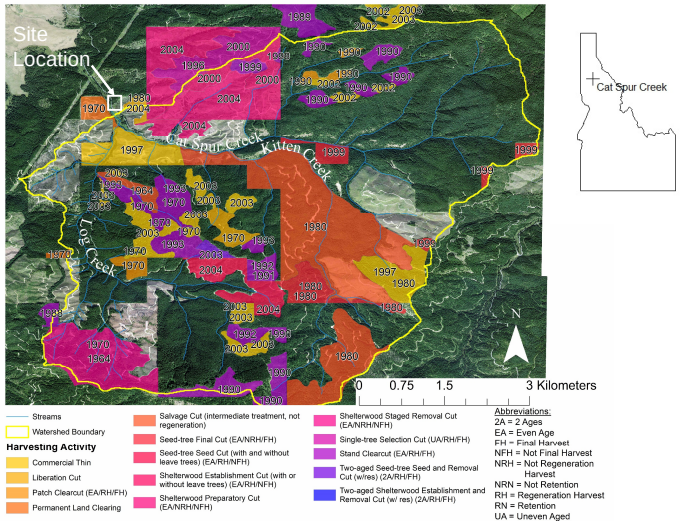
Response of Flow and Sediment Dynamics in Mountain Streams to Biomass Removal

Ross S Wickham and John Petrie
Washington State University | Department of Civil and Environmental Engineering

Project Introduction and Objectives

The project objective is to evaluate the potential impacts of altered hydrologic conditions on flow and sediment dynamics in mountain streams. Specifically, the effects of altered runoff and sediment supply due to biomass removal will be examined. Stream channel aggradation, degradation, and sediment transport will be investigated using hydraulic models.

Cat Spur Creek, a harvested watershed located in northern Idaho (Figure 1), has been selected to evaluate these effects on stream channels. Cat Spur Creek is a gravel bed stream, with an average flow of 0.3 m^3/s, bank full width of 6 m, and average slope of approximately 0.01.



*Numbers in polygons represent year of harvesting activity

Figure 1: Study Site

Methodology

To determine the stream channel response to biomass removal, an array of possible resulting streamflows and sediment supplies will be examined. The flow and sediment will be routed through a hydraulic model that will determine the output suspended sediment and channel aggradation/degradation.

Field Data Collection

Cat Spur Creek was surveyed in July 2014 for channel bathymetry and grain size data. Bed elevation measurements were collected roughly every 20 cm along 35 cross sections, producing the detailed representation of the bed surface shown in Figure 2. Grain size distributions (Figure 3) were obtained using the pebble count procedure for several locations within the channel.

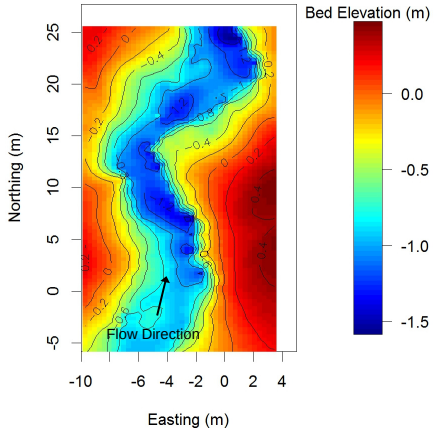


Figure 2: Bathymetric Map of Creek

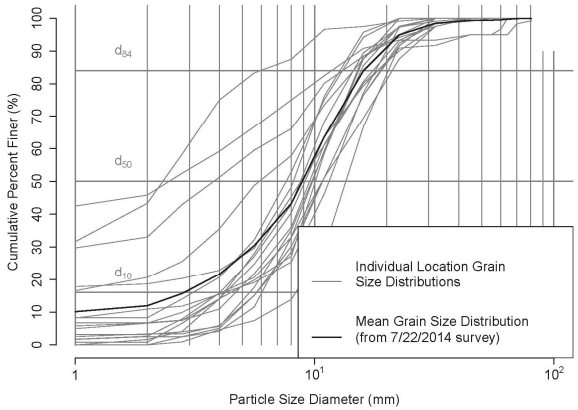


Figure 3: Grain Size Distributions

Future Work

More data and data processing is required to initialize and validate the hydraulic model. High resolution 3D velocity measurements will be collected with an acoustic Doppler velocimeter (ADV). The ADV measurements, in conjunction with the bed bathymetric map and grain size measurements, will be used to develop, calibrate, and validate the hydraulic model. An example of the hydraulic model performance is shown in Figure 4. Additional group collaboration is anticipated to determine the input streamflows and sediment supplies that will be evaluated by the hydraulic model.

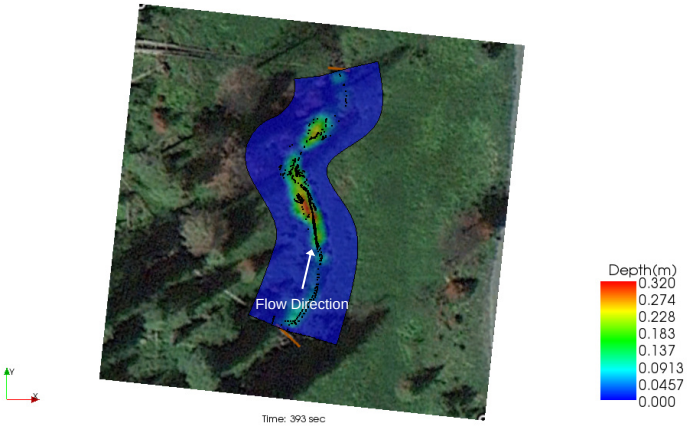


Figure 4: Preliminary hydraulic model created using International River Interface Cooperative (iRIC) software

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Contact Information:

Ross Wickham	Masters Student	ross.wickham@email.wsu.edu	(707) 567-2151
John Petrie	WSU Faculty	j.petrie@wsu.edu	(509) 335-0909

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