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ANCHOR QEA

Weekly Temperature Report
McNary Dam

July 31, 2017

Prepared by: Kathleen Carter, Mainstem Fish Research, LLC

Report Period: July 21 to July 27, 2017

Report No. MCN TEMP 17-7

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

Fish Collection

An estimated 85,100 juvenile salmonids were collected and 85,093 bypassed the McNary Juvenile Fish Facility (JFF; Table 1), comprising 99.8% subyearling Chinook salmon and 0.2% sockeye. There were 7 total facility mortalities, comprising 6 sample mortalities and 1 facility mortality.

River Conditions

Average river flow for this reporting period was 167,300 cubic feet per second (167.3 kcfs), with an average spill of 83.9 kcfs.

Temperature Logger Operations

Per the McNary project biologist, Anchor staff are accompanied onto the outfall pipe by USACE personnel. Due to limited USACE staff, the logger at the outfall pipe was downloaded on Wednesday July 26 instead of Thursday, July 27. The outfall pipe temperatures for this report reflect data collected from 0700 hours July 20 to 0900 hours July 26. The outfall pipe logger remains operational and the dataset in its entirety will be available in the annual report. Downloads for subsequent weeks should not be affected by this staff shortage.

Weather Conditions

The weekly average daytime temperature for 0700 hours July 20 to 0700 hours July 27, 2017, was 80.9 °F. The weekly average nighttime temperature was 74.0 °F. Temperatures ranged from a maximum of 97.3 °F from 1830 to 1900 hours on July 23 to a minimum of 59.3 °F at 0630 hours on July 21 (Figure 1).

Winds averaged 0.8 miles per hour (mph) and were predominately from the north. The wind was highest at 1100 hours on July 20, with winds averaging 12.0 mph and gusts up to 28 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: 71.2 °F, forebay, (weekly average of 8 positions); 70.0 °F, gatewells, (weekly average of 14 positions); 70.2 °F, collection channel, (weekly average of positions at Units 1, 8, and 12); 70.0 °F, JFF, (weekly average of the separator and sample tank "B"); and 68.9°F outfall pipe. The forebay at Unit 1 had the highest weekly average temperature, 71.9 °F (Figure 3). The maximum temperature, 78.0 °F, was recorded in the forebay at 2100 hours on July 22 at Unit 1.

The average weekly temperature differentials within dam locations were: 2.6 °F, forebay; 3.6 °F, gatewells; 0.8 °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, 8.4 °F was recorded in the gatewells at 2100 hours on July 22 (Unit 1 low, Unit 14 high).

The average weekly temperature differential between the forebay and corresponding gatewell was 1.6 °F. The forebay was warmer than the corresponding gatewell on average across the powerhouse. The largest temperature differential was 10.4 °F at 2100 hours on July 22 at Unit 1 (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 8 and Unit 12, and cooler than the collection channel at Unit 1. The largest temperature differential between the gatewell and corresponding collection channel location was 4.0 °F at 1830 on July 24 at Unit 1 (gatewell low, collection channel high).

Table 1
Bypass, Mortality, and River and Weather Conditions from 0700 Hours July 20 to 0700 Hours July 27

Date	Fish Collected	Fish Bypassed	Mortality		Avg. River Flow	Avg. Turbine Flow	Avg. Spill	Air Temperature		Wind Speed	
			Sam.	Fac.				Avg.	Max	Avg.	Max
7/20-21					187.3	88.8	93.8	71.8	82.8	2.9	12.0
7/21-22	34,900	34,897	3	0	166.3	78.5	83.1	73.2	88.6	0.7	3.0
7/22-23					165.4	77.8	82.9	77.9	93.6	0.3	4.0
7/23-24	12,500	12,497	3	0	142.4	66.1	71.6	81.5	97.3	0.2	3.0
7/24-25					168.3	79.2	84.4	76.9	89.9	1.2	9.0
7/25-26	37,700	37,699	0	1	175.1	82.3	88.1	77.6	93.4	0.3	3.0
7/26-27					166.5	78.4	83.5	81.4	94.7	0.1	3.0
Weekly Total	**85,100**	**85,093**	**6**	**1**	**167.3**	**78.7**	**83.9**	**77.4**		**0.8**	

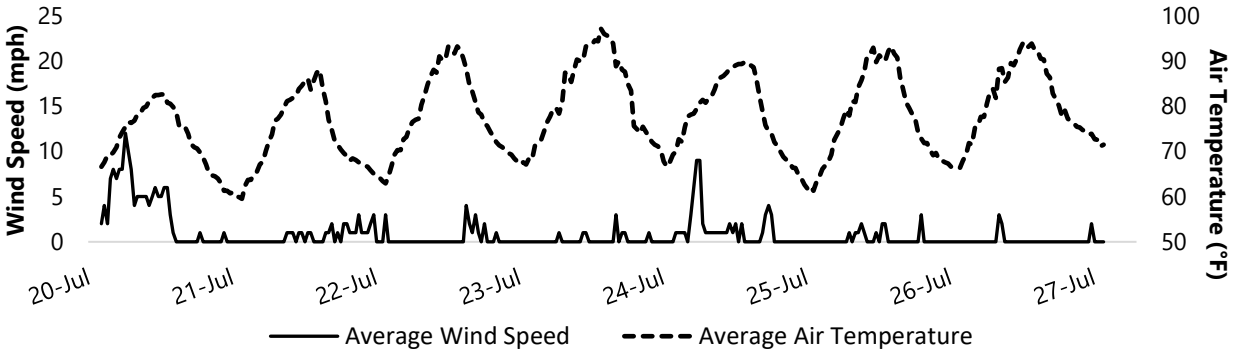

Figure 1
Average Wind Speed and Air Temperature for Each Half-Hour Interval from 0700 Hours July 20 to 0700 Hours July 27

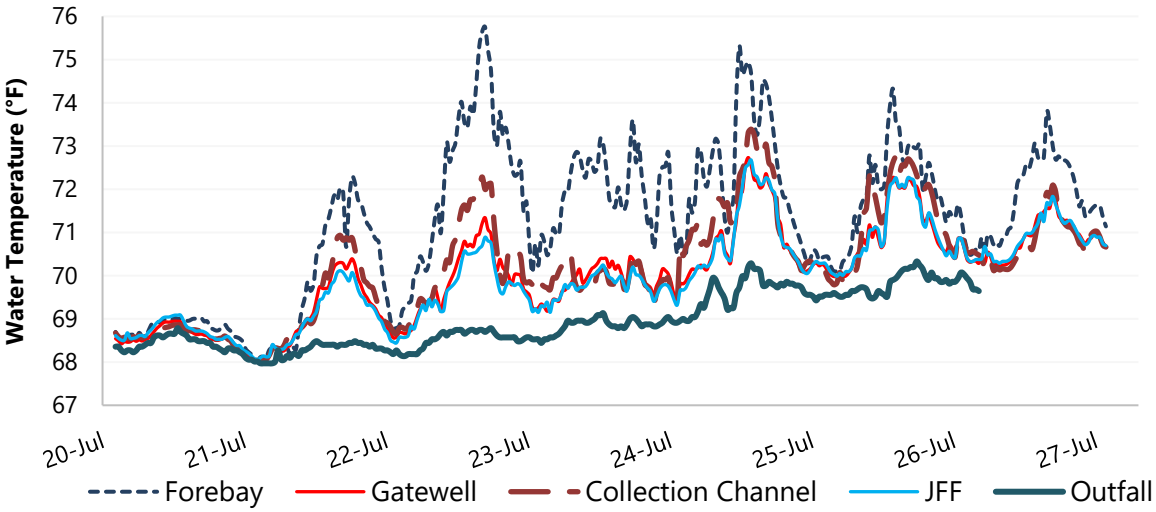

Figure 2
Average Water Temperatures for Each Half-Hour Interval for Five Dam Locations from 0700 Hours July 20 to 0700 Hours July 27

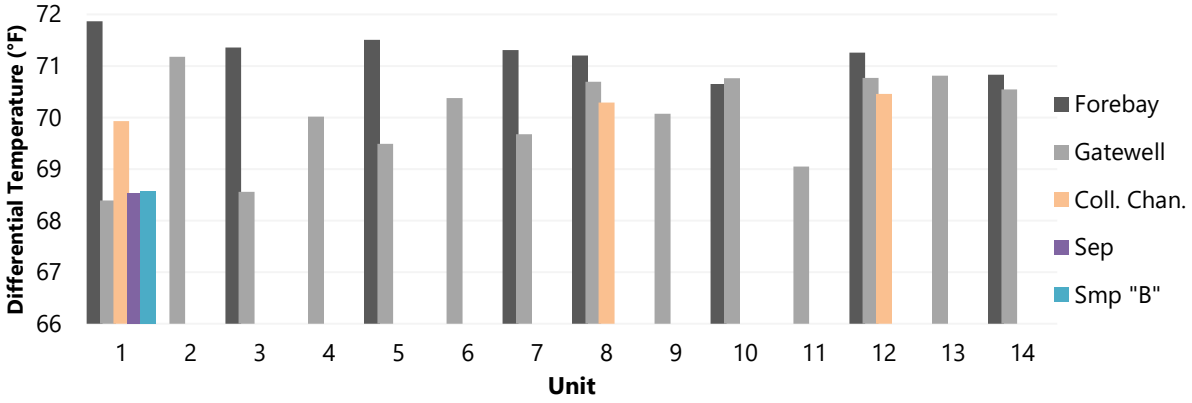

Figure 3
Average Weekly Water Temperatures by Position for Five Dam Locations from 0700 Hours July 20 to 0700 Hours July 27

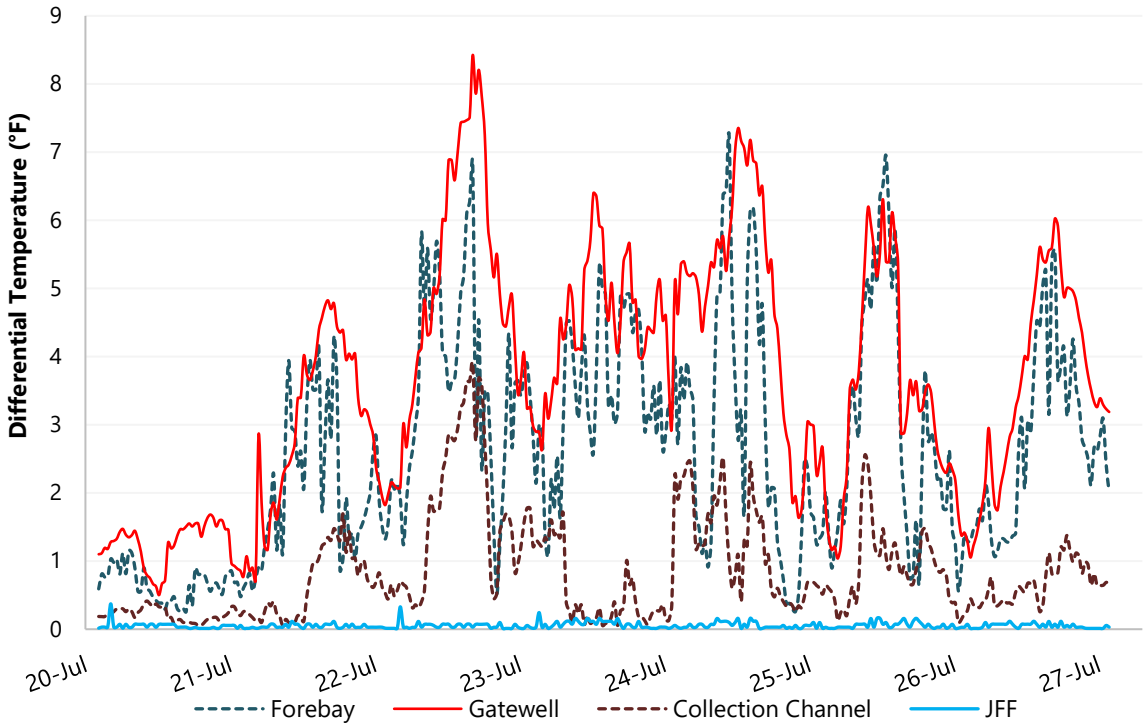

Figure 4
Average Differential Temperatures Within Four Dam Locations from 0700 Hours July 20 to 0700 Hours July 27

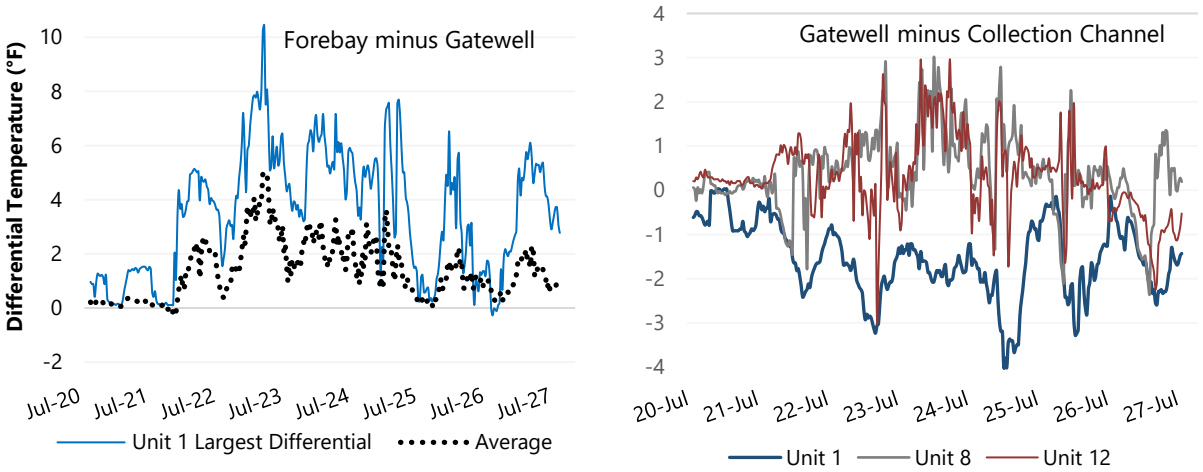

Figure 5
Average Differential Temperatures Across Three Dam Locations from 0700 Hours July 20 to 0700 Hours July 27