



FISH PASSAGE CENTER

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MEMORANDUM

TO: Scott Bettin, BPA

FROM: Michele DeHart

DATE: July 21, 2008

RE: Adult sockeye return and ocean conditions

In response to your request the FPC staff considered ocean conditions and adult returns. Sockeye mark group data is limited and therefore extensive lifecycle analysis such as that conducted on Chinook and steelhead is not possible. Ocean conditions are important for adult returns. However, out migration conditions that result in high juvenile survival and fast travel time, for optimum ocean entry, are critical in order for juvenile fish to benefit from good ocean conditions.

Analysis of Steelhead and Chinook migration and adult return data, which incorporates ocean conditions, indicates that adult return is related to juvenile migration conditions.

The FPC has conducted an analysis on Chinook and steelhead which incorporates ocean conditions, juvenile migration characteristics, juvenile migration conditions and adult returns. The analysis is available on the FPC web site. This analysis of Chinook and steelhead indicates that juvenile passage conditions and specifically increased spill is related to increased adult returns. Sockeye population numbers are extremely depressed so the numbers of marked fish are small. Therefore, a similar analysis on sockeye is not possible at this time. Other analyses such as the multiple linear regression conducted in CSS Ten Year Report (Schaller et al. 2007; Chapter 5) indicates that SARs of Snake River wild spring/summer Chinook were positively correlated with faster water travel time experienced during the smolt migration, cooler phases of the PDO index and stronger downwelling in the fall during first year of ocean residence. Similarly, the Interior Columbia Technical Recovery Team and R. Zabel (2007) analyzed first year ocean survival for Snake River spring/summer Chinook and steelhead and upper Columbia

spring Chinook; again, first year ocean survival was significantly related to water travel time experienced by juveniles, spring upwelling or fall downwelling and cooler phases of the PDO.

Good ocean conditions have occurred in past years (1998-2002), but not all of these good ocean years resulted in high returns of sockeye adults.

Our analysis for Chinook and steelhead indicate that 1998 through 2002 were all good ocean years. However, past years with good ocean conditions, in which migration conditions were less favorable and included a higher proportion of sockeye transported (e.g., MY 2001) did not result in high returns of sockeye adults to the Snake River (2003).

The last recent high return of sockeye to the Snake River occurred in 2000, the juvenile migration year of this adult return was 1998 which was a high flow, high spill year. In 2000, 299 adult sockeye were counted at Lower Granite Dam. Most of these individuals would have out-migrated in 1998. Based on our analysis, juveniles out-migrating in 1998 would have experienced the lowest water travel time (and subsequently highest average flow) and second highest average spill percent among the years we analyzed and good ocean conditions.

ICBTRT and R.W. Zabel. 2007. Assessing the impact of environmental conditions and hydropower on population productivity for Interior Columbia River stream-type Chinook and steelhead populations. http://www.nwfsc.noaa.gov/trt/col_docs/matrix_model.pdf