

Aerial Image Analysis of the North Fork Stillaguamish River

Mid-year report for Center for Environmental Justice and Sustainability
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Project Overview

The purpose of this project is to contribute to the growing body of knowledge about sediment transport in the North Fork Stillaguamish River, which has received more attention recently in response to the devastating 2014 Oso landslide. In particular, we would like to understand how the river has been changing over time—the river course, banks, and gravel bars shift continually—and at what rate. This information, we hope, will provide more quantitative insight into the Oso landslide. Lastly, the project will apply the knowledge gained from the analysis to our greater understanding of the river and watershed: what are impacts on wildlife, humans, and the environment? Can long-term trends, if they are present, be attributed to human causes?

Progress to Date

Literature review

The first step in this project was to research the context of the project and previous relevant research. During late summer and early Fall Quarter 2015, I read about the history of the Stillaguamish River and surrounding areas, the geological studies of the Oso landslide, and some fundamental concepts of sediment transfer processes. Furthermore, I researched papers in the literature that have used aerial images and GIS to extract quantitative data and draw meaningful conclusions. Dr. Lauer was helpful in demonstrating methodology that has previously been successful in similar research. Lastly, I researched which historical aerial images to use for analysis.

Image digitization

Most of the aerial images that are potentially useful for this study are from federal, state and county agencies conducting surveys by plane, which are maintained in the archives of the Maps and Cartographic Information Services of the Suzzallo Library at the University of Washington, with indexes of these images online. During one visit to the library in late Fall Quarter 2015 and several visits Winter Quarter 2016, I searched the archives for the physical images referenced in their online indexes. I scanned these images at high resolution for use in GIS.

GIS manipulation

This is the current stage of the project. Employing Dr. Lauer's methods, I am importing each historical image – about one per decade – as a layer and georeferencing them. Once they are all in proper alignment, I will trace the river banks and bars as polygons, from which the area of shifting river characteristics can be computed with various GIS tools and packages. Each of these steps will be carefully recorded with notes and GIS-reported residuals.

Future Direction

Data analysis

Depending on the results of the GIS layer manipulation, some analyses may be more appropriate than others – Dr. Lauer will provide some guidance here regarding which direction to take the quantitative analysis. This is also the correct time to incorporate existing information into the project, including hydrological, biological, and geological data. Upon finishing these steps, I will draw conclusions based on the data and analysis. If they prove to be strongly significant, I hope to connect historical changes in the floodplain to the Oso landslide and the other studies being conducted on the river, especially those by other students.

Present findings

Once the study is complete, I will focus on communicating the findings to CEJS, the Seattle University community, and the broader public. I intend to find venues in the Oso area to share my research, as well as at academic fora related to hydrology/geology. Additionally, I am currently writing a short article for Fr. Pat Howell that may feature in a late 2016 edition of *Conversations* magazine that is distributed to Jesuit institutions throughout the country.