

Memorandum

June 5, 2019

To: John Palmer, Ben Cope and Rochelle Labiosa, R10EPA

From: Peter Leinenbach, R10EPA

Subject: Comparison of NorWeST future temperature estimates to a continuation of historical warming trends in the lower Columbia River

NorWeST temperature predictions for the Columbia River were downloaded from the USFS NorWeST website -www.fs.fed.us/rm/boise/AWAE/projects/NorWeST.html. Current Conditions were obtained from the 2002 through 2011 estimate of average conditions (i.e., S1) and 2040 and 2080 temperature predictions were obtained from the S30 and S32 model estimates, respectively. Specifically, average August temperatures were obtained at the four lower dams located along the Columbia River (**Table 1**). The difference between current and future scenario temperatures based on these NorWeST values are listed on **Table 2**. Also included in Table 2 are the estimated temperature change for these sites based on the average historic temperature change previously presented in the draft Columbia TMDL. Specifically, the average of the reported decadal change rate, 0.3°C, was applied to current mainstem Columbia River estimates proportional to the length of time associated with each future scenario (e.g., 2040 water temperature increase was estimated as 1.0°C, which was calculated as 3.3 decades in the future times 0.3°C increase per decade, and using similar methods, the 2080 mainstem temperature conditions were estimated to increase 2.19°C above current conditions). In summary, it appears that the 2040 NorWeST estimates report, on average, a 0.15°C higher decadal temperature increase, than reported for historical conditions (i.e., 0.3°C). Similarly, 2080 NorWeST estimates were also higher (i.e., 0.05°C per decade) than reported for the historic rate of decadal temperature increase (i.e., 0.3°C).

Table 1. NorWeST August Average Temperature Estimates (*C)

Dam Location	Current Conditions (2002-2011)	2040 Estimates	2080 Estimates
Bonneville	21.1	22.6	23.7
Dalles	21.6	23.1	24.1
John Day	21.9	23.4	24.4
McNary	21.3	22.8	23.8

Table 2. Estimated Future Temperature Change (*C) from Current Conditions (i.e, 2002 through 2011)

Dam Location	NorWeST Difference 2040	NorWeST Difference 2080	Historical 0.3°C Difference 2040	Historical 0.3°C Difference 2080
Bonneville	1.5	2.5	1.0	2.2
Dalles	1.5	2.5	1.0	2.2
John Day	1.5	2.5	1.0	2.2
McNary	1.5	2.5	1.0	2.2