

SYSTEM OPERATIONAL REQUEST: #2021-4

Walla Walla District

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FROM: Erick Van Dyke, Oregon Department of Fish and Wildlife

DATE: July 8, 2021

SUBJECT: Requested short-term operation modifications to address unseasonably high-water temperatures in the region during 2021

SPECIFICATIONS: A package of actions that may maintain suitable Lower Granite Dam tailrace water temperatures and extend application of Dworshak flow augmentation through the end of August include:

- 1) Restoring minimum operation pool elevations (inclusive of a 1-ft operation range) at Lower Granite (MOP range 733–734), Little Goose (MOP 633–634), Lower Monumental (MOP 557–558) and Ice Harbor (MOP 437–438) through August 31, 2021.
- 2) Short-term prioritization of traditional spillway that return to 2021 FOP summer spill volumes and close spillway weirs at Little Goose, Lower Monumental and Ice Harbor dams,
- 3) Short-term emergency transport operation can continue during lethal heat stressed conditions, but should return to 2021 FOP summer reduced powerhouse flow volumes while continuing truck transport if Lower Granite tailwater conditions are maintaining the 68°F criteria,
- 4) Temporarily change to Dworshak summer flow augmentation
 - a. Modify the end of August draft limit at Dworshak from 1535 to 1525, and
 - b. Start 200 kaf Settlement releases September 1—operating to ~1510 rather than 1520 by end of September
- 5) Coordinate potential alternative to stretch-out cool water augmentation measures that do not require modifications to federal or state water quality standards.
- 6) Seek efficiencies for Lower Granite Doble test scheduling where practicable to minimize risk of unintentional loss of Dworshak water conserved by actions taken in SOR 2021-3 and those proposed above.

JUSTIFICATION:

An extended heat wave in the Pacific Northwest has exacerbated already strained summer operations meant to address excessive water quality, most notably lethal water temperatures in the lower Snake River. The current climate abnormalities have combined with low water supply and low flows in the lower Snake River basin to magnify current heat-trapping characteristics of CRS reservoirs resulting in water temperatures that can exceed the physiological limits of juvenile and adult anadromous salmonids. This is not a unique circumstance as a similar situation developed during the summer of 2015 resulting in a severe adult sockeye die-off. Small incremental changes to operations since 2015 have not provided long-term solutions when managing annual elevated summer water temperatures in the lower Snake River reservoirs. These continuous annual summer water temperature exceedances demonstrate that the system, as currently configured, is incapable of delivering river water temperatures below the federal, state and tribal water quality standards of 68°F established in part to protect cold water fish. This request proposes a suite of actions that may not ultimately resolve current temperature issues but may offer just enough relief to avoid immediate disproportionately large physiological effects.

Action 1: Restoring minimum operation pool elevations both have potential to speed reservoir replacement times that improve water and fish travel times while reducing pool surface area and volume that may improve efficacy of cool water augmentation actions with a dwindling water supply. This may be particularly beneficial during low flow conditions (see FPC Memo April 13, 2015). Prior to 2017 MOP operations consistently used minimum operation pool that constrained operation to a 1 foot operating range even during low flow conditions. Therefore, these early evaluations fully incorporated assumptions associated with operations that included the implementation of MOP. The CRS reservoirs act as solar traps. Water heating increases with increasing water residence time in reservoirs and water temperatures can be decreased small amounts by replacing water more quickly. The Reservoir Replacement Method (also referred to

as turnover rate, or water residence time) is estimated by dividing reservoir volume by its flow rate. Reducing forebay elevations results in lower reservoir volumes with no changes in inflow or outflow, thus decreases water residence time. At current inflows of ~30-40kcfs, reducing forebay elevations at LWG from MOP + 3 to MOP can reduce water residence time by 0.3-0.4 days (see FPC December 22, 2020). An additional reduction in water residence time can be realized by shifting forebay elevations at LGS from MOP + 1 to MOP.

Action 2: Short-term prioritization of traditional spillway at Little Goose, Lower Monumental and Ice Harbor dams that maintain planned summer spill levels may be a stop-gap measure that might provide relief to excessive water temperatures. Although results of past modification of spillway operations that included eliminating surface passage spill in hopes of reducing excessive water temperatures have been mixed. Prioritizing spill through the traditional spill routes may provide cooler water at lower depths in the forebays. However it is unlikely to overcome the broader issue of current climate abnormalities and is part of the current toolbox that is available to address the warm water crisis the current heatwave has exacerbated. It is unlikely that continued reduction to fish passage operations will amount to a meaningful long-term solution, in that past modification in spill operations at best shifted where heat was in excess. Continued dependence on this action criteria fails to address the problem in ways that effectively support fish passage infrastructure purported to be maintained to improve fish passage.

Action 3: High water temperatures throughout the lower Snake River and lower Columbia River reservoirs increases thermal stress on salmon and steelhead migrants with consequences for survival. Current transport operations ended on June 20 and were not scheduled to resume until August 1. Because seasonal passage was indorsed as a principle “that all juvenile passage alternatives should be evaluated against a baseline of spill, eroding spill volumes to address spikes of lethal heat stress should not be overemphasized. However, when river water temperature approach lethal levels in the river, it may spread the survival risk to implement a short-term stop-gap measure that transports the portion of juveniles that are already captured in the bypass systems rather than discharge them back to the river. That being said, spill operations should not be purposefully managed to increase the proportion of juveniles encountering the project powerhouses in order to collect a larger proportion of juveniles for truck transport (ISAB 2008-5). Additionally, previous adaptive management actions (see SOR 2016-2 for details) terminated late summer collections at Lower Monumental Dam and should be considered for a later action if few, potentially diseased fish are observed in transport collections. Therefore, if Lower Granite tailwater temperatures are able to maintain the 68°F criteria operations (up to August 31), collector dams should return to preplanned powerhouse passage reduction measures by restoring the full summer FOP spill volume to the spillway routes thus reducing powerhouse flows while reducing powerhouse encounter rates.

Action 4: Temporarily change to Dworshak summer flow augmentation to modify the end of August draft limit at Dworshak from 1535 to 1525 and start 200 kaf Settlement releases September 1—operating to ~1510 rather than 1520 by end of September. Because Dworshak reservoir did not fill before drafting for temperature control in 2021, current projections suggest the summer flow augmentation volume will be depleted between August 5 and August 20 depending on weather conditions. Such an early depletion of cool water augmentation threaten to

increase passage risk for larger segments of steelhead and fall Chinook passage in the lower Snake River as well as above Lower Granite Dam. Additionally, early depletion of cool water augmentation measures is expected to put hatchery Snake River fall Chinook salmon broodstock collection at risk. Broodstock collection typically begins August 17th and requires temperatures at the Lower Granite Dam adult fish trap to be below 70°F and ideally below 68°F. The potential minimum discharge from Dworshak Dam during the second half of August threatens to cease trapping at LWG due to temperature restrictions and any additional days gained through Dworshak Reservoir water conservation will benefit steelhead passage and fall Chinook broodstock collection. Adjusting these targets that were coordinated to protect natural escapement may help balance unanticipated shortfalls while increasing risk to natural escapement mitigation.

Action 5: Coordinate potential alternative to stretch-out cool water augmentation measures that do not require modifications to federal or state water quality standards. Again this is directly associated with Dworshak reservoir not fully refilling before drafting for temperature control in 2021. As in the justification in Action 4, the current projections suggest the summer flow augmentation volume will be depleted between August 5 and August 20 depending on weather conditions. The expected effects for this action essentially identical to those in Action 4 of this SOR.

Action 6: Seek efficiencies for Lower Granite Doble test scheduling where practicable. The 2021 Fish Passage Plan Appendix A shows two separate periods are planned. The first workweek is focused on T1 (August 9–13) and then following-up with a second week to complete work on T2 (August 15–17). An example of a possible efficiency could include considering doing work over no more than 8 consecutive days (i.e., August 9–16) to minimize risk of unintentional loss of Dworshak water conserved by actions taken in SOR 2021-3 and those proposed above. Rather than reduce gains made to extend available Dworshak cool water augmentation, this requested action seeks to identify possible efficiencies while completing necessary work over no more than eight consecutive days.