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Weekly Temperature Report
McNary Dam

July 1, 2019

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Report Period: June 21 to 27, 2019

Report No. 2019 Anchor QEA: MCN Temperature Weekly for 0621-0627

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

Fish Collection

An estimated 61,800 juvenile salmonids were collected and 61,794 bypassed the McNary Juvenile Fish Facility (JFF; Table 1), comprising 96.7% subyearling Chinook salmon, 2.8% yearling Chinook salmon, and 0.5% coho. There were 6 total facility mortalities, 5 sample mortalities, and 1 facility mortality.

River Conditions

Average river flow for this reporting period was 186,600 cubic feet per second (186.6 kcfs) with an average spill of 106.6 kcfs.

Temperature Logger Operations

The logger at Gatewell 11 (G11) malfunctioned and was replaced on June 23. There was no data recorded for G11 from 1500 June 23 until 1200 June 24. The logger at Gatewell 2 (G02) malfunctioned and was replaced on June 25. There was no data recorded for G02 for 0930 June 24 until 1230 June 25.

Weather Conditions

The weekly average daytime temperature for 0700 hours June 21 to 0700 hours June 27, 2019, was 62.0°F. The weekly average nighttime temperature was 71.6°F. Temperatures ranged from a maximum of 83.6°F at 1800 hours on June 25 to a minimum of 54.1°F at 0530 hours on June 21 (Figure 1).

Winds averaged 3.8 miles per hour (mph) and were predominately from the northeast. The highest average wind speed was 12.0 mph at 1100 to 1630 hours and at 1700 hours on June 19, and the highest gusts were up to 26 mph at 1800 hours on June 23.

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: 63.9°F, forebay (weekly average of 8 positions); 63.5°F, gatewells (weekly average of 14 positions); 63.4°F, collection channel (weekly average of positions at Units 1, 8, and 12); and 63.5°F, JFF (weekly average of the separator and sample tank "B"). The forebay at Unit 7 had the highest weekly average temperature, 64.2°F (Figure 3). The maximum temperature, 71.1°F, was recorded in the forebay at 1730 hours on June 25 at Unit 7.

The average weekly temperature differentials within dam locations were: 1.1°F, forebay; 1.7°F, gatewells; 0.3°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, 1.94°F, was recorded on June 25 in the forebay at 1800 hours (Unit 10 high, Unit 8 low).

The average weekly temperature differential between the forebay and corresponding gatewell was 0.5°F. The forebay was warmer than the corresponding gatewell on average across the powerhouse. The largest temperature differential was 7.1°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 0.5°F. On average, the gatewell was warmer than the collection channel at Units 1, and 8, but the collection channel was warmer than the gatewell at Unit 12. The largest temperature differential between the gatewell and corresponding collection channel location was 3.3°F at 1730 on June 25 at Unit 1 (gatewell greater than collection channel).

Table 1
Bypass, Mortality, and River and Weather Conditions from 0700 Hours June 21 to 0700 Hours June 27

Date	Fish Collected	Fish Bypassed	Mortality		Avg. River Flow	Avg. Turbine Flow	Avg. Spill	Air Temperature		Wind Speed	
			Sample	Facility				Avg.	Max	Avg.	Max
21-Jun					186.3	75.2	106.4	64.1	73.7	3.6	9.0
22-Jun	24,100	24,097	3	0	222.4	90.6	127.0	68.7	83.2	4.2	8.0
23-Jun					185.9	74.8	106.4	67.4	78.6	6.4	12.0
24-Jun	15,700	15,699	1	0	163.5	65.6	93.3	66.4	79.9	2.6	5.0
25-Jun					182.8	74.1	104.1	69.2	83.6	2.6	8.0
26-Jun	22,000	21,998	1	1	172.8	69.7	98.4	65.8	78.7	3.1	10.0
27-Jun					192.4	77.3	110.4	57.0	58.9	4.5	7.0
Weekly Total	**61,800**	**61,794**	**5**	**1**	**186.6**	**75.3**	**106.6**	**66.6**		**3.8**	

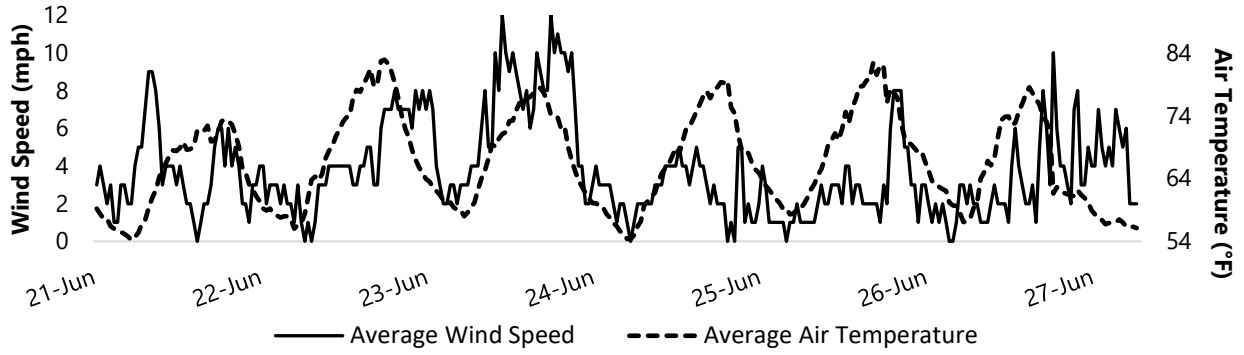

Figure 1
Average Wind Speed and Air Temperature for Each Half-Hour Interval from 0700 Hours June 21 to 0700 Hours June 27

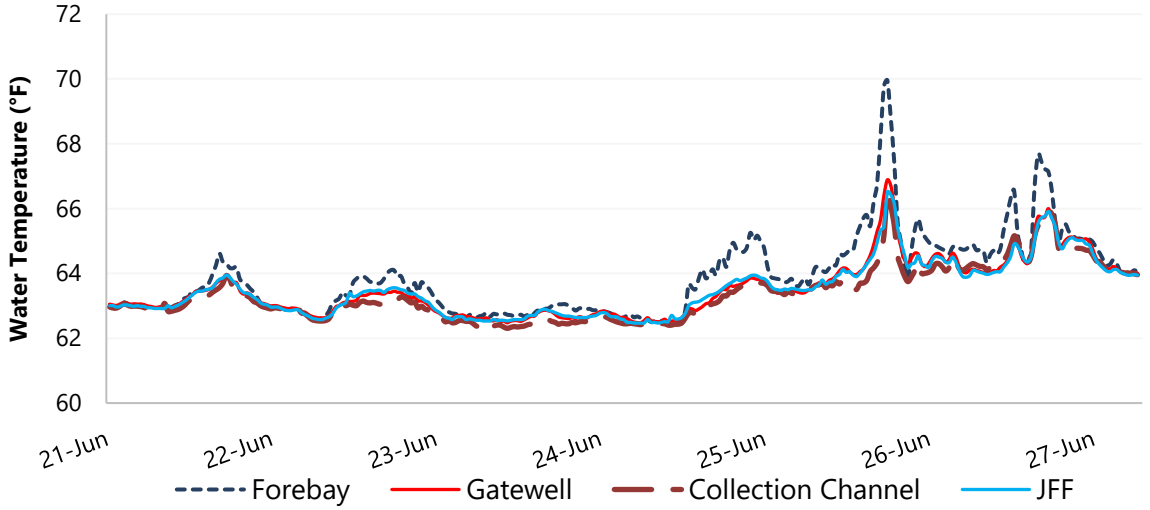

Figure 2
Average Water Temperatures for Each Half-Hour Interval for Four Dam Locations from 0700 Hours June 21 to 0700 Hours June 27

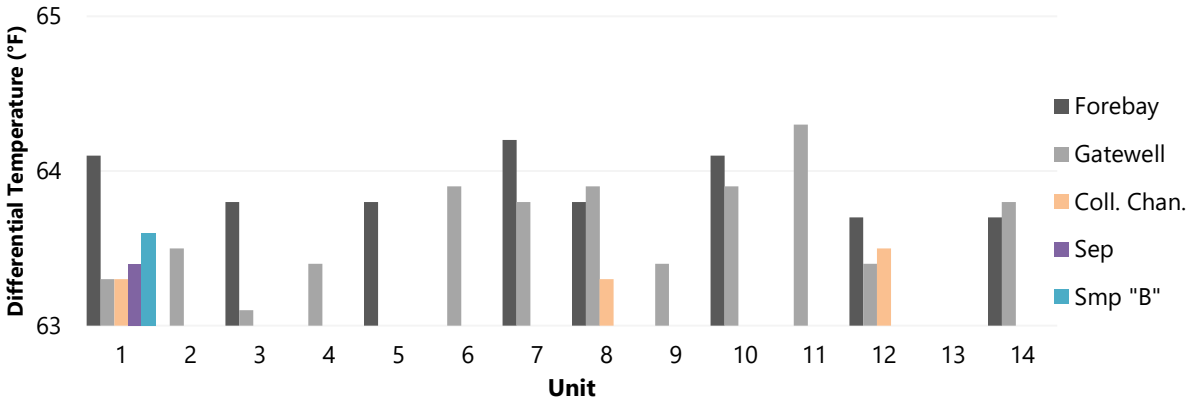

Figure 3
Average Weekly Water Temperatures by Position for Five Dam Locations from 0700 Hours June 21 to 0700 Hours June 27

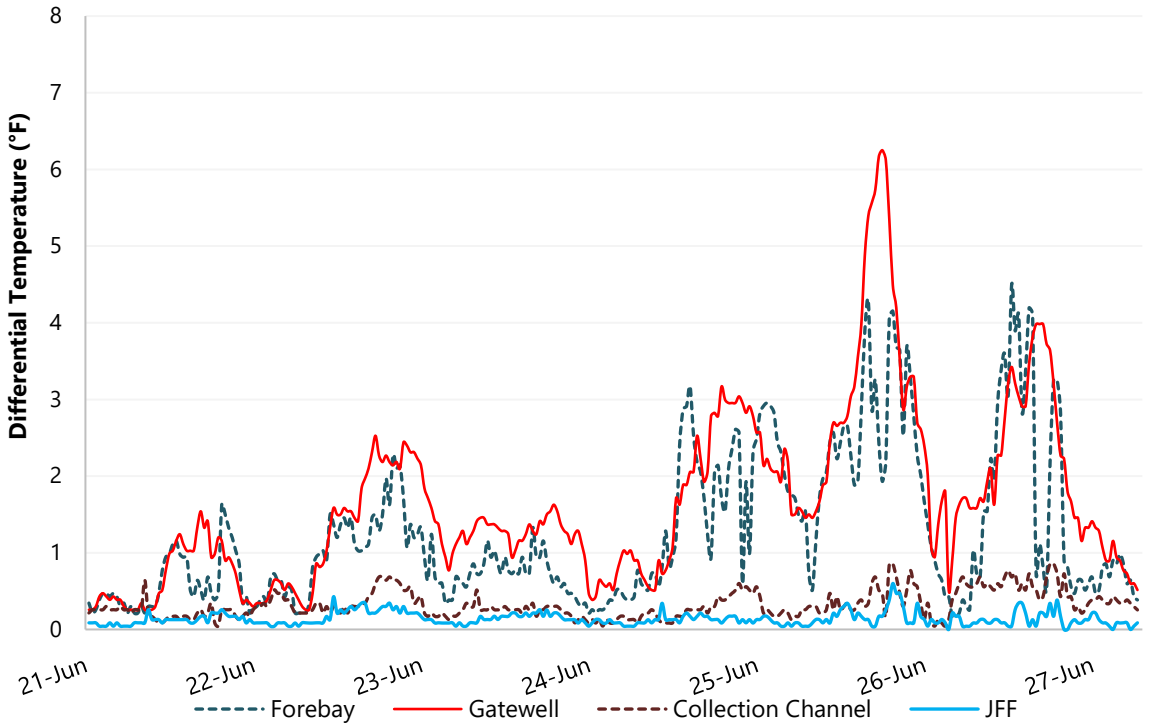

Figure 4
Average Differential Temperatures Within Four Dam Locations from 0700 Hours June 21 to 0700 Hours June 27

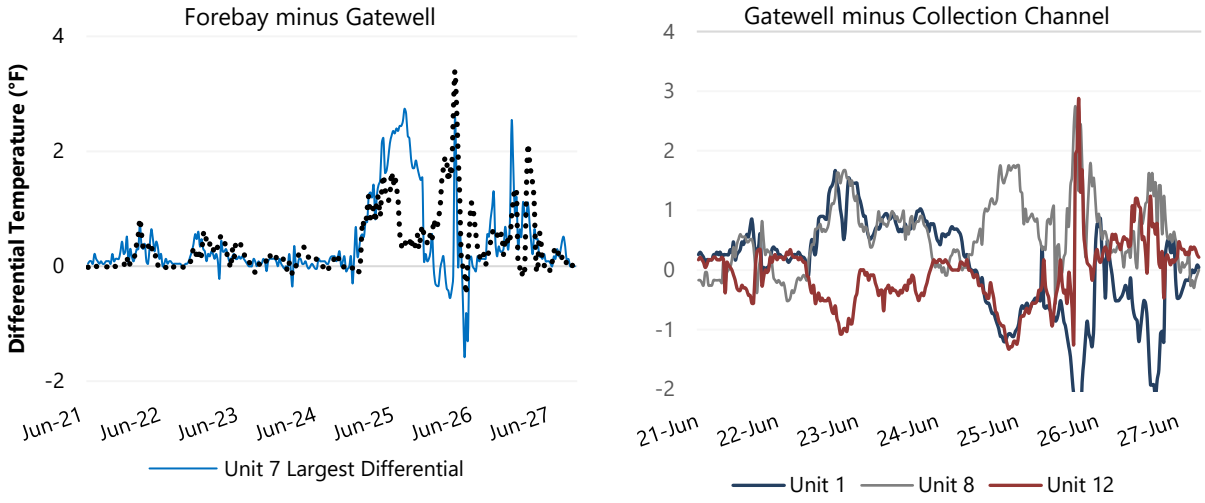

Figure 5
Average Differential Temperatures Across Three Dam Locations from 0700 Hours June 21 to 0700 Hours June 27