Annual Little Colorado River Sand Inputs

LITTLE COLORADO RIVER ANNUAL SAND INPUT

MILLION METRIC TONS

CALENDAR YEAR

MEDIAN ANNUAL SAND INPUT
(WITH 30% UNCERTAINTY)

Preliminary Data – Subject to Review and Revision 08/13/03
SAND SUPPLY BETWEEN THE LEES FERRY AND GRAND CANYON GAGES

PARIA RIVER (20% UNCERTAINTY)
BADGER CREEK, TANNER WASH, NORTH CYN, SHINUMO WASH (50% UNCERTAINTY)
HOUSE ROCK WASH (50% UNCERTAINTY)
LITTLE COLORADO RIVER (30% UNCERTAINTY)

CUMULATIVE SAND SUPPLY (million metric tons)

Preliminary Data – Subject to Review and Revision 08/13/03
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 m³)

Preliminary Results – Subject to Review and Revision 08/13/03
MASS-BALANCE SAND BUDGET BETWEEN LEES FERRY AND THE GRAND CANYON GAGE

MASS-BALANCE UNCERTAINTY ENVELOPE

WATER DISCHARGE

SAND MASS IN REACH RELATIVE TO THAT ON AUG 15, 1999 (million metric tons)

DISCHARGE AT THE LEES FERRY GAGE (ft³/s)

PARIA RIVER FLOODS

LCR FLOOD

Preliminary Data – Subject to Review and Revision 08/13/03
Update on Effectiveness of New Sediment Technologies Below Glen Canyon Dam

**GRAND CANYON GAGE**

- Cableway Samples
- Pump Samples
- LISST 100 Measurements
- EZQ Measurements

Silt & Clay Concentration (mg/l)

Date Range: 3-1-2003 to 3-31-2003

Preliminary Data – Subject to Review and Revision 08/13/03
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)  
(Data: Northern Arizona University – Geology Department)

Sand Bar Volume in the Fluctuating Zone (8,000-25,000 ft³/s)

- 0 to 40 mile
- 41 to LCR
- LCR to Phantom Ranch
- 119 to 225 mile

1996 Beach/Habitat Building Flow
1997 and 2000 Powerplant Capacity flows
2003 Experimental Fluctuating Flows

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

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

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

Glen Canyon Dam Release Hydrograph, Daily Average CFS
October 2000 to August 2003

Total Dam Releases, cfs

Preliminary Data – Subject to Review and Revision 08/13/03
Glen Canyon Dam Hourly Operations for Water Years 2001, 2002 & 2003

Glen Canyon Dam Hourly Discharge
October 2000 to August 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
Thank You!