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ANCHOR QEA

Weekly Temperature Report
McNary Dam

August 20, 2018

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Report Period: August 10 to August 16, 2018

Report No. 2018 Anchor QEA: MCN Temperature Weekly for 0810-0816

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

Fish Collection

An estimated 676 juvenile salmonids were collected and 674 bypassed the McNary Juvenile Fish Facility (JFF; Table 1), comprising 99.4% subyearling Chinook salmon and 0.6% sockeye salmon. There were 2 total facility mortalities, comprising 1 sample mortality and 1 facility mortality.

River Conditions

Average river flow for this reporting period was 148,200 cubic feet per second (148.2 kcfs), with an average spill of 74.4 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.

Wind data for 0700 hours August 9 to 1400 hours August 10 and 2230 hours August 12 to 1030 hours August 13 were unavailable from the JFF anemometer due to fouling from spider webs. These data were replaced by wind data recorded by a National Oceanic and Atmospheric Administration monitoring station at the Hermiston, Oregon, airport, which reports hourly averages at 0053. The JFF anemometer was cleaned on August 13. The JFF anemometer data will be included in subsequent reports as available.

Weather Conditions

The weekly average daytime temperature for 0700 hours August 9 to 0700 hours August 16, 2018, was 81.1 °F. The weekly average nighttime temperature was 72.6 °F. Temperatures ranged from a maximum of 100.8 °F at 1500 and 1530 hours on August 10 to a minimum of 56.6 °F at 0630 hours on August 13 (Figure 1). Weather became very hazy around midday August 13 due to wildfire smoke moving in from Canada and remained hazy throughout the reporting period.

Winds averaged 2.9 miles per hour (mph) and were predominately from the east north east and the northwest. The highest average wind speed was 21.0 mph at 1400 hours on August 10, and the highest gusts were up to 29 mph also at 1400 hours on August 10.

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: 72.3 °F, forebay (weekly average of 8 positions); 71.8 °F, gatewells (weekly average of 14 positions); 71.7 °F, collection channel (weekly average of positions at Units 1, 8, and 12); and 71.7 °F, JFF (weekly average of the separator and sample tank "B"). The forebay at Unit 5 had the highest weekly average temperature, 72.5 °F (Figure 3). The maximum temperature, 78.2 °F, was recorded in the forebay at 1500 hours on August 9 at Unit 8.

The average weekly temperature differentials within dam locations were: 1.4 °F, forebay; 1.7 °F, gatewells; 0.3 °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, 6.5 °F, was recorded on August 9 in the forebay at 1530 hours (Unit 9 high, Unit 2 low).

The average weekly temperature differential between the forebay and corresponding gatewell was 0.6 °F. The forebay was warmer than the corresponding gatewell on average across the powerhouse. The largest temperature differential was 6.6 °F at 1500 hours on August 9 at Unit 7 (forebay greater than gatewell; Figure 5). The average weekly temperature differential between the gatewell and corresponding collection channel location was 0.5 °F. On average, the gatewell was warmer than the collection channel at Unit 1 and the collection channel was warmer than the gatewell at Units 8 and 12. The largest temperature differential between the gatewell and corresponding collection channel location was 3.7 °F at 1700 on August 9 at Unit 12 (collection channel greater than gatewell).

Table 1
Bypass, Mortality, and River and Weather Conditions from 0700 Hours August 9 to 0700 Hours August 16

Date	Fish Collected	Fish Bypassed	Mortality		Avg. River Flow	Avg. Turbine Flow	Avg. Spill	Air Temperature		Wind Speed	
			Sam.	Fac.				Avg.	Max	Avg.	Max
8/9-10					167.9	79.2	84.0	83.3	96.7	4.6	7.0
8/10-11	260	259	0	1	161.4	75.8	81.0	84.2	100.8	4.8	21.0
8/11-12					133.3	61.6	67.0	73.6	85.5	5.4	12.0
8/12-13	288	287	1	0	124.5	57.3	62.5	70.8	85.0	1.9	6.0
8/13-14					139.7	64.9	70.1	72.2	87.3	3.1	9.0
8/14-15	128	128	0	0	154.7	72.1	77.8	74.1	90.5	2.5	5.0
8/15-16					155.9	72.7	78.5	78.5	92.2	1.7	4.0
Weekly Total	**676**	**674**	**1**	**1**	**148.2**	**69.1**	**74.4**	**76.9**		**3.4**	

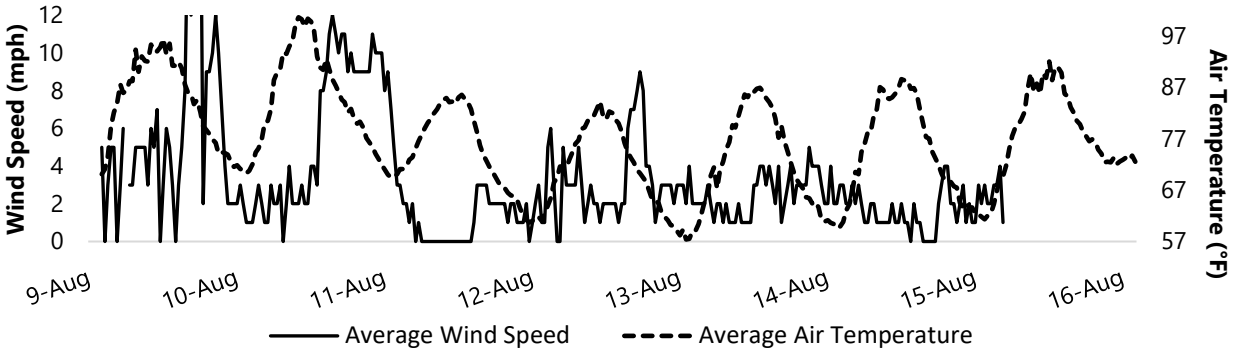

Figure 1
Average Wind Speed and Air Temperature for Each Half-Hour Interval from 0700 Hours August 9 to 0700 Hours August 16

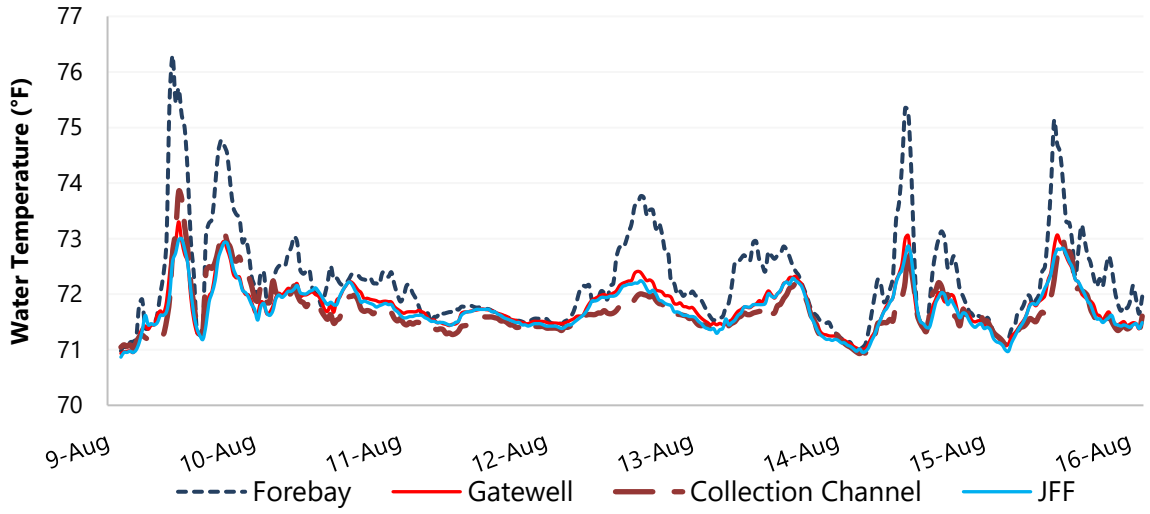

Figure 2
Average Water Temperatures for Each Half-Hour Interval for Four Dam Locations from 0700 Hours August 9 to 0700 Hours August 16

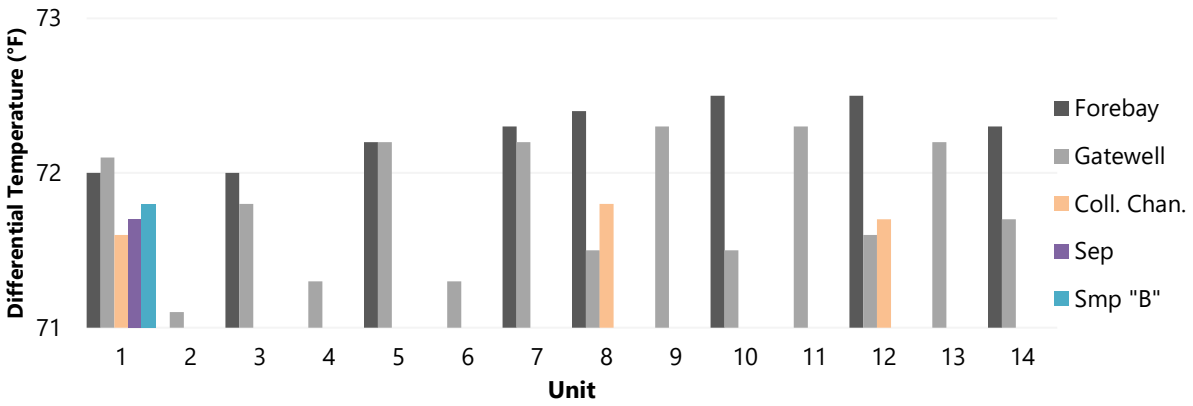

Figure 3
Average Weekly Water Temperatures by Position for Five Dam Locations from 0700 Hours August 9 to 0700 Hours August 16

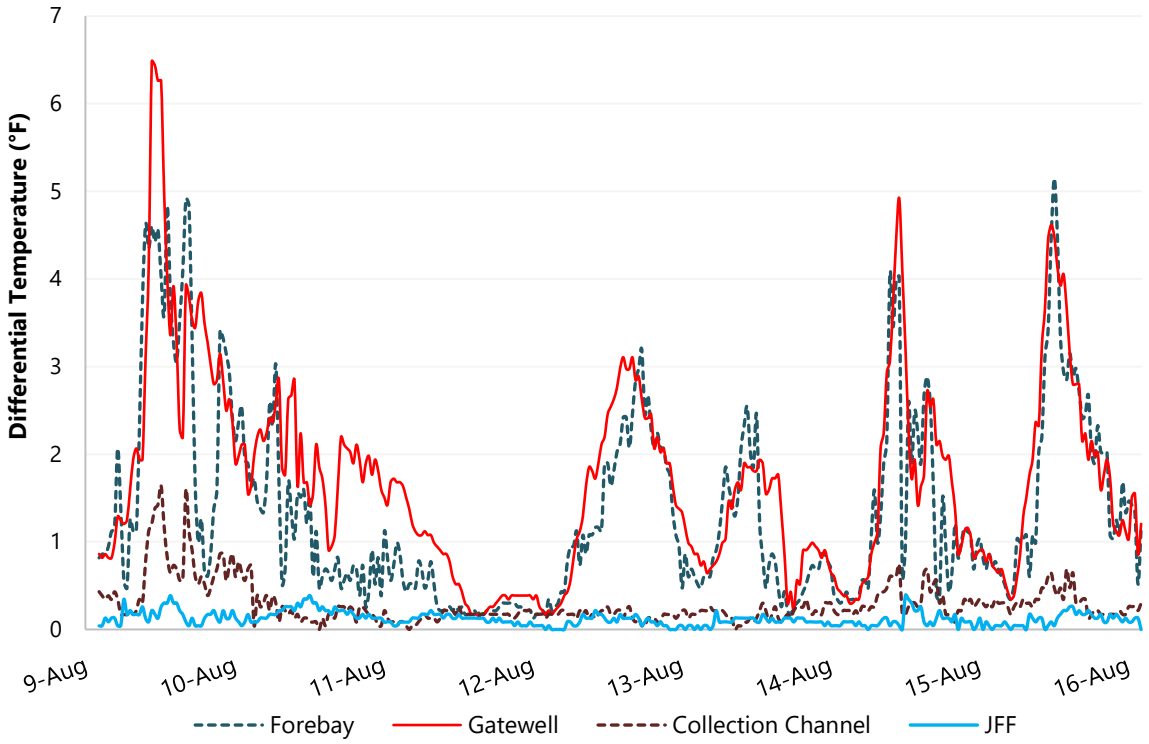

Figure 4
Average Differential Temperatures Within Four Dam Locations from 0700 Hours August 9 to 0700 Hours August 16

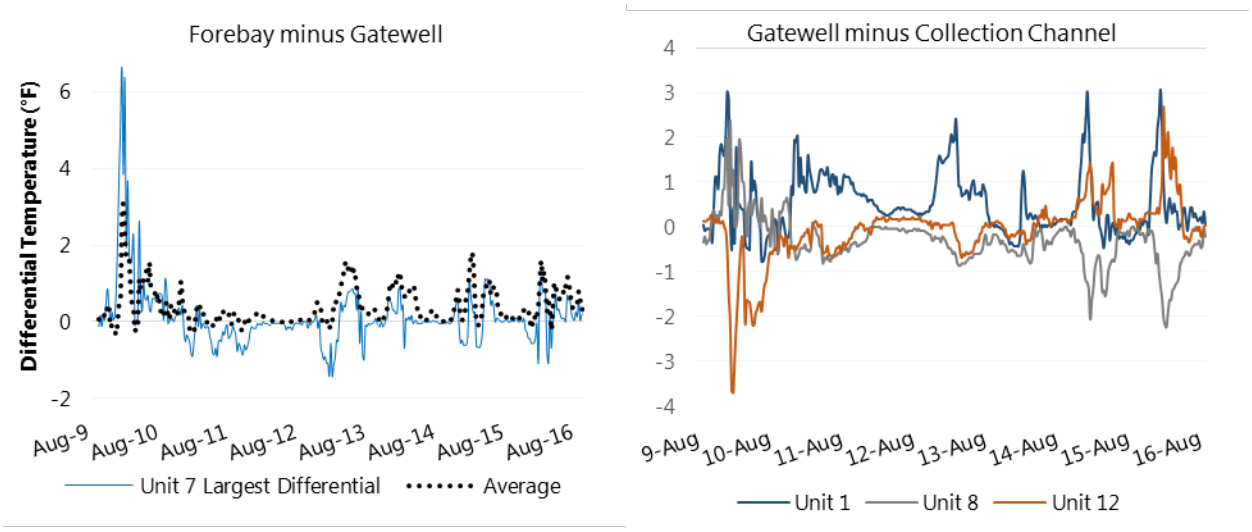

Figure 5
Average Differential Temperatures Across Three Dam Locations from 0700 Hours August 9 to 0700 Hours August 16