COWLITZ-TOUTLE RIVER WATERSHED SEDIMENT ASSESSMENT UTILIZING THE SIAM MODEL

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Abstract The Cowlitz and Toutle River watersheds have been dramatically altered by the 1980 volcanic eruption of Mount St. Helens, and the resulting measures constructed to protect the public and control the extraordinary volumes of sediment mobilized by the eruption.

The Mount St. Helens (MSH) Project was formulated to control the movement of large amounts of sediment downstream from the debris avalanche resulting from the May 18, 1980 eruption and maintain a congressionally authorized level of flood protection along the lower Cowlitz River. The Sediment Retention Structure (SRS), constructed on the North Fork Toutle River in 1987 has provided significant reduction in the sediment volumes downstream in the Cowlitz River from 1987 to 1998 while operated as a reservoir, trapping over 100 million cubic yards of sand and silt eroded from the debris avalanche. The North Fork Toutle now flows through the sediment-filled reservoir pool, exiting through a spillway and rock ramp. Under the current operation with the retained sediment reaching the spillway elevation, the sediment discharge from the SRS has changed to include a higher portion of sand sized sediment, particularly in the fine sand size class.

The objectives of the investigation leading to this paper were to develop a sediment budget that identifies the existing watershed sediment sources, pathways and sinks contributing to the transport of the massive sediment load of Mount St. Helens 1980 eruption. The sediment budget estimates the volumes and transport rates of sediments in the Toutle watershed and the near and long term effects on the Cowlitz and Columbia Rivers. The sediment budget provides a framework for identifying, screening and evaluating potential alternatives.

The Sediment Impact Analysis Method (SIAM) model was developed to assist in the assessment of erosion and sedimentation trends in river systems. SIAM is viewed as a screening level tool for the assessment of multiple rehabilitation alternatives, particularly in the reconnaissance and feasibility phases of a project. It provides a framework to combine sediment sources and computed sediment transport capacities into a model that can evaluate sediment imbalances and downstream sediment yields for different alternatives. The SIAM model was used, as directed by the Portland District, to assist in the development of the existing conditions sediment budget.