

Geomorphic Analysis of the Middle Rio Grande – Elephant Butte Reach, New Mexico

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Abstract. Sediment plugs occasionally form along the Middle reach of the Rio Grande River, completely blocking the main channel of the river. Aggradation within the Elephant Butte Reach contributes to a decrease in channel capacity, which may be a cause of sediment plug formation. Elephant Butte Reach is the last reach of the Middle Rio Grande and is impounded to form Elephant Butte Reservoir. Elephant Butte Reservoir water surface elevations have changed significantly throughout history. It is important to understand the influences of Elephant Butte Reservoir levels on channel aggradation/degradation in order to decrease the potential for future sediment plug formation. Historical cross-section survey data of Elephant Butte Reach and historical reservoir levels of Elephant Butte Reservoir were compared and analyzed to quantify the rate of channel aggradation/degradation in response to increases/decreases of the reservoir water surface elevation (change in base-level). When the base-level changes, a wave of aggradation/degradation travels upstream. The rate of wave propagation upstream varies relative to the rate of base-level change, and was also quantified for this study. Understanding the influences of Elephant Butte Reservoir levels on channel aggradation/degradation of the Middle Rio Grande are essential for improvement in future river management practices along the Middle Rio Grande. And while the results of this study are specific to the Middle Rio Grande, the methodology can be applied to other channels.