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Title: Spatial clustering of spawners and limited dispersal capacity of fry influence habitat accessibility of juvenile steelhead *(Oncorhynchus mykiss)*.

Juvenile salmonids are often assumed to follow an ideal free distribution where fish distribute themselves in proportion to the abundance and quality of habitats across a stream reach. This approach does not account for the ability of fish to access nearby habitat patches during life stages where dispersal is limited and mortality is high, such as the fry life stage of salmonids. When redds are spatially clustered and dispersal is limited, traditional models of population dynamics may overestimate the amount of habitat fry are able to reach during the greatest period of mortality in life and contribute to the high degree of uncertainty in current models. Dispersal distance of salmonids during the first months of life is generally thought to be limited but to our knowledge has never been explicitly quantified for steelhead *(Oncorhynchus mykiss)*. Dispersal distance of steelhead fry from single and clustered redd sites was measured during the first two months following emergence in 2021 and 2022 in the mainstem Skagit River. At all sites greater than 90% of observed fry remained within the same habitat unit as the redd and dispersal occurred primarily downstream. Dispersal kernels representing the location of 90% of observed fry had a median distance of 178m and maximum of 270m from single redds. At sites with clustered redds the dispersal kernels representing 90% of observed fry had a median distance of 685m and maximum of 910m. At low adult escapements the distance between redd sites and the degree of clustering are generally believed to increase. Given the dispersal distance measured here, existing models may overestimate population scale productivity of steelhead when fry dispersal is not accounted for, and this effect may be most pronounced at low escapements. Models which incorporate estimates of the dispersal capacity of fry could improve our understanding of the freshwater population dynamics of steelhead, reduce uncertainty and improve the estimation of population vital rates and forecasts.