Estimating summer steelhead redd abundance and variance in the Wenatchee River

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Summer steelhead exhibit a prolonged and complex freshwater migration in route to their natal stream. Fish often overshoot their natal streams in search of cool water refugia and may experience differential survival based on overwintering location. These factors dramatically confound the use of dam counts as an index of abundance. Spawner abundance estimates based on redd counts are also confounded by the variation in the ability to correctly identify and enumerate redds (i.e., observer efficiency). Factors that may contribute to variation in observer efficiency are numerous and include environmental, habitat, and surveyor experience. Despite these challenges, spawner abundance estimates remain a critical component in understanding the status and productivity of a population. Unlike other species of anadromous salmoinds, steelhead have been found to spawn in a wide range of habitats within a watershed, often precluding the use of more traditional salmon based techniques (i.e., total census of redds) due to logistical and financial constraints. We developed a model that estimated observer efficiency and found that an index of habitat complexity, an index of visibility, reach specific surveyor experience, and density of redd like features were the most important factors explaining variation in observer efficiency. Redd abundance and variance estimates for each stream reach can be estimated using a modified area-under-curve (AUC) methodology, redd life, and observer efficiency. Application of the methodology should be possible anywhere steelhead redd surveys can be conducted, but does rely on robust estimates of redd life and observer efficiency, which may require additional financial support at least initially. An evaluation and refinement of the methodology will be conducted in the Wenatchee Basin in 2012.