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Sand transport during steady and low fluctuating flows in September/October 2005

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Approach

- Assess the difference between steady flows and low fluctuating flows in terms of sand transport

- Analysis based on existing sediment monitoring program (primarily acoustics) – no additional field work conducted for experiment

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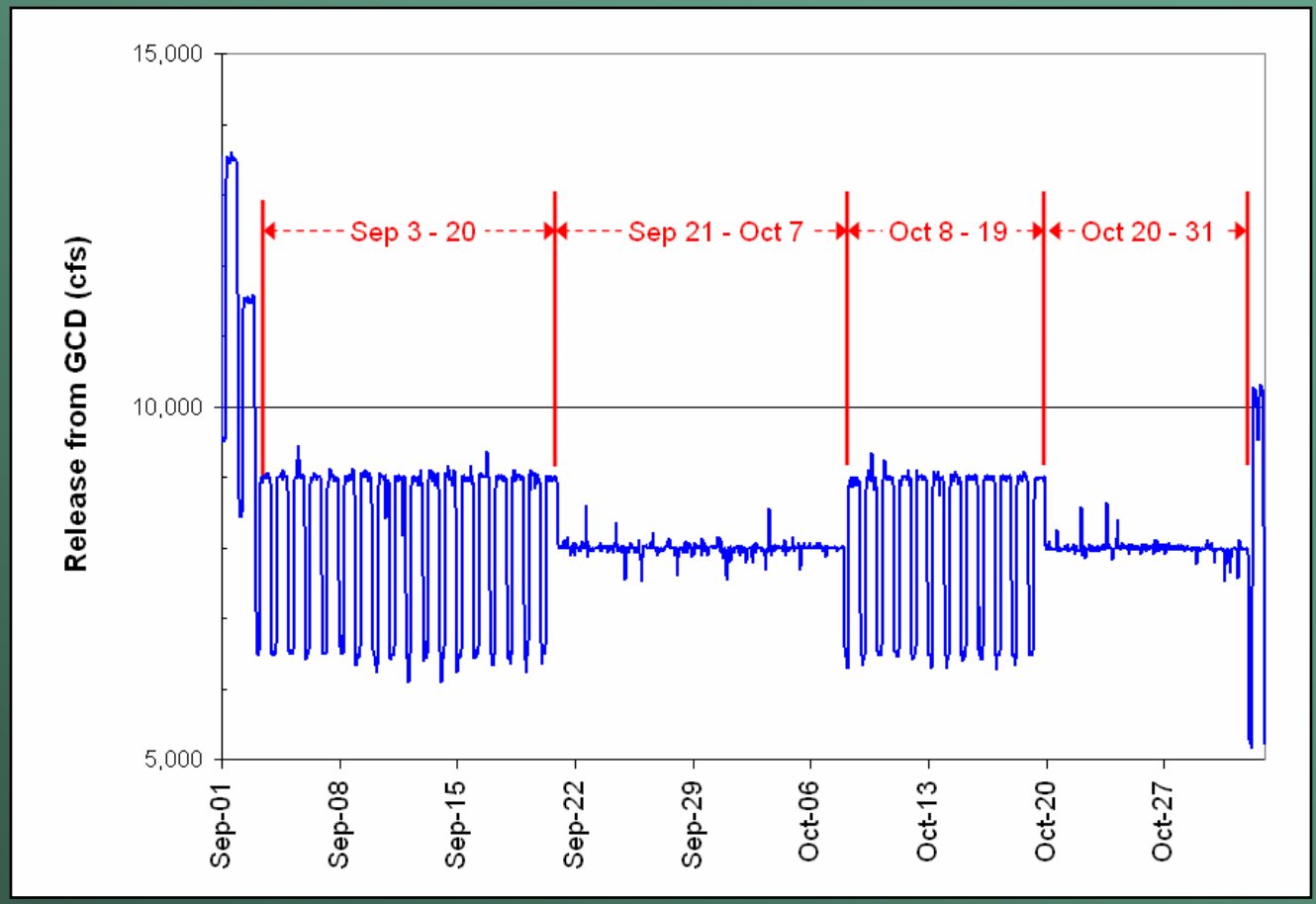
Flow releases from GCD

Alternating two-week blocks of steady 8,000 cfs and 6,500 – 9,000 cfs fluctuations



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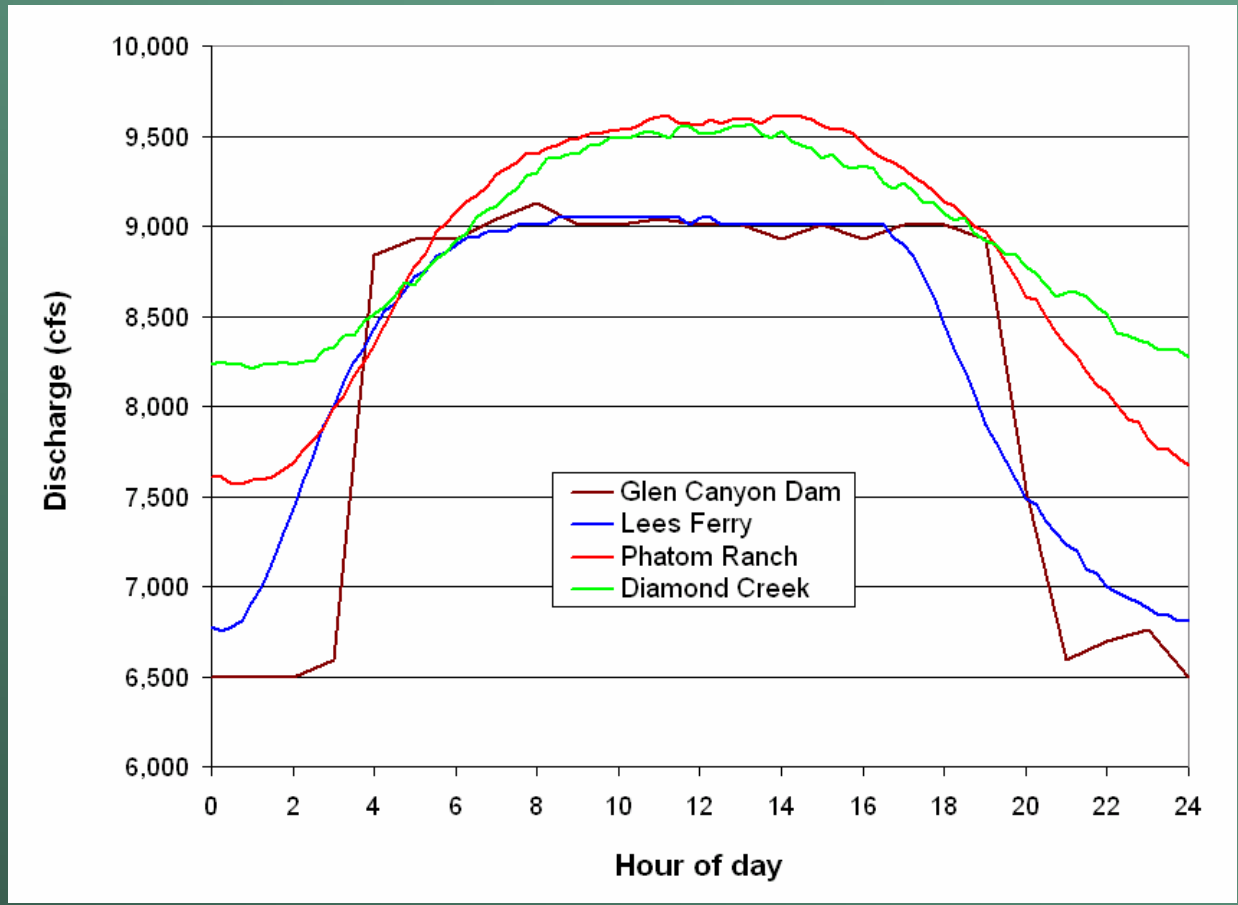
Discharge Wave Attenuation

Location	Q range (cfs)
GCD	2,600
LF	2,300
30-mile	2,200
61-mile	N/A
PR	2,000
DC	1,400



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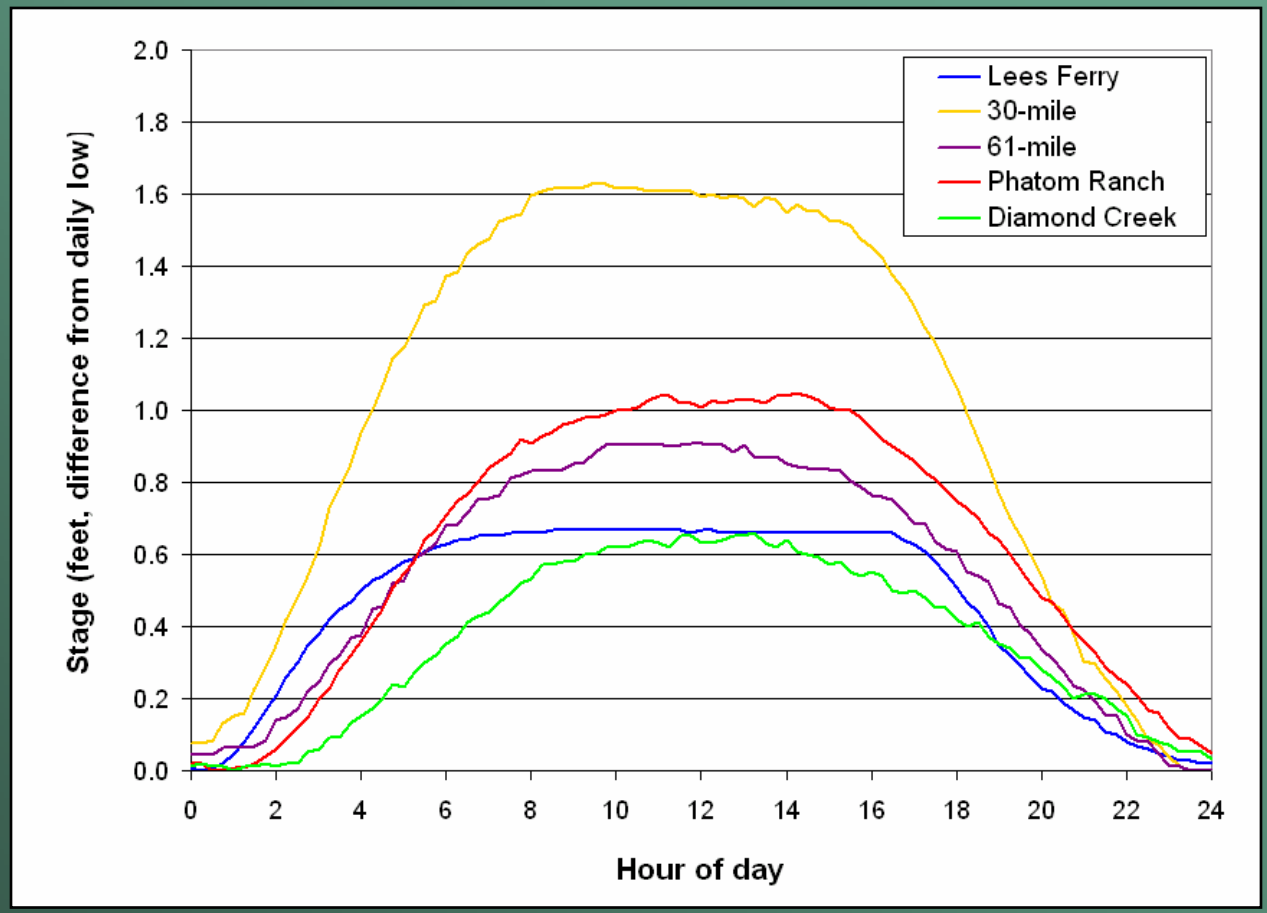
Stage Range

Location	Stage range (ft)
LF	0.67
30-mile	1.6
61-mile	0.91
PR	1.1
DC	0.66



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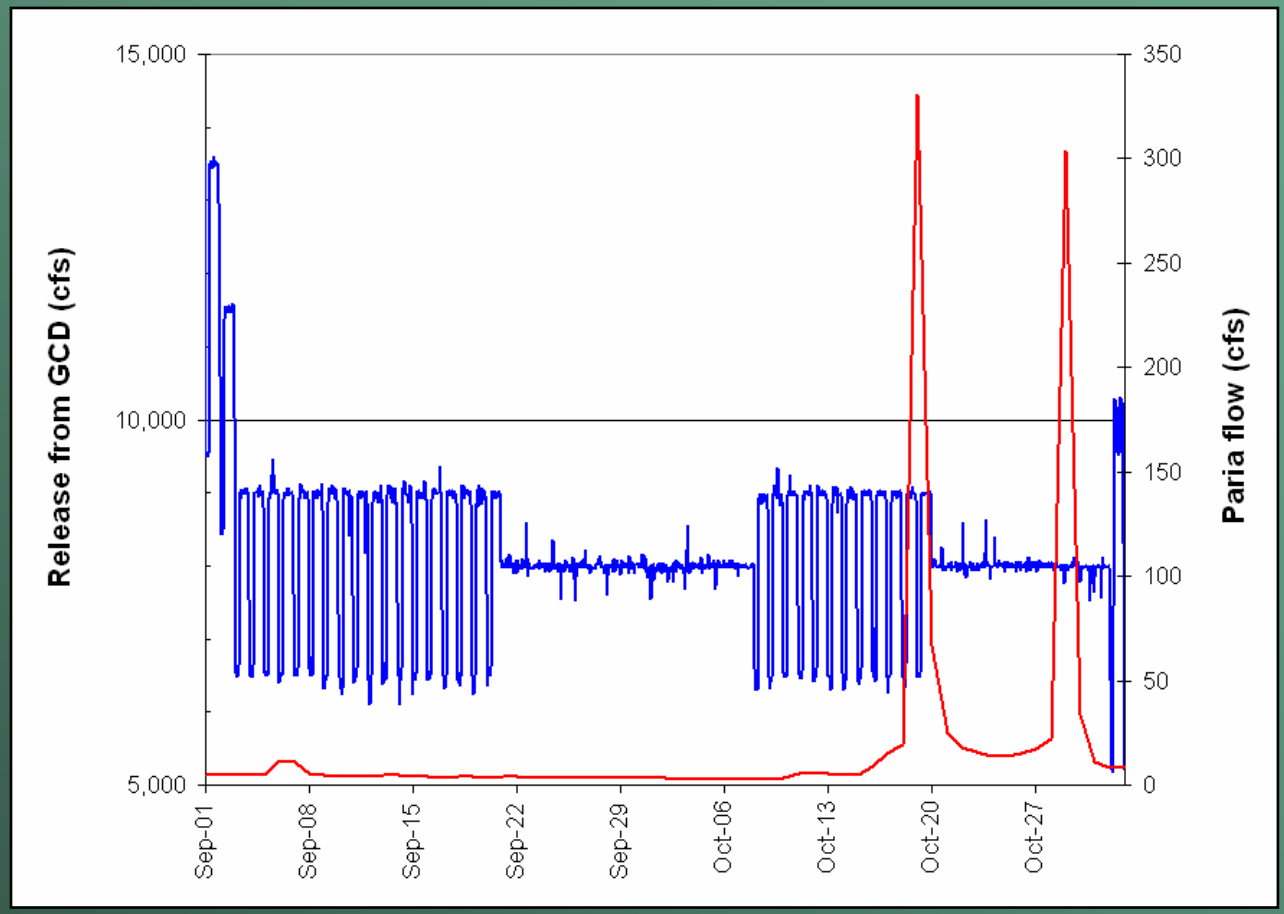
Complicating factor – Paria inputs

Can't use 2nd block of steady – affected by Paria inputs



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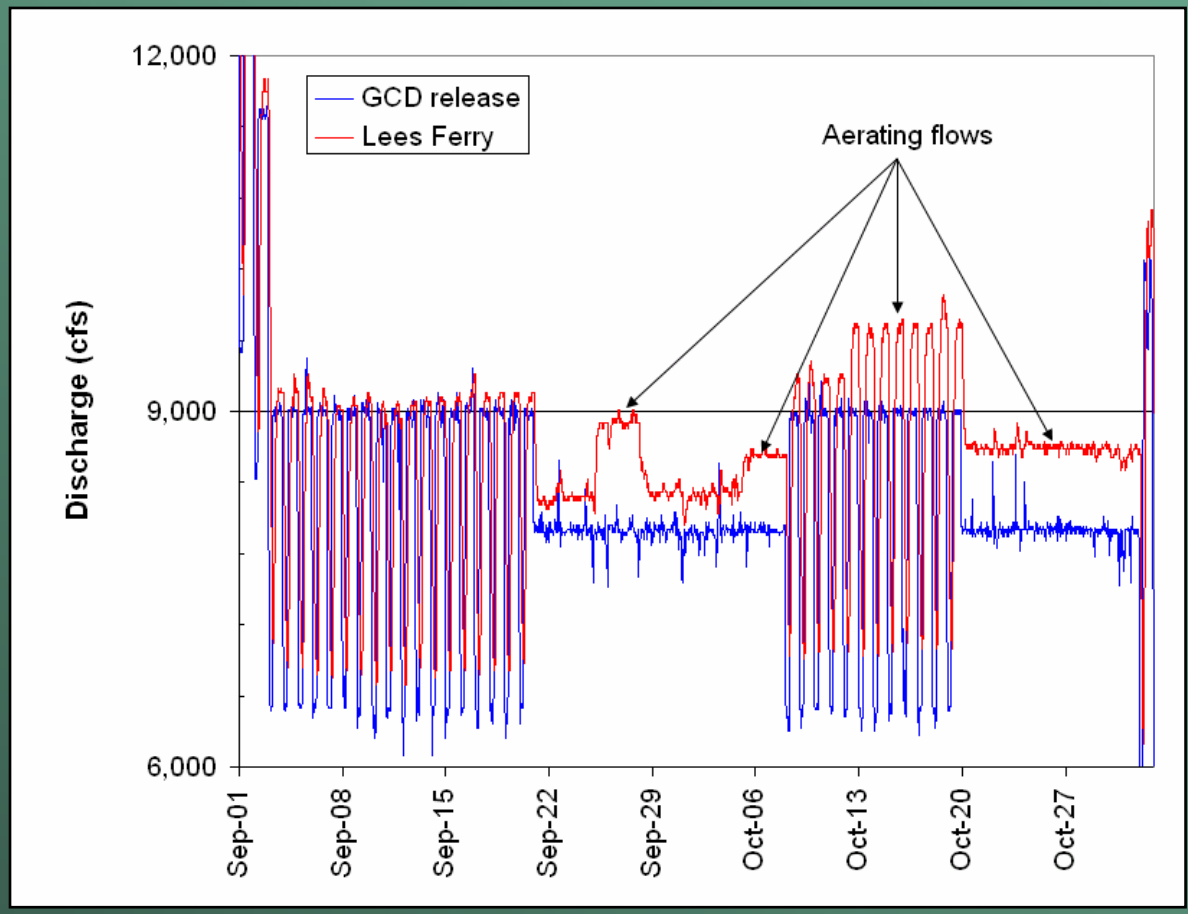
Complicating factor – Aerating flows

Low DO in fall 2005 lead to experimenting with different turbine/flow combinations



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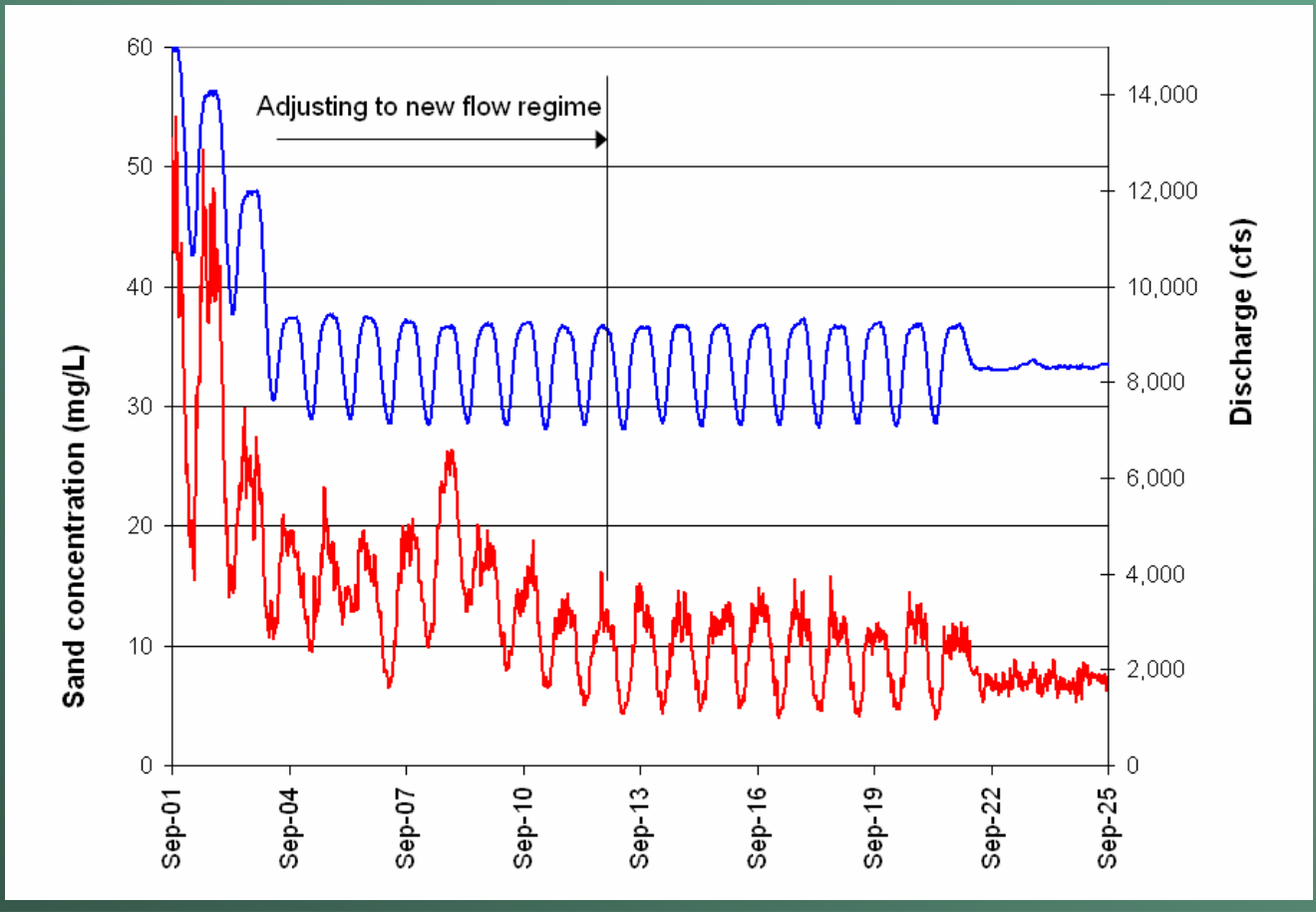
Complicating factor – Flow transition

30-mile site



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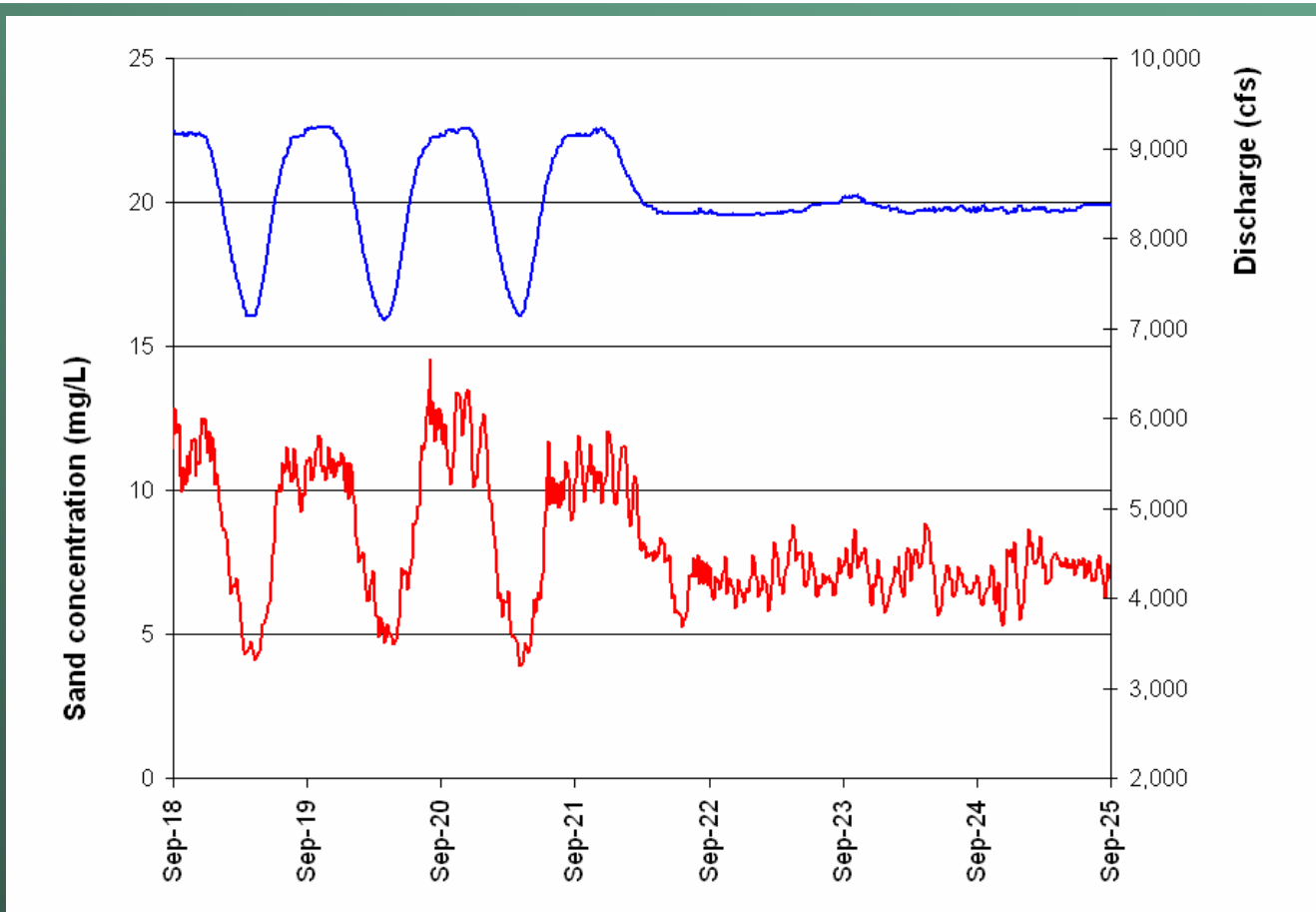
Comparison at 30-mile

Block 1

last 3 days of fluctuating

versus

first 3 days of steady



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Comparison at 30-mile site

Day	Flow regime	Average Q (cfs)	Sand load (mt)
Sep-18	6.5 – 9	8,460	189
Sep-19	6.5 – 9	8,440	191
Sep-20	6.5 – 9	8,470	190
		8,460	**190**
Sep-22	Steady 8	8,300	142
Sep-23	Steady 8	8,350	145
Sep-24	Steady 8	8,330	145
		8,330	**144**

Discharge **1.5%** greater during fluctuations, sand load **28%** greater

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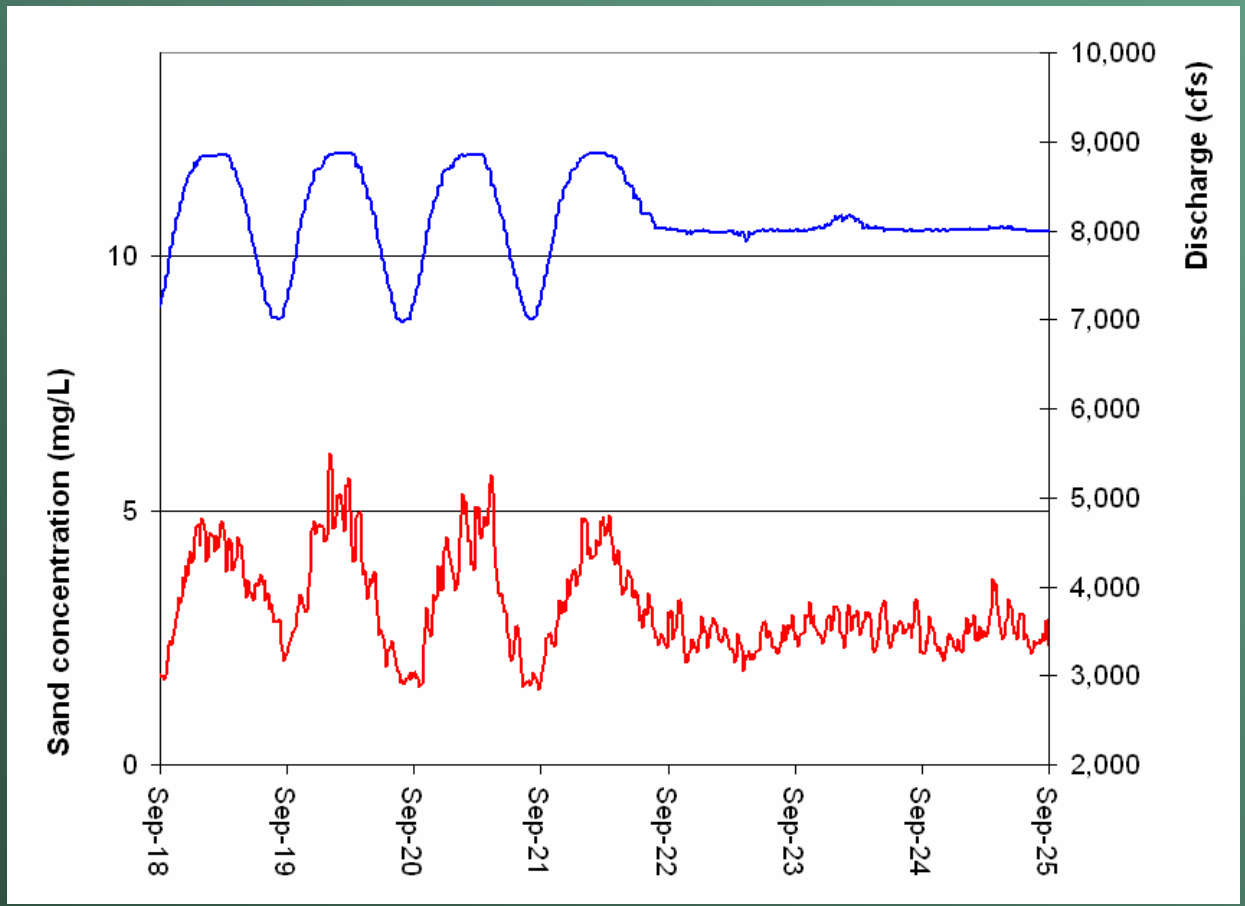
Comparison at 61-mile



Discharge **1.8%** greater during fluctuations, sand load **31%** greater

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Conclusions

- Sand transport was about 30% greater during low fluctuations (6,500 – 9,000 cfs) versus steady 8,000 cfs as measured at 30-mile and 61-mile sites – average flow almost identical

- Results consistent with suspended-sand transport theory and previous observations

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