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

ANCHOR QEA

Weekly Temperature Report
McNary Dam

August 12, 2019

Prepared by: Alexis Bonoff, Anchor QEA, LLC

Report Period: August 2 to 8, 2019

Report No. 2019 Anchor QEA: MCN Temperature Weekly for 0802-0808

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

Fish Collection

An estimated 2,612 juvenile salmonids were collected and 2,610 bypassed at the McNary Juvenile Fish Facility (JFF; Table 1), comprising 98.8% subyearling Chinook salmon, 1.1% sockeye, and 0.2% steelhead. There were 2 total facility mortalities, comprising 2 sample mortalities and 0 facility mortalities.

River Conditions

Average river flow for this reporting period was 157,700 cubic feet per second (157.7 kcfs) with an average spill of 90.7.6 kcfs. On August 6, from 1724 to 2023, due to an issue at a Bonneville Power Administration substation, all turbines tripped offline, resulting in a high spill percentage during that time. Restoring project systems resulted in a brief power outage at the Juvenile Fish Facility and the channel. Collection was not affected.

Temperature Logger Operations

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

Weather Conditions

The weekly average daytime temperature for 0700 hours August 2 to 0700 hours August 8, 2019, was 85.4°F. The weekly average nighttime temperature was 74.1°F. Temperatures ranged from a maximum of 102.7°F at 1630 hours on August 6 to a minimum of 62.4°F at 0600 hours on August 4 (Figure 1).

Winds averaged 1.5 miles per hour (mph) and were predominately from the west southwest. The highest average wind speed was 7.0 mph at 1700 on August 2, and the highest gusts were up to 21 mph at 1700 hours and 1730 on August 2.

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: 72.4°F, forebay (weekly average of 8 positions); 71.0°F, gatewells (weekly average of 14 positions); 70.8°F, collection channel (weekly average of positions at Units 1, 8, and 12); and 71.0°F, JFF (weekly average of the separator and sample tank "B"). The forebay at Unit 8 had the highest weekly average temperature, 72.8°F (Figure 3). The maximum temperature, 79.5°F, was recorded in the forebay at 1700 hours on August 7 at Unit 10.

The average weekly temperature differentials within dam locations were: 2.4°F, forebay; 3.2°F, gatewells; 0.5°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, 7.5°F, was recorded on August 7 in the forebay at 1700 hours (Unit 10 high, Unit 14 low).

The average weekly temperature differential between the forebay and corresponding gatewell was 1.5°F. The forebay was warmer than the corresponding gatewell on average across the powerhouse. The largest temperature differential was 8.6°F at 1700 hours on August at Unit 7 (forebay greater than gatewell; Figure 5). The average weekly temperature differential between the gatewell and corresponding collection channel location was 1.1°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 4.6°F at 1500 on August 6 at Unit 8 (gatewell greater than collection channel).

Table 1
Bypass, Mortality, and River and Weather Conditions from 0700 Hours August 2 to 0700 Hours August 08

Date	Fish Collected	Fish Bypassed	Mortality		Avg. River Flow	Avg. Turbine Flow	Avg. Spill	Air Temperature		Wind Speed	
			Sample	Facility				Avg.	Max	Avg.	Max
2-Aug					179.1	72.3	102.1	80.4	97.6	1.0	4.0
3-Aug	1,396	1,396	0	0	158.9	63.6	90.6	78.0	90.8	2.4	7.0
4-Aug					150.1	59.9	85.5	75.7	88.7	1.8	5.0
5-Aug	804	803	1	0	149.2	59.5	85.0	78.3	96.6	1.7	4.0
6-Aug					143.1	51.1	87.4	78.8	95.4	1.2	5.0
7-Aug	412	411	1	0	163.7	65.7	93.3	82.9	102.7	1.2	5.0
8-Aug					159.7	64.1	90.9	82.8	98.4	1.1	5.0
Weekly Total	**2,612**	**2,610**	**2**	**0**	**157.7**	**62.3**	**90.7**	**79.7**	**80.7**	**1.5**	4.4

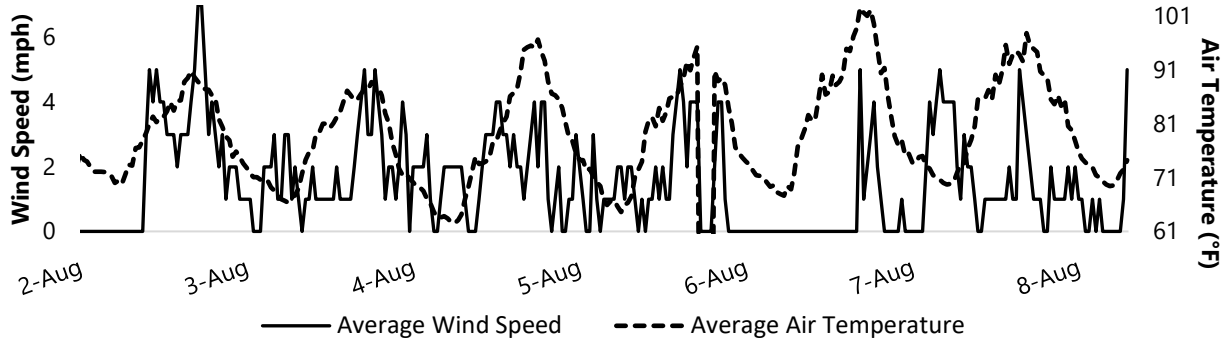

Figure 1
Average Wind Speed and Air Temperature for Each Half-Hour Interval from 0700 Hours August 2 to 0700 Hours August 08

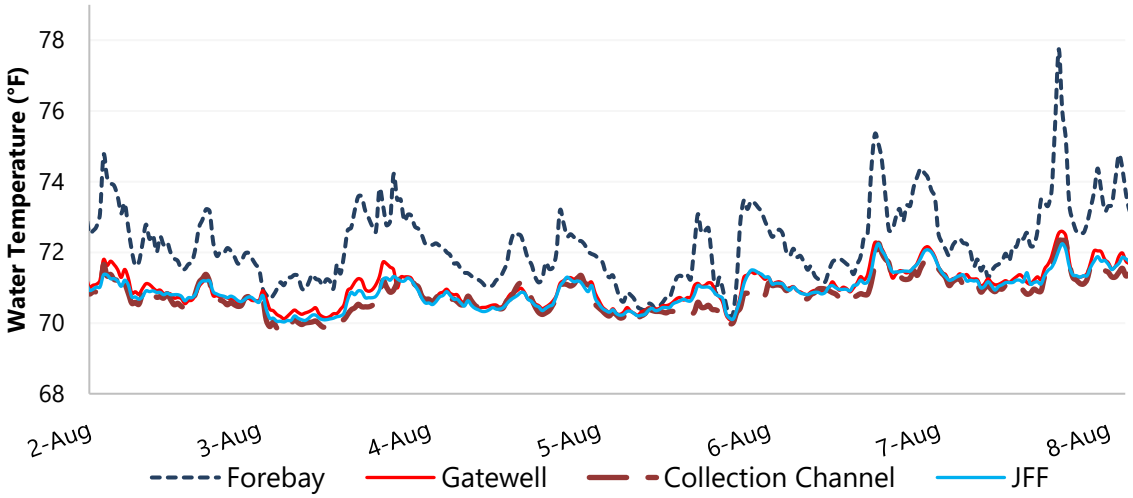

Figure 2
Average Water Temperatures for Each Half-Hour Interval for Four Dam Locations from 0700 Hours August 2 to 0700 Hours August 08

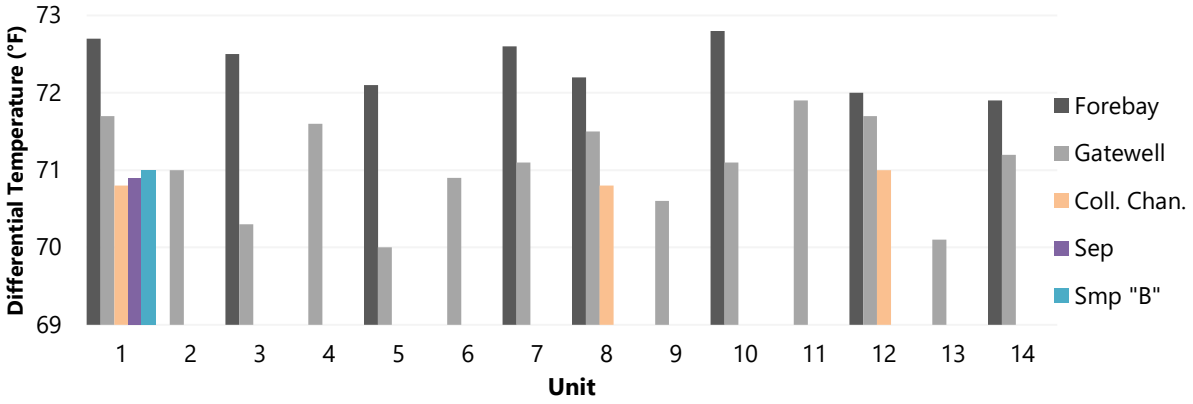

Figure 3
Average Weekly Water Temperatures by Position for Five Dam Locations from 0700 Hours August 2 to 0700 Hours August 08

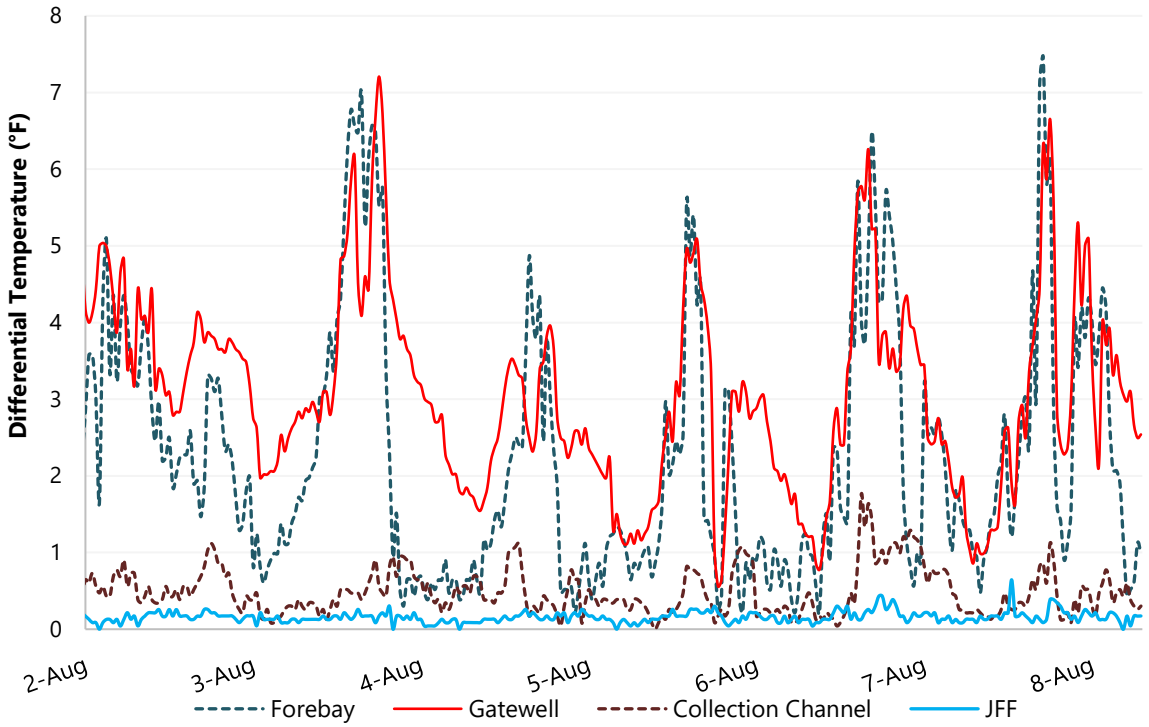

Figure 4
Average Differential Temperatures Within Four Dam Locations from 0700 Hours August 2 to 0700 Hours August 08

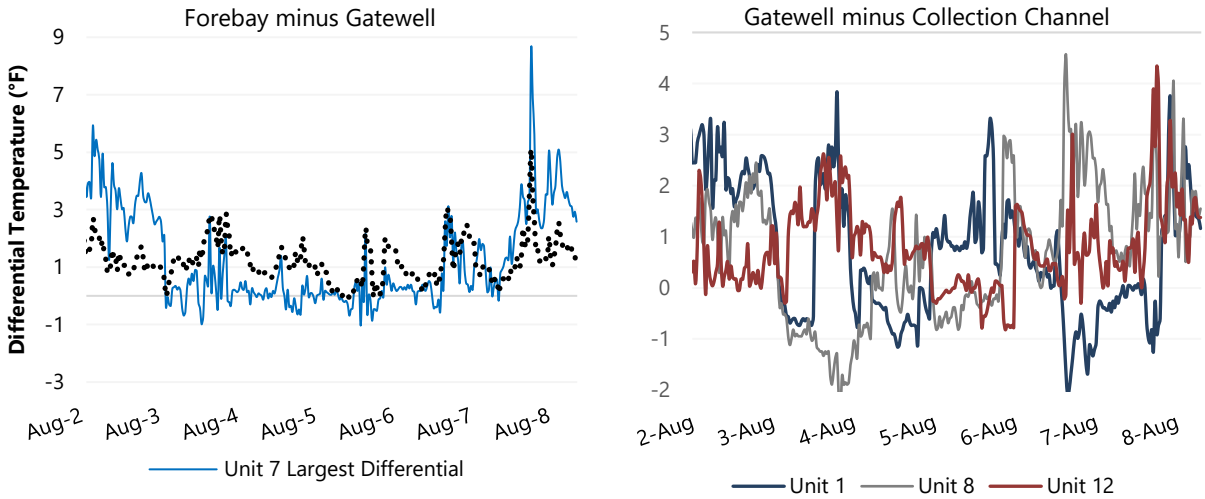

Figure 5
Average Differential Temperatures across Three Dam Locations from 0700 Hours August 2 to 0700 Hours August 08