

Assessment of Future Paleoflood Analysis Sites—Lower Green River

In early July, 2010, we did a reconnaissance survey of the lower Green River, near its junction with the Colorado. Our preliminary analysis of data from this survey indicates that the lower Green River canyons contain an excellent record of extreme paleofloods, probably occurring within the last few thousand years. Using our field survey of paleostages reached at 14 sites along the Stillwater Canyon reach of the lower Green River (see attached table), we estimated cross-sectional areas for the hydraulic geometries at the respective flood stages. Multiplying these cross-sectional areas by mean flow velocities determined for analogous hydraulic geometries (similar slope, similar cross-sectional areas and dimensions) by HEC-RAS analyses of the Moab Study Site on the main-stem Colorado River (Greenbaum et al., 2010), we estimate paleodischarges achieved at the 14 Stillwater Canyon sites along the Green. As shown in the table below, the peak flows achieved on the Green River seem to have reached at least 6000 cubic meters per second (cms) and perhaps as high as 8000 cms. Although we did not have the resources to do the geochronology, the flood deposits are clearly late Holocene and probably comparable in age to the deposits at the Moab Study Site (i.e., the last few thousand years). The importance of these values can be appreciated by the fact that the largest historically documented flood of the Green River is that of 1884, with a peak flow estimated at approximately 2830 cms (6370 cms on the Colorado below its confluence with the Green, minus the 3540 cms contributed by the main-stem Colorado above the confluence).

These results show that a future in-depth survey, similar to what we did for the Moab Study Site (Greenbaum et al., 2010), would significantly transform our understanding of the magnitude and frequency of extreme flood phenomena on the entire upper Colorado system (including the Green River), showing that the modern stream gage records are totally inadequate for understanding extreme flood phenomena in this system. This conclusion points to the need for a much more extensive paleoflood study of the upper Colorado system than was possible in this limited reconnaissance study.

Reference Cited

Greenbaum, N., Weisheit, J.S., Harden, T., Dohrenwend, J.C., 2005. Paleofloods of the upper Colorado River near Moab, Utah, May, 2006. In: Weisheit, J.S., and Fields, S.M. (Eds.), *The Moab Mill Project: A Technical Report Towards Reclaiming Uranium Mill Tailings along the Colorado River in Grand County, Utah*. Living Rivers, Moab, Utah, pp. 13-28.

Paleoflood sites with Paleostage Indicators (PSI's) and estimated peak

Peak discharge range for 4 m/s (m ³ /sec)	Peak discharge range for 3 m/s (m ³ /sec)	Estimated width (m)	Elevation above water level (m)	Type of PSI's	Coordinates	Site no.
4800-6400	3600-4800	200	6-8	SWD - Overbank deposit		1
6080	4560	190	8	Dead Horse Canyon – Tributary mouth SWD		2
4800	3600	150	8	SWD - Overbank deposit		3
3600-4200	2700-3150	150	6-7	SWD - Overbank deposit		4
4200-4800	3150-3600	150	7-8	SWD - Overbank deposit		5
7800	5850		13	SWD - tributary mouth		
7600	5700	190	10	Horse Canyon - SWD - tributary mouth		6
8800	6600	200	11	SWD - Overbank deposit		7
6720-7560	5040-5670	210	8-9	SWD - tributary mouth		8
5440	4080	170	8	SWD - Overbank deposit		9
6800	5100	170	10	SWD - Overbank deposit		10
8160	6120		12	Large Driftwood logs		
5120-5760	3840-4320	160	8-9	SWD - Overbank deposit		11
				SWD - Overbank deposit		12
				Large Driftwood logs		
7200	5400	180	10	SWD - Overbank deposit		13
7040-8800	5280-6600	220	8-10	Green-Colorado confluence - SWD - Overbank deposit		14

discharges along Stillwater Canyon, lower Green River, Utah

- * Elevation of PSI's – measurements from a field reconnaissance – July-August 2010
- * Width of channel – estimations using Google-Earth
- * Velocity of large paleofloods – based on HECRASS analyses along the Upper Colorado River near Moab, Utah