

Comparing the performance, health, and welfare of juvenile Wenatchee steelhead raised in either partial water reuse or flow-through pond environments

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The Chelan County Public Utility District installed a pilot partial water reuse system at the Chiwawa Ponds Hatchery in Leavenworth, Washington in 2009 to assess the suitability of water reuse technology for raising and acclimating Wenatchee River steelhead *Oncorhynchus mykiss* prior to stocking. From January – May 2010, The Conservation Fund's Freshwater Institute evaluated the performance, health, and welfare of steelhead reared in the pilot reuse system relative to a portion of the same population raised in a comparison flow-through pond at the Turtle Rock Island facility. Fish were sampled on three occasions (pre-study October 2009, March 2010, and May 2010); during the final sampling, fish were screened for subclinical infections by important bacterial and viral fish pathogens. During the two study sampling events in 2010, fish from each cohort were collected and fixed in formalin for histological evaluation of multiple tissues, including gill, heart, liver, spleen, and kidney. To assess fin erosion (an established welfare indicator) the dorsal and caudal fins of fish sampled from each cohort were measured and standardized to fork length to compare fin indices. Fish from each cohort were also bled via caudal venipuncture for evaluation of blood gas (pO₂, pCO₂, O₂ saturation, etc.) and chemistry (sodium, chloride, glucose, etc.) parameters. No listed bacterial or viral fish pathogens were isolated from either cohort at study's end. Histological evaluation revealed a higher prevalence of gill epithelial hypertrophy and lymphocytic epidermitis in reuse fish, while raceway fish exhibited a higher prevalence of lymphocytic hepatitis; the majority of prevalent lesions observed in either cohort, however, were mild and subclinical in extent. Blood chemistry and gas measurements revealed minor differences between the two populations; all measured parameters, however, fell within published normal reference ranges for salmonids. Dorsal fin erosion was present in the population prior to study initiation, and reuse fish exhibited improvement in dorsal fin index by study's end, while raceway fish exhibited higher caudal fin indices prior to stocking. Overall, by study's end both cohorts were generally comparable in performance, health, and welfare indices, suggesting that partial water reuse technology for rearing steelhead can be employed without negatively affecting fish quality.