



FISH PASSAGE CENTER

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MEMORANDUM

TO: Fish Passage Advisory Committee (FPAC)

Michele DeHart

FROM: Michele DeHart

DATE: February 13, 2017

RE: Turbine Unit 2 Lower Granite – Fixed Blade Position – Turbine Efficiency Range and Juvenile Fish Survival

At the last FPAC meeting Paul Wagner, NOAA, advised the group that discussions would occur within the Fish Passage Operations and Maintenance (FPOM) Committee, regarding the welding of Lower Granite, turbine 2, blades in fixed position. Points to consider:

- Smolt passage survival studies at Lower Granite Dam indicate that survival is higher at the lower end of the 1% turbine efficiency range (~13.7 Kcfs).
- Studies at Bonneville Powerhouse 2 have shown that higher flows resulting from operations in the higher end of the 1% efficiency range can result in adverse conditions through the gatewells, resulting in increased fish injuries in the bypass systems.
- The potential adverse effects of a fixed-blade turbine unit (Unit 2), in terms of increased powerhouse flow, increased fish passage through the powerhouse, and lower fish passage survival is dependent upon the amount of time the unit operates, particularly in lower summer flows. This depends on the completion of rehabilitation work on unit 1 and unit priorities during the fixed-blade (Unit 2) configuration.

In order to support the FPAC discussion, the FPC has summarized the following information regarding turbine efficiency and juvenile fish survival. Skalski et al. (2002), based upon balloon tag studies, argued that turbine efficiency range alone did not predict smolt passage survival. Passage survival was estimated at three flow levels for Kaplan turbines at Lower Granite Dam. In those tests, smolt passage survival was higher at the lower flow level of the 1% turbine

efficiency range, which was 13.5 Kcfs in this test, compared to 18 Kcfs and 19 Kcfs. It is worth noting that the 19 Kcfs operation was outside the 1% efficiency range identified in this study..

Studies at Bonneville Dam second powerhouse indicated that increased flow through gatewells can result in increases in fish injuries. Studies conducted in 2008 and 2009 confirmed that when Bonneville second powerhouse units were operated in the mid to upper 1% efficiency operating band, descaling and mortality was elevated in Spring Creek hatchery and run-of-river out-migrant spring and fall Chinook salmon.