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ANCHOR QEA

Weekly Temperature Report
McNary Dam

August 28, 2017

Prepared by: Kathleen Carter, Mainstem Fish Research, LLC

Report Period: August 18 to August 24, 2017

Report No. MCN TEMP 17-11

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

Fish Collection

An estimated 1,425 juvenile salmonids were collected and 1,424 bypassed the McNary Juvenile Fish Facility (JFF; Table 1), comprising 99.6% subyearling Chinook salmon and 0.4% sockeye. There was 1 total facility mortality, comprising 0 sample mortalities and 1 facility mortality.

River Conditions

Average river flow for this reporting period was 125,900 cubic feet per second (125.9 kcfs), with an average spill of 63.2 kcfs.

Temperature Logger Operations

The anemometer at the separator booth at JFF became fouled with spider webs and did not record wind data starting on approximately August 17, 2017. Wind data for the current report was recorded by a National Oceanic and Atmospheric Administration monitoring station at the Hermiston, Oregon, airport one time hourly at 0053. The JFF anemometer was cleaned and repaired on August 23 when it could be accessed. The JFF anemometer data will be included in subsequent reports.

Weather Conditions

The weekly average daytime temperature for 0700 hours August 17 to 0700 hours August 24, 2017, was 75.8 °F. The weekly average nighttime temperature was 71.0 °F. Temperatures ranged from a maximum of 92.3 °F at 1730 hours on August 18 to a minimum of 58.3 °F at 0530 hours on August 20 (Figure 1).

Winds at the Hermiston airport averaged 7.9 miles per hour (mph) and were predominately from the north and west south west. The wind was highest at 1953 hours on August 18, with winds averaging 21.0 mph and gusts up to 26 mph.

Water Temperatures

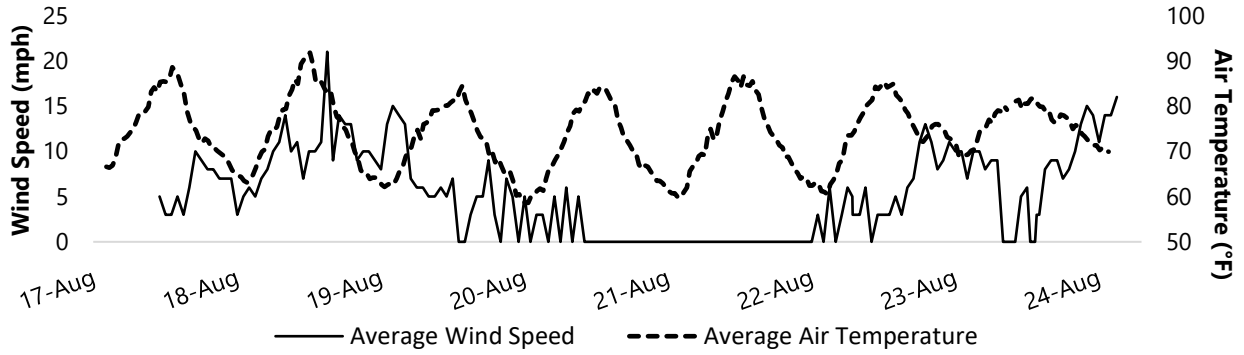
Average water temperatures within dam locations varied with air temperatures and wind velocities (Figure 2). The weekly average temperature within dam locations were: 72.2 °F, forebay (weekly average of 8 positions); 71.0 °F, gatewells (weekly average of 14 positions); 71.0 °F, collection channel (weekly average of positions at Units 1, 8, and 12); 71.0 °F, JFF (weekly average of the separator and sample tank "B"); and 70.6°F, outfall pipe. The forebay at Unit 3 had the highest weekly average temperature, 72.8 °F (Figure 3). The maximum temperature, 77.1 °F, was recorded in the forebay at 1600 hours on August 19 at Unit 3.

The average weekly temperature differentials within dam locations were: 2.1 °F, forebay; 2.7 °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, 6.2 °F, was recorded in the forebay at 1730 hours on August 22 (Unit 8 high, Unit 1 low).

The average weekly temperature differential between the forebay and corresponding gatewell was 1.4 °F. The forebay was warmer than the corresponding gatewell on average across the powerhouse. The largest temperature differential was 7.3 °F at 1600 hours on August 19 at Unit 3 (forebay greater than gatewell; Figure 5). The average weekly temperature differential between the gatewell and corresponding collection channel location was 1.0 °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 3.6 °F at 1700 on August 22 at Unit 1 (gatewell greater than collection channel).

Table 1
Bypass, Mortality, and River and Weather Conditions from 0700 Hours August 17 to 0700 Hours August 24

Date	Fish Collected	Fish Bypassed	Mortality		Avg. River Flow	Avg. Turbine Flow	Avg. Spill	Air Temperature		Wind Speed	
			Sam.	Fac.				Avg.	Max	Avg.	Max
8/17-18					116.8	53.4	58.6	74.6	88.8	5.9	10.0
8/18-19	700	700	0	0	119.2	54.7	59.8	74.8	92.3	10.8	21.0
8/19-20					130.5	60.3	65.4	71.3	84.7	6.3	14.0
8/20-21	305	305	0	0	117.1	53.7	58.8	71.3	84.7	4.8	6.0
8/21-22					130.7	60.4	65.6	72.4	87.6	3.0	3.0
8/22-23	420	419	0	1	133.7	62.0	67.1	74.9	85.7	6.7	13.0
8/23-24					133.4	61.8	66.9	73.0	84.3	9.9	16.0
Weekly Total	**1,425**	**1,424**	**0**	**1**	**125.9**	**58.0**	**63.2**	**73.4**		**7.9**	



Note: Wind speed data recorded at Hermiston, OR airport

Figure 1
Average Wind Speed and Air Temperature for Each Half-Hour Interval from 0700 Hours August 17 to 0700 Hours August 24

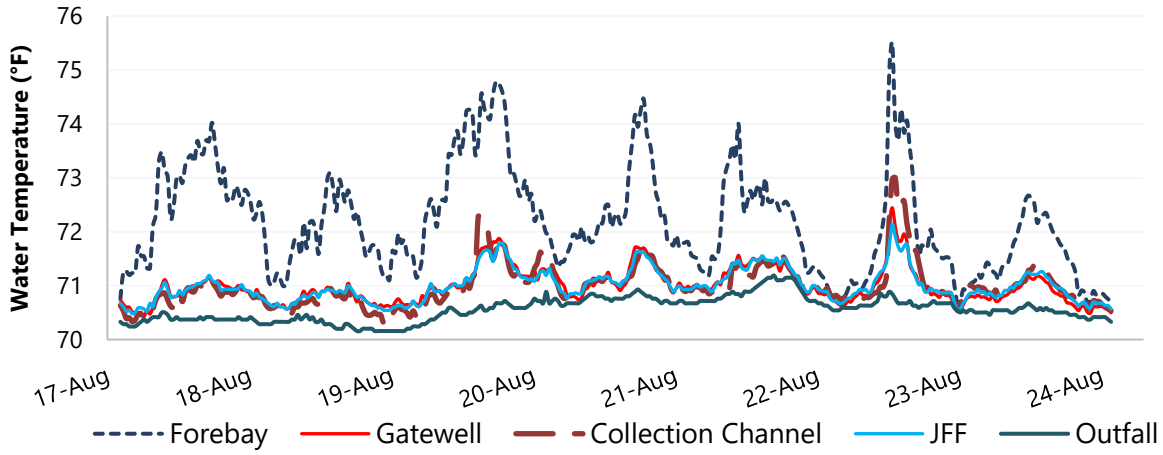


Figure 2
Average Water Temperatures for Each Half-Hour Interval for Five Dam Locations from 0700 Hours August 17 to 0700 Hours August 24

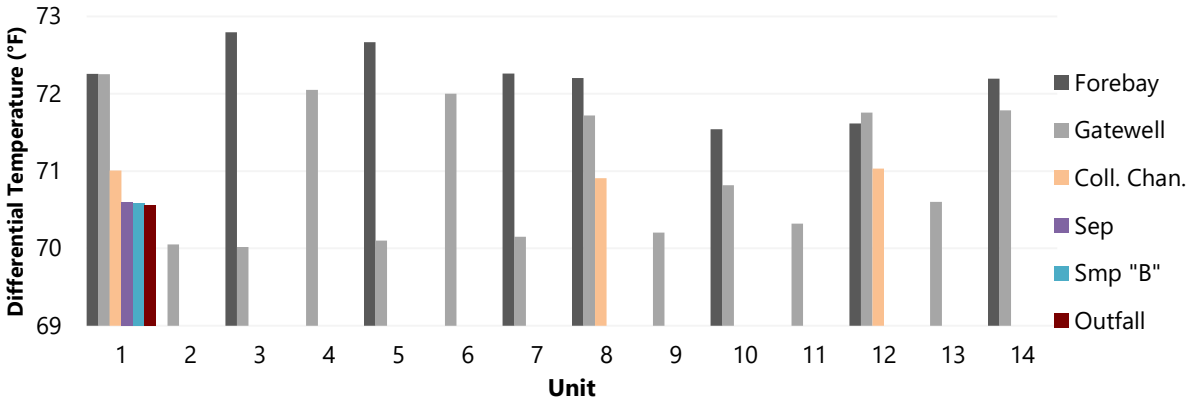


Figure 3
Average Weekly Water Temperatures by Position for Six Dam Locations from 0700 Hours August 17 to 0700 Hours August 24

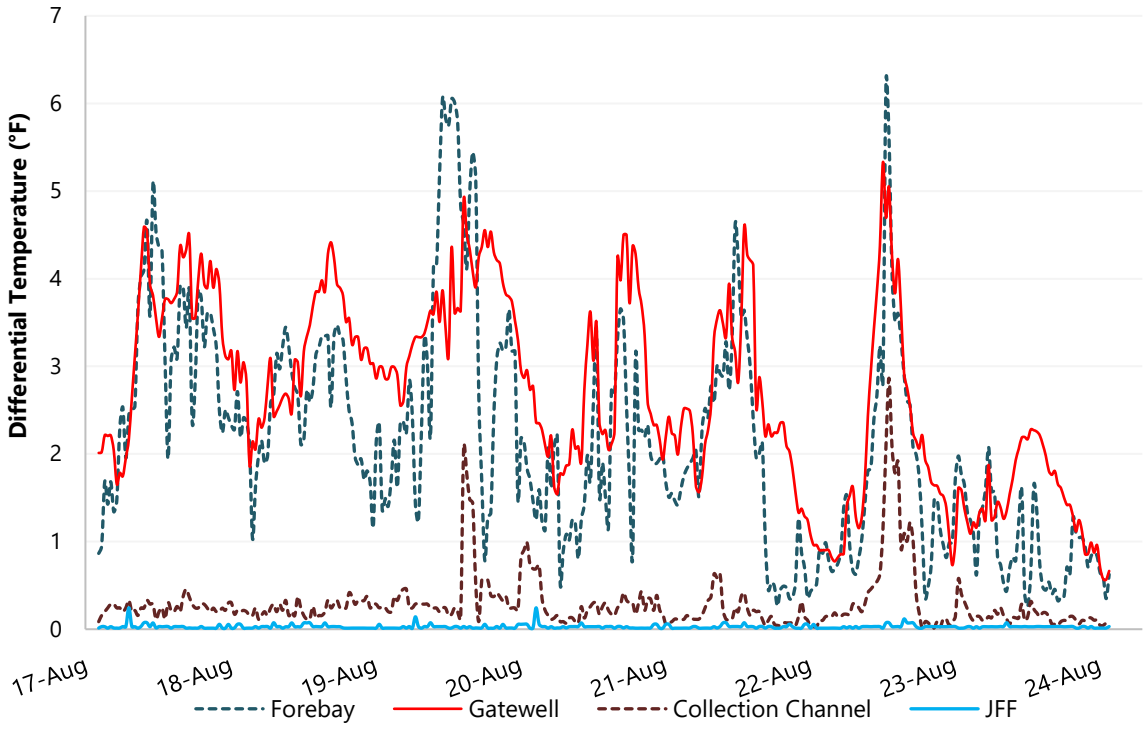


Figure 4
Average Differential Temperatures Within Four Dam Locations from 0700 Hours August 17 to 0700 Hours August 24

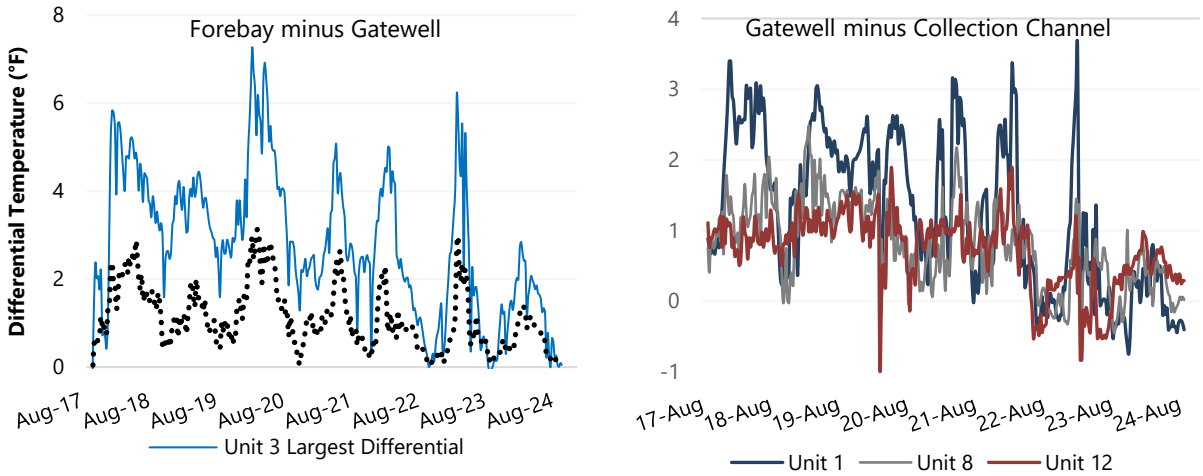


Figure 5
Average Differential Temperatures Across Three Dam Locations from 0700 Hours August 17 to 0700 Hours August 24