720 Olive Way, Suite 1900
Seattle, Washington 98101
206.287.9130

ANCHOR QEA

Weekly Temperature Report
McNary Dam

August 14, 2017

Prepared by: Kathleen Carter, Mainstem Fish Research, LLC

Report Period: August 4 to August 10, 2017

Report No. MCN TEMP 17-9

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

Fish Collection

An estimated 6,701 juvenile salmonids were collected and 6,697 bypassed the McNary Juvenile Fish Facility (JFF; Table 1), comprising 99.7% subyearling Chinook salmon, 0.3% sockeye, and <0.1% steelhead. There were 4 total facility mortalities, comprising 1 sample mortality and 3 facility mortalities.

River Conditions

Average river flow for this reporting period was 144,300 cubic feet per second (144.3 kcfs), with an average spill of 72.4 kcfs.

Temperature Logger Operations

All operations proceeded as normal this week.

Weather Conditions

The weekly average daytime temperature for 0700 hours August 3 to 0700 hours August 10, 2017, was 83.1 °F. The weekly average nighttime temperature was 76.1 °F. Temperatures ranged from a maximum of 99.2 °F at 1530 hours on August 4 and 1800 hours on August 9 to a minimum of 63.7 °F at 0700 hours on August 3 (Figure 1). There was heavy smoke during the entire week.

There was little to no wind for the majority of the week. Winds averaged 0.1 miles per hour (mph) and were predominately from the west south west when present. The wind was highest at 1730 hours on August 3, with winds averaging 5.0 mph and gusts up to 9 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: 73.4 °F, forebay, (weekly average of 8 positions); 71.9 °F, gatewells, (weekly average of 14 positions); 72.2 °F, collection

channel, (weekly average of positions at Units 1, 8, and 12); 71.8 °F, JFF, (weekly average of the separator and sample tank "B"); and 71.2°F, outfall pipe. The forebay at Unit 1 had the highest weekly average temperature, 74.1 °F (Figure 3). The maximum temperature, 80.1 °F, was recorded in the forebay at 1630 hours on August 8 at Unit 12.

The average weekly temperature differentials within dam locations were: 2.6 °F, forebay; 3.4 °F, gatewells; 0.9 °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, 8.9 °F was recorded in the forebay at 1630 hours on August 8 (Unit 12 high, Unit 8 low).

The average weekly temperature differential between the forebay and corresponding gatewell was 1.8 °F. The forebay was warmer than the corresponding gatewell on average across the powerhouse. The largest temperature differential was 9.6 °F at 1600 hours on August 9 at Unit 7 (forebay greater than gatewell; Figure 5). The average weekly temperature differential between the gatewell and corresponding collection channel location was 0.9 °F. On average, the gatewell was warmer than the collection channel at Unit 8 and Unit 12, and cooler than the collection channel at Unit 1. The largest temperature differential between the gatewell and corresponding collection channel location was 3.7 °F at 1500 on August 9 at Unit 1 (collection channel low, gatewell high).

Table 1
Bypass, Mortality, and River and Weather Conditions from 0700 Hours August 3 to 0700 Hours August 10

Date	Fish Collected	Fish Bypassed	Mortality		Avg. River Flow	Avg. Turbine Flow	Avg. Spill	Air Temperature		Wind Speed	
			Sam.	Fac.				Avg.	Max	Avg.	Max
8/3-4					151.9	71.0	76.2	79.2	93.8	0.6	5.0
8/4-5	3,260	3,259	0	1	150.0	70.0	75.4	82.2	99.2	0.0	0.0
8/5-6					144.5	67.3	72.5	77.2	92.3	0.0	0.0
8/6-7	2,060	2,059	0	1	138.1	64.2	69.2	78.5	93.8	0.0	0.0
8/7-8					125.5	57.9	62.9	78.6	94.0	0.0	0.0
8/8-9	1,381	1,379	1	1	146.6	68.5	73.4	79.4	95.9	0.0	0.0
8/9-10					153.5	71.9	76.9	80.8	99.2	0.0	0.0
Weekly Total	**6,701**	**6,697**	**1**	**3**	**144.3**	**67.3**	**72.4**	**79.6**		**0.1**	

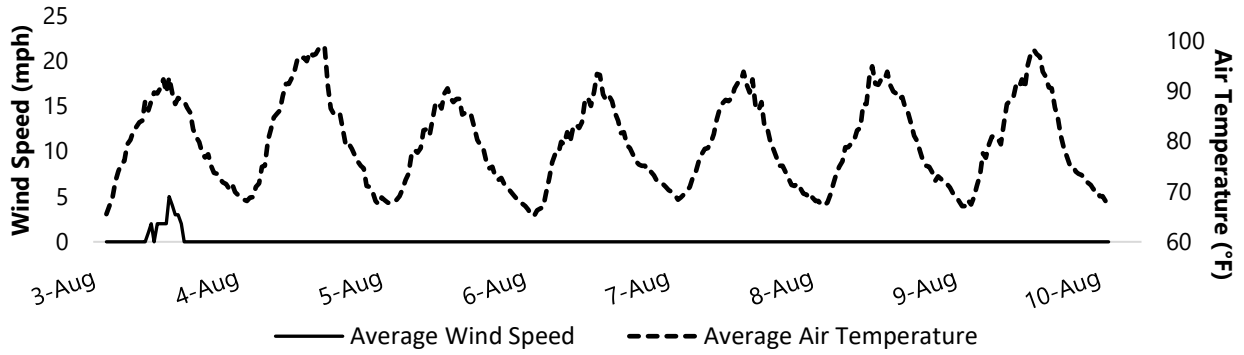

Figure 1
Average Wind Speed and Air Temperature for Each Half-Hour Interval from 0700 Hours August 3 to 0700 Hours August 10

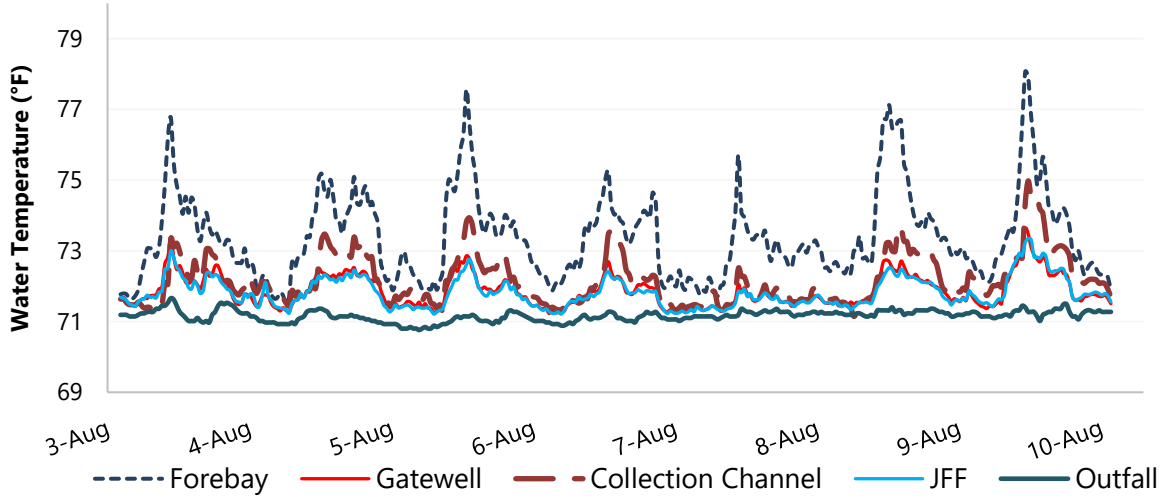

Figure 2
Average Water Temperatures for Each Half-Hour Interval for Five Dam Locations from 0700 Hours August 3 to 0700 Hours August 10

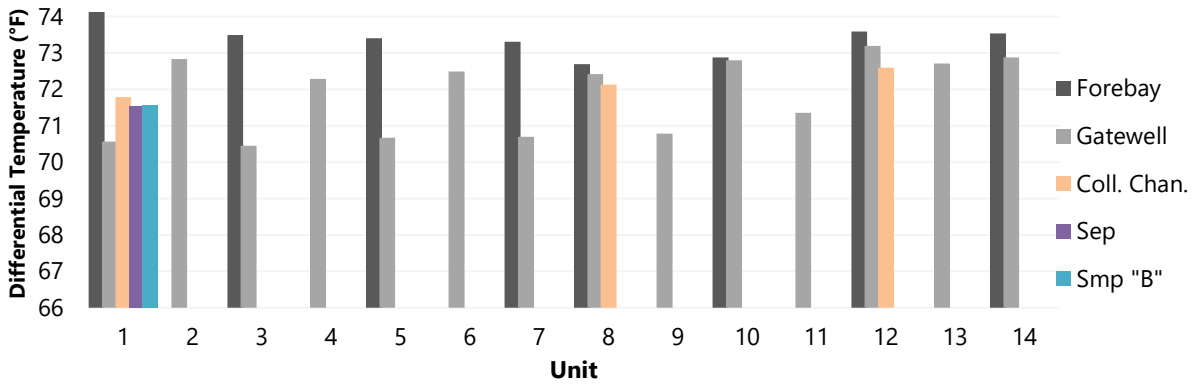

Figure 3
Average Weekly Water Temperatures by Position for Five Dam Locations from 0700 Hours August 3 to 0700 Hours August 10

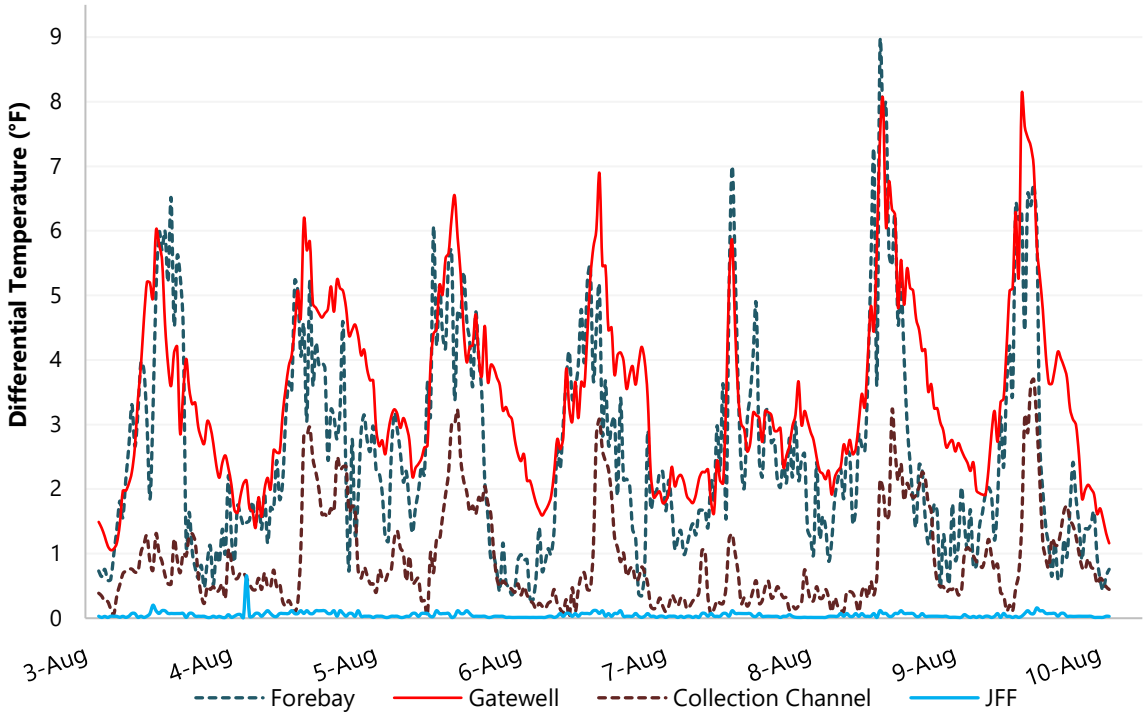

Figure 4
Average Differential Temperatures Within Four Dam Locations from 0700 Hours August 3 to 0700 Hours August 10

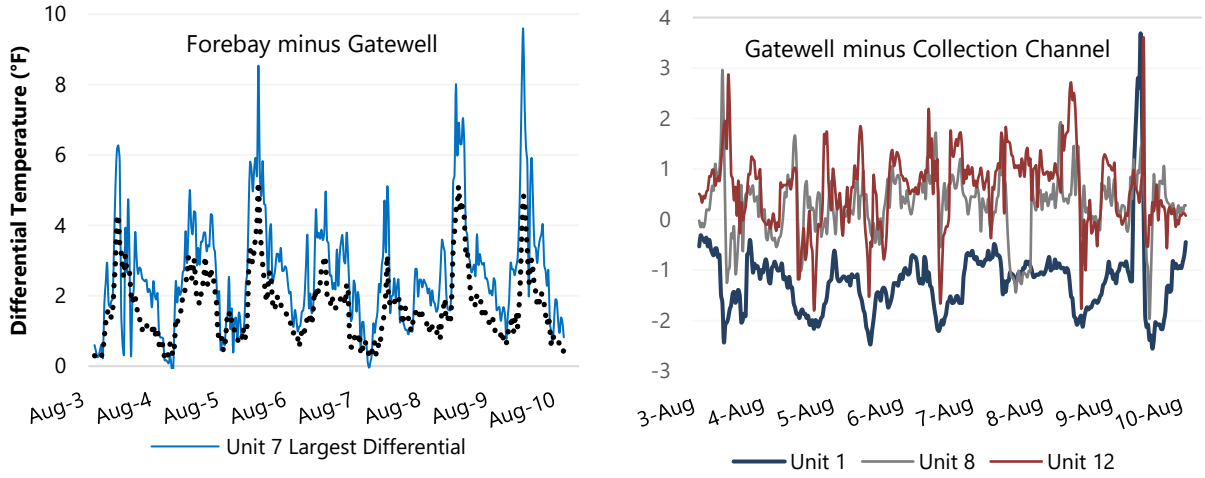

Figure 5
Average Differential Temperatures Across Three Dam Locations from 0700 Hours August 3 to 0700 Hours August 10