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Weekly Temperature Report
McNary Dam

June 24, 2019

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Report Period: June 15 to 20, 2019

Report No. 2019 Anchor QEA: MCN Temperature Weekly for 0615-0620

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

This weekly report includes 6 days of temperature monitoring beginning June 15 as the start date of the Temperature Monitoring Project at McNary Dam.

Fish Collection

An estimated 33,461 juvenile salmonids were collected and 33,452 bypassed the McNary Juvenile Fish Facility (JFF; Table 1), comprising 94.4% subyearling Chinook salmon, 3.1% yearling Chinook salmon, 1.1% steelhead, 0.8% unclipped coho, and 0.7% sockeye. There were 9 total facility mortalities, 7 sample mortalities, and 2 facility mortalities.

River Conditions

Average river flow for this reporting period was 203,200 cubic feet per second (203.2 kcfs) with an average spill of 122.8 kcfs.

Temperature Logger Operations

There were no operations that affected the collection of data from the loggers this week.

Weather Conditions

The weekly average daytime temperature for 0700 hours June 15 to 0700 hours June 20, 2019, was 76.3°F. The weekly average nighttime temperature was 67.6°F. Temperatures ranged from a maximum of 93.0°F at 1930 hours on June 15 to a minimum of 53.0°F at 0630 hours on June 20 (Figure 1).

Winds averaged 3.9 miles per hour (mph) and were predominately from the northeast. The highest average wind speed was 16.0 mph at 1530 to 1630 hours and at 1700 hours on June 19, and the highest gusts were up to 33 mph at 2000 hours on June 19.

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: 64.5°F, forebay (weekly average of 8 positions); 63.6°F, gatewells (weekly average of 14 positions); 63.7°F, collection channel (weekly average of positions at Units 1, 8, and 12); and 63.8°F, JFF (weekly average of the separator and sample tank "B"). The forebay at Unit 7 had the highest weekly average temperature, 65.5°F (Figure 3). The maximum temperature, 73.1°F, was recorded in the forebay at 1700 hours on June 15 at Unit 14.

The average weekly temperature differentials within dam locations were: 4.4°F, forebay; 4.7°F, gatewells; 1.1°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, 12.5°F, was recorded on June 15 in the forebay at 1530 hours (Unit 12 high, Unit 14 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 7.6°F at 2030 hours on June 20 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 6.2°F at 1900 on June 15 at Unit 1 (gatewell greater than collection channel).

Table 1
Bypass, Mortality, and River and Weather Conditions from 0700 Hours June 15 to 0700 Hours June 20

Date	Fish Collected	Fish Bypassed	Mortality		Avg. River Flow	Avg. Turbine Flow	Avg. Spill	Air Temperature		Wind Speed	
			Sample	Facility				Avg.	Max	Avg.	Max
14-Jun	3,480	3,479	1	0	230.2	72.5	153.0	70.8	84.5	3.0	8.0
15-Jun					216.1	68.6	142.9	73.5	93.0	2.6	7.0
16-Jun	4,640	4,638	2	0	202.6	75.4	122.4	75.7	90.0	2.0	4.0
17-Jun					206.2	84.0	117.5	75.5	90.8	2.3	5.0
18-Jun	10,340	10,337	2	1	197.0	79.7	112.6	70.7	84.3	5.3	10.0
19-Jun					198.7	80.4	113.6	64.0	74.2	8.2	16.0
20-Jun	15,001	14,998	2	1	171.3	68.7	97.9	55.4	58.6	5.1	7.0
Weekly Total	**33,461**	**33,452**	**7**	**2**	**203.2**	**75.6**	**122.8**	**71.8**		**3.9**	

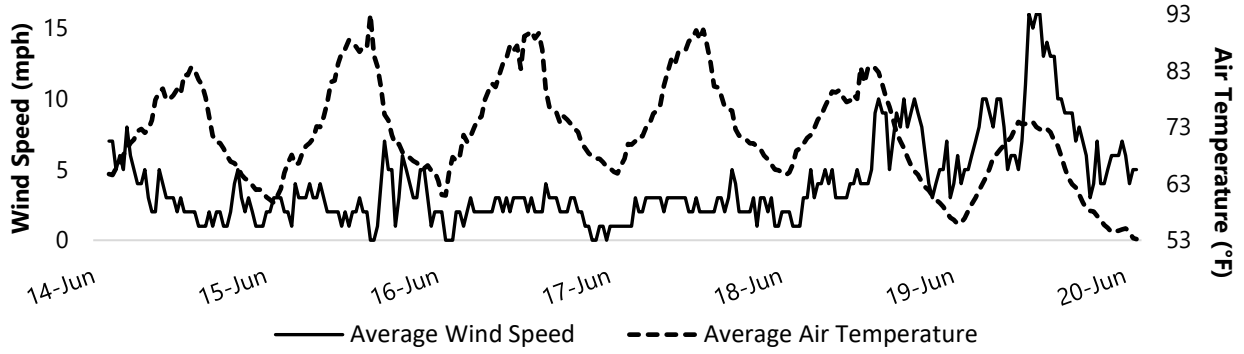

Figure 1
Average Wind Speed and Air Temperature for Each Half-Hour Interval from 0700 Hours June 15 to 0700 Hours June 20

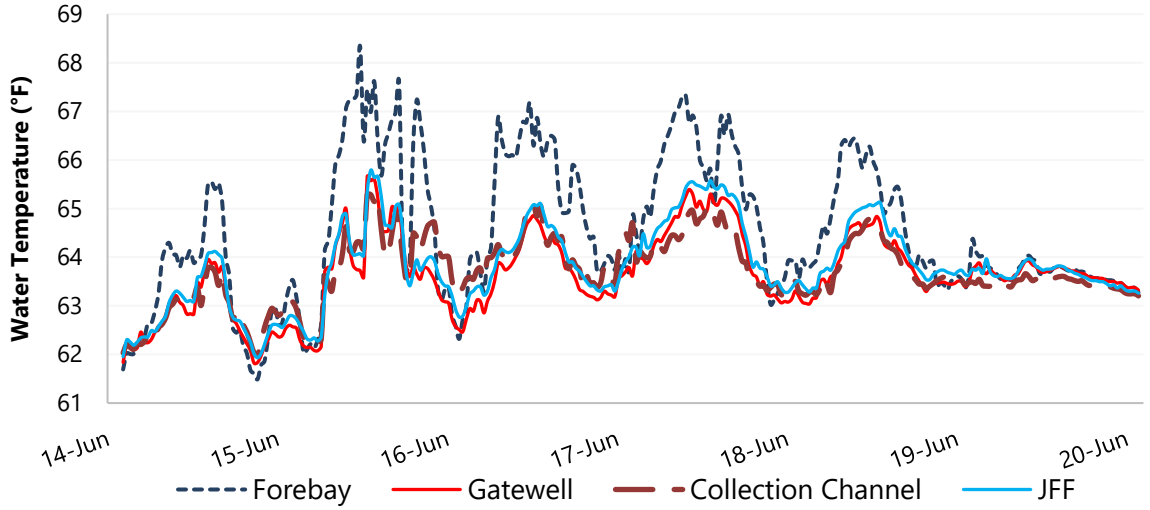

Figure 2
Average Water Temperatures for Each Half-Hour Interval for Four Dam Locations from 0700 Hours June 15 to 0700 Hours June 20

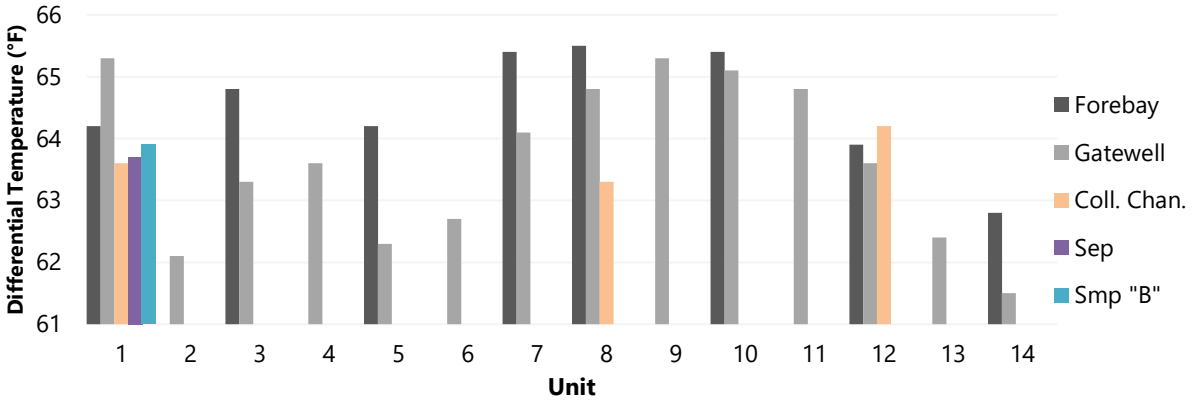

Figure 3
Average Weekly Water Temperatures by Position for Five Dam Locations from 0700 Hours June 15 to 0700 Hours June 20

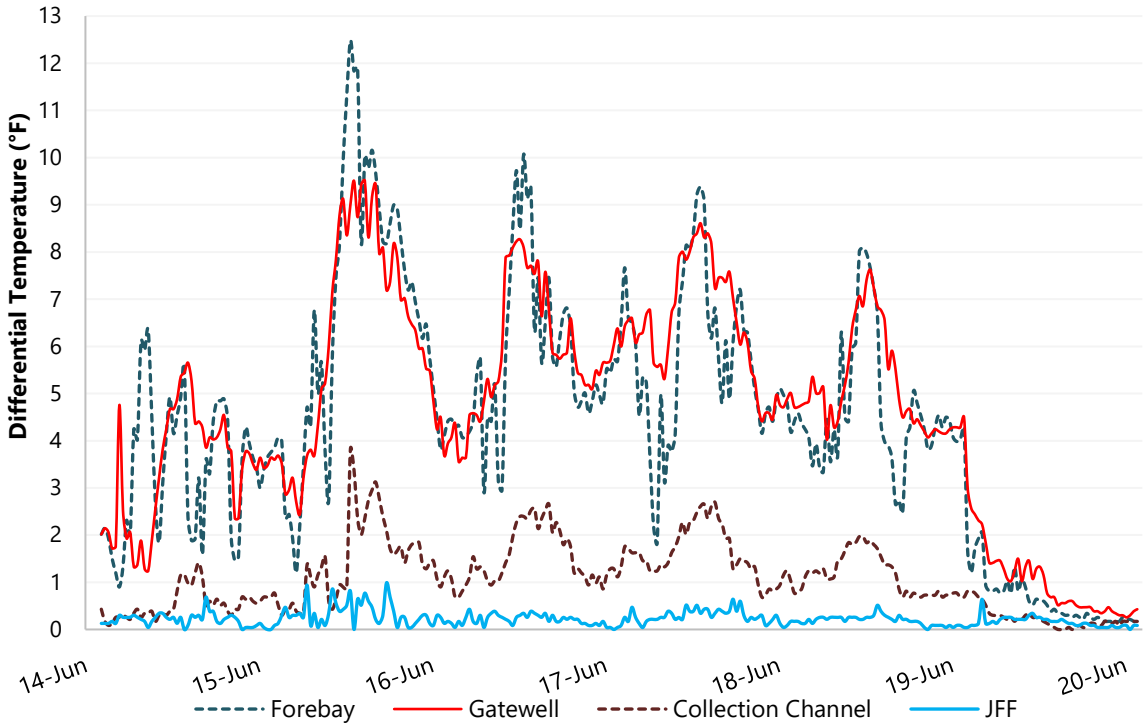

Figure 4
Average Differential Temperatures Within Four Dam Locations from 0700 Hours June 15 to 0700 Hours June 20

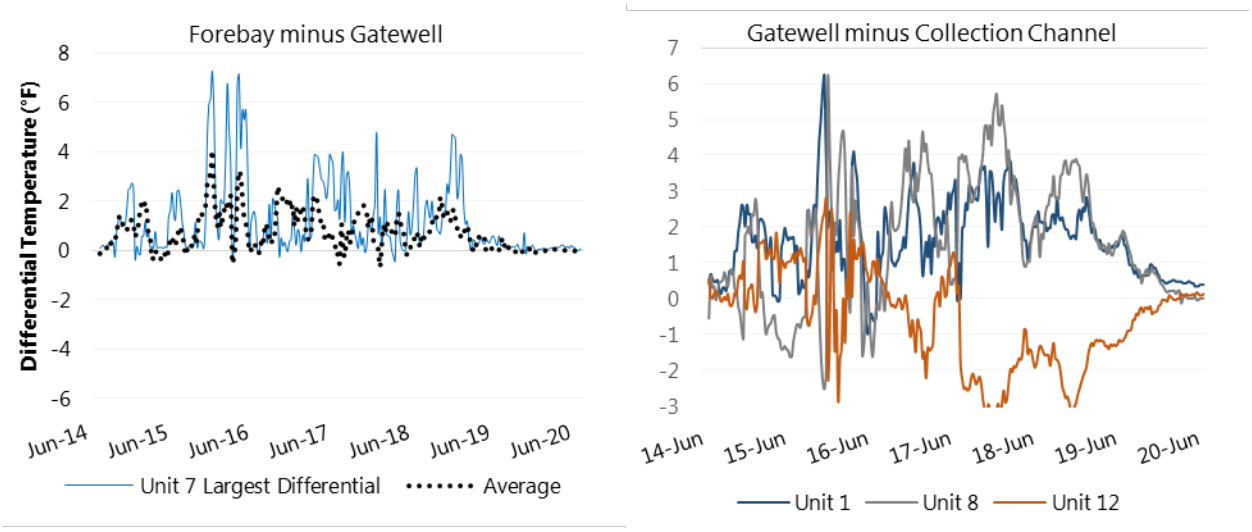

Figure 5
Average Differential Temperatures Across Three Dam Locations from 0700 Hours June 15 to 0700 Hours June 20