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ANCHOR QEA

Weekly Temperature Report
McNary Dam

July 29, 2019

Prepared by: Meaghan Wright, Anchor QEA, LLC

Report Period: July 19 to July 25, 2019

Report No. 2019 Anchor QEA: MCN Temperature Weekly for 0719-0725

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

Fish Collection

An estimated 5,297 juvenile salmonids were collected and 5,292 bypassed the McNary Juvenile Fish Facility (JFF; Table 1), comprising 99.8% subyearling Chinook salmon and 0.2% steelhead. There were 5 total facility mortalities, comprising 4 facility mortalities and 1 sample mortality.

River Conditions

Average river flow for this reporting period was 149,900 cubic feet per second (149.9 kcfs) with an average spill of 85.5 kcfs.

Temperature Logger Operations

There were no logger operations that affected data collection this week.

Weather Conditions

The weekly average daytime temperature for 0700 hours July 19 to 0700 hours July 25, 2019, was 66.4°F. The weekly average nighttime temperature was 81.4°F. Temperatures ranged from a maximum of 100.5°F at 1730 hours on July 22 to a minimum of 53.1°F at 0530 hours on July 20 (Figure 1).

Winds averaged 2.3 miles per hour (mph) and were predominately from the northeast. The highest average wind speed was 12.0 mph at 1930 on July 23, and the highest gusts were up to 27 mph at 1930 hours on July 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: 70.2°F, forebay (weekly average of 8 positions); 69.1°F, gatewells (weekly average of 14 positions); 68.9°F, collection channel (weekly average of positions at Units 1, 8, and 12); and 69.0°F, JFF (weekly average of the separator and sample tank "B"). The forebay at Units 3,5, and 14 had the highest weekly average temperature, 70.4°F

(Figure 3). The maximum temperature, 77.6°F, was recorded in the forebay at 1930 hours on July 22 at Unit 14.

The average weekly temperature differentials within dam locations were: 1.8°F, forebay; 2.8°F, gatewells; 0.5°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, 8.6°F, was recorded on July 22 in the forebay at 1930 hours (Unit 14 high, Unit 12 low).

The average weekly temperature differential between the forebay and corresponding gatewell was 1.1°F. The forebay was warmer than the corresponding gatewell on average across the powerhouse. The largest temperature differential was 7.3°F at 2030 hours on July 22 at Unit 10 (forebay greater than gatewell; Figure 5). The average weekly temperature differential between the gatewell and corresponding collection channel location was 1.2°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 5.6°F at 2030 on July 22 at Unit 8 (gatewell greater than collection channel).

Table 1
Bypass, Mortality, and River and Weather Conditions from 0700 Hours July 19 to 0700 Hours July 25

Date	Fish Collected	Fish Bypassed	Mortality		Avg. River Flow	Avg. Turbine Flow	Avg. Spill	Air Temperature		Wind Speed	
			Sample	Facility				Avg.	Max	Avg.	Max
19-Jul					154.4	61.8	87.9	67.5	83.3	1.6	4.0
20-Jul	1,960	1,958	0	2	161.7	65.0	92.0	71.3	87.0	2.0	7.0
21-Jul					156.7	62.8	89.2	75.5	93.8	1.7	5.0
22-Jul	2,620	2,619	0	1	136.4	53.8	77.9	79.9	100.5	1.8	4.0
23-Jul					147.8	58.9	84.2	79.1	96.9	3.9	12.0
24-Jul	717	715	1	1	143.9	57.0	82.2	71.1	86.5	3.1	9.0
25-Jul					148.7	59.1	84.9	60.4	66.1	2.3	4.0
Weekly Total	**5,297**	**5,292**	**1**	**4**	**149.9**	**59.8**	**85.5**	**73.6**	**74.5**	**2.3**	6.4

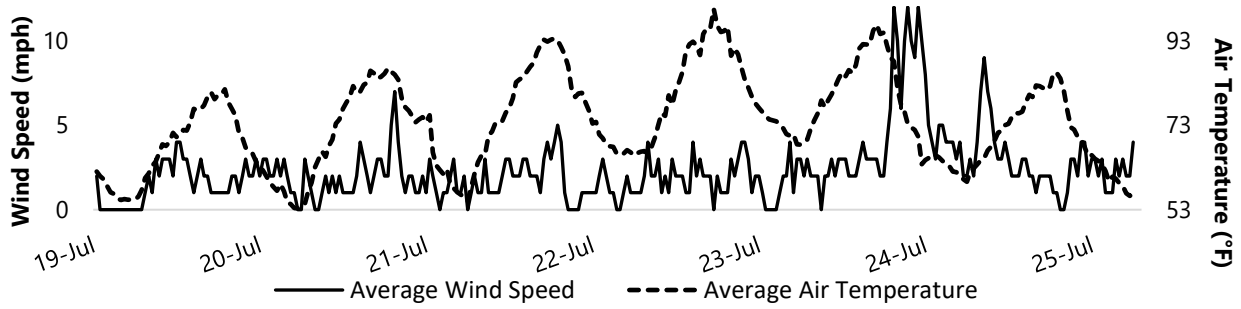

Figure 1
Average Wind Speed and Air Temperature for Each Half-Hour Interval from 0700 Hours July 19 to 0700 Hours July 25

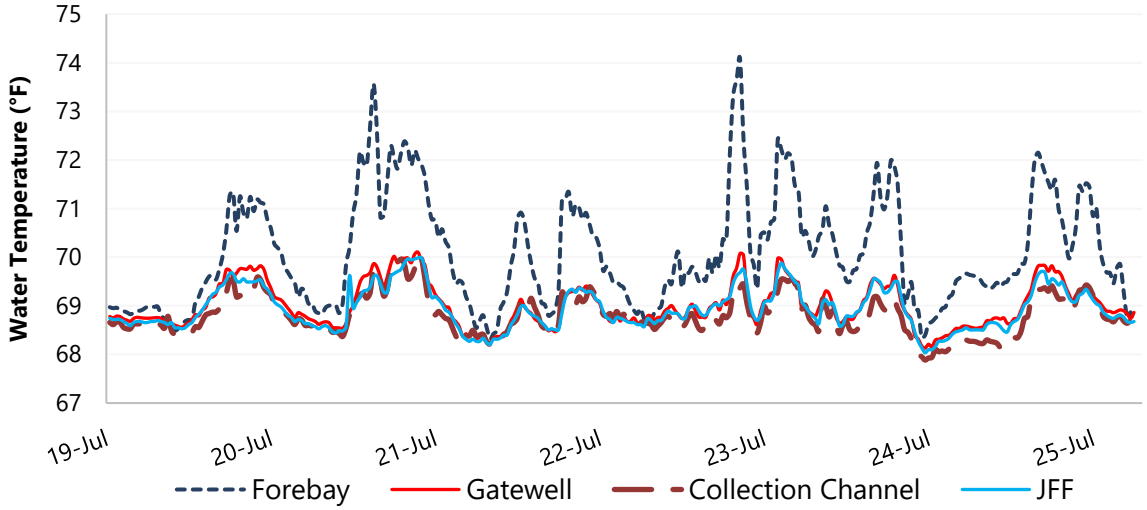

Figure 2
Average Water Temperatures for Each Half-Hour Interval for Four Dam Locations from 0700 Hours July 19 to 0700 Hours July 25

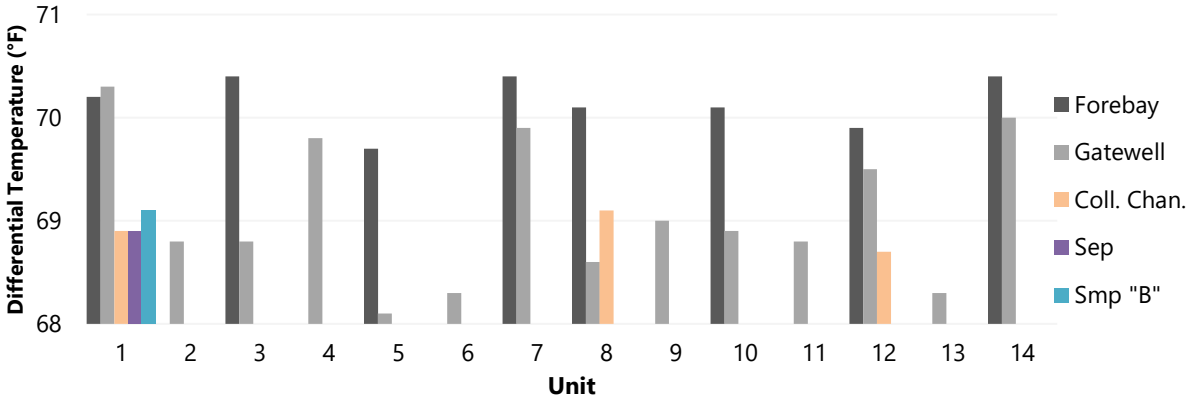

Figure 3
Average Weekly Water Temperatures by Position for Five Dam Locations from 0700 Hours July 19 to 0700 Hours July 25

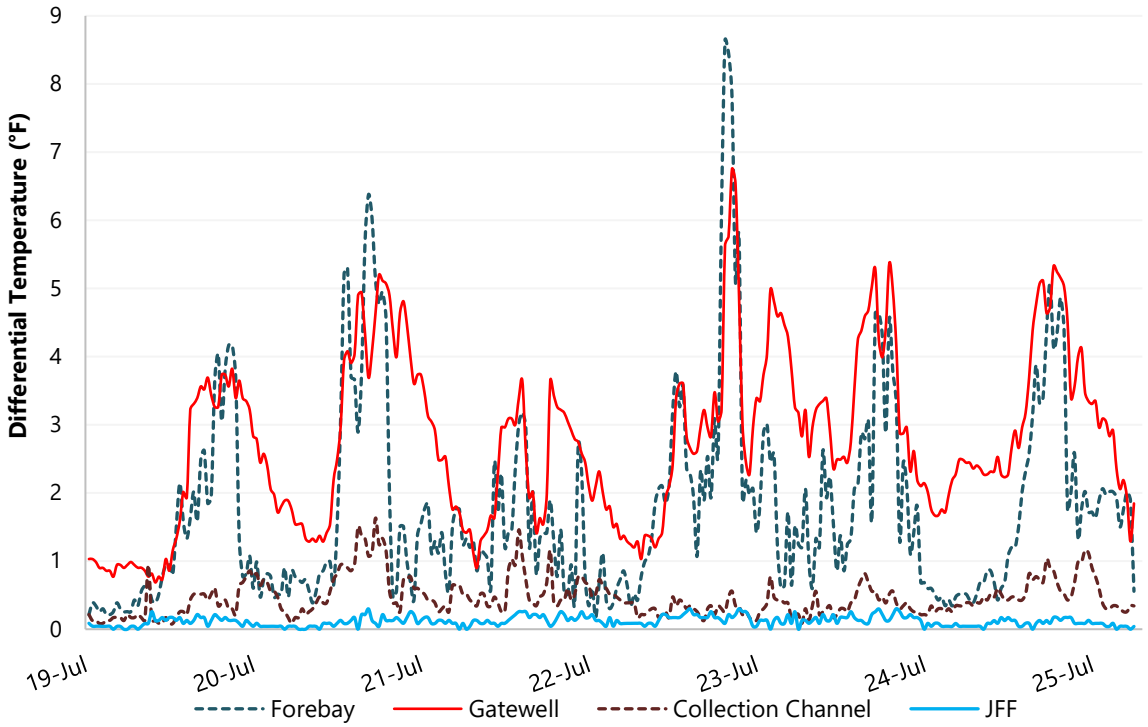

Figure 4
Average Differential Temperatures Within Four Dam Locations from 0700 Hours July 19 to 0700 Hours July 25

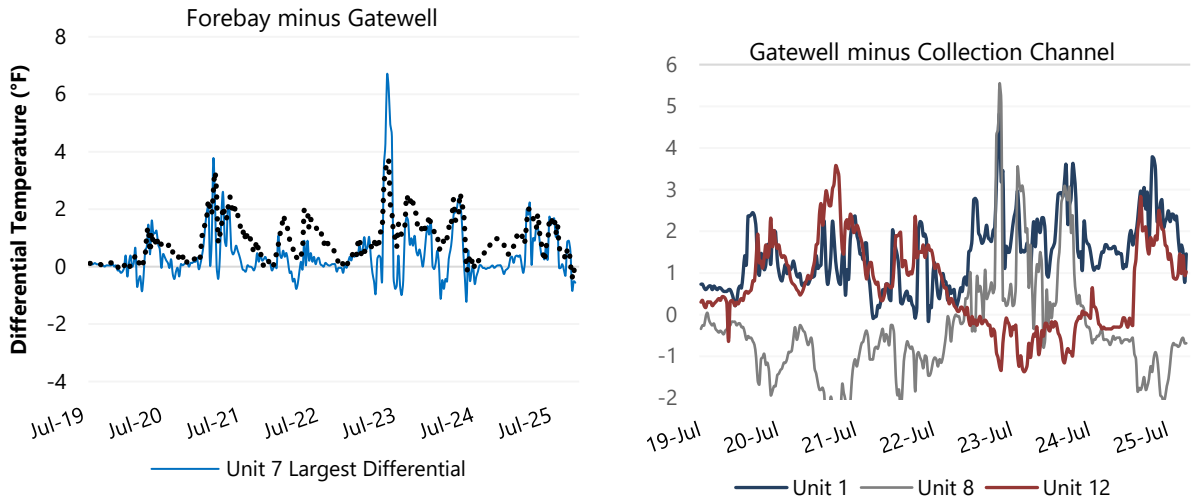

Figure 5
Average Differential Temperatures across Three Dam Locations from 0700 Hours July 19 to 0700 Hours July 25