Estimates of Prespawn Mortality Rates Based on Missing Chinook Salmon in the Mainstem Willamette River

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Large numbers of Chinook Salmon transported above dams are known to die prior to spawning, but little is known about prespawn mortality rates in the mainstem Willamette River. Although it is very likely that prespawn mortality occurs in the mainstem, dead fish are likely to be unreported given monitoring programs and river conditions. We provide an indirect estimate of mainstem prespawn mortality for 2001 – 2013 based on the number of 'missing fish', calculated by comparing fish counts at Willamette Falls to the sum of fish encountered at upstream projects, estimates of mainstem spawners from red counts, and reported harvest. The annual proportion of missing fish varied from 0.28 to 0.55 and was positively related to the size of the run and length of time spent in the river. These relationships suggest that the proportion of missing fish is density dependent and increases with exposure to pathogens, which aligns with a disease mechanism resulting in prespawn mortality. Although the fates of missing fish are unknown, we utilize existing pathogen information from studies to propose potential prespawn mortality agents. We also discuss implications for salmon recovery, outplanting procedures and future monitoring efforts.