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ANCHOR QEA

Weekly Temperature Report
McNary Dam

August 7, 2017

Prepared by: Kathleen Carter, Mainstem Fish Research, LLC

Report Period: July 28 to August 3, 2017

Report No. MCN TEMP 17-8

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

Fish Collection

An estimated 43,031 juvenile salmonids were collected and 43,008 bypassed the McNary Juvenile Fish Facility (JFF; Table 1), comprising 99.9% subyearling Chinook salmon and 0.1% sockeye. There were 23 total facility mortalities, comprising 10 sample mortalities and 13 facility mortalities.

River Conditions

Average river flow for this reporting period was 161,200 cubic feet per second (161.2 kcfs), with an average spill of 80.9 kcfs.

Temperature Logger Operations

The temperature logger in sample tank "B" was removed from the tank from 1100 to 1900 hours on July 28 to clean debris out of the diffuser plates. The logger deployed in the forebay at Unit 1 failed to record data from 0800 hours on July 29 to 1100 hours on July 30, most likely due to user error. The logger was replaced at 1130 hours on July 30.

Weather Conditions

The weekly average daytime temperature for 0700 hours July 27 to 0700 hours August 3, 2017, was 82.9 °F. The weekly average nighttime temperature was 75.5 °F. Temperatures ranged from a maximum of 98.7 °F at 1830 hours on August 1 to a minimum of 63.7 °F at 0630 hours on August 1 (Figure 1).

Winds averaged 0.4 miles per hour (mph) and were predominately from the north. The wind was highest from 1730 to 1830 hours on August 2, with winds averaging 9.0 mph and gusts up to 19 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: 73.2 °F, forebay, (weekly average of 8 positions); 71.7 °F, gatewells, (weekly average of 14 positions); 71.8 °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 70.6°F, outfall pipe. The forebay at Unit 1 had the highest weekly average temperature, 73.9 °F (Figure 3). The maximum temperature, 82.5 °F, was recorded in the forebay at 1730 hours on July 31 at Unit 1.

The average weekly temperature differentials within dam locations were: 2.8 °F, forebay; 4.1 °F, gatewells; 1.0 °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, 9.0 °F was recorded in the forebay at 1700 hours on July 31 (Unit 1 high, Unit 14 low).

The average weekly temperature differential between the forebay and corresponding gatewell was 1.9 °F. The forebay was warmer than the corresponding gatewell on average across the powerhouse. The largest temperature differential was 12.7 °F at 1730 hours on July 31 at Unit 1 (forebay greater than gatewell; Figure 5). The average weekly temperature differential between the gatewell and corresponding collection channel location was 1.3 °F. On average, the gatewell was warmer than the collection channel at Unit 12, and cooler than the collection channel at Unit 1 and Unit 8. The largest temperature differential between the gatewell and corresponding collection channel location was 4.3 °F at 1800 on July 31 at Unit 1 (gatewell low, collection channel high).

Table 1
Bypass, Mortality, and River and Weather Conditions from 0700 Hours July 27 to 0700 Hours August 3

Date	Fish Collected	Fish Bypassed	Mortality		Avg. River Flow	Avg. Turbine Flow	Avg. Spill	Air Temperature		Wind Speed	
			Sam.	Fac.				Avg.	Max	Avg.	Max
7/27-28	15,100	15,096	4	0	139.4	64.6	70.1	79.7	92.9	0.7	5.0
7/28-29					179.2	84.7	89.8	77.7	92.7	0.0	0.0
7/29-30	11,611	11,599	0	12	173.1	81.6	86.7	77.9	96.3	0.0	0.0
7/30-31					139.2	64.7	69.8	78.9	95.4	0.0	0.0
7/31-8/1	9,100	9,099	1	0	165.0	77.5	82.7	78.1	95.9	0.0	0.0
8/1-2					165.1	77.4	83.0	79.9	98.7	0.2	4.0
8/2-3	7,220	7,214	5	1	167.3	78.5	84.1	80.3	98.5	1.5	9.0
Weekly Total	**43,031**	**43,008**	**10**	**13**	**161.2**	**75.6**	**80.9**	**79.1**		**0.4**	

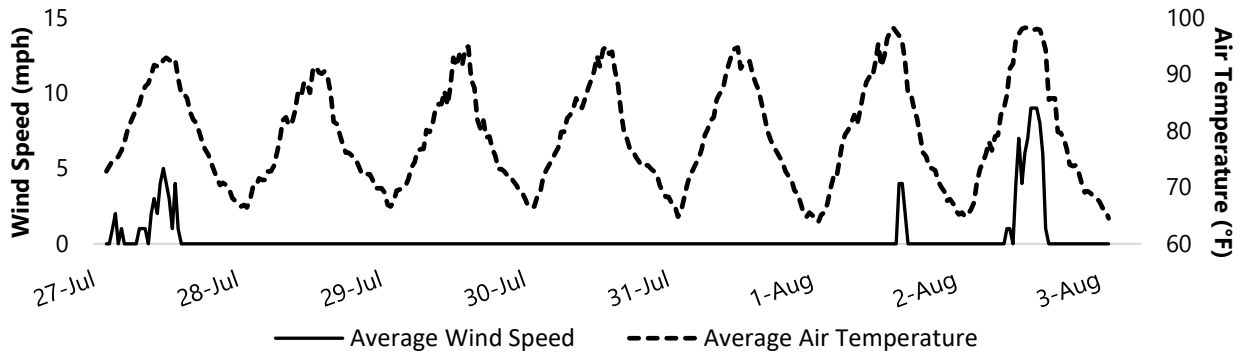

Figure 1
Average Wind Speed and Air Temperature for Each Half-Hour Interval from 0700 Hours July 27 to 0700 Hours August 3

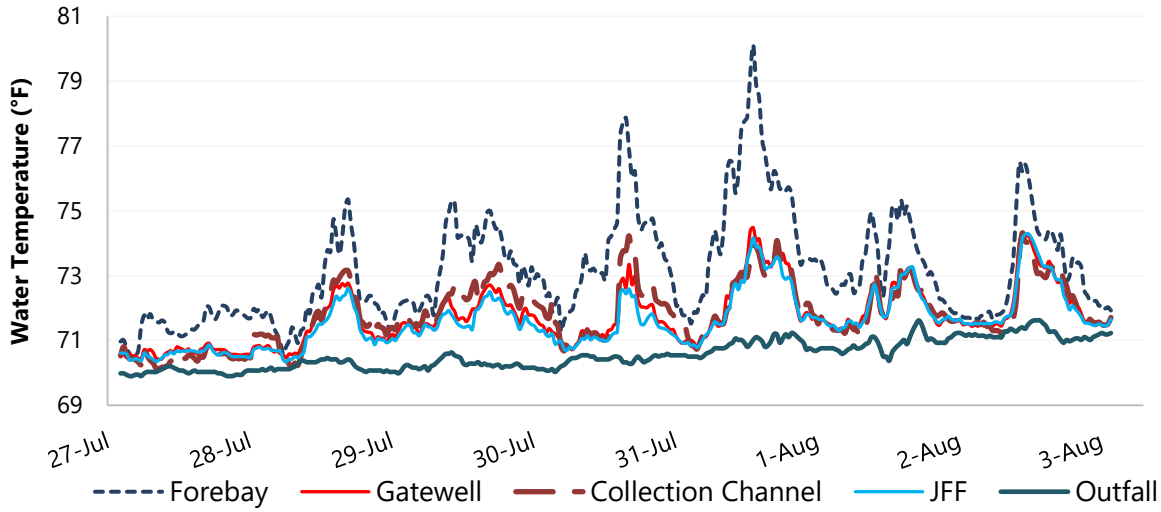

Figure 2
Average Water Temperatures for Each Half-Hour Interval for Five Dam Locations from 0700 Hours July 27 to 0700 Hours August 3

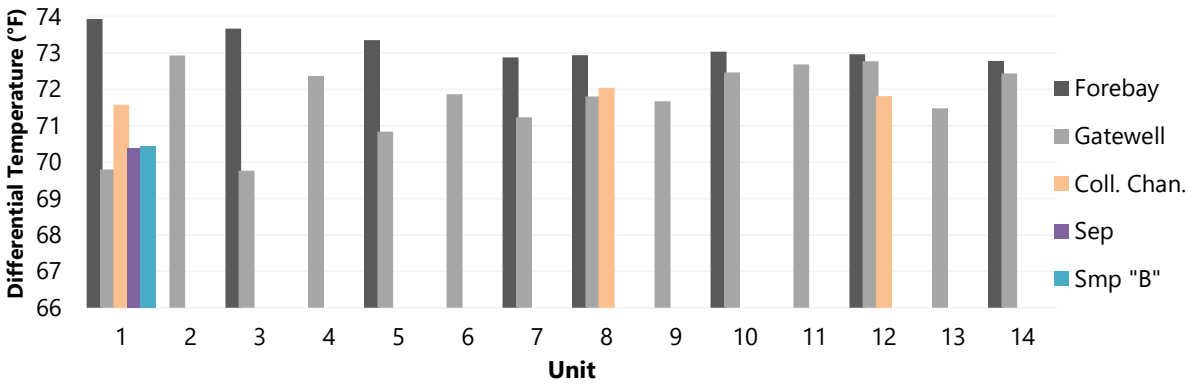

Figure 3
Average Weekly Water Temperatures by Position for Five Dam Locations from 0700 Hours July 27 to 0700 Hours August 3

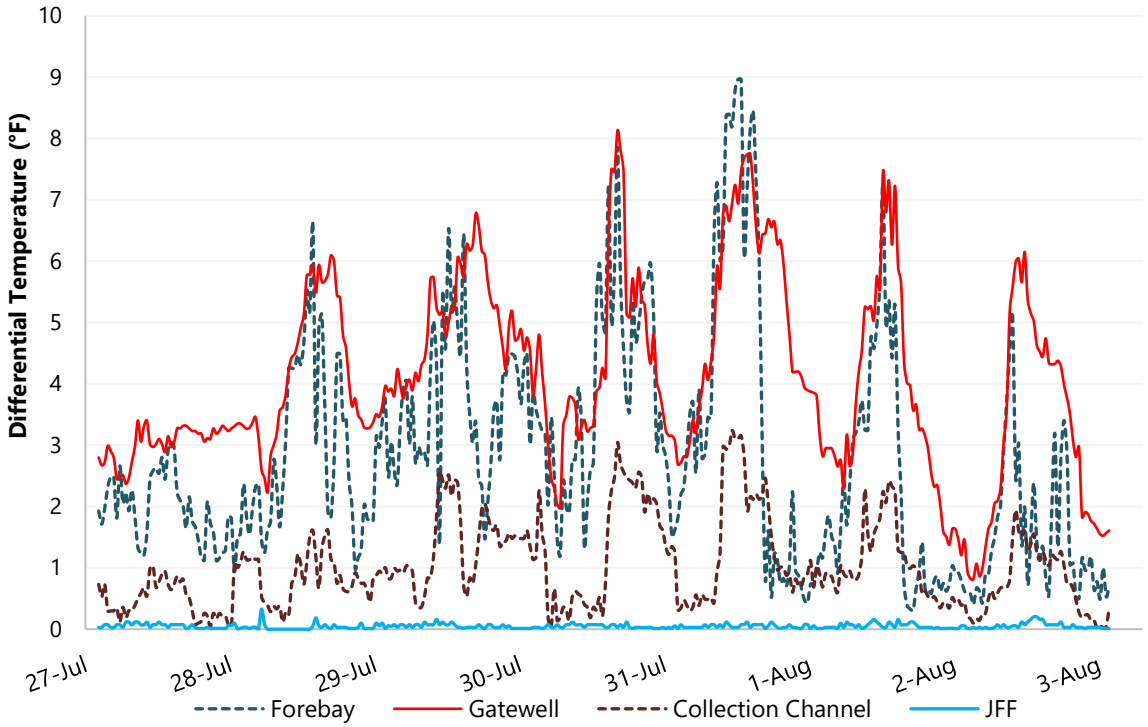

Figure 4
Average Differential Temperatures Within Four Dam Locations from 0700 Hours July 27 to 0700 Hours August 3

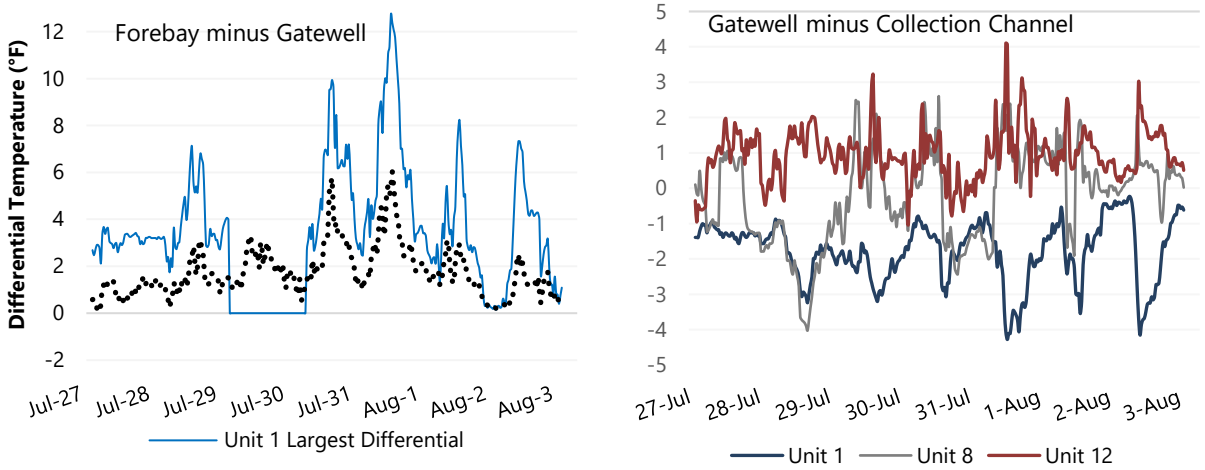

Figure 5
Average Differential Temperatures Across Three Dam Locations from 0700 Hours July 27 to 0700 Hours August 3