Monitoring the Destruction and Natural Recovery of a Monsoon-Dominated Stream System After a Wildfire Damages its Watershed, Stout Canyon, Utah

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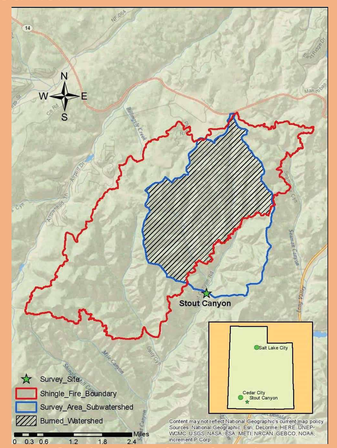
PURPOSE

The changes in stream morphology after a forest fire damages its watershed are well documented in streams whose high water event occurs from snow melt. However, changes in stream morphology are not well documented in streams whose high water event comes from late summer monsoon rains. Stout Canyon, a stream in a monsoon-dominated system, had 3,114 acres, or 73.6%, of its watershed burned during the Shingle Fire of 2011. This provides a unique opportunity to document and compare the changes in morphology in a monsoon-dominated-stream-system.

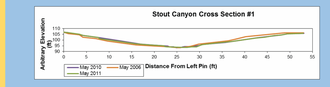
LOCATION

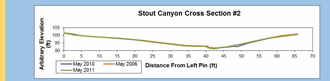


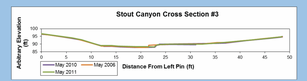
Overview of Stout Canyon Survey Area

DATA

Pre-Fire May 2011

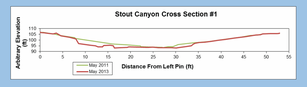


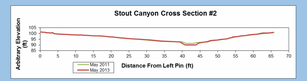


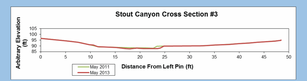


D50	Area at Bankfull	Width to Depth Ratio	Wetted Perimeter
Coarse Gravel	2.70 ft^2	7.40	5.18 ft

Post-Fire May 2013

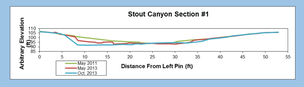


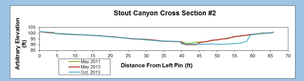


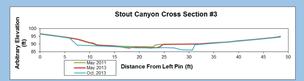


D50	Area at Bankfull	Width to Depth Ratio	Wetted Perimeter
Medium Gravel	No Floodplain	No Floodplain	No Floodplain

Post-Fire October 2013

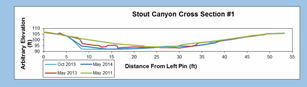


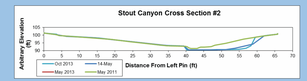


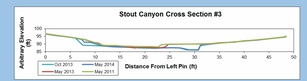


D50	Area at Bankfull	Width to Depth Ratio	Wetted Perimeter
Medium Gravel	No Floodplain	No Floodplain	No Floodplain

Post-Fire May 2014







D50	Area at Bankfull	Width to Depth Ratio	Wetted Perimeter
Medium Gravel	21.99 ft^2	10.63	16.72 ft

DATA INTERPRETATION

- Before the fire, Stout Canyon's bank geometry was stable.
- After the fire the bank geometry changed drastically.
- The largest change occurred two years after the fire.
- The average size of sediment (D50) in the substrate decreased after the fire.
- As of 2014, the D50 shows signs of increasing and returning to pre-fire conditions.
- The area at bankfull, width to depth ratio, and wetted perimeter all increased after the fire.
- The floodplain appears wider and less vegetated after the fire.

CONCLUSIONS

The data show that Stout Canyon underwent changes in morphology similar to streams with spring-runoff high water events. The substrate initially underwent a fining process after the fire but began to stabilize and return to pre-fire conditions within three years. The floodplain was completely destroyed after the fire. A wider and shallower floodplain reformed three years after the fire. The only notable difference between Stout Canyon and with spring runoff high water events is that the banks took longer to re-stabilize as evident in the fact that the greatest change in bank geometry occurring in the second year rather the in the first year as is typical in spring runoff streams. It is concluded that banks will take longer to re-stabilize in monsoon-dominated-systems due to the abrupt and destructive nature of high water events caused by monsoon rains.

ACKNOWLEDGEMENTS

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