

Fluvial Reconnaissance of Rock Creek and Selected Tributaries with Implications for Anadromous Salmonid Habitat Management

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Rock Creek flows into the Columbia River approximately 12 river miles (RM) upstream of John Day Dam and is within the Mid Columbia River Distinct Population Segment (DPS; ESA-Threatened) of steelhead trout (*Oncorhynchus mykiss*) geographic region. A study was undertaken to develop recommendations and identify areas needing further investigations of stream restoration, protection, and enhancement potential for steelhead habitat.

Previous assessments identified low baseflow and low instream cover to be the main limiting habitat conditions for steelhead. Baseflow habitat surveys conducted by Allen et al. (2014a) from 2009 through 2012 found, on average, 17% of total stream length remains as perennial pools and 36% of total length dries-up seasonally. Underwater cover limited juvenile survival during summer baseflow in all years.

The 1964 peakflow was a signature event that caused significant changes in channel alignments and ongoing geomorphic response. Peakflows in 1974 and 1996 also caused morphologic shifts. In most years, stream power seems insufficient to perform much geomorphic work. The ongoing duration of post-disturbance responses combined with recurrence frequencies of such disturbances suggest Rock Creek's alluvial reaches can be expected to be in a nearly continual state of geomorphic adjustment.

Several intrinsic watershed characteristics contribute to challenging hydrogeomorphic conditions, in particular: south-facing aspect, equant shape, low elevation (83% below 3,000 feet), moderately-high relief, low mean annual precipitation (16.6 inches), and very little storage. Climate predictions and human groundwater demands further challenge the habitat context.

Recent genetic sampling documented the steelhead run to be highly introgressed with the Snake River DPS (Matala 2014). Preliminary results of an ongoing PIT-tagging study found 85% of adult detections of known juvenile origin to be Snake River DPS steelhead (Allen et al. 2014a). Ongoing work should reveal whether or not steelhead in Rock Creek are a viable naturalized Snake River DPS subpopulation or sustained solely by straying. Determination of whether or not the watershed is a meta-population "sink" will be important to ensuring that habitat actions are necessary and potentially effective.

While awaiting answers to population-level questions, securing protections for instream flow and physical habitat as well as passive techniques (e.g. allowing beaver colonization) may be pursued. A hierarchy should be noted that places streamflow protections above other actions. Without protection of instream flows, certainty of success related to physical habitat manipulations generating a positive population response decreases significantly.