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PROPOSAL BRIEF

Subject: Analysis of Effects of the Mid-Columbia Water Commission's Columbia River mitigation water portfolio on juvenile salmon and steelhead survival and travel time from McNary Dam to Bonneville Dam

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Prepared for: Mid-Columbia Water Commission and Northeast Oregon Water Association

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BACKGROUND

The Mid-Columbia Water Commission (Mid-C) and its member districts oversee several water right permits that authorize the diversion of water from the Columbia River for irrigation use. The authorized diversion period includes the time period from April 15 to September 30. Some of these permits include mitigation conditions set by the Oregon Water Resources Department (OWRD) requiring the permit holders to mitigate for diversions "bucket-for-bucket." Specifically, permit holders are required to return every unit of water withdrawn from the Columbia River "at or above the point of impact for the maximum instantaneous rate approved by the permit …" As part of an ongoing, temporary mitigation program, the Mid-C currently satisfies these requirements by, among other things, leasing water to instream use under water rights held by other water right holders.

Currently, water leased from the Port of Umatilla represents a large proportion of the mitigation package submitted to OWRD by the Mid-C annually. Although the bucket-for-bucket mitigation requirement is limited to April 15 through September 30 when irrigation water withdrawals occur, water is leased from the Port of Umatilla under the Port's water rights year-round. Moreover, during the irrigation season, water withdrawals are not continuous at the peak rate allowed. The combination of year-round leasing and less-than-peak withdrawals results in more than 85,000 acre-feet (AF) of volume protected instream with roughly 30,000 AF diverted each year. In addition to the discrepancy between the amount of mitigation and total diversion volumes, the bucket-for-bucket approach also creates numerous monitoring difficulties for both OWRD and the water right permit holders.

To address these concerns, the Mid-C is proposing a volumetric approach whereby mitigation is provided at or above the point of impact to offset the effects of diversions on aquatic resources, but not necessarily at the exact time diversion is occurring. This type of approach requires an analysis of tradeoffs between diversion impacts and instream lease benefits to confirm net benefits to aquatic resources and potentially to native groundwater storage supplies, which would then offset the impacts of the diversions being overseen by the Mid-C. It is assumed that the

annual excess volume of mitigation water protected instream provides a benefit to fish populations. However, an analysis to validate this assumption has not been completed. To that end, the Mid-C retained Mount Hood Environmental (MHE) to work with the Oregon Department of Fish and Wildlife (ODFW) to craft a method useful for evaluating the efficacy of a volumetric approach to mitigation. The purpose of this proposal brief is to provide a starting point for discussions with ODFW about a suitable approach that focuses on the primary salmonid life stage affected by flow changes in the mainstem Columbia River, emigrating juveniles, commonly referred to as *smolts*.

PROPOSAL SYNOPSIS

The maximum rate of water diversion by the Mid-C is less than a fraction of one percent of the total Columbia River flow volume downstream of McNary Dam. Such a small relative volume of flow should not be expected to yield a measurable change in fish production or survival because field observations cannot provide sufficient precision to detect very small effects due to the confounding influence of other factors (e.g., meteorological conditions, dam and pool operations within the Federal Columbia River Power System, etc.) that have large interannual effects on fish migration. However, rigorous analyses have been conducted on survival and travel time of juvenile salmon and steelhead in the Columbia River. Specifically, work done to support the U.S. Army Corps of Engineers' Columbia River System Operations Environmental Impact Statement involved quantification of the relationship between Columbia River flow and smolt survival and travel time. We believe leveraging these previous analyses may allow us to predict effects of small flow changes within a theoretical modeling framework. Though not equivalent to direct observation, this type of approach does offer a path forward for objectively assessing effects of the Mid-C's proposed mitigation approach.

More specifically, to evaluate a volumetric approach to mitigation, MHE proposes to conduct a smolt survival analysis using NOAA Fisheries' Comprehensive Passage (COMPASS) Model (Zabel et al. 2008). The model was developed to evaluate the effect of flow, spill proportion at mainstem dams, and water temperature on juvenile spring Chinook Salmon and steelhead trout survival and travel time from Lower Granite Dam in the Snake River to Bonneville Dam in the Lower Columbia River. Relationships between fish survival and travel time were statistically fit to flow, spill, and temperature data collected from 1995-2005. The model can be used to estimate fish survival and travel time for specific flow, temperature, and spill scenarios.

Metrics of interest for our analysis of the volumetric mitigation concept include survival and travel time from McNary Dam to Bonneville Dam. Multiple flow scenarios will be evaluated using the model to compare the impacts of diversion with the benefits of unused mitigation water remaining instream. Additionally, MHE will provide a qualitative description of the effects of the volumetric mitigation plan on other salmonid life stages and keystone aquatic species influenced by Columbia River flows. This latter portion of our analysis will be descriptive due to

lack of available data to comprehensively quantify effects of small changes in river flow on all the species and life stages of interest.

REFERENCES

Zabel, R.W., Faulkner, J., Smith, S.G., Anderson, J.J., Van Holmes, C., Beer, N., Iltis, S., Krinke, J., Fredricks, G., Bellerud, B. and Sweet, J., 2008. Comprehensive passage (COMPASS) model: a model of downstream migration and survival of juvenile salmonids through a hydropower system. *Hydrobiologia*, *609*, pp.289-300.