


Results of Long-Term Monitoring and Research of Colorado River Sand Resources



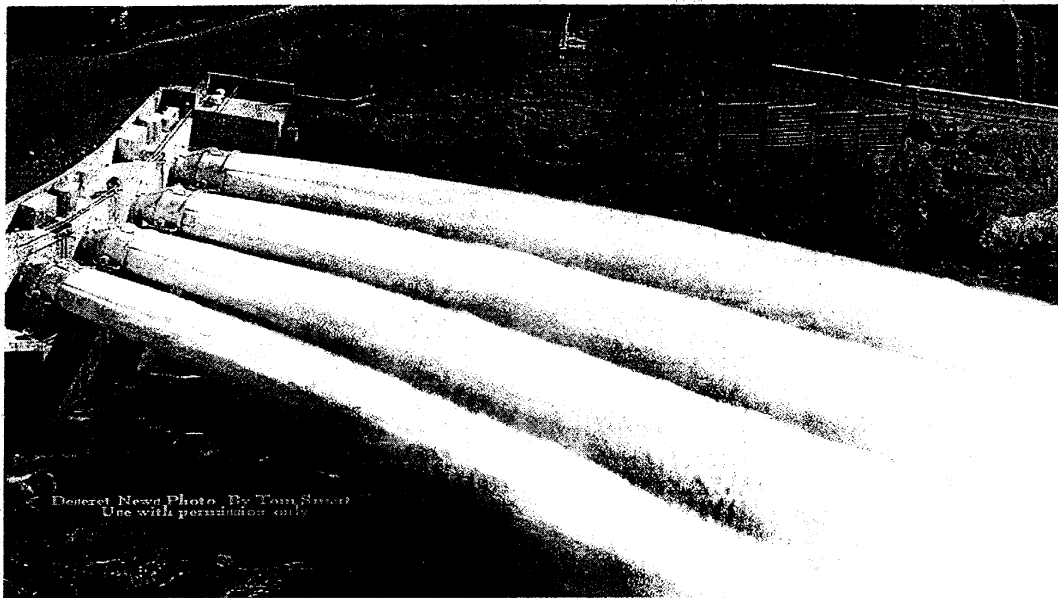
U.S. Geological Survey
Utah State University
Northern Arizona University

EIS - BHBF and Sand Resources

∞ Two-Fold Approach to Sand Conservation and Restoration of Physical Habitats

1 - Bank Multi-Year Sand Inputs in Bed by Constraining Power Plant Operations

2 - Restore and Sustain Channel-Margin Sand Bars by Periodically Releasing High Flows

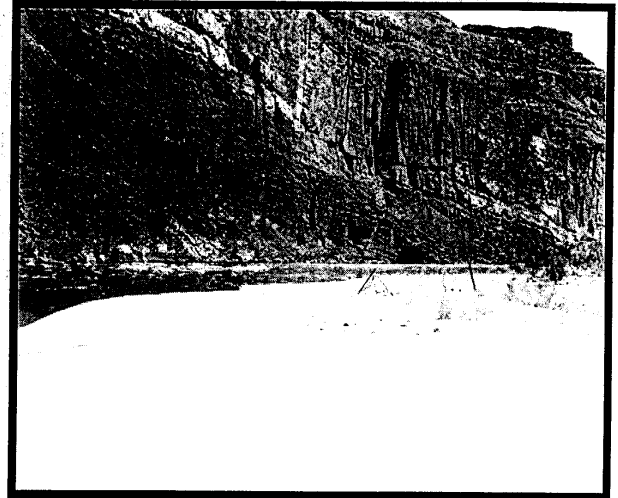


On March 26, 1996, Secretary Babbitt Begins
the First in a Series of Flow Experiments
Intended to Restore and Preserve Colorado
River Resources; Emphasis on Bar Building

Beach Building Associated with 1996 High-Flow Test



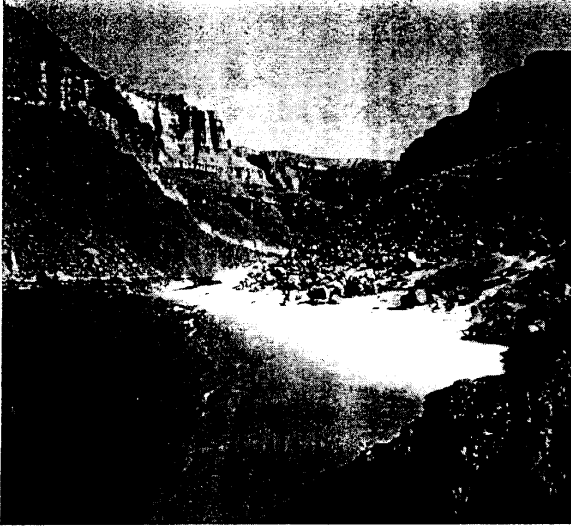
Before



After

Beach Below Nevills Rapid (RM 76)

Beach Building Associated with 1996 High-Flow Test



Before

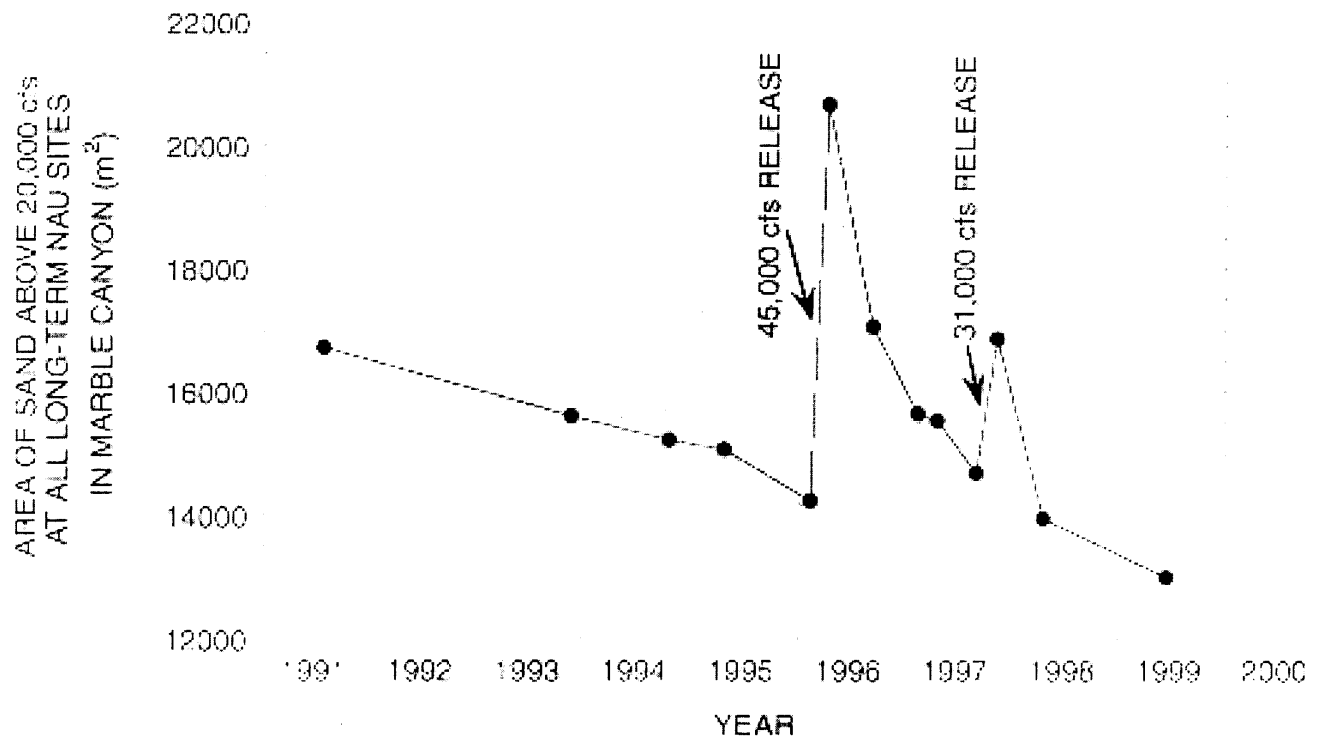


After

Owl Eyes (RM 134.6 L)

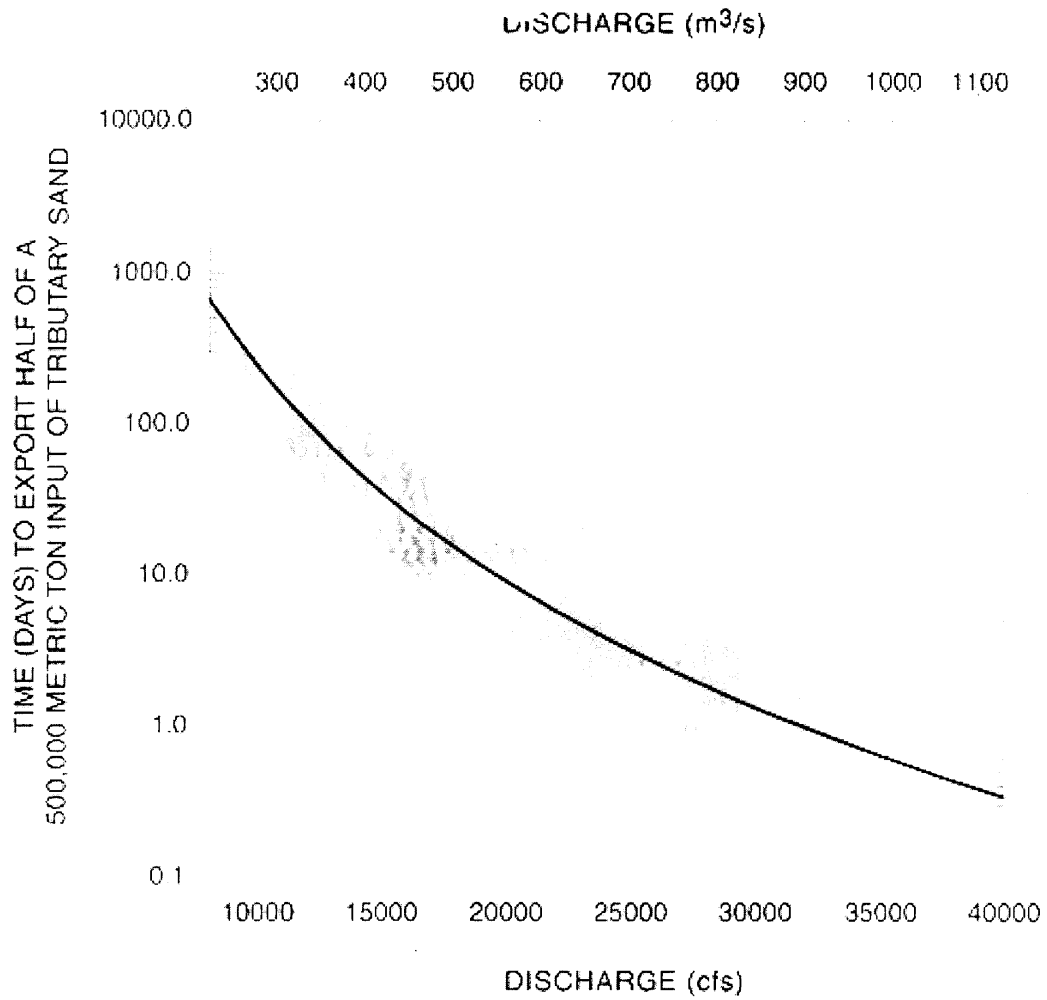
Summary of Sand Bar Studies

- ∞ Marble Canyon Sand Bar Areas (above 20,000 cfs) Decreased by 22% Since 1991
- ∞ 7 Independent Sources of Monitoring Data Show Declining Sand in Marble Canyon
- ∞ 1996 and 1997 Sand Bar Responses to Restoration Flows Were Short Lived



Sand Inputs and Mass Balance

- ∞ Sand Inputs are Exported from Critical Reaches Faster than Assumed in GCD EIS
- ∞ Mid- to Upper ROD Operations Result in High Rates of Sand Export (days to weeks)
- ∞ Multi-Year Sand Accumulation is Only Likely Under ROD Operations Limited to About 8,000 to 10,000 cfs

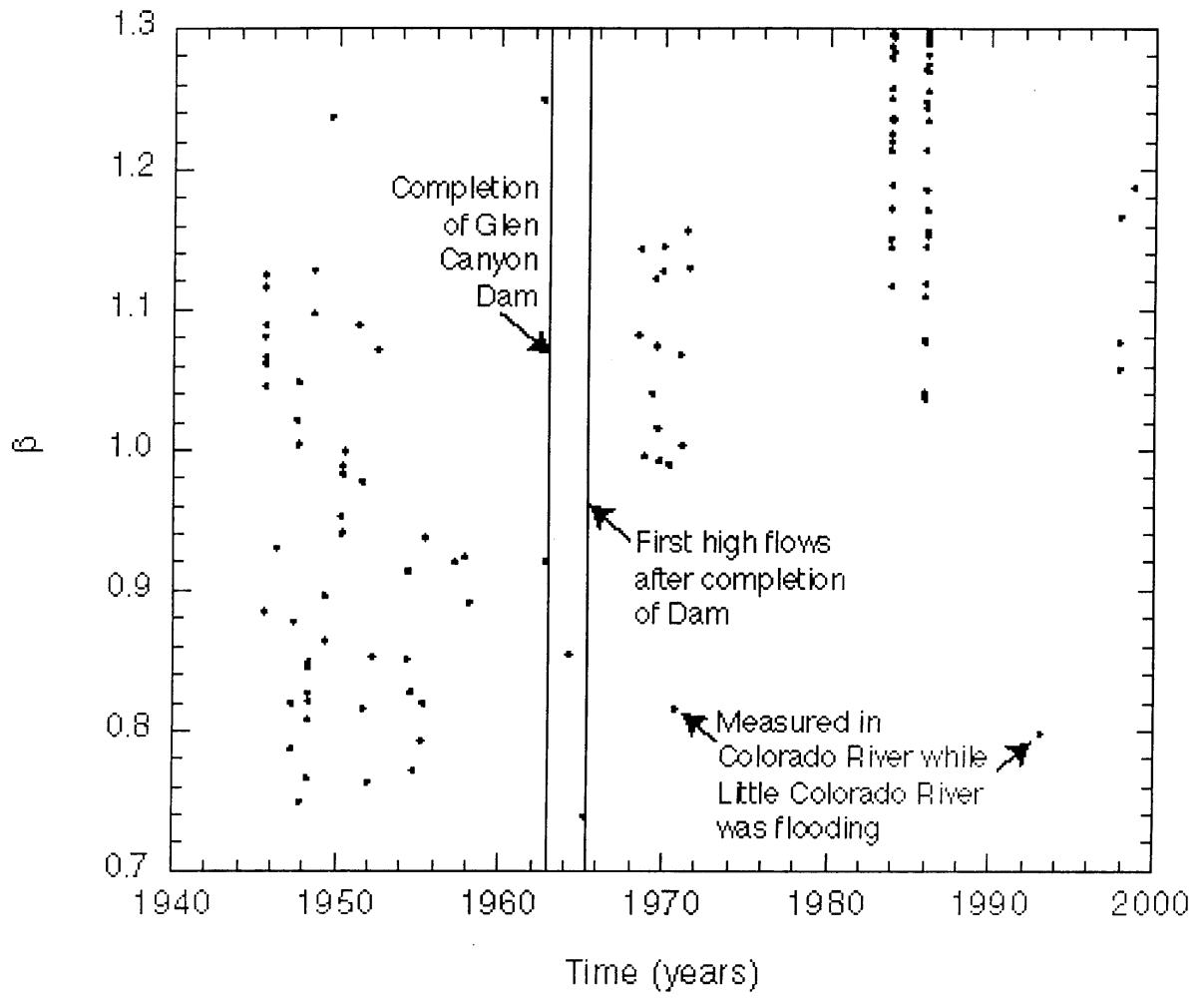


Alternatives for Conserving Sand

- Release Restoration High Flows During or Immediately After Sand Inputs Occur (Late Summer or Fall Seasons)... And (Or)
- Limit Releases to About 8,000 to 10,000 cfs During/After Sediment Inputs, until Such Time That BHBF can be Released
- Revisit EIS Alternative for Supplementing Sand Supply from Upstream (Lake Powell)

Beta as Proxy for Sand Banking

- ✧ Post-Dam Bed Became Highly Winnowed and Coarsened (Sand Supply Decreased)
- ✧ Despite ROD Operations, Sand on Bed Remains Relatively Coarsened (Limits Potential for Success of Restoration Flows)
- ✧ Only During Post-Dam Tributary Inputs does Bed Become Enriched with Sand to the Degree that Occurred in Pre-Dam



$$\beta = \left(\frac{C}{C_m} \right)^{\frac{1}{14 - K_2}} \left(\frac{D_s}{D_{cm}} \right)^{\frac{1}{14 - K_2}}$$

