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**Genetic monitoring of steelhead trout (*Oncorhynchus mykiss*) in Rock Creek, WA: variability in a unique watershed of the middle Columbia River Basin**

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**Abstract:**

The riparian habitat of the Rock Creek subbasin, WA is characterized by patchy vegetation, highly variable flows, and seasonally dry stretches of riverbed. Steelhead productivity may be adversely affected by these and other limitations including recent habitat degradation. Oral history of the Yakama Nation Tribe indicates that present day fish populations and habitat conditions have changed dramatically over time. The watershed has no artificial barriers to fish migration and there is no intentional stocking of hatchery origin fish. However, straying of out-of-basin fish is likely to occur and the current status of Rock Creek steelhead, including population distinction within the Middle Columbia DPS, is not well understood. We genotyped juvenile *O. mykiss* collected over a four year period, at 192 SNP loci to test for effects of degraded habitat and out of basin straying on genetic structure. A Columbia River basin-wide genetic baseline was used to evaluate stray influences and to characterize population structure within-watershed as well as among populations throughout the Columbia Basin. Based on GSI assignment analyses, straying from out-of-basin fish was moderate and there was no apparent difference in the degree of stray influence coincident with upstream distance or habitat variability throughout most of the surveyed range. An exception occurred in the furthest sampled upstream collection sites adjacent to Ekone Falls, which is not a migration barrier. Results indicate the population above Ekone Falls is genetically distinct from the others in this watershed. Overall results suggest that habitat variability within a large portion of the anadromous range of Rock Creek does not affect steelhead dispersal. Upstream population aggregates may consist largely of resident fish with gene flow presumably occurring almost exclusively in a downstream direction.