

# **Development of Inflow Hydrology For Hells Canyon Complex Studies (E.1-4, Chapter 2)**

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## **I. Introduction**

Inflow hydrology is a hydrograph of numerical values of flow-over-time. A hydrograph is required to analyze and evaluate various alternatives for operating the Hells Canyon reservoirs. The inflow hydrology for the Hells Canyon Complex will serve as the inflow boundary condition for modeling the Hells Canyon complex reservoirs as well as the Snake River below Hells Canyon Dam.

*“There are numerous approaches for developing inflow hydrology. Therefore, the basic objectives for this study were to evaluate various approaches and their combinations and select the best approach for use with the Hells Canyon Complex and to develop the inflow hydrology record that would meet several specific considerations (Parkinson 2000). In evaluating the approaches and developing the inflow hydrology, we had to ensure that the resulting inflow hydrology would meet the following considerations:” (Page 1, Paragraph 2)*

- *“Address the current level of water-resources development and the operation of existing projects in the Snake River Basin to be representative of future conditions.*
- *Reflect the variability of flow patterns from year to year, as well as the intrinsic seasonal variability within each year.*
- *Include the level and flexibility of detail (such as length of record and time step) appropriate to use in analyses of key riverine and riparian organisms.*
- *Incorporate data concerning water quality, aquatic organisms, and sediment into recent data about historic flows.*
- *Assign a probability of occurrence for distinct hydrologic events, such as floods and droughts.” (Page 1, Paragraphs 3-7)*

## **II. Conclusions**

*1. “After our evaluation of the approaches, we recommended a hybrid approach for developing inflow hydrology to address various issues and level of detail required for subsequent analyses.” (Page 16, Paragraph 2)*

- *“Use IDWR adjusted flows at Weiser with fish augmentation flows (June 2000) from 1928 through 1992—disaggregated to a daily time step—as a basis for representing future conditions and assume current basinwide projects and operations.” (Page 16, Paragraph 3)*
- *“Include recent historic data (1992 to the present) to extend the record and include associated water quality, aquatic, and other data that are correlated to flow (using a daily or sub-daily time step, depending on the needs of each analysis). From these years of historic data, the following were selected to represent a wide range of hydrologic conditions for which reservoir operation modeling will be conducted using detailed (sub-daily) time steps: 1992, 1994, 1995, 1997, 1999.” (Page 16, Paragraph 4)*
- *“Conduct stochastic analysis (based on 1928—1992 IDWR-adjusted flows with fish augmentation) to evaluate the completeness of the record with respect to long-term droughts and high-flow periods. If warranted, use selected traces of stochastically generated monthly data (potentially disaggregated to daily) to supplement the adjusted data for extreme flow condition for some specific analyses.” (Page 16, Paragraph 5)*

Response: The BLM agrees with the approach. This approach was discussed with the ARWG on July 19, 2000 and the NMFS hydrologist in July 2000. No significant modifications to the approach were suggested.

### **III. Study Adequacy**

The study has thoroughly considered the data and the approaches that can be used to develop an inflow hydrology model. The study is considered adequate.

### **IV. BLM Conclusions and Recommendations**

The BLM has concluded that the approach proposed to model inflow hydrology is adequate and has no further recommendations.