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ANCHOR QEA

# Weekly Temperature Report
# McNary Dam

August 19, 2019

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Report Period: August 9 to 15, 2019

Report No. 2019 Anchor QEA: MCN Temperature Weekly for 0809-0815

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

## Fish Collection

An estimated 1,316 juvenile salmonids were collected and 1,309 bypassed at the McNary Juvenile Fish Facility (JFF; Table 1), comprising 99.4% subyearling Chinook salmon, 0.3% sockeye, and 0.3% coho. There were 7 total facility mortalities, comprising 7 sample mortalities and 0 facility mortalities.

## River Conditions

Average river flow for this reporting period was 138,600 cubic feet per second (138.6 kcfs) with an average spill of 78.0 kcfs.

## Temperature Logger Operations

On August 15, the temperature logger for forebay 10 failed to record data at 0900 but did not have any other collection problems after that.

## Weather Conditions

The weekly average daytime temperature for 0700 hours August 8 to 0700 hours August 15, 2019, was 79.0°F. The weekly average nighttime temperature was 69.4°F. Temperatures ranged from a maximum of 90.6°F at 1630 hours on August 14 to a minimum of 60.3°F at 0530 hours on August 13 (Figure 1).

Winds averaged 1.6 miles per hour (mph) and were predominately from the west southwest. The highest average wind speed was 9.0 mph at 2030 on August 9, and the highest gusts were up to 30 mph at 2030 hours on August 9. Wind speeds were not collected on August 13 due to cobwebs interfering with the weather station. Once cleaned, the weather station began recording wind speeds again at 1430 on August 13.

## 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: 72.2°F, forebay (weekly average of 8 positions); 71.2°F, gatewells (weekly average of 14 positions); 71.1°F, collection channel (weekly average of positions at Units 1, 8, and 12); and 71.1°F, JFF (weekly average of the separator and sample tank "B"). The forebay at Unit 1 had the highest weekly average temperature, 72.7°F (Figure 3). The maximum temperature, 78.1°F, was recorded in the forebay at 1500 hours on August 13 at Unit 5.

The average weekly temperature differentials within dam locations were: 1.5°F, forebay; 2.1°F, gatewells; 0.3°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, 6.4°F, was recorded on August 13 in the gatewells at 1600 hours (Unit 10 high, Unit 3 low).

The average weekly temperature differential between the forebay and corresponding gatewell was 1.2°F. The forebay was warmer than the corresponding gatewell on average across the powerhouse. The largest temperature differential was 7.9°F at 1600 hours on August 13 at Unit 5 (forebay greater than gatewell; Figure 5). The average weekly temperature differential between the gatewell and corresponding collection channel location was 0.6°F. On average, the gatewell was warmer than the collection channel at Units 8 and 12. The largest temperature differential between the gatewell and corresponding collection channel location was 2.8°F at 1700 on August 9 at Unit 8 (gatewell greater than collection channel).

**Table 1**
**Bypass, Mortality, and River and Weather Conditions from 0700 Hours August 8 to 0700 Hours August 15**

| Date | Fish Collected | Fish Bypassed | Mortality | | Avg. River Flow | Avg. Turbine Flow | Avg. Spill | Air Temperature | | Wind Speed | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample | Facility | | | | Avg. | Max | Avg. | Max |
| 9-Aug | 388 | 384 | 4 | 0 | 149.3 | 59.6 | 85.1 | 75.1 | 82.6 | 1.7 | 7.0 |
| 10-Aug | | | | | 142.6 | 56.6 | 81.3 | 75.2 | 89.6 | 1.4 | 9.0 |
| 11-Aug | 412 | 411 | 1 | 0 | 136.8 | 53.9 | 78.1 | 72.9 | 82.8 | 1.4 | 6.0 |
| 12-Aug | | | | | 124.4 | 51.5 | 68.2 | 69.8 | 80.7 | 3.2 | 9.0 |
| 13-Aug | 164 | 162 | 2 | 0 | 119.8 | 51.0 | 64.1 | 72.0 | 86.2 | 0.0 | 0.0 |
| 14-Aug | | | | | 146.1 | 58.5 | 82.9 | 75.1 | 89.4 | 1.6 | 4.0 |
| 15-Aug | 352 | 352 | 0 | 0 | 151.4 | 60.6 | 86.1 | 78.8 | 90.6 | 1.5 | 4.0 |
| **Weekly Total** | **1,316** | **1,309** | **7** | **0** | **138.6** | **56.0** | **78.0** | **74.2** | **75.0** | **1.6** | 4.6 |

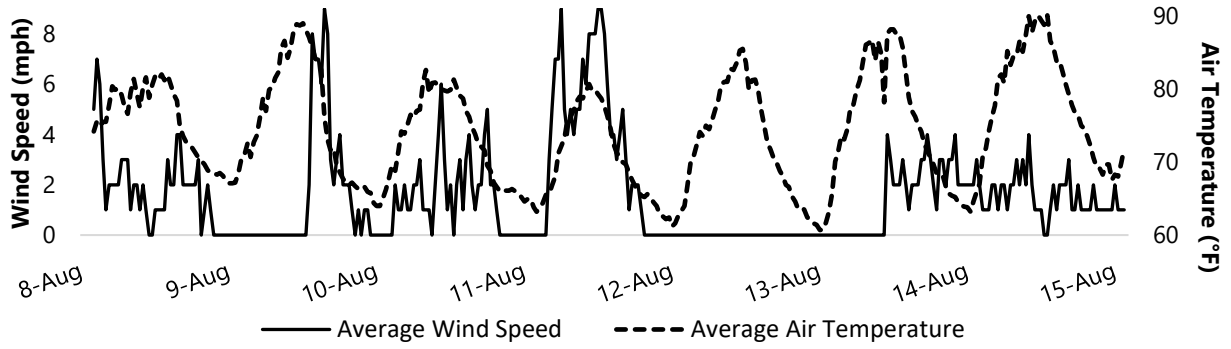


**Figure 1**
**Average Wind Speed and Air Temperature for Each Half-Hour Interval from 0700 Hours August 8 to 0700 Hours August 15**

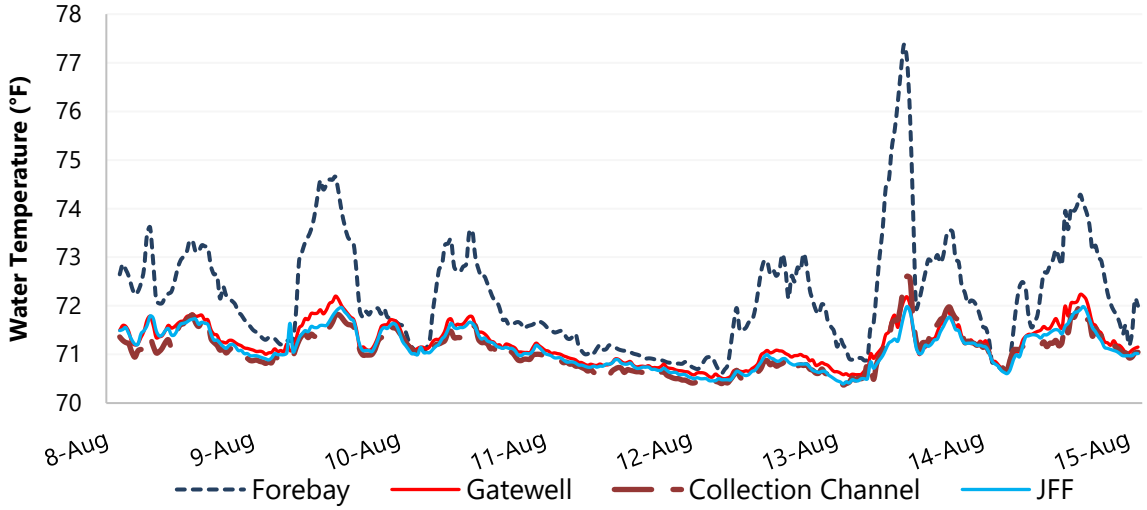


**Figure 2**
**Average Water Temperatures for Each Half-Hour Interval for Four Dam Locations from 0700 Hours August 8 to 0700 Hours August 15**

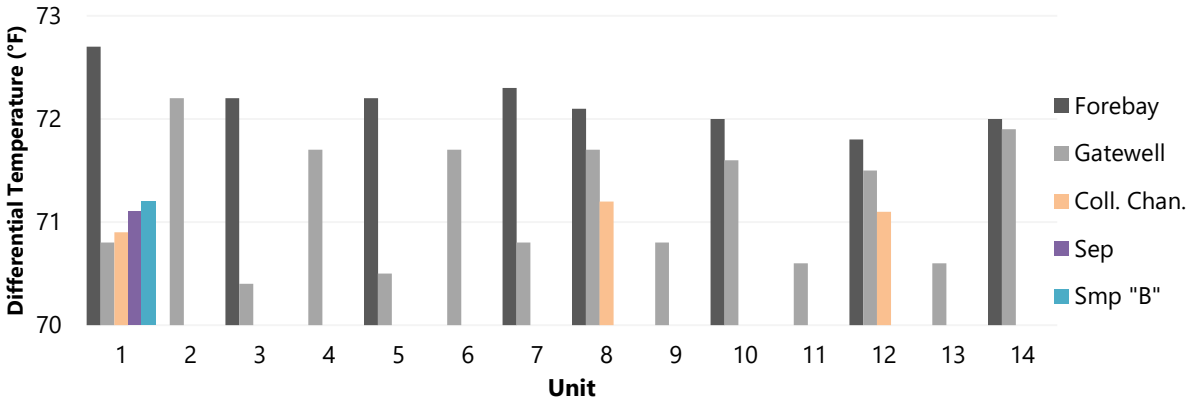


**Figure 3**
**Average Weekly Water Temperatures by Position for Five Dam Locations from 0700 Hours August 8 to 0700 Hours August 15**

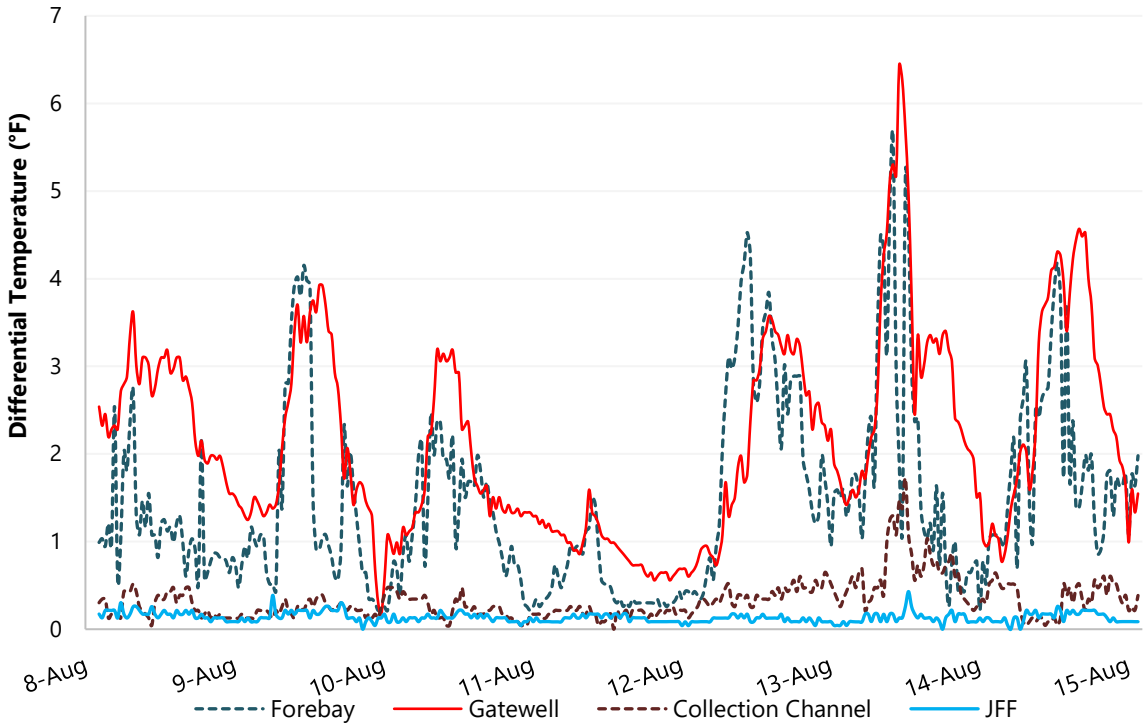


**Figure 4**
**Average Differential Temperatures Within Four Dam Locations from 0700 Hours August 8 to 0700 Hours August 15**

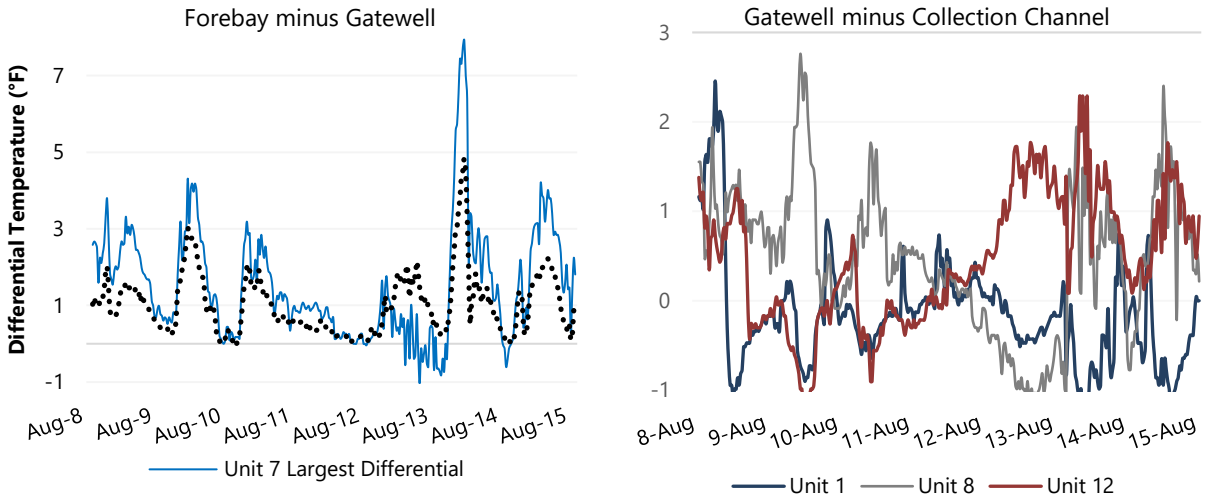


**Figure 5**
**Average Differential Temperatures across Three Dam Locations from 0700 Hours August 8 to 0700 Hours August 15**