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ANCHOR QEA

Weekly Temperature Report
McNary Dam

July 8, 2019

Prepared by: Alexis Bonoff, Anchor QEA, LLC

Report Period: June 28 to July 4, 2019

Report No. 2019 Anchor QEA: MCN Temperature Weekly for 0628-0704

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

Fish Collection

An estimated 42,901 juvenile salmonids were collected and 42,898 bypassed the McNary Juvenile Fish Facility (JFF; Table 1), comprising 96.5% subyearling Chinook salmon, 3.3% yearling Chinook salmon, and 0.2% sockeye. There were 3 total facility mortalities, 2 sample mortalities, and 1 facility mortality.

River Conditions

Average river flow for this reporting period was 165,100 cubic feet per second (165.1 kcfs) with an average spill of 94.7 kcfs.

Temperature Logger Operations

There were no issues that affected logger operations this week.

Weather Conditions

The weekly average daytime temperature for 0700 hours June 28 to 0700 hours July 4, 2019, was 65.3°F. The weekly average nighttime temperature was 75.0°F. Temperatures ranged from a maximum of 90.1°F at 1730 hours on June 30 to a minimum of 53.4°F at 0430 hours on June 29 (Figure 1).

Winds averaged 3.0 miles per hour (mph) and were predominately from the northeast. The highest average wind speed was 17.0 mph at 1830 on July 1, and the highest gusts were up to 42 mph at 1230 hours on June 29.

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: 66.3°F, forebay (weekly average of 8 positions); 65.3°F, gatewells (weekly average of 14 positions); 65.3°F, collection channel

(weekly average of positions at Units 1, 8, and 12); and 65.3°F, JFF (weekly average of the separator and sample tank "B"). The forebay at Unit 8 had the highest weekly average temperature, 67.0°F (Figure 3). The maximum temperature, 72.3°F, was recorded in the forebay at 1630 hours on June 29 at Unit 10.

The average weekly temperature differentials within dam locations were: 2.1°F, forebay; 3.2°F, gatewells; 0.9°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, 8.0°F, was recorded on June 30 in the forebay at 1800 hours (Unit 12 high, Unit 14 low).

The average weekly temperature differential between the forebay and corresponding gatewell was 1.0°F. The forebay was warmer than the corresponding gatewell on average across the powerhouse. The largest temperature differential was 8.6°F at 1700 hours on June 29 at Unit 5 (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 Units 1, 8, and 12. The largest temperature differential between the gatewell and corresponding collection channel location was 6.0°F at 1700 on July 1 at Unit 8 (gatewell greater than collection channel).

Table 1
Bypass, Mortality, and River and Weather Conditions from 0700 Hours June 28 to 0700 Hours July 4

Date	Fish Collected	Fish Bypassed	Mortality		Avg. River Flow	Avg. Turbine Flow	Avg. Spill	Air Temperature		Wind Speed	
			Sample	Facility				Avg.	Max	Avg.	Max
28-Jun	20,100	20,100	0	0	180.6	72.0	103.9	66.4	80.6	3.2	7.0
29-Jun					182.0	72.6	104.7	69.9	87.7	1.8	9.0
30-Jun	10,500	10,500	0	0	167.1	66.2	96.2	74.3	90.1	1.8	5.0
1-Jul					166.9	66.3	95.9	72.0	88.6	3.2	17.0
2-Jul	12,301	12,298	2	1	164.5	65.5	94.3	69.0	80.0	5.8	11.0
3-Jul					149.3	59.6	85.0	69.3	82.4	2.3	5.0
4-Jul					145.2	57.8	82.6	63.0	64.6	0.8	2.0
Weekly Total	**42,901**	**42,898**	**2**	**1**	**165.1**	**65.7**	**94.7**	**69.9**		**3.0**	

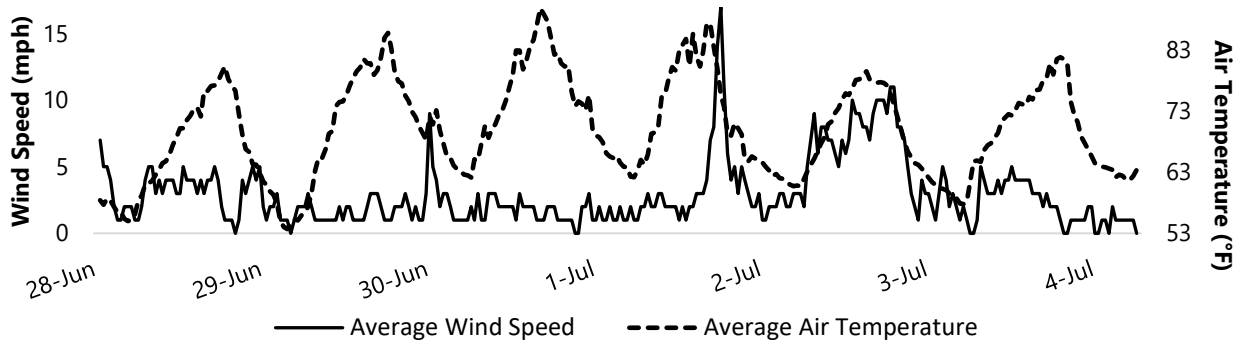

Figure 1
Average Wind Speed and Air Temperature for Each Half-Hour Interval from 0700 Hours June 28 to 0700 Hours July 4

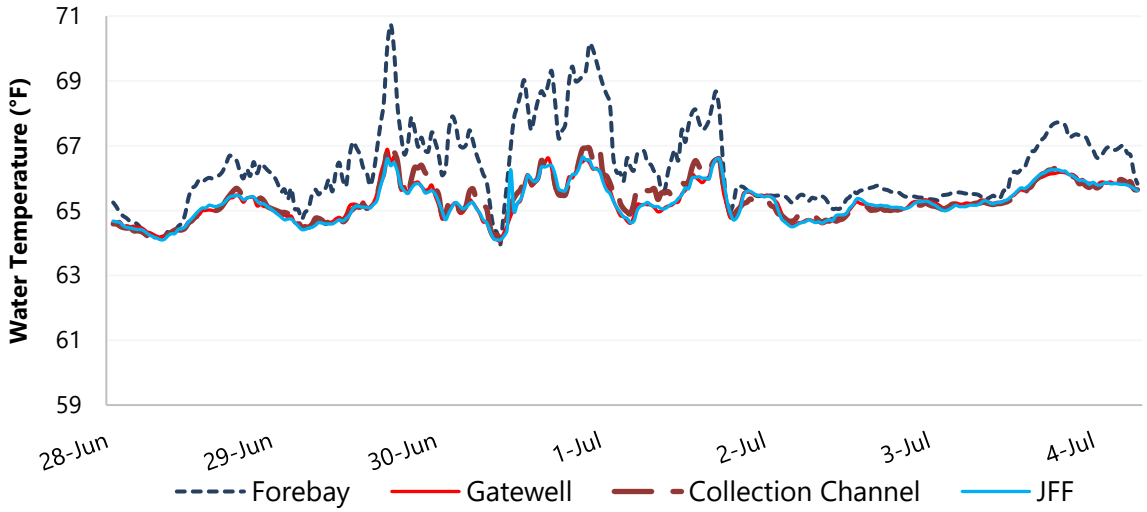

Figure 2
Average Water Temperatures for Each Half-Hour Interval for Four Dam Locations from 0700 Hours June 28 to 0700 Hours July 4

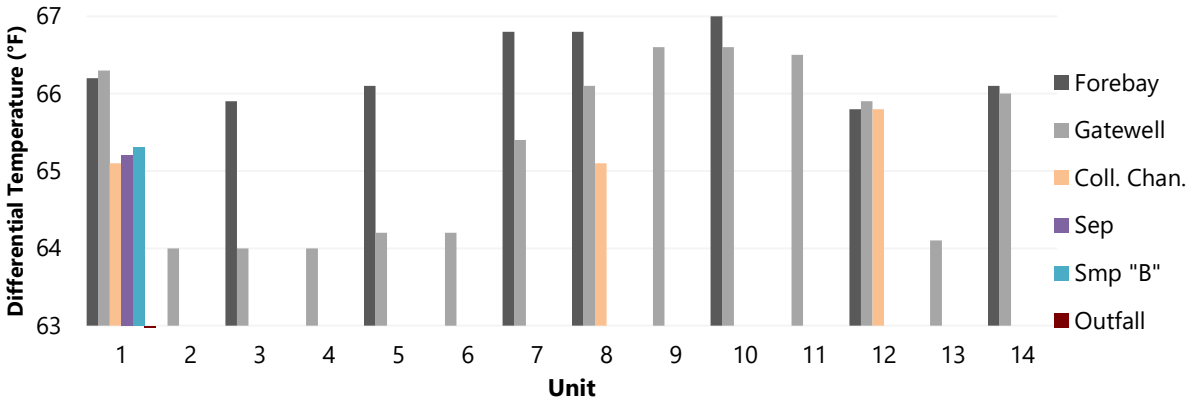

Figure 3
Average Weekly Water Temperatures by Position for Five Dam Locations from 0700 Hours June 28 to 0700 Hours July 4

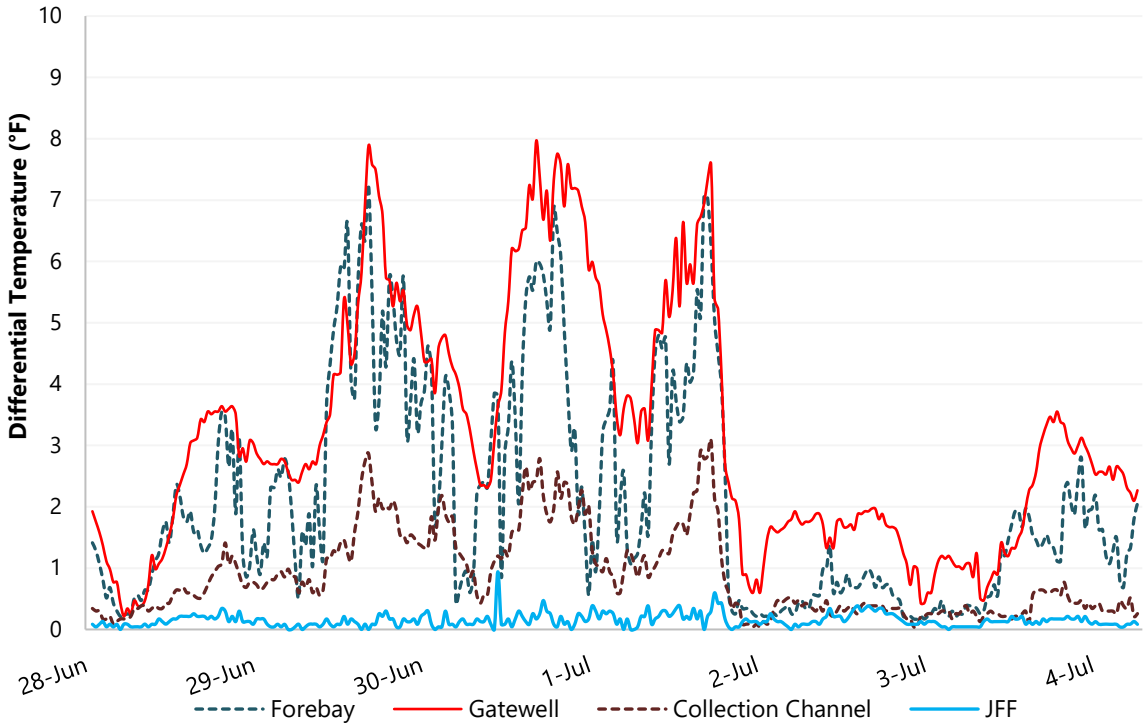

Figure 4
Average Differential Temperatures Within Four Dam Locations from 0700 Hours June 28 to 0700 Hours July 4

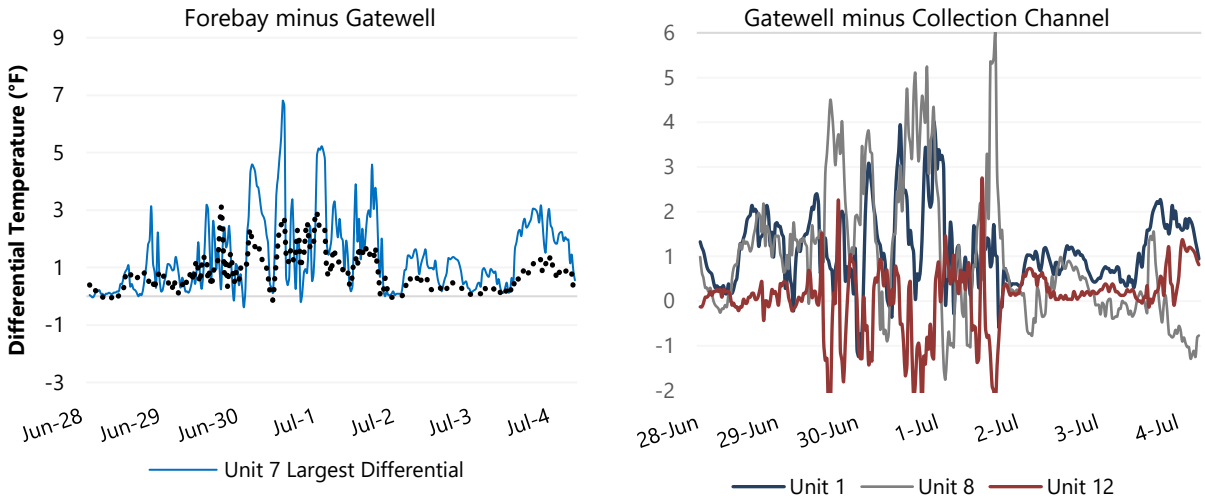

Figure 5
Average Differential Temperatures Across Three Dam Locations from 0700 Hours June 28 to 0700 Hours July 4