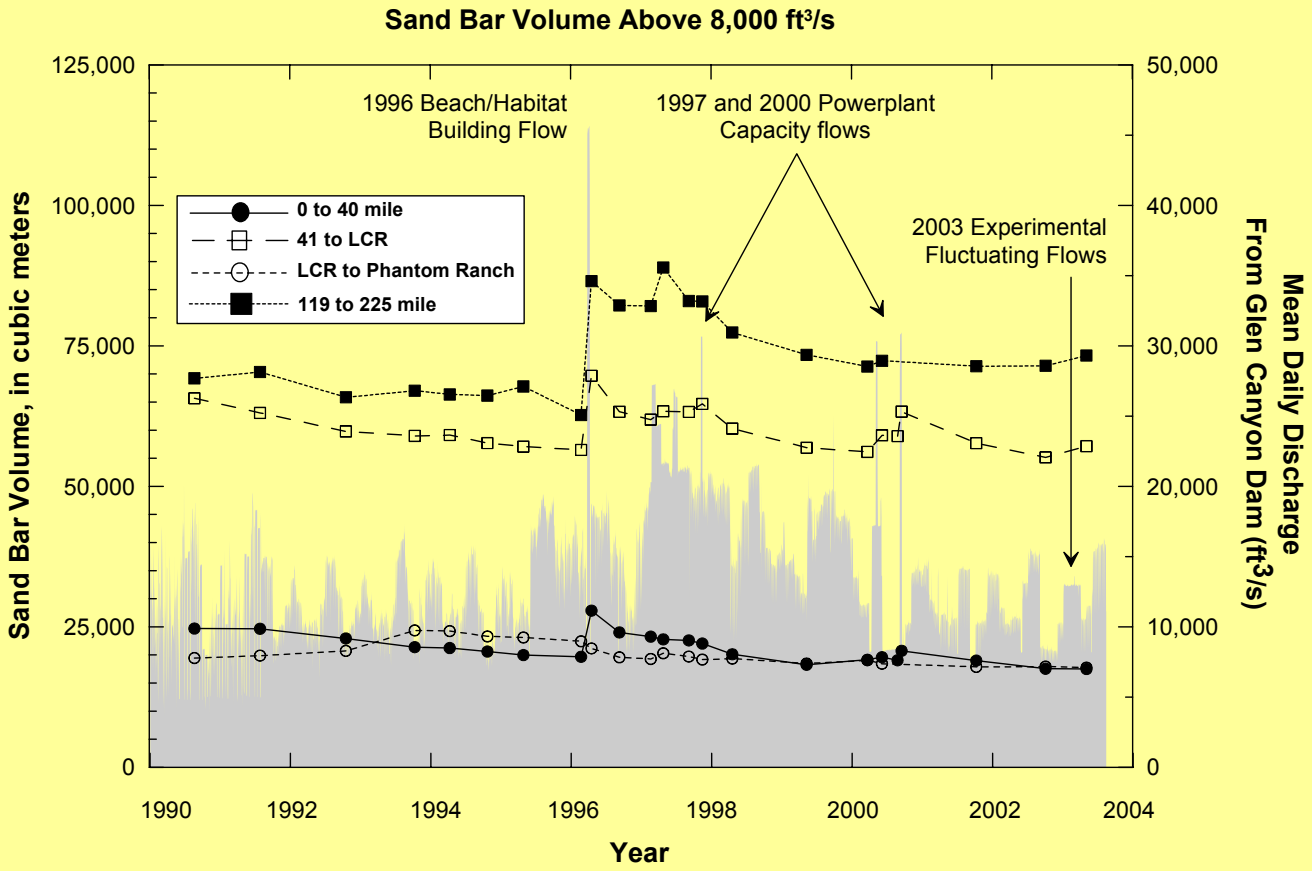


Preliminary Data – Subject to Review and Revision 08/13/03

USGS science for a changing world

Cumulative Sand Bar Volume in Marble & Grand Canyon Eddies (Total Above 8,000 cfs) Jun. 1990 – May 2003

(Data: Northern Arizona University – Geology Department)



Preliminary Data – Subject to Review and Revision 08/13/03

USGS science for a changing world

Some Take-Home Messages

Increased Eddy Storage Below LCR:

Likely explained by LCR sand inputs of Sept. 2002, as well as sand exported from Marble Canyon

Increased Eddy Storage Above LCR:

Only occurs in Lower Marble Canyon and is likely explained by Upper Marble Canyon export below 8,000 cfs

Sediment and Current Experimental Design:

Elevated operations in Jun. – Aug. increase Summer export, while the fluctuating-flow treatment increases Winter sand export. These resource costs come with no guarantee for sand-bar restoration in the future

Some Take-Home Messages

Paria River Sand-Input Trigger:

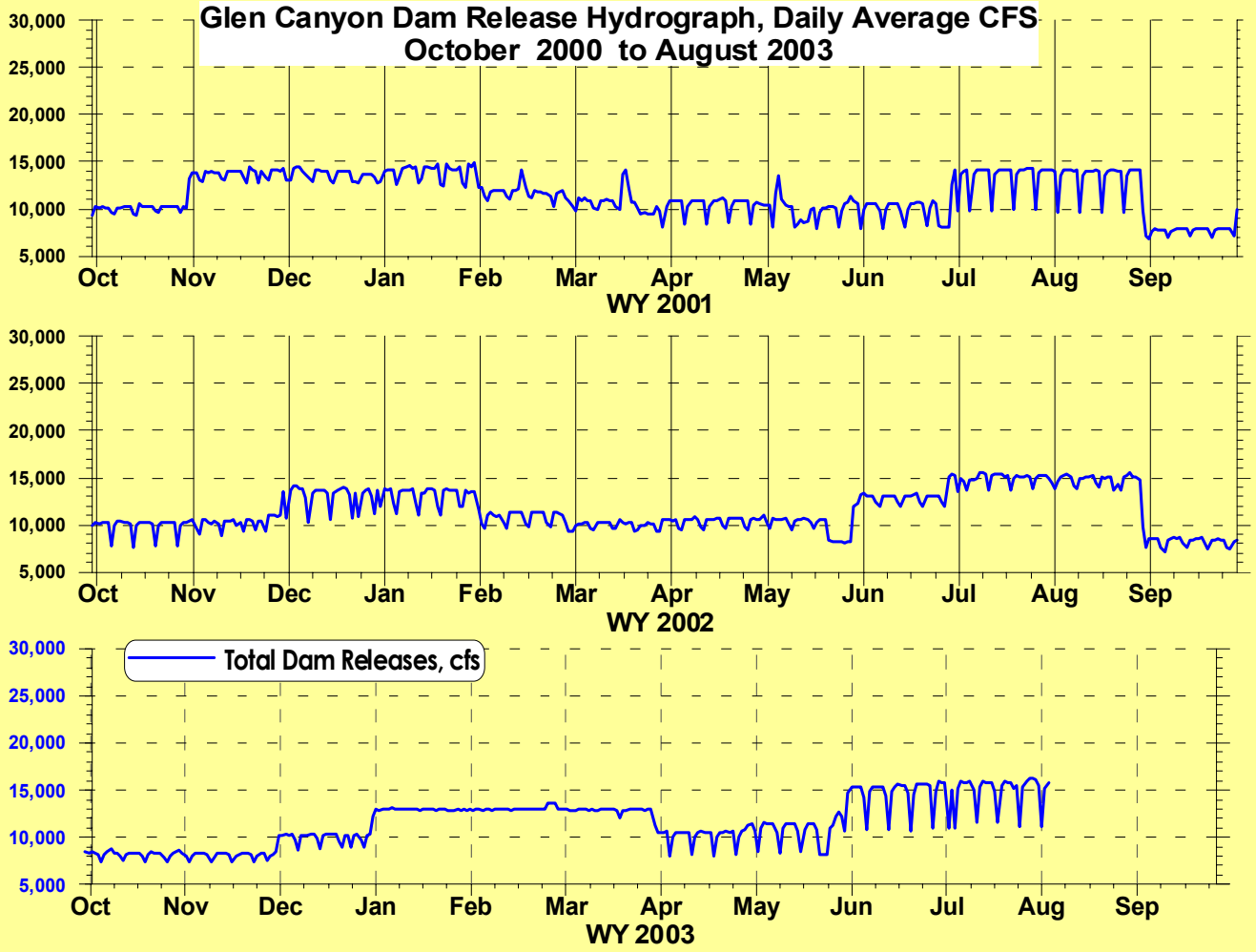
For High-Flow Experiment - we need at least 1,500,000 metric tons by Dec. 2003, to date, we have not had significant sand inputs in 2003

Continued Sand Export & Bar Erosion:

About 3 percent of sand stored in Marble Canyon was eroded Jan.-Apr. 2003. Under current June-August, as well as under future experimental operations (5,000-20,000 cfs) in Winter 2003-04, export and bar loss will continue.

***Surprisingly, current Summer operations (designed to allow low Fall releases) are actually forcing more sand export than the Winter fluctuation experiment, owing to ROD daily range constraints!

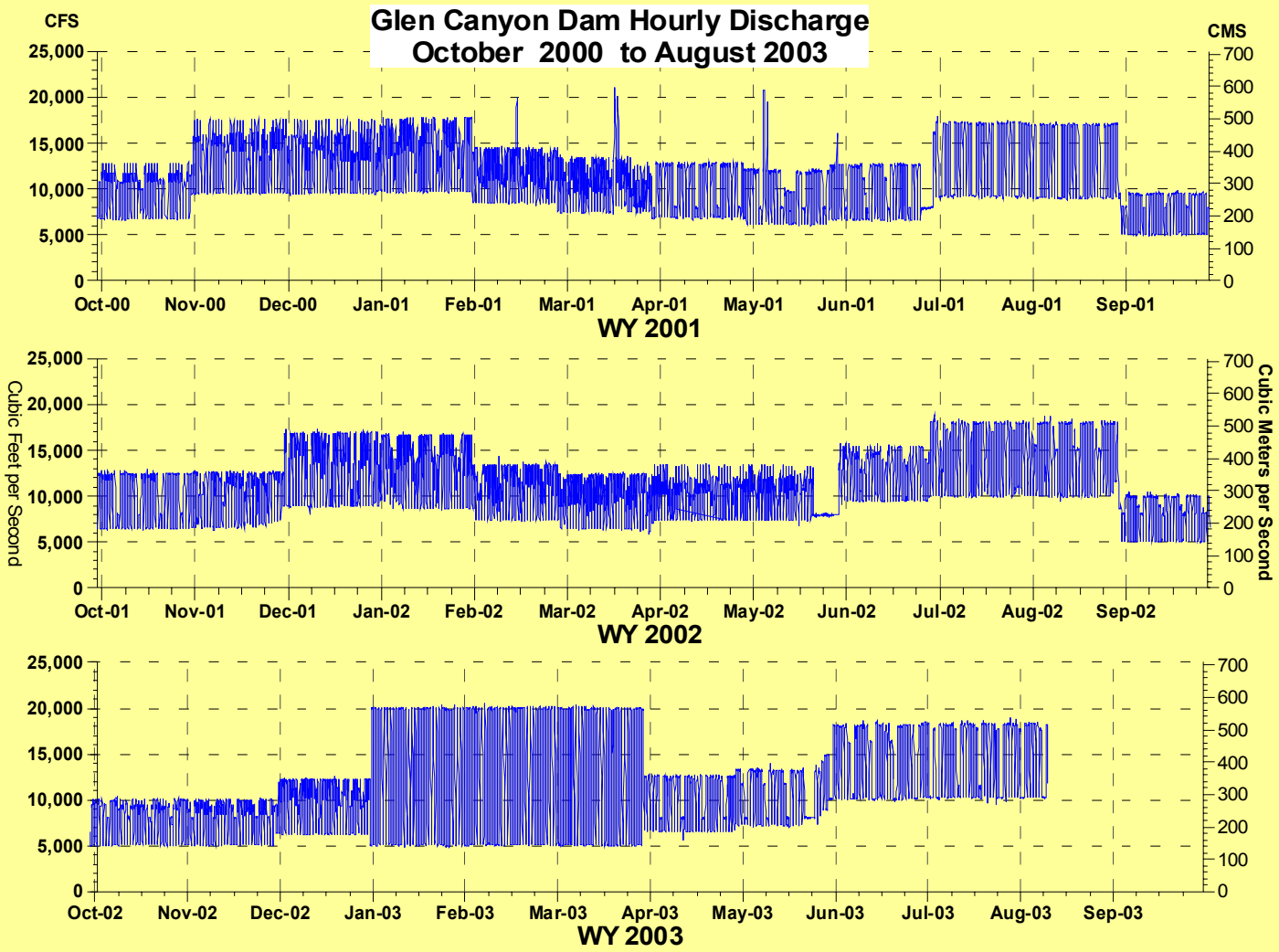
Glen Canyon Dam Mean Daily Operations for Water Years 2001, 2002 & 2003



Preliminary Data – Subject to Review and Revision 08/13/03

USGS science for a changing world

Glen Canyon Dam Hourly Operations for Water Years 2001, 2002 & 2003



Preliminary Data – Subject to Review and Revision 08/13/03

Final Sand Mass Balance for First 3 Quarters of WY2003 Will be Reported at the GCMRC Science Symposium in October 2003

USGS
science for a changing world

Thank You!

USGS
science for a changing world