# Fish Distribution and Population Dynamics in Rock Creek, Washington.

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**Abstract:**

The U.S. Geological Survey collaborated with the Yakama Nation starting in 2009 to study the fish populations in Rock Creek, a Washington tributary of the Columbia River 21 kilometers upstream of John Day Dam. Prior to this study, very little was known about the threatened steelhead *(Oncorhynchus mykiss)* population in this arid watershed with intermittent stream flow. The objectives of the study were to survey the habitat conditions, learn where and how fish currently inhabit the system, and learn which areas are most productive for steelhead.

To accomplish these objectives, we electrofished in the spring and fall, documenting the distribution and relative abundance of all fish species to evaluate the influence of biotic factors on salmonid productivity and survival. We surveyed the distribution of perennial pools and established a network of automated temperature recording devices from river kilometer (rkm) 2 to 23 in Rock Creek and rkm 0 to 8 in Squaw Creek, a major tributary entering Rock Creek at rkm 13, to better understand the physical factors influencing the salmonid populations. Salmonid abundance estimates were conducted using the mark-recapture method in a systematic random subsample of the perennial pools. The proportion and timing of salmonids migrating from these pools were determined by building, installing, and operating two passive integrated transponder (PIT)-tag interrogation systems at rkm 5 and at the confluence with Squaw Creek. Since fall of 2009, we PIT-tagged 2,903 *O. mykiss* and 148 coho salmon (*O. kisutch*) during electrofishing efforts. In the lowest flow periods of 2010 to 2012, we found that an average of 36% of the surveyed streambed length was dry, and 17% remained as perennial pools. The maximum temperature recorded in those pools was 24.4 °C, but most pools had a maximum temperature that was less than 21 °C. *O. mykiss* were present in most pools, and non-native fish species, such as smallmouth bass (*Micropterus dolomieu*), were typically found below rkm 4. Coho salmon were present in nearly every pool in 2011, but were rare in 2009, 2010, and 2012. About 30% of the PIT-tagged *O. mykiss* and coho salmon migrated out of Rock Creek as smolts in March and April. As of February 2013, only three fish that we tagged as juveniles, all *O. mykiss* tagged in October 2009, have returned as adults. However, a total of 40 PIT-tagged adult steelhead have been detected, twenty-two of known origin. Of these, 73 % were from the Snake River. We intend to operate our PIT-tag interrogation systems for several more years to allow time for the fish that we tagged as juveniles to return as adults and complete their life cycles. The Yakama Nation intends to use the information collected from this study to prioritize and gauge the effectiveness of ongoing and future restoration actions.