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ANCHOR QEA

Weekly Temperature Report
McNary Dam

September 4, 2018

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Report Period: August 24 to August 31, 2018

Report No. 2018 Anchor QEA: MCN Temperature Weekly for 0824-0831

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

This weekly report includes 8 days of temperature monitoring in order to capture the last day of the temperature monitoring period (August 31), per the project biologist's request.

Fish Collection

An estimated 408 juvenile salmonids were collected and 408 bypassed the McNary Juvenile Fish Facility (JFF; Table 1), comprising 100% subyearling Chinook salmon. There were no mortalities.

River Conditions

Average river flow for this reporting period was 143,300 cubic feet per second (143.3 kcfs), with an average spill of 71.9 kcfs.

Temperature Logger Operations

The outfall pipe was damaged by high water and is not currently accessible for temperature logger deployment. The digital thermometer in the ScrollCase of Unit 1 is currently not functioning so data were collected from the analog thermometer of the closest in-service ScrollCase. The data from the logger in the forebay at Unit 12 for August 23 were missing from the archived record, resulting in the data from 0700 to 1030 hours on August 23 not contributing to this report. The logger in the gatewell of Unit 5 stopped logging temperature data after offloading at 0820 hours on August 24 and was replaced by a spare logger at 1030 hours on August 25. The logger at Unit 3 in the gatewell failed to offload data from 0830 hours on August 27 until it was replaced with a spare logger at 0845 hours on August 28. The logger in the gatewell at Unit 7 failed to log temperature data after 0900 hours on August 30.

Weather Conditions

The weekly average daytime temperature for 0700 hours August 23 to 0700 hours August 31, 2018, was 73.4 °F. The weekly average nighttime temperature was 64.8 °F. Temperatures ranged from a maximum of 91.4 °F at 1700 hours on August 29 to a minimum of 53.4 °F at 0530 hours on August 28

(Figure 1). Hazy weather began on August 19 due to wildfire smoke moving in from Canada and remained hazy until August 24.

Winds averaged 3.3 miles per hour (mph) and were predominately from the east and the east north east. The highest average wind speed was 11.0 mph at 1930 hours on August 26 and at 2000 hours on August 31, and the highest gusts were up to 29 mph at 2000 hours on August 31.

Water Temperatures

Average water temperatures within dam locations varied with air temperatures and wind velocities (Figure 2). The weekly average temperatures within dam locations were: 68.7 °F, forebay (weekly average of 8 positions); 68.6 °F, gatewells (weekly average of 14 positions); 68.4 °F, collection channel (weekly average of positions at Units 1, 8, and 12); and 68.5 °F, JFF (weekly average of the separator and sample tank "B"). The forebay at Unit 10 and the gatewell at Units 1 and 7 had the highest weekly average temperature, 68.9 °F (Figure 3). The maximum temperature, 72.9 °F, was recorded in the forebay at 2030 hours on August 28 at Unit 1.

The average weekly temperature differentials within dam locations were: 0.7 °F, forebay; 1.0 °F, gatewells; 0.2 °F, collection channel; and 0.1 °F, JFF (Figure 4). The largest gatewell differentials were recorded between units that were operational and non-operational. The largest temperature differential, 4.6 °F, was recorded on August 28 in the forebay at 2000 hours (Unit 1 high, Unit 3 low).

The average weekly temperature differential between the forebay and corresponding gatewell was 0.3 °F. The forebay was warmer than the corresponding gatewell on average across the powerhouse. The largest temperature differential was 4.6 °F at 2030 hours on August 28 at Unit 8 (forebay greater than gatewell; Figure 5). The average weekly temperature differential between the gatewell and corresponding collection channel location was 0.4 °F. On average, the gatewell was warmer than the collection channel at Units 1 and 12 and the collection channel was warmer than the gatewell at Unit 8. The largest temperature differential between the gatewell and corresponding collection channel location was 3.2 °F at 1730 on August 28 at Unit 1 (gatewell greater than collection channel).

Table 1
Bypass, Mortality, and River and Weather Conditions from 0700 Hours August 23 to 0700 Hours August 31

Date	Fish Collected	Fish Bypassed	Mortality		Avg. River Flow	Avg. Turbine Flow	Avg. Spill	Air Temperature		Wind Speed	
			Sam.	Fac.				Avg.	Max	Avg.	Max
8/23-24					147.8	69.1	74.0	72.9	86.6	5.2	9.0
8/24-25	152	152	0	0	128.6	59.5	64.4	65.9	77.8	3.6	9.0
8/25-26					175.4	82.8	87.9	67.1	73.3	2.2	6.0
8/26-27	88	88	0	0	138.4	64.2	69.5	65.7	74.9	4.8	11.0
8/27-28					127.8	59.0	64.1	65.8	76.5	2.3	5.0
8/28-29	116	116	0	0	149.8	69.9	75.2	69.3	88.3	2.0	4.0
8/29-30					152.0	71.0	76.4	73.7	91.4	2.8	10.0
8/30-31	52	52	0	0	126.9	58.5	63.8	70.5	83.0	3.2	11.0
Weekly Total	**408**	**408**	**0**	**0**	**143.3**	**66.8**	**71.9**	**69.0**		**3.3**	

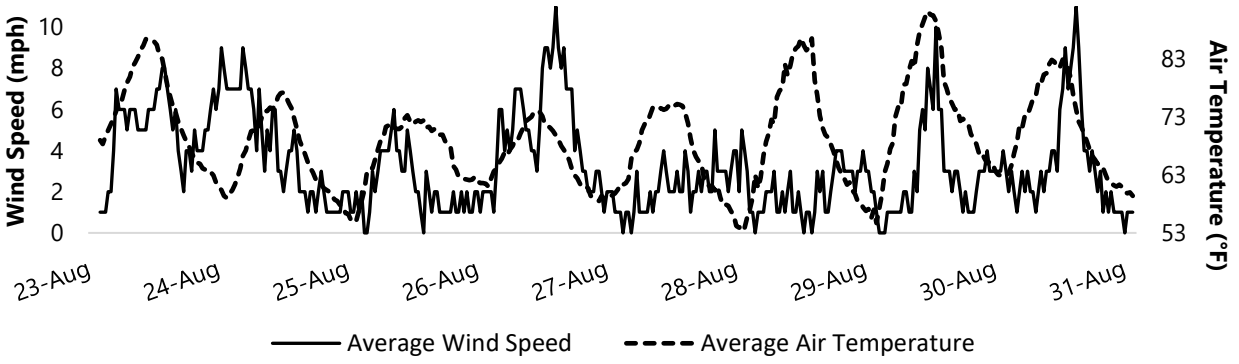

Figure 1
Average Wind Speed and Air Temperature for Each Half-Hour Interval from 0700 Hours August 23 to 0700 Hours August 31

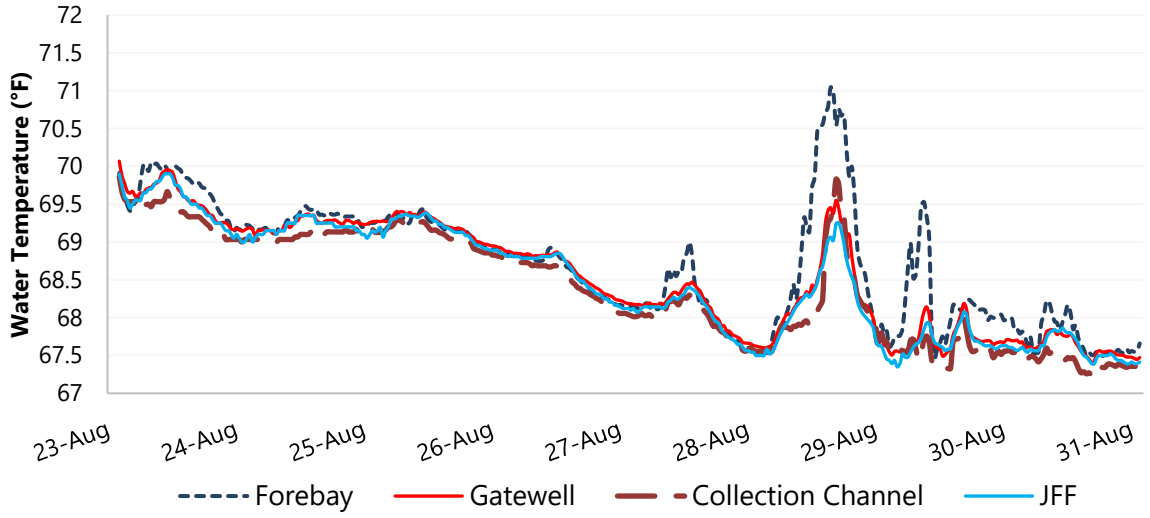

Figure 2
Average Water Temperatures for Each Half-Hour Interval for Four Dam Locations from 0700 Hours August 23 to 0700 Hours August 31

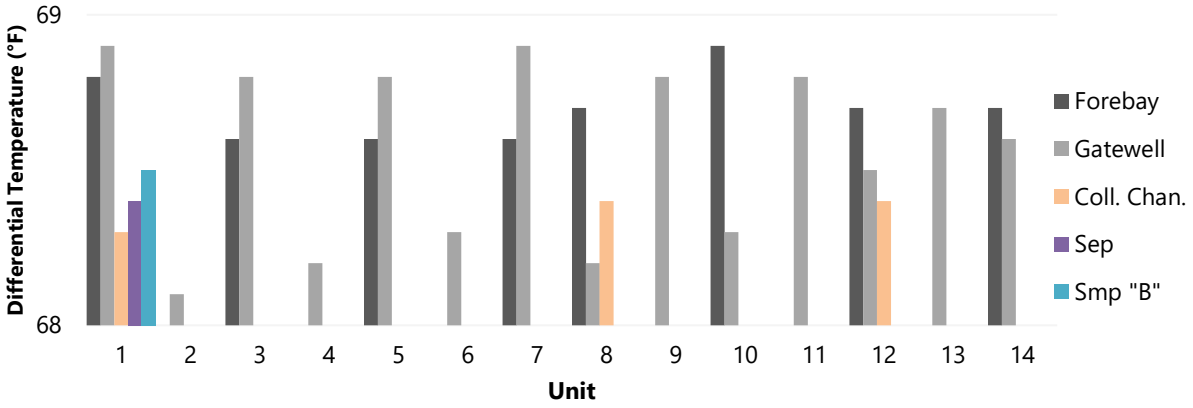

Figure 3
Average Weekly Water Temperatures by Position for Five Dam Locations from 0700 Hours August 23 to 0700 Hours August 31

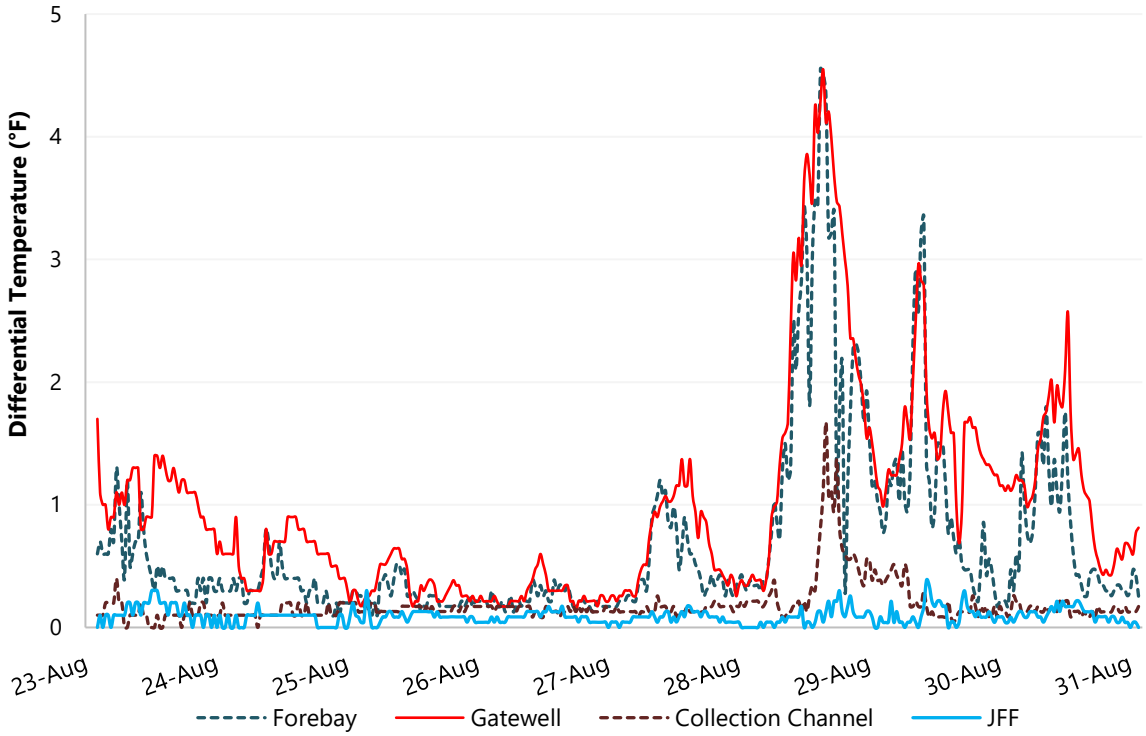

Figure 4
Average Differential Temperatures Within Four Dam Locations from 0700 Hours August 23 to 0700 Hours August 31

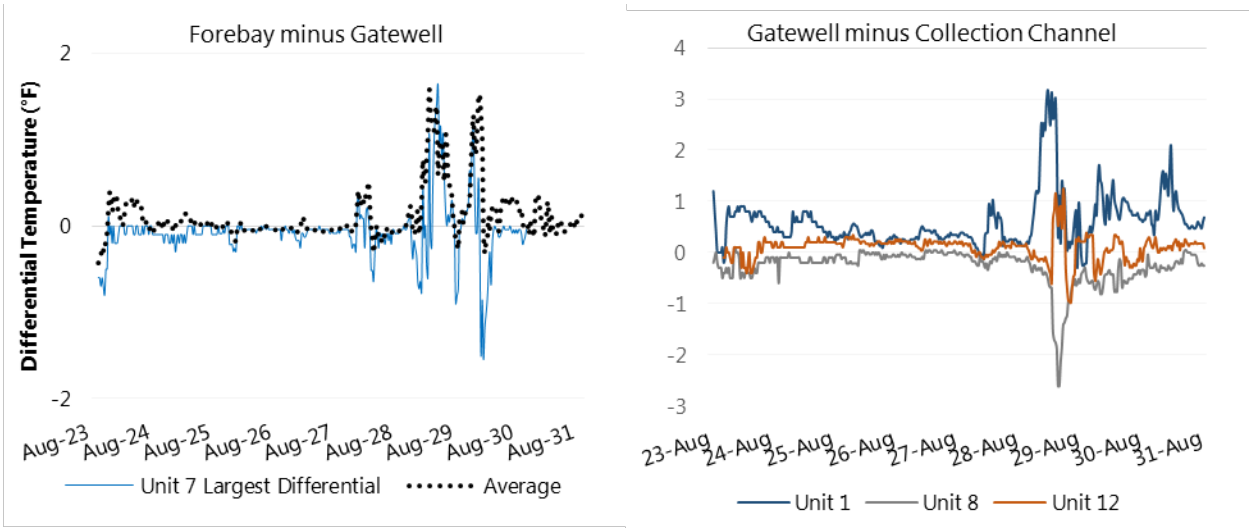

Figure 5
Average Differential Temperatures Across Three Dam Locations from 0700 Hours August 23 to 0700 Hours August 31