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ANCHOR QEA

Weekly Temperature Report
McNary Dam

June 25, 2018

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Report Period: June 15 to June 21, 2018

Report No. 2018 Anchor QEA: MCN Temperature Weekly for 0615-0621

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

Fish Collection

An estimated 47,600 juvenile salmonids were collected and 47,589 bypassed the McNary Juvenile Fish Facility (JFF; Table 1), comprising 98.2% subyearling Chinook salmon, 0.9% steelhead, 0.5% yearling Chinook salmon, 0.2% coho salmon, and 0.2% sockeye salmon. There were 11 total facility mortalities, comprising 8 sample mortalities and 3 facility mortalities.

River Conditions

Average river flow for this reporting period was 225,900 cubic feet per second (225.9 kcfs), with an average spill of 127.8 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.

Weather Conditions

The weekly average daytime temperature for 0700 hours June 14 to 0700 hours June 21, 2018, was 72.7 °F. The weekly average nighttime temperature was 67.0 °F. Temperatures ranged from a maximum of 92.6 °F at 1700 hours on June 20 to a minimum of 52.6 °F at 0639 hours on June 15 (Figure 1).

Winds averaged 2.9 miles per hour (mph) and were predominately from the east north east. The wind was highest at 1500 hours on June 16, with winds averaging 21.0 mph and gusts up to 36 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: 62.8 °F, forebay (weekly

average of 8 positions); 62.1 °F, gatewells (weekly average of 14 positions); 62.3 °F, collection channel (weekly average of positions at Units 1, 8, and 12); and 62.2 °F, JFF (weekly average of the separator and sample tank "B"). The forebay at Units 10, 12, and 14 had the highest weekly average temperature, 63.2 °F (Figure 3). The maximum temperature, 72.1 °F, was recorded in the forebay at 1900 hours on June 20 at Unit 3.

The average weekly temperature differentials within dam locations were: 2.0 °F, forebay; 2.2 °F, gatewells; 0.8 °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, 7.6 °F, was recorded twice on June 15 in the forebay at 1800 hours (Unit 12 high, Unit 3 low) and at 1930 hours (Unit 12 high, Units 5 and 7 low).

The average weekly temperature differential between the forebay and corresponding gatewell was 0.7 °F. The forebay was warmer than the corresponding gatewell on average across the powerhouse. The largest temperature differential was 8.0 °F at 1900 hours on June 20 at Unit 7 (forebay greater than gatewell; Figure 5). The average weekly temperature differential between the gatewell and corresponding collection channel location was 0.1 °F. On average, the gatewell was warmer than the collection channel at Unit 1 and Unit 12, and the collection channel was warmer than the gatewell at Unit 8. The largest temperature differential between the gatewell and corresponding collection channel location was 3.9 °F at 1900 on June 15 at Unit 1 (gatewell greater than collection channel).

Table 1
Bypass, Mortality, and River and Weather Conditions from 0700 Hours June 14 to 0700 Hours June 21

Date	Fish Collected	Fish Bypassed	Mortality		Avg. River Flow	Avg. Turbine Flow	Avg. Spill	Air Temperature		Wind Speed	
			Sam.	Fac.				Avg.	Max	Avg.	Max
6/14-15					232.5	51.7	176.4	64.4	76.8	2.3	5.0
6/15-16	5,200	5,199	1	0	230.4	66.7	159.3	67.3	81.9	2.0	4.0
6/16-17					222.6	106.9	111.3	67.8	75.8	7.8	21.0
6/17-18	12,350	12,348	1	1	212.9	102.1	106.4	72.7	83.3	2.8	8.0
6/18-19					217.8	104.6	108.8	64.2	67.2	1.4	4.0
6/19-20	30,050	30,042	6	2	229.3	110.3	114.6	72.7	85.0	2.1	5.0
6/20-21					235.8	113.6	117.8	79.2	92.6	1.9	7.0
Weekly Total	**47,600**	**47,589**	**8**	**3**	**225.9**	**93.7**	**127.8**	**69.8**		**2.9**	

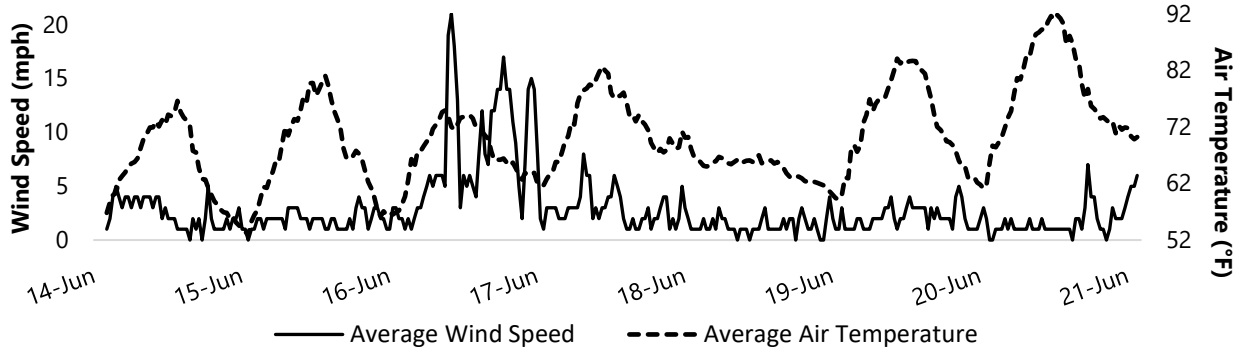

Figure 1
Average Wind Speed and Air Temperature for Each Half-Hour Interval from 0700 Hours June 14 to 0700 Hours June 21

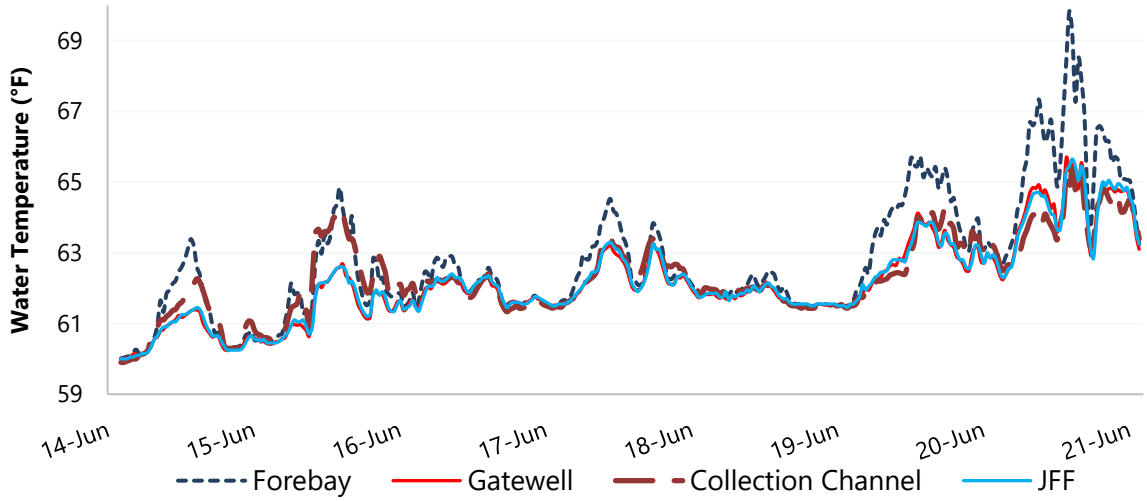

Figure 2
Average Water Temperatures for Each Half-Hour Interval for Four Dam Locations from 0700 Hours June 14 to 0700 Hours June 21

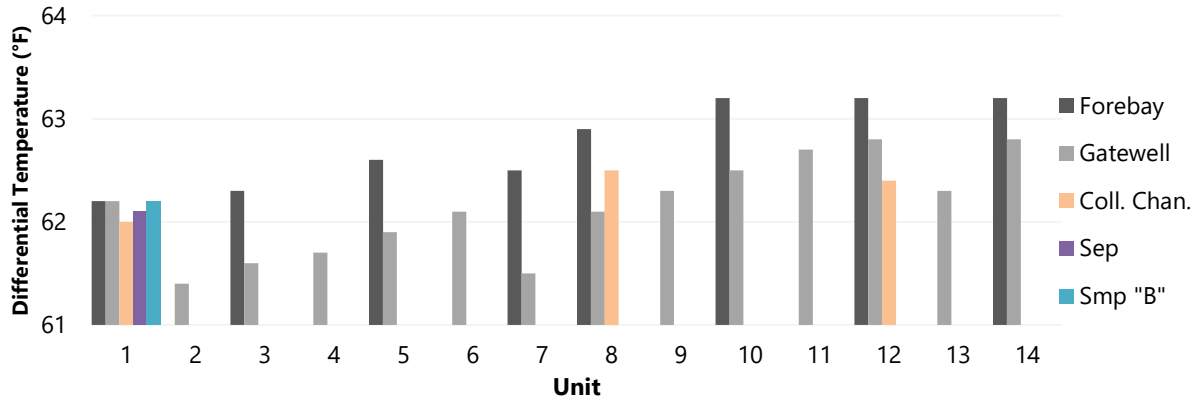

Figure 3
Average Weekly Water Temperatures by Position for Five Dam Locations from 0700 Hours June 14 to 0700 Hours June 21

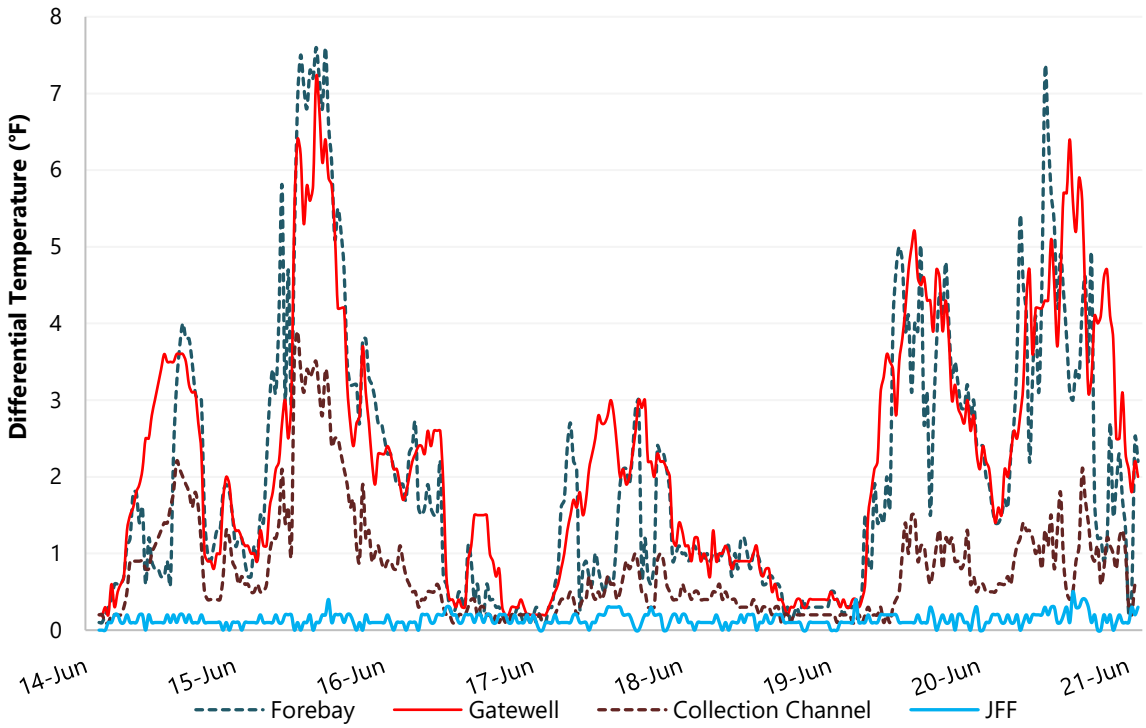

Figure 4
Average Differential Temperatures Within Four Dam Locations from 0700 Hours June 14 to 0700 Hours June 21

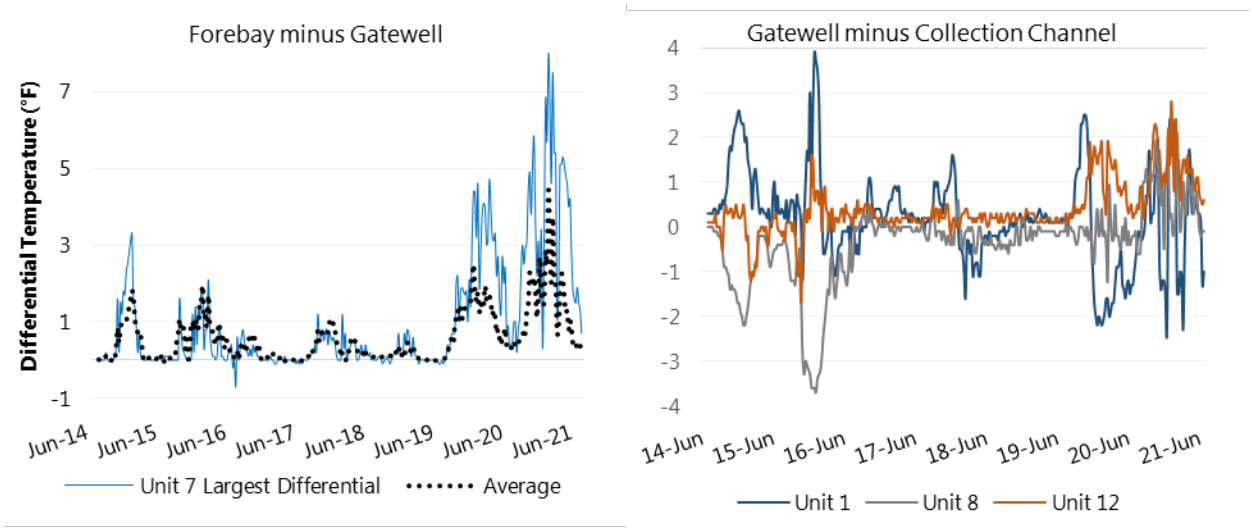

Figure 5
Average Differential Temperatures Across Three Dam Locations from 0700 Hours June 14 to 0700 Hours June 21