Sediment Transport in the North Fork Stillaguamish River

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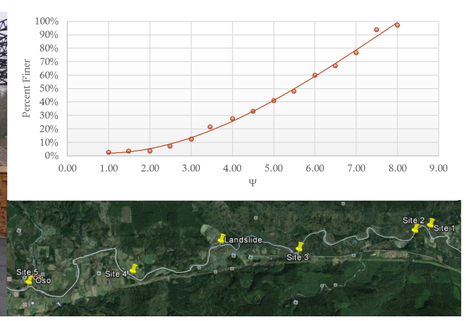
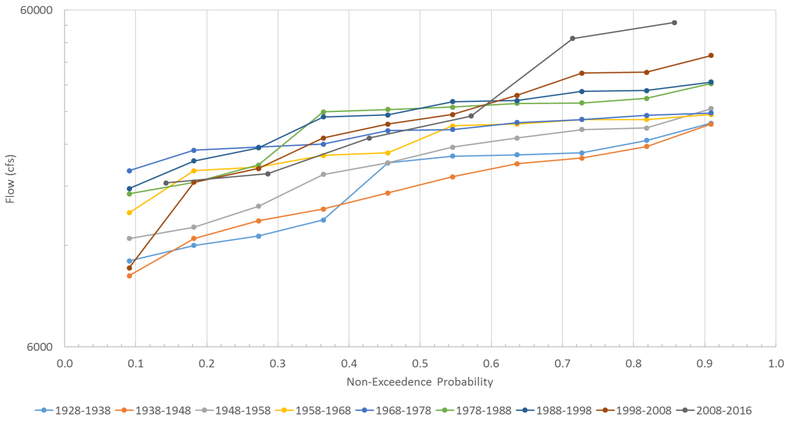
Introduction

Our investigation of the North Fork Stillaguamish River is rooted in the salmon that begin and end their lifecycles there. Landslides like the Oso Landslide have occurred naturally in the region for centuries, and help to replenish sediments in the river. These sediments develop important features that salmon use for spawning and to hide from predators. By modeling the North Fork Stillaguamish we can get an idea of how local fish populations might be impacted by events like the Oso Landslide.

Methodology

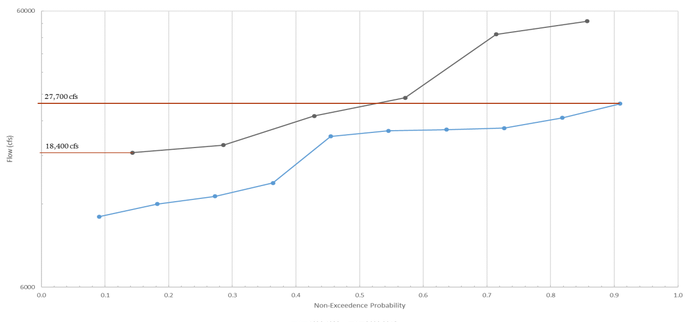
In order to perform a numerical analysis of the river's sediment transport, we needed data. Specifically, we needed grain size distributions and the river channel topography. We gathered the grain size data by performing "pebble counts" on site visits (we took samples from various gravel bars and counted the number of rocks in a given size class), and we got the topographic data from the United States Geologic Service.





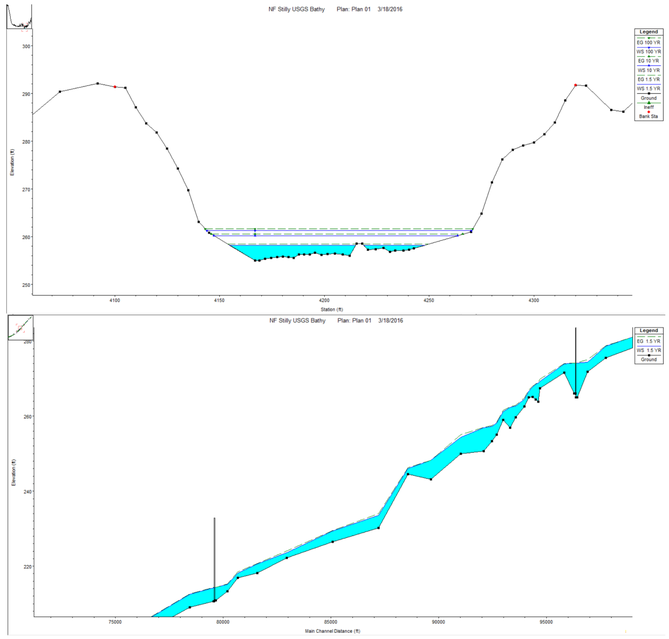
Analysis

In addition to measuring the grain size, we needed to analyze the historic flood patterns in the river. Knowing what kinds of floods the river is capable of producing, and how often they are produced, is essential to modeling. Above this text box is a plot of the largest flow in the river each year between 1928 and 2016. The data is divided up by decade. Below this text are the 1928-1938 and 2008-2016 sections. This image makes it obvious that the flow in the river has increased dramatically over the years.



Modeling

We used the Hydraulic Engineering Center River Analysis System (HEC-RAS) to model our stretch of river. The graphical outputs of the 1.5 year flood are shown in the upper right of this poster and include a typical cross-section and a side view zoomed in on the Oso Landslide are.



Community Outreach

At the end of our research we traveled up to Darrington, Washington (located about 12 miles east of the Oso Landslide area) to present our project to students at Darrington High School. We discussed our project, the challenges we faced along the way, and what the flow duration curves mean in regards to climate change.