720 Olive Way, Suite 1900
Seattle, Washington 98101
206.287.9130

ANCHOR QEA

Weekly Temperature Report
McNary Dam

July 10, 2017

Prepared by: Kathleen Carter, Mainstem Fish Research, LLC

Report Period: June 30 to July 6, 2017

Report No. MCN TEMP 17-4

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

Fish Collection

An estimated 277,402 juvenile salmonids were collected and 277,390 bypassed the McNary Juvenile Fish Facility (JFF; Table 1), comprising 99.7% subyearling Chinook salmon, 0.15% coho salmon, and 0.15% sockeye. There were 12 total facility mortalities, comprising 7 sample mortalities and 5 facility mortalities.

River Conditions

Average river flow for this reporting period was 250,800 cubic feet per second (250.8 kcfs), with an average spill of 125.8 kcfs.

Temperature Logger Operations

A temperature logger was deployed at the JFF outfall pipe at 1200 hours on July 3. It was affixed to the downstream railing approximately 40 feet from the north end and is in approximately 10 feet of water. Data were downloaded on July 6, at which time it was discovered that the logger had stopped logging at 2330 on July 4. It was replaced at 1130 on July 7.

Weather Conditions

The weekly average daytime temperature for 0700 hours June 29 to 0700 hours July 6, 2017, was 78.8 °F. The weekly average nighttime temperature was 72.0 °F. Temperatures ranged from a maximum of 97.1 °F at 1500 on July 5 to a minimum of 58.4 °F at 0700 hours on June 29 (Figure 1).

Winds averaged 0.5 miles per hour (mph) and were predominately from the north. The wind was highest at 0500 hours on July 6, with winds averaging 7.0 mph and gusts up to 11 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: 67.7 °F, forebay, (weekly

average of 8 positions); 66.8 °F, gatewells, (weekly average of 14 positions); 66.9 °F, collection channel, (weekly average of positions at Units 1, 8, and 12); 67.0 °F, JFF, (weekly average of the separator and sample tank "B") and 66.0°F outfall pipe. The forebay at Unit 5 had the highest weekly average temperature, 68.0 °F (Figure 3). The maximum temperature, 77.7 °F, was recorded in the forebay at 1500 hours on July 5 at Unit 12.

The average weekly temperature differentials within dam locations were: 2.8 °F, forebay; 3.4 °F, gatewells; 0.8 °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, 10.6 °F was recorded in the forebay at 1400 hours on July 5 (Unit 14 low, Unit 3 high).

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 1530 hours on July 5 at Unit 10 (forebay greater than gatewell; Figure 5). The average weekly temperature differential between the gatewell and collection channel was 0.7 °F. On average, the gatewell was warmer than the collection channel at Unit 12, equal to the collection channel at Unit 8, and cooler than the collection channel at Unit 1. The largest temperature differential between the gatewell and corresponding collection channel location was 5.4 °F at 2000 on July 4 at Unit 1.

Table 1
Bypass, Mortality, and River and Weather Conditions from 0700 Hours June 29 to 0700 Hours July 6

Date	Fish Collected	Fish Bypassed	Mortality		Avg. River Flow	Avg. Turbine Flow	Avg. Spill	Air Temperature		Wind Speed	
			Sam.	Fac.				Avg.	Max	Avg.	Max
6/29-30	75,000	74,998	1	1	273.2	131.6	136.9	70.3	83.6	0.5	4.0
6/30-7/1					258.8	124.4	129.7	74.8	93.2	0.4	6.0
7/1-2	81,200	81,200	0	0	265.2	127.3	133.2	74.5	91.0	0.1	1.0
7/2-3					239.6	114.6	120.3	76.2	93.8	0.2	2.0
7/3-4	66,101	66,093	5	3	234.2	111.9	117.6	74.4	90.1	0.5	3.0
7/4-5					256.4	123.1	128.6	75.2	95.1	0.7	4.0
7/5-6	55,101	55,099	1	1	228.2	109.0	114.5	80.7	97.1	1.2	7.0
Weekly Total	**277,402**	**277,390**	**7**	**5**	**250.8**	**120.3**	**125.8**	**75.3**		**0.5**	

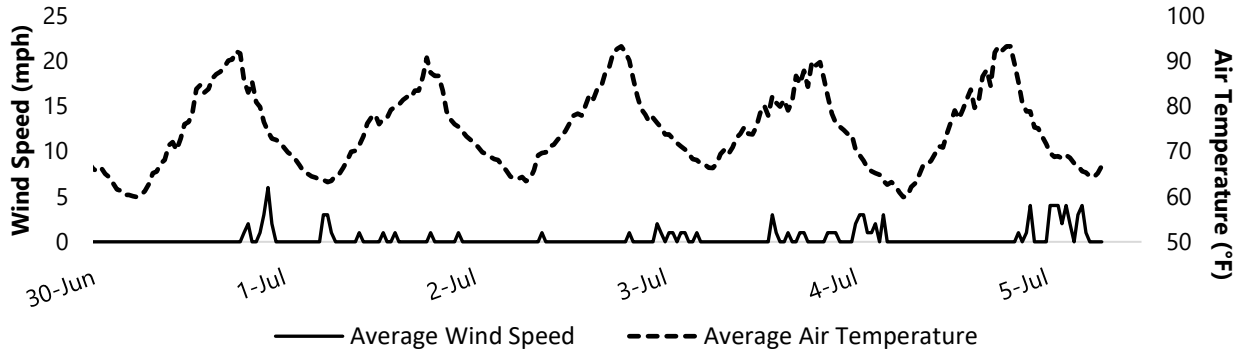

Figure 1
Average Wind Speed and Air Temperature for Each Half-Hour Interval from 0700 Hours June 29 to 0700 Hours July 6

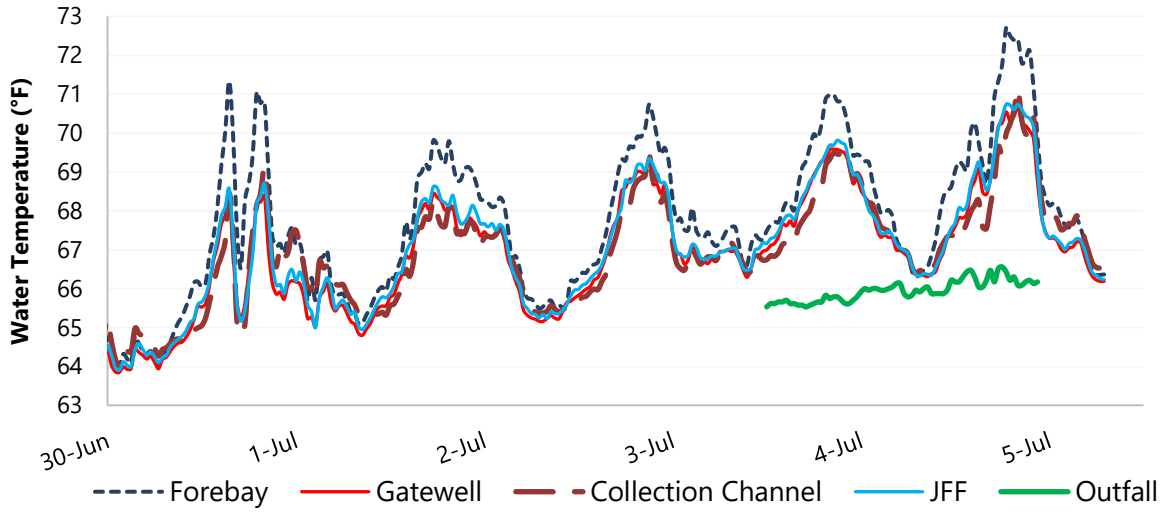

Figure 2
Average Water Temperatures for Each Half-Hour Interval for Five Dam Locations from 0700 Hours June 29 to 0700 Hours July 6

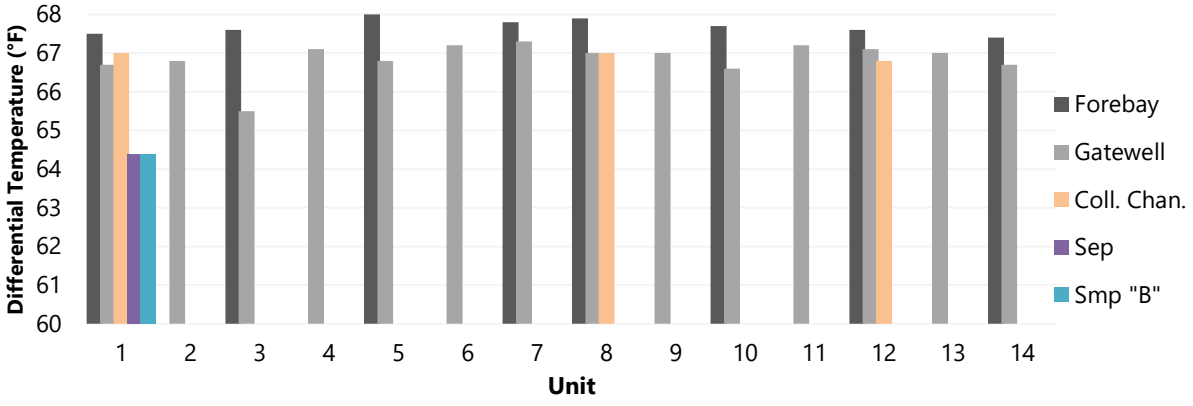

Figure 3
Average Weekly Water Temperatures by Position for Five Dam Locations from 0700 Hours June 29 to 0700 Hours July 6

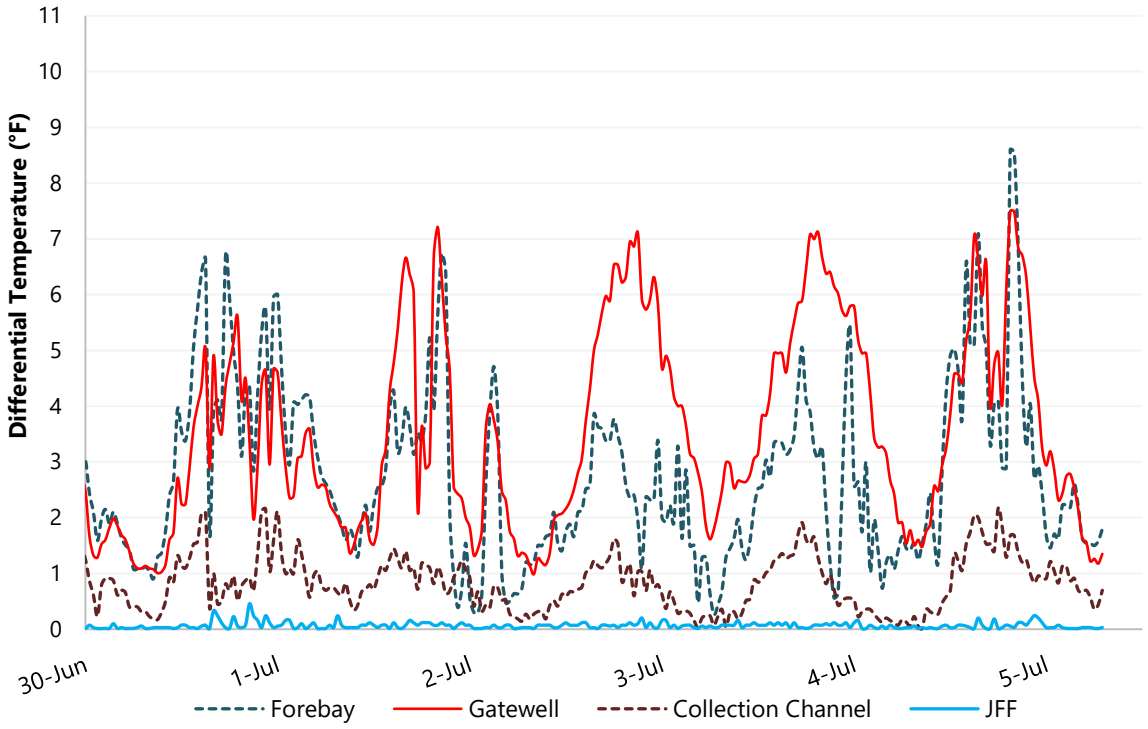

Figure 4
Average Differential Temperatures Within Four Dam Locations from 0700 Hours June 29 to 0700 Hours July 6

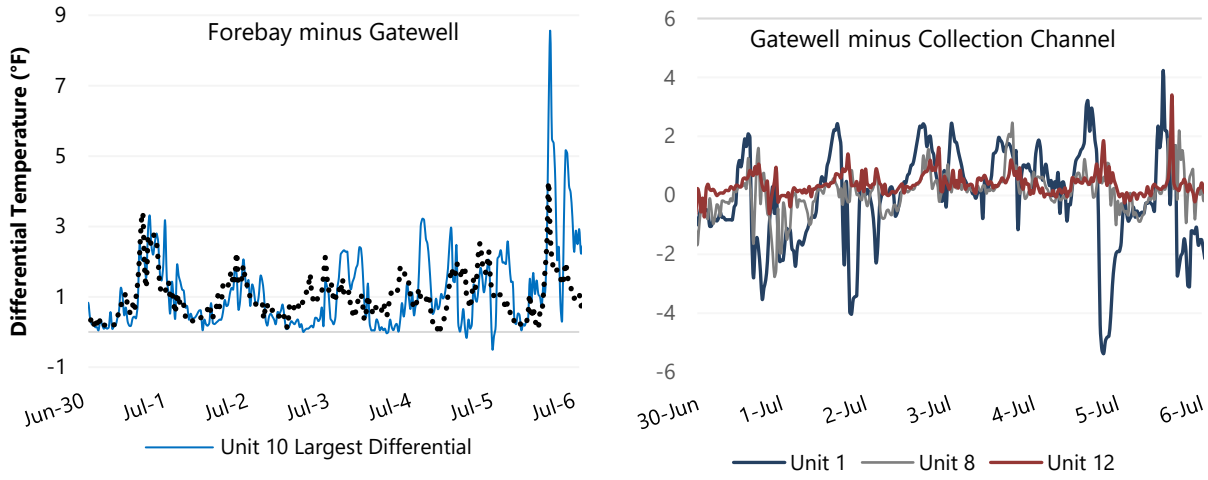

Figure 5
Average Differential Temperatures Across Three Dam Locations from 0700 Hours June 29 to 0700 Hours July 6