Effects of Exposure to Low Dissoved Oxygen on Survival, Development, and Growth of Snake River Fall Chinook Salmon Eggs and Alevins

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Fall Chinook salmon eggs were exposed to water temperatures of 15-16.5 °C at dissolved oxygen (DO) levels of 4-8 mg O_2/L, and 100-percent air-saturation. Water temperatures were immediately adjusted downward 0.2 °C/day while initial DO was adjusted upward 2 mg O_2/L on day 17 post-fertilization (PF). On day 39 PF, all embryos were moved to saturated DO to complete

development through emergence. Survival to emergence was greater than 83 percent for all treatments. At the lowest DO level, the eggs took 6-10 days longer to reach hatch and 13-24 days longer to reach emergence than eggs exposed at the same temperature to saturated DO. The yolk weight at emergence was higher from eggs initially exposed to saturated DO than in groups exposed to 4-8 mg/L DO (7.5 mg). Survival at low DO may have been possible by reducing metabolism and slowing growth. The consequence of this strategy is that emergence was significantly later for those fry that were initially exposed to low DO at the egg stage. Delaying emergence may be detrimental to fall Chinook salmon survival because late migrants encounter unsuitable conditions