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Article

Sources and Magnitude of Sampling Error in Redd Counts for Bull Trout

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Abstract

Monitoring of salmonid populations often involves annual redd counts, but the validity of this method has seldom been evaluated. We conducted redd counts of bull trout Salvelinus confluentus in two streams in northern Idaho to address four issues: (1) relationships between adult escapements and redd counts; (2) interobserver variability in redd counts; (3) sources of interobserver variability; and (4) temporal and spatial variation in spawning activity. We found that estimated adult escapements and redd counts were strongly correlated on a logarithmic scale, but both sources of data probably contained large estimation or observation errors. In particular, redd counts varied significantly among observers in replicate counting trials. Observer counts ranged between 28% and 254% of the best estimates of actual redd numbers. Counting errors included both omissions and false identifications. Correlations between counting errors and redd and habitat characteristics were highly variable and provided limited

insights into potential causes of sampling error. Finally, we found significant spatial and temporal variability in spawning activity, which should be considered in establishing index areas for redd counts and the timing of counts. Our results suggest substantial improvements are needed to make redd counts and unbiased estimates of adult escapement more useful for population monitoring.