Principal Investigator(s):
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Study Title: Influence of Debris Avalanche Block Faces and Mixed Facies on the Evolution of the North Fork of the Toutle River Drainage (1980-Present), Mount St. Helens, WA

Key Words: Physical Terrestrial Geology Volcanic Hazards Geomorphology Sedimentology Stream Evolution Debris Avalanche Volcaniclastics

Abstract: An integrated field and laboratory-based study is outlined that proposes the role that sedimentary, geomorphic, and vegetative variables have played in the recovery on the North Fork of the Toutle River (NFTR) following the May 18, 1980 eruption of Mount St. Helens. The abundant volcaniclastic detritus produced by this eruption temporarily overwhelmed drainage systems flowing from the crater including the NFTR. The sedimentary detritus delivered to the upper reaches of the NFTR including debris avalanche facies has had a profound effect on the Morpho-sedimentary character of this drainage system. Planning and hazard evaluation along the North and South Forks of the Toutle River as well as the main Toutle River depend upon a clear understanding of sediment balance within the stream system. Data gathered during the duration of this project will extend understanding of that balance by quantifying the relative contributions of volcanogenic sedimentary detritus from prominent source deposits.

Field activities during 1998 will focus on identifying sedimentary, stratigraphic, morphologic, and vegetative interrelations from near the headwaters of the North Fork of the Toutle River to downstream of the sediment retention dam. These field studies will support detailed analyses of archival air photos that span time interval from just prior to the 1980 eruption until present. Air photo stereopairs will be evaluated for the following years: 1978, 1980, 1983, 1986, 1990, 1994, and 1996. If available, stereopairs from 1998 will be evaluated as well. Ultimately, maps will be generated that depict morpho-sedimentary and vegetative (primarily density of grass, tree, shrub, crytogamic soil cover) changes. The findings from the research will help address questions about the character of stream recovery following eruptions that are both specific to Mount St. Helens and applicable to other volcanic terrains.

Research Sites:
Mount St. Helens 7.5' Topographic Quad. T9N, R4E, Section 24, and T9N, R5E, Section 19
Spirit Lake West 7.5' Topographic Quad. T9N, R5E, Section 7 and Section 18
Elk Rock 7.5' Topographic Quad. T9N, R4E, Sections 2,3,4,5,6,7,8,9,10,11,14; T9N, R3E, Sections 1, 12

Type of Measurement(s):
Vertical and lateral sedimentary and stratigraphic profiling of selected exposures.
Selected sedimentary sampling of exposures and shallow pits.
Cross-section profiling and surveying of streams, terraces, alluvial fans, and bars.
Size, shape, and composition assessment using various sized grid layouts.

Frequency of Measurement(s): May to September, 1998

Data Storage: Sedimentary and stratigraphic data and results stored with Professor David R. Gaylord, Dept. of Geology, Washington State University, Pullman, WA 99164-2812. Field maps and theses (from both Bart and Killenbeck) in Library at Washington State University. Separate copies of theses to be sent to USGS-CVO and to Mount St. Helens National Volcanic Monument.

Long-term plans: Data available for collaborative efforts: If deemed appropriate. Interested parties should contact D. Gaylord at WSU.