2013 Adult Chinook VSP Monitoring in the White Salmon River – A Comparison of Abundance Estimation Methodologies

Jeremy Wilson
Fish and Wildlife Biologist
Washington Department of Fish and Wildlife
2108 Grand Blvd. Vancouver, WA 98661
360-921-5749
Jeremy.Wilson@dfw.wa.gov

In 2010, WDFW implemented a comprehensive Viable Salmonid Population (VSP) parameter monitoring program for Chinook Salmon (*Oncorhynchus tshawytscha)* populations downstream of Bonneville Dam focused on estimating adult abundance, spatial distribution, diversity and productivity (McElhany et al.2000; Crawford and Rumsey 2011). In 2013, this monitoring program was expanded to include the White Salmon population. Surveys were conducted weekly prior to start of spawning (early August) until completion of spawning (mid- December) and over the entire spawning distribution as outlined in Rawding et al. (2010). Counts of lives, carcasses, and redds were recorded by pre-determined reach and individual redd locations were recorded using Garmin Oregon 550 handheld GPS units. All intact carcasses were sampled for external tags and biologically sampled for fork length, sex, adipose fin presence, and condition. The study design was setup to estimate adult abundance using three independent methods: carcass tagging using the Jolly-Seber (JS) model, Area under the Curve (AUC) using live counts of Chinook classified as spawners, and redd expansion. The three abundance estimates varied substantially suggesting not all of the assumptions were met for each method. We hypothesize that the redd expansion estimate was biased low due to redd superimposition, turbid conditions at times throughout the season, and a skewed sex ratio of carcass recoveries while the carcass tagging estimate was biased low due to not meeting the equal mixing assumption of the JS model. AUC appeared to be the best estimator of Chinook abundance in the White Salmon River of the three methods used in 2013 and produced an estimate of 88 (95% CI 77-100) spring Chinook, 1232 (95% CI 1088-1409) tule stock fall Chinook, and 4251 (95% CI 3755-4861) bright stock fall Chinook using an apparent residence time (ART) of 5.0 days. Approximately 42.7% of spring Chinook, 1.0% of tule fall Chinook, and 1.5% of bright fall Chinook spawning occurred above the old Condit Dam site, respectively. The proportion of hatchery-origin spawners (pHOS) based on the presence of a coded-wire tag (CWT) and/or an adipose fin clip was 22.8% (95% CI 3.7 - 58.4%) for spring Chinook, 32.7% (95% CI 27.3-38.5%) tule fall Chinook, and 64.1% (95% CI 60.4 – 67.6%) for bright fall Chinook. Further work should be done to validate ART used in AUC calculations for 2013.

Crawford, B. A., and S.M. Rumsey. 2011. Guidance for monitoring recovery of Pacific Northwest salmon and steelhead listed under the federal endangered species act. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northwest Region, Portland, Oregon.

McElhany, P., M. H. Ruckelshaus, M. J. Ford, T. C.Wainright, and E. P. Bjorkstedt. 2000. Viable salmonid populations and the recovery of evolutionarily significant units. NOAA Technical Memorandum NMFS-WFSC-42.

Rawding, D., S. VanderPloeg, A. Weiss, and D. Miller. 2010. Preliminary Spawning Distribution of Tule Fall Chinook Salmon in Washington’s portion of the Lower Columbia River Evolutionary Significant Unit Based on Field Observation, GIS Attributes, and Logistic Regression. Washington Department of Fish and Wildlife. Olympia, WA. 17pp.