Title: Modeling Lateral Erosion During Reservoir Drawdown

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Abstract: Reservoir drawdown is a management technique increasingly used to maintain aging infrastructure, decommission dams, and promote the flushing of fish and sediment. Typically, models of the reservoir's geomorphic response have been limited to 1D incisional erosion without the incorporation of lateral widening. The proposed research aims to understand how the drawdown rate may affect the magnitude, timing, and mechanism of lateral erosion processes in a reservoir. It is hypothesized that an increased drawdown rate (the water level is reduced over a relatively shorter period of time) will increase the volume and rate of lateral erosion and will be dominated by geotechnical failure. Field observations will be coupled with a hydrodynamic and bank stability model to conduct numerical experiments of the processes leading to erosion with varying drawdown scenarios. Bishop's Method will be utilized in a limit equilibrium model to evaluate planes of slope failure at various water levels, in addition to shear stress transfer at the bank toe for hydraulic failure. The incorporation of retrogressive bank erosion in this model will be a new contribution to address sequential slumping, which is expected to play a critical role in improving the accuracy of modeling reservoir erosion. High frequency surveys and sediment testing from Lake Mills and Lake Aldwell on the Elwha River in Washington will provide input data for robust verification of the model. Predicting the characteristics of erosion in a reservoir is essential in managing the impacts of sediment on downstream ecosystems and infrastructure.