

Morphological changes in the middle Elwha River, Washington following dam removal

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Abstract. Sediment supply is known to play an important role in many aspects of river morphodynamics. With the increasing commonality of dam removal and other anthropogenic activities that dramatically alter the sediment regime, it is important to understand how channels adjust to dramatic changes in sediment supply characteristics. In particular, there is considerable uncertainty in how mesoscale morphological units (e.g., riffles and pools) respond to these kinds of disturbances. The removal of Glines Canyon Dam as a part of the Elwha River Restoration project provides a natural setting to explore how large increases in sediment supply may affect downstream reaches. Here we present the results from three bathymetric/topographic surveys conducted yearly from 2014-2016 on a 1 km reach of the middle Elwha River approximately 5 km downstream from the former Glines Canyon Dam site. The field surveys, conducted using RTK-GNSS equipment, were combined with aerial lidar data to produce three continuous digital elevation models of the entire valley bottom. Differences between the elevation surfaces reveal bank retreat on the outside of bends coupled with general bar aggradation on the inside of bends, resulting in an increased sinuosity. Multi-dimensional hydrodynamic modeling, used to estimate flow parameters, aids in the delineation of riffle and pools units. Preliminary results indicate riffles comprise a greater area than pools and that riffle area has been increasing while pool area has been decreasing. Modeling results also indicate that a shear stress reversal between low and high flows may be responsible for the maintenance for riffle and pool units in this reach.