7-24-2007

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Abstracts of the presentations given on Tuesday, 24 July 2007, in Session 9 of the UCOWR Conference.

# Disease Susceptibility of Hatchery Snake River Chinook Salmon with Different Migration Histories in the Columbia River

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## ABSTRACT

Various methods have been developed to mitigate the effects of dams on juvenile salmon migrating to the Pacific Ocean through the Columbia River Basin. We conducted a study in FY02 to examine the health of hatchery-reared Snake River Spring Chinook salmon relative to bypass history and transportation. The health of outmigrants was assessed in terms of the difference in the incidence of mortality among fish, categorically grouped into no-bypass, bypass, and transportation life-histories, in response to challenge with the pathogenic marine bacterium Listonella anguillarum during seawater holding. The incidence of disease is strongly modulated by stressors in the environment, hence, the incidence of disease-induced mortality was viewed as a direct measure of physiological health and the potential for delayed mortality among the groups of fish representing different out-migration life-histories. In replicate disease challenges, the cumulative incidence of mortality associated with barged fish was statistically less than in-river fish with no-bypass life-history. The cumulative incidence of mortality associated with barged fish was statistically different than in-river fish with a single or multiple bypass life-history. However, the cumulative incidence of mortality was not statistically different between single and multiple bypass life-histories. In FY06 we repeated the FY02 study utilizing Snake River Spring Chinook salmon reared in two distinct hatcheries. In-river stressors in the Columbia River Basin again adversely impacted the health status of in-river outmigrants relative to fish barged through the hydropower network. Between the two migration life histories, barged fish were significantly less susceptible to L. anguillarum than in-river fish (p?0.0134). Likewise, when the results were separated by hatchery, the cumulative incidence of mortality of in-river fish was statistically greater than barged fish within individual hatcheries. Interestingly, the cumulative incidence of mortality was statistically different for transported fish (p?0.0929), but not for in-river fish (p?0.3865) between the two hatchery populations. The collective results suggest that transportation may help mitigate adverse health effects of the Columbia River Basin's hydropower system on Snake River Spring Chinook salmon, but the fate of the transported fish in the estuary and ocean may depend on their hatchery of origin.

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