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ANCHOR QEA

Weekly Temperature Report
McNary Dam

August 13, 2018

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Report Period: August 3 to August 9, 2018

Report No. 2018 Anchor QEA: MCN Temperature Weekly for 0803-0809

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

Fish Collection

An estimated 2,831 juvenile salmonids were collected and 2,827 bypassed the McNary Juvenile Fish Facility (JFF; Table 1), comprising 100% subyearling Chinook salmon. There were 4 total facility mortalities, comprising 3 sample mortalities and 1 facility mortality.

River Conditions

Average river flow for this reporting period was 144,100 cubic feet per second (144.1 kcfs), with an average spill of 72.1 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 probe at Unit 12 in the forebay began a new logging interval of 8 minutes 40 seconds on August 2, likely caused by an optical misread with the Shuttle during re-launching after offloading data from the probe. The probe was replaced with a spare probe at 1004 on August 3. The probe at Unit 8 in the forebay failed to communicate with the Shuttle multiple times on August 4. The probe was replaced with a spare probe at 0835 that began recording water temperature data at 0900 on August 4.

Wind data for 0700 hours August 4 to 0730 hours August 6 and 2300 hours August 8 to 0700 hours August 9 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 6. The JFF anemometer data will be included in subsequent reports as available.

Weather Conditions

The weekly average daytime temperature for 0700 hours August 2 to 0700 hours August 9, 2018, was 82.2 °F. The weekly average nighttime temperature was 72.7 °F. Temperatures ranged from a maximum of 103.1 °F at 1900 hours on August 8 to a minimum of 59.1 °F at 0630 hours on August 4 (Figure 1).

Winds averaged 2.7 miles per hour (mph) and were predominately from the east north east and the east. The highest average wind speed was 11.0 mph at 1730 hours on August 2, and the highest gusts were up to 26 mph at 1630, 1700, and 1730 hours on August 2.

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: 72.1 °F, forebay (weekly average of 8 positions); 71.3 °F, gatewells (weekly average of 14 positions); 71.2 °F, collection channel (weekly average of positions at Units 1, 8, and 12); and 71.2 °F, JFF (weekly average of the separator and sample tank "B"). The forebay at Unit 8 had the highest weekly average temperature, 72.5 °F (Figure 3). The maximum temperature, 78.7 °F, was recorded in the forebay at 1800 hours on August 6 at Unit 5.

The average weekly temperature differentials within dam locations were: 1.6 °F, forebay; 2.4 °F, gatewells; 0.4 °F, collection channel; and 0.2 °F, JFF (Figure 4). The largest gatewell differentials were recorded between units that were operational and non-operational. The largest temperature differential, 8.2 °F, was recorded on August 6 in the forebay at 1800 hours (Unit 5 high, Unit 1 low).

The average weekly temperature differential between the forebay and corresponding gatewell was 0.9 °F. The forebay was warmer than the corresponding gatewell on average across the powerhouse. The largest temperature differential was 8.7 °F at 1930 hours on August 5 at Unit 8 (forebay greater than gatewell; Figure 5). The average weekly temperature differential between the gatewell and corresponding collection channel location was 1.1 °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 5.9 °F at 1830 on August 5 at Unit 1 (gatewell greater than collection channel).

Table 1
Bypass, Mortality, and River and Weather Conditions from 0700 Hours August 2 to 0700 Hours August 9

Date	Fish Collected	Fish Bypassed	Mortality		Avg. River Flow	Avg. Turbine Flow	Avg. Spill	Air Temperature		Wind Speed	
			Sam.	Fac.				Avg.	Max	Avg.	Max
8/2-3	1,140	1,138	2	0	139.7	65.0	70.0	76.2	90.8	5.5	11.0
8/3-4					120.0	55.2	60.1	71.8	84.4	2.6	9.0
8/4-5	590	590	0	0	139.4	64.9	69.8	73.2	87.3	2.2	8.0
8/5-6					142.5	66.5	71.3	77.3	96.7	2.2	7.0
8/6-7	824	822	1	1	156.1	73.3	78.1	78.5	94.8	1.8	4.0
8/7-8					154.5	72.5	77.3	80.6	95.9	2.2	6.0
8/8-9	277	277	0	0	156.2	73.4	78.1	82.6	103.1	1.9	6.0
Weekly Total	**2,831**	**2,827**	**3**	**1**	**144.1**	**67.3**	**72.1**	**77.4**		**2.7**	

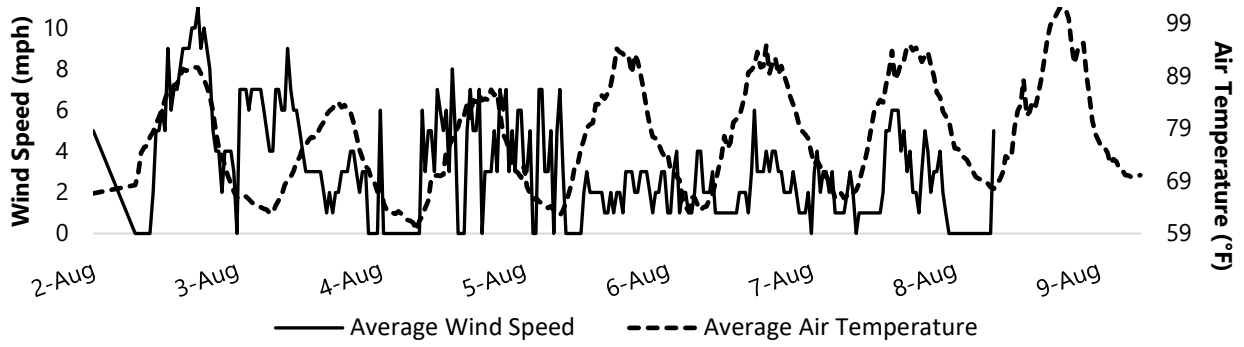

Figure 1
Average Wind Speed and Air Temperature for Each Half-Hour Interval from 0700 Hours August 2 to 0700 Hours August 9

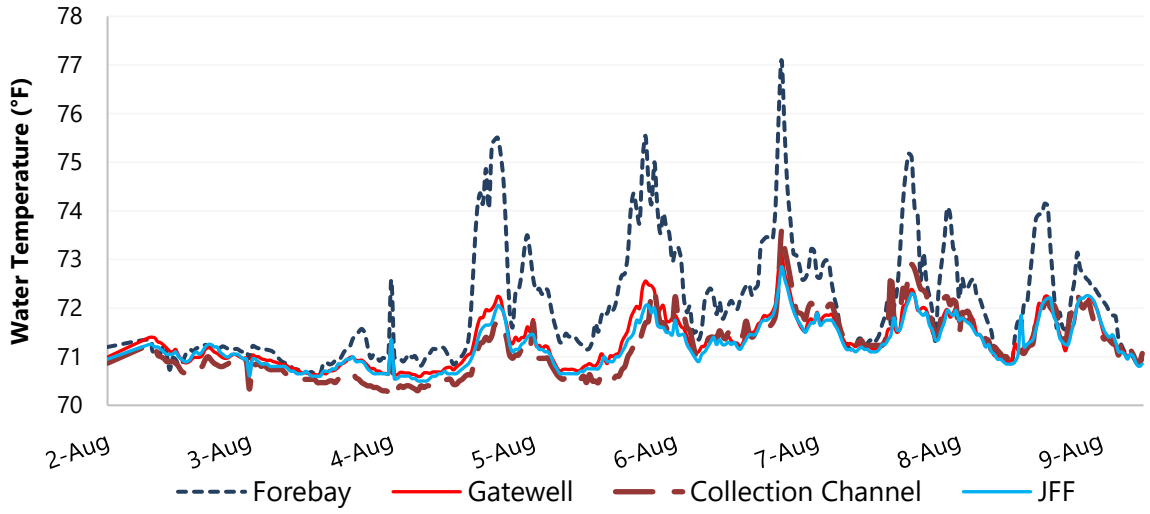

Figure 2
Average Water Temperatures for Each Half-Hour Interval for Four Dam Locations from 0700 Hours August 2 to 0700 Hours August 9

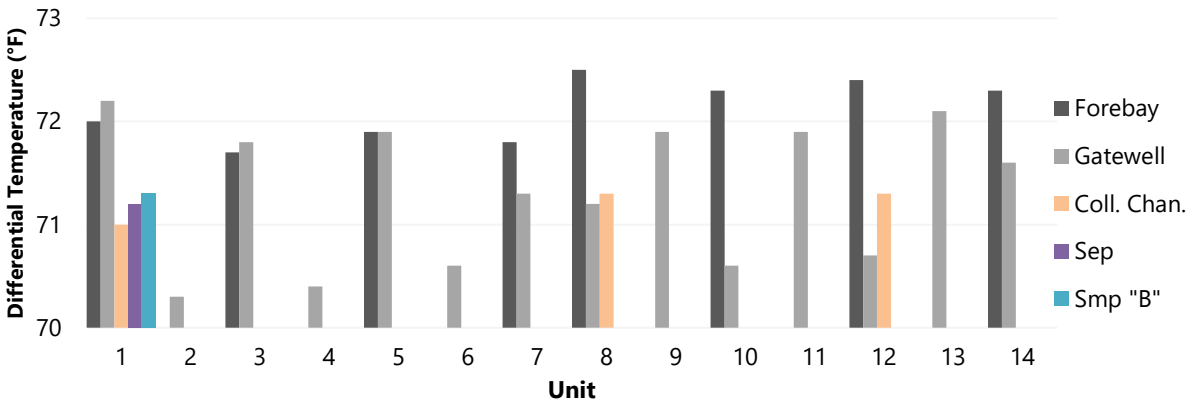

Figure 3
Average Weekly Water Temperatures by Position for Five Dam Locations from 0700 Hours August 2 to 0700 Hours August 9

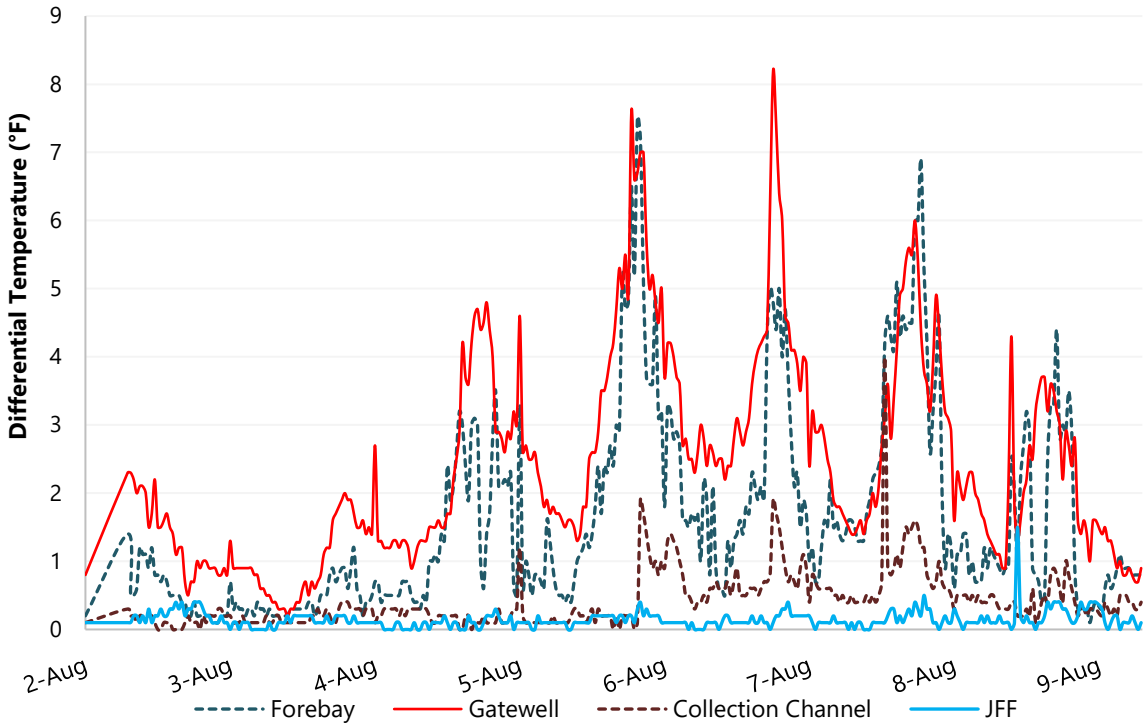

Figure 4
Average Differential Temperatures Within Four Dam Locations from 0700 Hours August 2 to 0700 Hours August 9

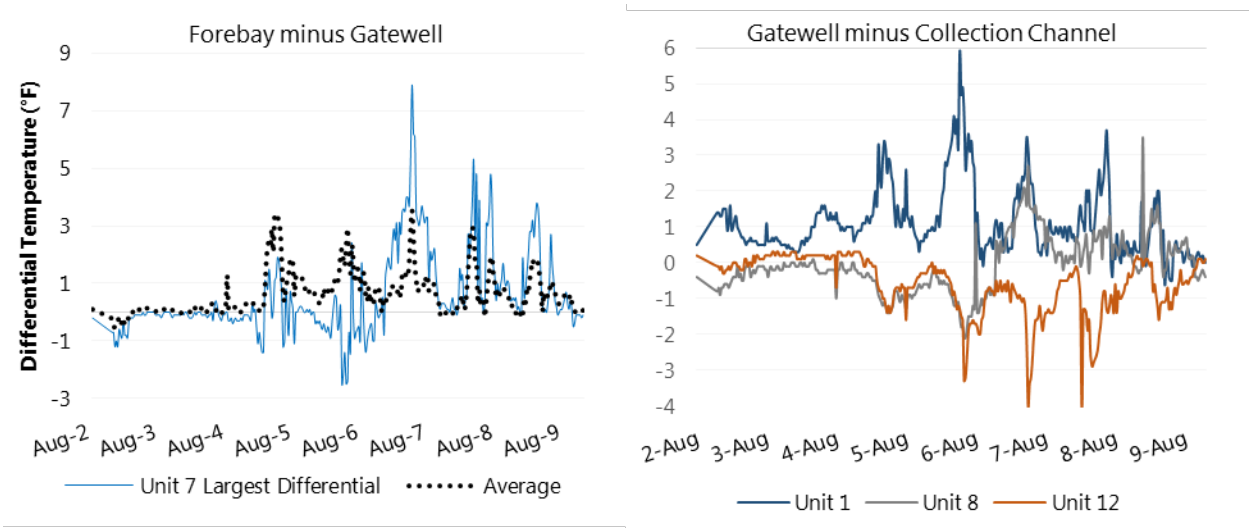

Figure 5
Average Differential Temperatures Across Three Dam Locations from 0700 Hours August 2 to 0700 Hours August 9