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ANCHOR QEA

Weekly Temperature Report
McNary Dam

August 21, 2017

Prepared by: Kathleen Carter, Mainstem Fish Research, LLC

Report Period: August 11 to August 17, 2017

Report No. MCN TEMP 17-10

Re: USACE Walla Walla District Biological Services: Temperature Monitoring Program at McNary Dam

Fish Collection

An estimated 3,785 juvenile salmonids were collected and 3,779 bypassed the McNary Juvenile Fish Facility (JFF; Table 1), comprising 100% subyearling Chinook salmon. There were 6 total facility mortalities, comprising 6 sample mortalities and 0 facility mortalities.

River Conditions

Average river flow for this reporting period was 144,000 cubic feet per second (144.0 kcfs), with an average spill of 72.2 kcfs.

Temperature Logger Operations

The logger deployed in the gatewell at Unit 8 failed to record data from 0900 hours on August 14 to 1030 hours on August 15, most likely due to user error. The logger was replaced at 1100 hours on August 15.

Weather Conditions

The weekly average daytime temperature for 0700 hours August 10 to 0700 hours August 17, 2017, was 78.3 °F. The weekly average nighttime temperature was 72.5 °F. Temperatures ranged from a maximum of 97.8 °F from 1900 to 1930 hours on August 10 to a minimum of 56.2 °F from 0630 to 0730 hours on August 15 (Figure 1).

Winds averaged 0.6 miles per hour (mph) and were predominately from the north when present. There were five days with no wind recorded. The wind was highest at 1800 hours on August 13, with winds averaging 13.0 mph and gusts up to 26 mph.

Water Temperatures

Average water temperatures within dam locations varied with air temperatures and wind velocities (Figure 2). The weekly average temperature within dam locations were: 72.4 °F, forebay (weekly

average of 8 positions); 71.5 °F, gatewells (weekly average of 14 positions); 71.6 °F, collection channel (weekly average of positions at Units 1, 8, and 12); 71.6 °F, JFF (weekly average of the separator and sample tank "B"); and 71.1°F, outfall pipe. The forebay at Unit 1, Unit 3, and Unit 5 had the highest weekly average temperature, 72.7 °F (Figure 3). The maximum temperature, 78.4 °F, was recorded in the forebay at 1500 hours on August 10 at Unit 10.

The average weekly temperature differentials within dam locations were: 1.5 °F, forebay; 2.2 °F, gatewells; 0.3 °F, collection channel; and less than 0.1 °F, JFF (Figure 4). The largest gatewell differentials were recorded between units that were operational and non-operational. The largest temperature differential, 6.6 °F, was recorded in the gatewells at 1500 hours on August 10 (Unit 11 high, Unit 3 low).

The average weekly temperature differential between the forebay and corresponding gatewell was 1.0 °F. The forebay was warmer than the corresponding gatewell on average across the powerhouse. The largest temperature differential was 7.4 °F at 1500 hours on August 10 at Unit 5 (forebay greater than gatewell; Figure 5). The average weekly temperature differential between the gatewell and corresponding collection channel location was 0.7 °F. On average, the gatewell was warmer than the collection channel at Unit 1, Unit 8, and Unit 12. The largest temperature differential between the gatewell and corresponding collection channel location was 3.2 °F at 1500 on August 10 at Unit 12 (collection channel low, gatewell high).

Table 1
Bypass, Mortality, and River and Weather Conditions from 0700 Hours August 10 to 0700 Hours August 17

Date	Fish Collected	Fish Bypassed	Mortality		Avg. River Flow	Avg. Turbine Flow	Avg. Spill	Air Temperature		Wind Speed	
			Sam.	Fac.				Avg.	Max	Avg.	Max
8/10-11	970	968	2	0	149.6	70.0	74.9	80.2	97.8	0.0	0.0
8/11-12					143.0	66.6	71.6	82.5	94.0	0.0	0.0
8/12-13	690	689	1	0	140.4	65.2	70.5	79.9	95.1	1.0	10.0
8/13-14					142.4	66.3	71.4	69.9	83.0	2.9	13.0
8/14-15	755	755	0	0	142.8	66.3	71.8	67.4	78.5	0.0	0.0
8/15-16					145.1	67.7	72.7	70.0	84.5	0.0	0.0
8/16-17	1,370	1,367	3	0	144.4	67.2	72.4	76.2	89.7	0.0	0.0
Weekly Total	**3,785**	**3,779**	**6**	**0**	**144.0**	**67.0**	**72.2**	**75.3**		**0.6**	

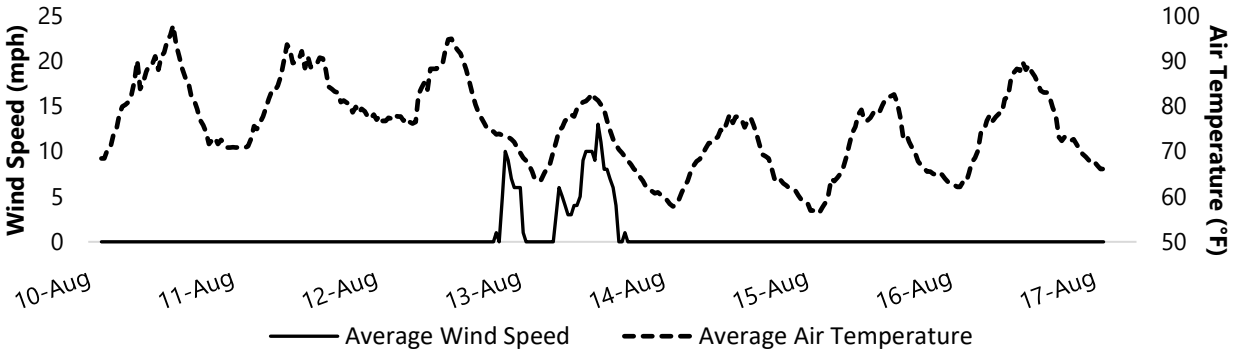

Figure 1
Average Wind Speed and Air Temperature for Each Half-Hour Interval from 0700 Hours August 10 to 0700 Hours August 17

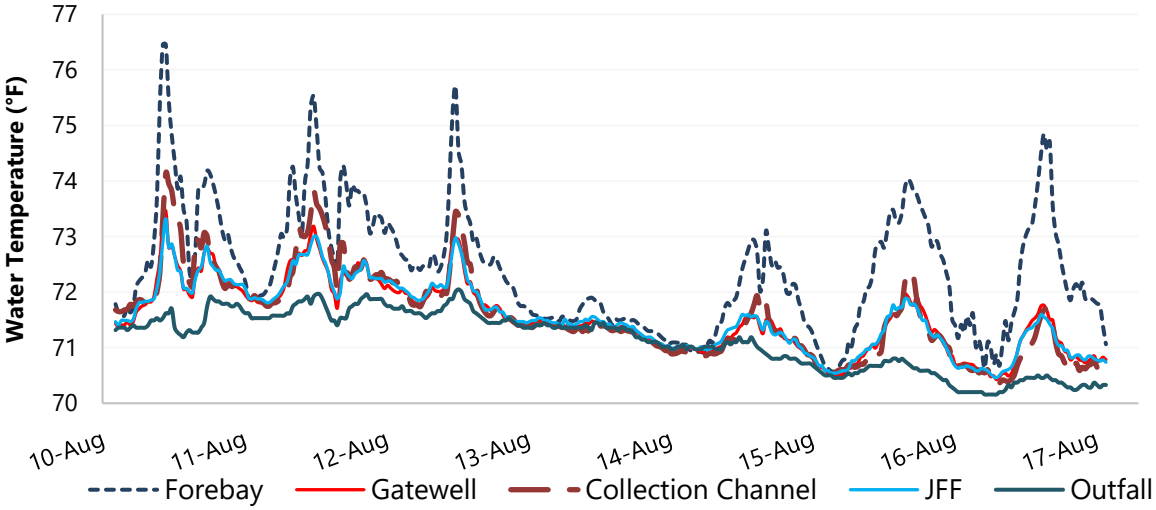

Figure 2
Average Water Temperatures for Each Half-Hour Interval for Five Dam Locations from 0700 Hours August 10 to 0700 Hours August 17

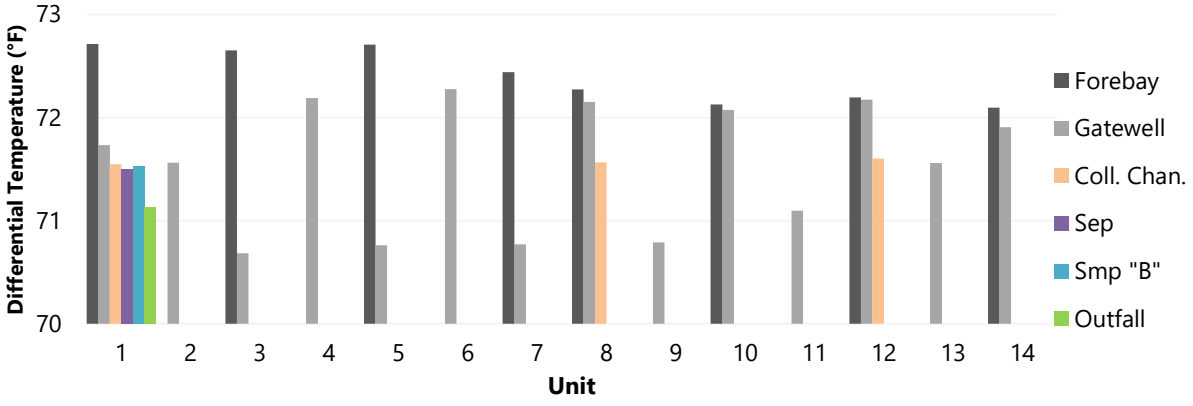

Figure 3
Average Weekly Water Temperatures by Position for Six Dam Locations from 0700 Hours August 10 to 0700 Hours August 17

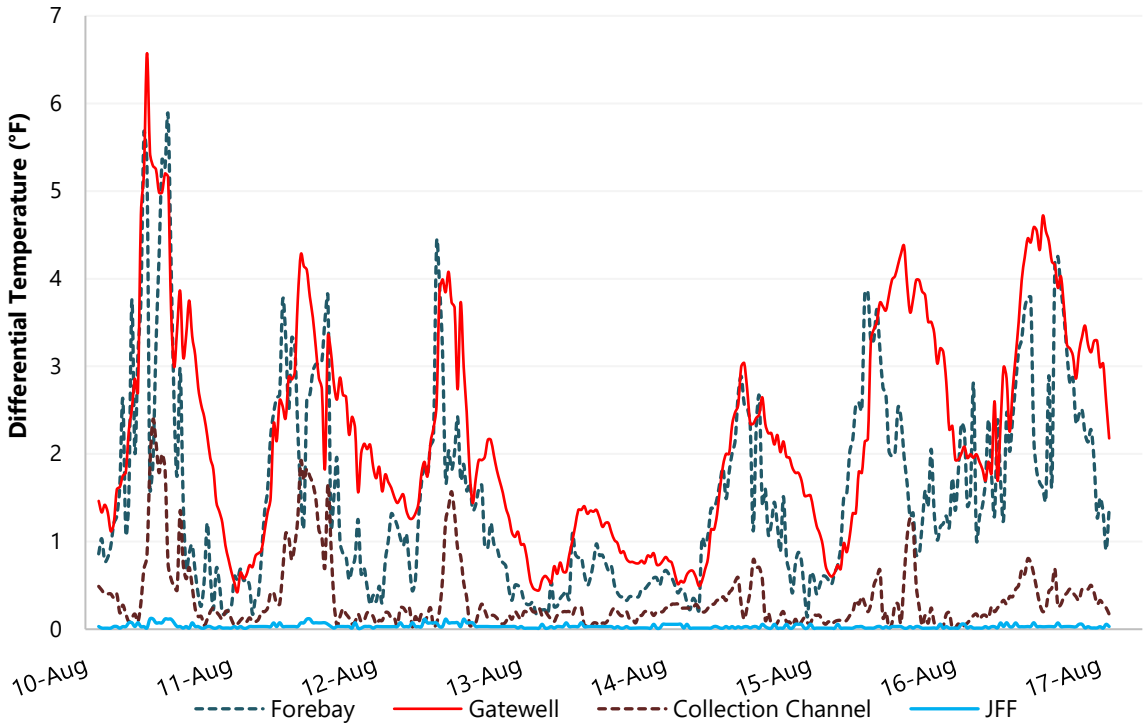

Figure 4
Average Differential Temperatures Within Four Dam Locations from 0700 Hours August 10 to 0700 Hours August 17

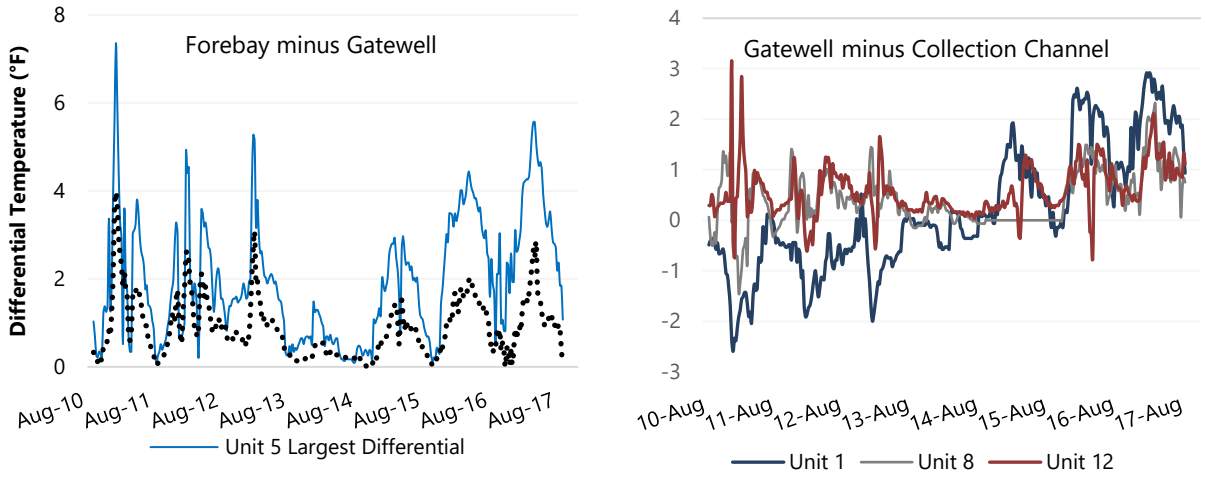

Figure 5
Average Differential Temperatures Across Three Dam Locations from 0700 Hours August 10 to 0700 Hours August 17