DOES THE ESTABLISHMENT OF THRESHOLDS PROVIDE THE BEST UNDERSTANDING OF SUPERSATURATION MORTALITY AND MORBIDITY?

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Applying empirically derived supersaturation thresholds to required limits in natural situations must be done with caution. Critical levels of supersaturation established by Fidler (1988) appear to ignore and certainly do no explain a number of reports of mortality in aquaculture situations where levels were as low as 103-105%. An alternative approach for setting a limit on supersaturation in natural waters like the Columbia/Snake River system is to use a concept of permissible "exposure" based on the degree of supersaturation (Delta-P) at depth (z) times time (t):

$$PE = \Delta P_z \cdot t$$

For example, if it is observed that at 120% supersaturation at the surface, fish are dead in 12 hrs (LD/50) whereas at 110% at the surface it requires 24 hrs, both "doses" work out to be 1824 mm Hg-hrs. Such a concept may help to clarify limiting exposures by extending to sub-lethal effects such as increased susceptibility to predation, infection etc. It may also provide a more consistent method of assessing the actual exposure of downstream migrants in the Columbia and Snake River system where highly variable exposures are sustained for several weeks by fish whose depth varies between 0 ft and 30 ft in waters supersaturated between 5% and 135%.