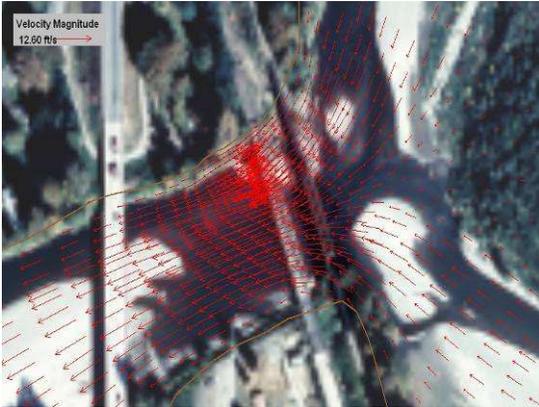




# Hallar Trestle 2-Dimensional Hydrodynamic Model

## *Stillaguamish River, Washington*



R2 was contracted to develop a two-dimensional (2-D) hydrodynamic model to aid in identifying dominant flow paths during flooding at a railroad trestle in Arlington, Washington, in the confluence reach of the Stillaguamish River. Large wood debris from upstream frequently deposits along the north side of the Trestle during floods. Concerns include pier stability and reduction of fish poaching opportunities. Snohomish County Surface Water Management will use the model to evaluate future actions and conditions that could avoid or reduce problems related to the debris buildup. R2 used SMS RMA2, a 2-D finite-element modeling software.

The morphology of the model incorporated surveyed river bathymetry and LIDAR (Light Detection and Ranging) topography of the

### **Project Elements:**

- Hydraulic Measurements
- 2-D Finite-element Modeling
- Flood Impacts
- Infrastructure Protection

floodplain surface. The bathymetry data below the trestle were adapted from an HEC-RAS model from WSDOT. Hydraulic roughness and eddy viscosity coefficients were assigned to different zones to reflect the land and topographic characteristics affecting the hydraulics. The channel roughness values and slopes for both forks were estimated using data from field collection.

R2 staff also collected field measurements of discharge and velocity at a moderate flow to help calibrate the model. The model was then applied to simulate the 5-year flood for current channel morphology conditions. The predicted velocity distribution near the Hallar Trestle indicated that large wood debris flowing down from the North Fork Stillaguamish River had a much higher risk of being trapped at the bridge piers on the north side of the river than on the south shore, reflecting the influence of channel morphology and velocity vectors from the South Fork.

The domain of the 2-D model will be expanded in the future to include areas farther downstream as part of another floodplain inundation study to be conducted by the County.

