2015 CHaMP Camp Workshop

Modeling relationships between CHaMP metrics and landscape characteristics in the Upper Grande Ronde River basin

June 4, 2015
7:45 a.m. – 8:45 a.m.

Presenter Casey Justice, Columbia River Inter-Tribal Fish Commission

Objectives: Extrapolating site-level habitat data from CHaMP surveys to larger spatial scales for application to life cycle modeling and restoration planning.

Software Needs: Microsoft PowerPoint

Additional Resources:

Abstract:

We analyzed the relationship of three important fish habitat metrics (fine sediment, large woody debris, and pool area) with landscape/land use characteristics in the Grande Ronde River basin with the objective of extrapolating site-level habitat data from CHaMP surveys to a larger spatial scale that would be more useful for life cycle modeling. We used both mixed-effects models and spatial statistical network models to fit relationships between CHaMP habitat metrics and landscape/land use data derived from remote sensing. The best fitting mixed-effects model for large woody debris (LWD) frequency included the explanatory variables elevation (positive effect), bankfull width (negative effect), and tree cover (positive effect), and together explained approximately 90% of the variation in LWD. The top model for percentage pool area included elevation (positive effect), valley width index (positive effect), watershed area (negative effect), slope (negative effect), and large woody debris frequency (positive effect) as explanatory variables, together explaining 88% of the variation in pools. In contrast with LWD frequency and percentage pools, the best fitting model for pool tail fines <2 mm was relatively weak ($r^2 = 0.44$). Despite statistically significant effects of elevation, valley width index, road density, and drainage density, this model was not a reliable predictor of fine sediment in pool tails. Spatial statistical network models showed promise for predicting LWD frequency as a function of landscape/land use characteristics and position in the watershed, but did not compare favorably with mixed-effects models for fine sediment or pool area metrics. These models will be used to predict habitat conditions at unsampled prediction points spaced every 500 m across the stream network. Prediction sites will then be rolled up using block kriging or simple averaging to calculate average habitat conditions at the scale of Biologically Significant Reaches (BSRs), the spatial unit used in our life cycle model.