1201 3rd Avenue, Suite 2600
Seattle, Washington 98101
206.287.9130

Weekly Temperature Report
McNary Dam

July 22, 2019

Prepared by: Alexis Bonoff, Anchor QEA, LLC

Report Period: July 12 to July 18, 2019

Report No. 2019 Anchor QEA: MCN Temperature Weekly for 0712-0718

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

Fish Collection

An estimated 12,930 juvenile salmonids were collected and 12,928 bypassed the McNary Juvenile Fish Facility (JFF; Table 1), comprising 100% subyearling Chinook salmon. There were 2 total facility mortalities; the 2 were sample mortalities.

River Conditions

Average river flow for this reporting period was 151,100 cubic feet per second (151.0 kcfs) with an average spill of 86.0 kcfs. Sawtooth pattern began on July 14 at 0600.

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 12 to 0700 hours July 18, 2019, was 70.4°F. The weekly average nighttime temperature was 80.2°F. Temperatures ranged from a maximum of 91.2°F at 1700 hours on July 12 to a minimum of 63.0°F at 0600 hours on July 14 (Figure 1).

Winds averaged 3.2 miles per hour (mph) and were predominately from the northeast. The highest average wind speed was 12.0 mph at 1930 on July 17, and the highest gusts were up to 28 mph at 0730 hours on July 17.

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: 69.9°F, forebay (weekly average of 8 positions); 68.7°F, gatewells (weekly average of 14 positions); 68.5°F, collection channel (weekly average of positions at Units 1, 8, and 12); and 68.7°F, JFF (weekly average of the separator and

sample tank "B"). The forebay at Unit 1 had the highest weekly average temperature, 70.8°F (Figure 3). The maximum temperature, 73.9°F, was recorded in the forebay at 1430 hours on July 13 at Unit 3.

The average weekly temperature differentials within dam locations were: 2.3°F, forebay; 3.9°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, 7.3°F, was recorded on July 12 in the gatewells at 1700 hours (Unit 9 high, Units 2,3,4 low).

The average weekly temperature differential between the forebay and corresponding gatewell was 1.3°F. The forebay was warmer than the corresponding gatewell on average across the powerhouse. The largest temperature differential was 7.2°F at 1430 hours on July 13 at Unit 7 (forebay greater than gatewell; Figure 5). The average weekly temperature differential between the gatewell and corresponding collection channel location was 1.6°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 5.4°F at 1630 on July 13 at Unit 8 (gatewell greater than collection channel).

Table 1
Bypass, Mortality, and River and Weather Conditions from 0700 Hours July 12 to 0700 Hours July 18

Date	Fish Collected	Fish Bypassed	Mortality		Avg. River Flow	Avg. Turbine Flow	Avg. Spill	Air Temperature		Wind Speed	
			Sample	Facility				Avg.	Max	Avg.	Max
12-Jul	3,650	3,650	0	0	149.4	59.6	85.0	76.5	91.2	1.9	4.0
13-Jul					156.9	62.9	89.3	76.9	89.4	3.1	9.0
14-Jul	4,180	4,178	2	0	164.9	66.4	93.8	75.5	91.2	2.2	4.0
15-Jul					153.2	61.4	87.2	74.0	83.2	3.0	8.0
16-Jul	3,200	3,200	0	0	148.1	59.1	84.3	74.5	86.7	2.5	4.0
17-Jul					134.4	53.1	76.6	74.3	83.9	6.5	12.0
18-Jul	1,900	1,900	0	0	150.3	60.0	85.6	68.3	70.6	3.3	6.0
Weekly Total	**12,930**	**12,928**	**2**	**0**	**151.0**	**60.4**	**86.0**	**75.1**		**3.2**	

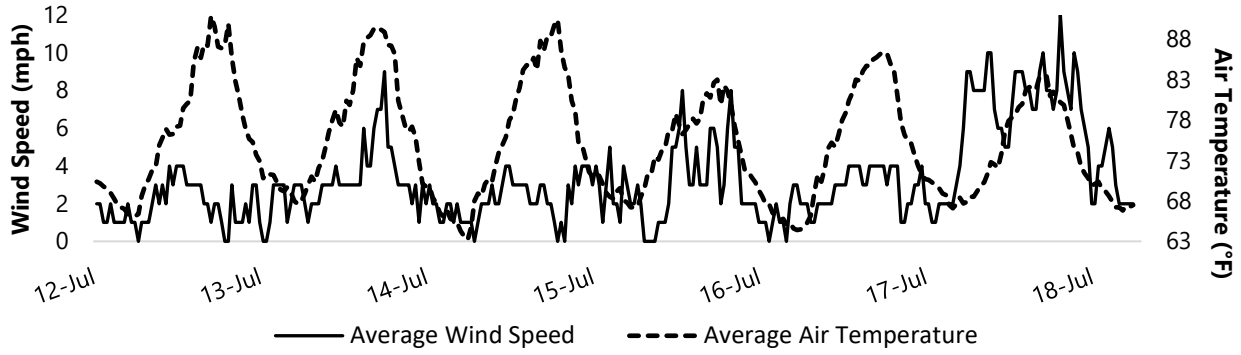

Figure 1
Average Wind Speed and Air Temperature for Each Half-Hour Interval from 0700 Hours July 12 to 0700 Hours July 18

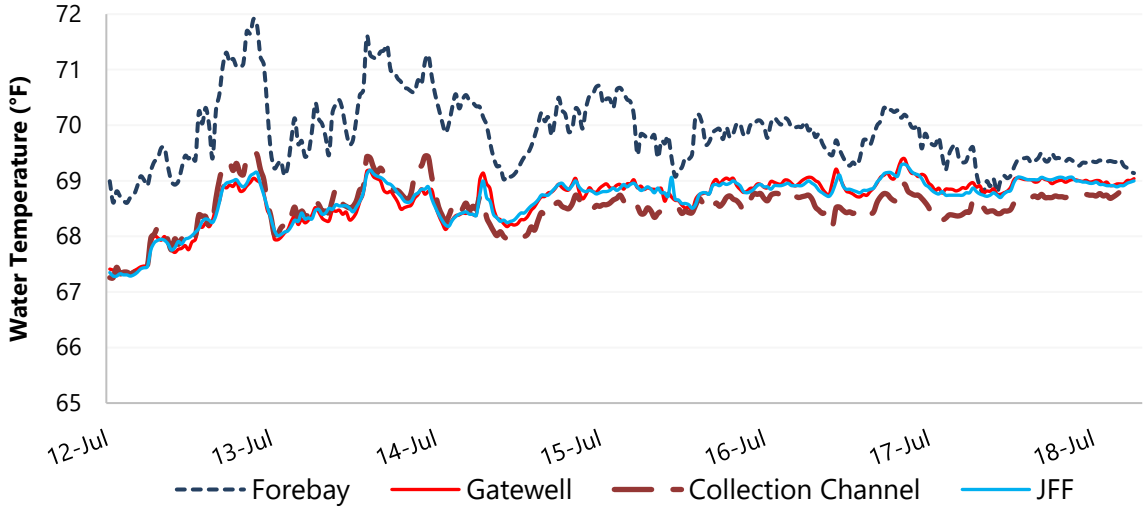

Figure 2
Average Water Temperatures for Each Half-Hour Interval for Four Dam Locations from 0700 Hours July 12 to 0700 Hours July 18

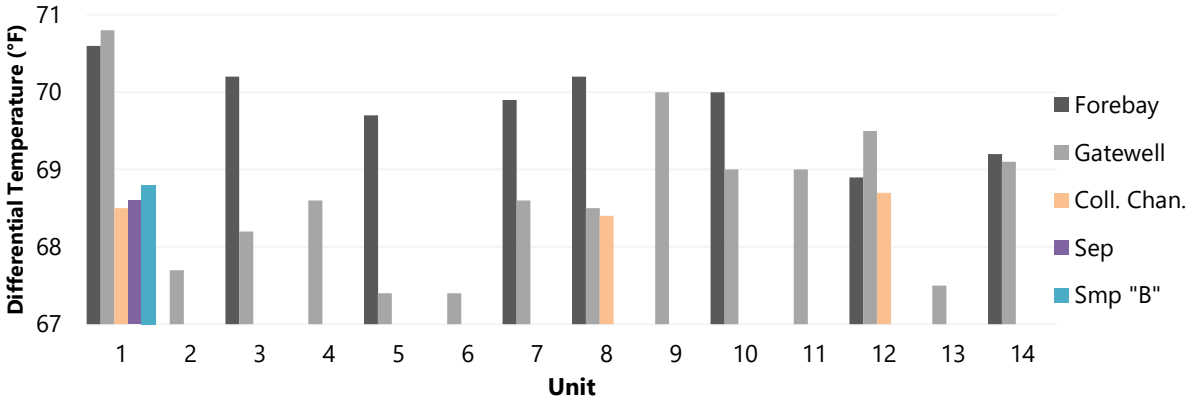

Figure 3
Average Weekly Water Temperatures by Position for Five Dam Locations from 0700 Hours July 12 to 0700 Hours July 18

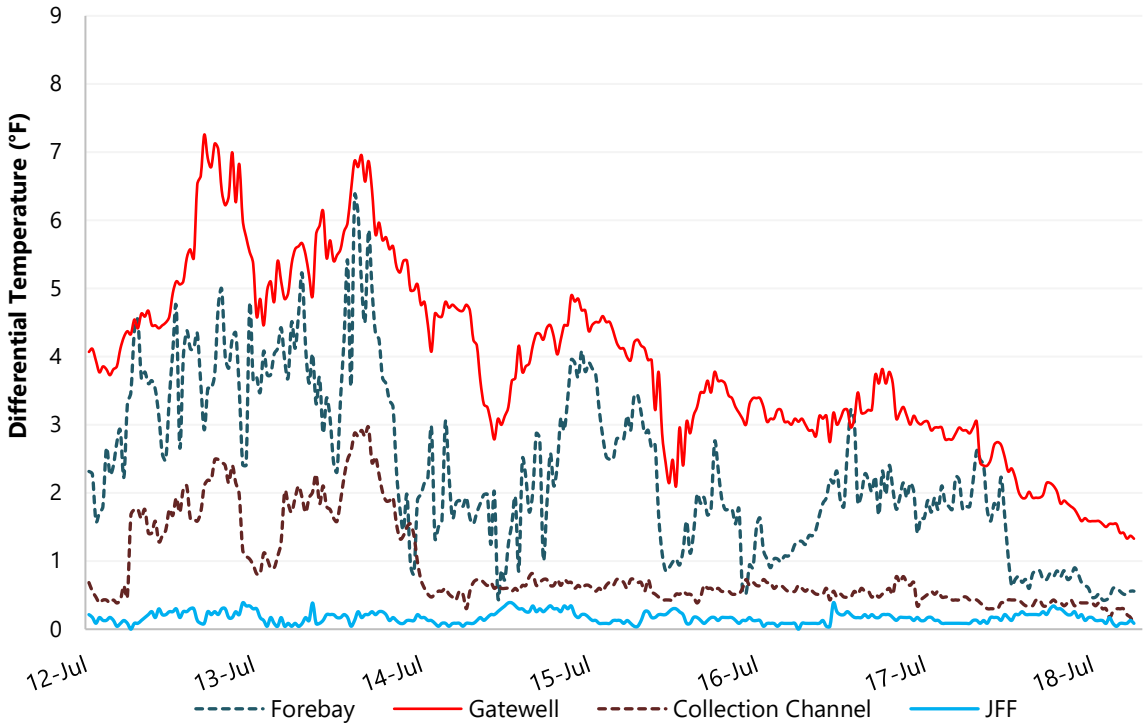

Figure 4
Average Differential Temperatures Within Four Dam Locations from 0700 Hours July 12 to 0700 Hours July 18

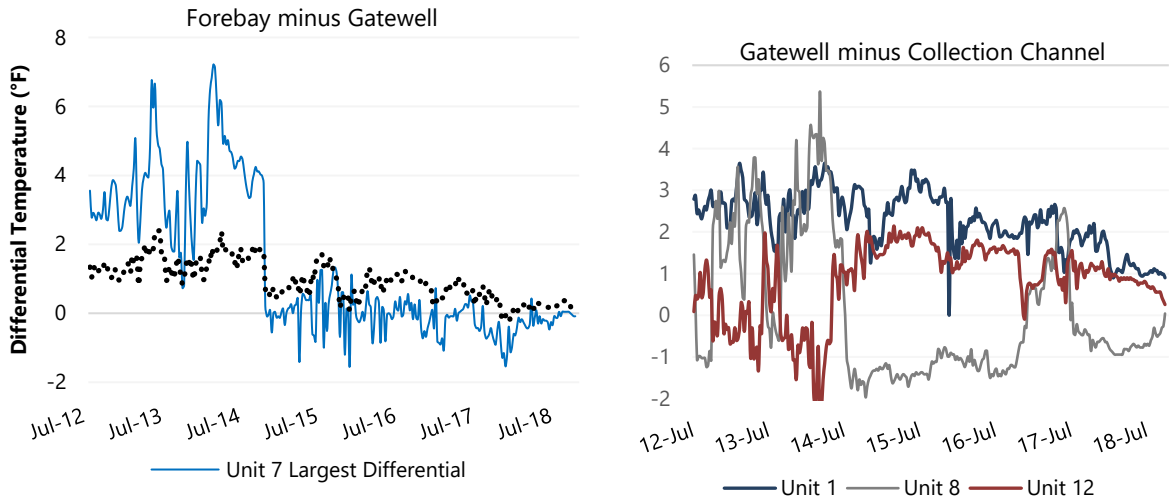

Figure 5
Average Differential Temperatures across Three Dam Locations from 0700 Hours July 12 to 0700 Hours July 18