

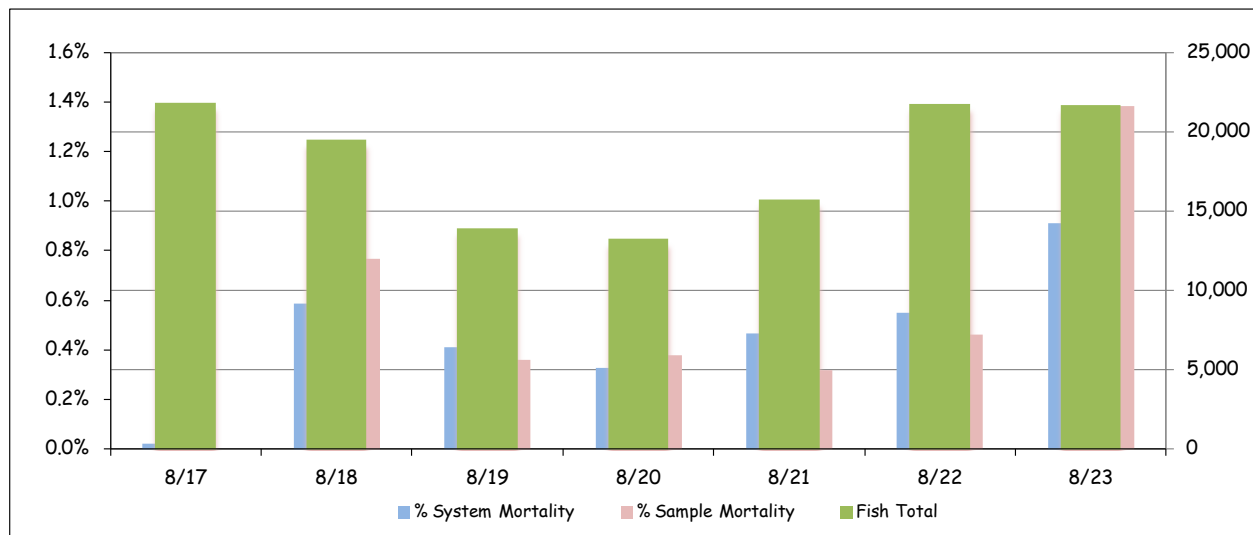


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### McNary Temperature Report #10 August 17 - 23, 2012

A total of 127,700 juvenile salmonids were collected at the McNary Juvenile Fish Facility (JFF) for this weekly period (Figure 1 and Table 1). Subyearling fall chinook accounted for 99.9% of the total collection. Daily flows for this week averaged 196.7kcfs. Spill averaged 98.6kcfs (50.1%). The system mortality averaged 0.48% for the week. Sample tank mortality averaged 0.55%. Mortalities are being enumerated from the sample tanks and the raceways.

Collection for transport began August 17. Fish are being trucked every day. Units 3 and 8 are off for rewinding. Units 1 and 14 are down for maintenance. All orifices are open.

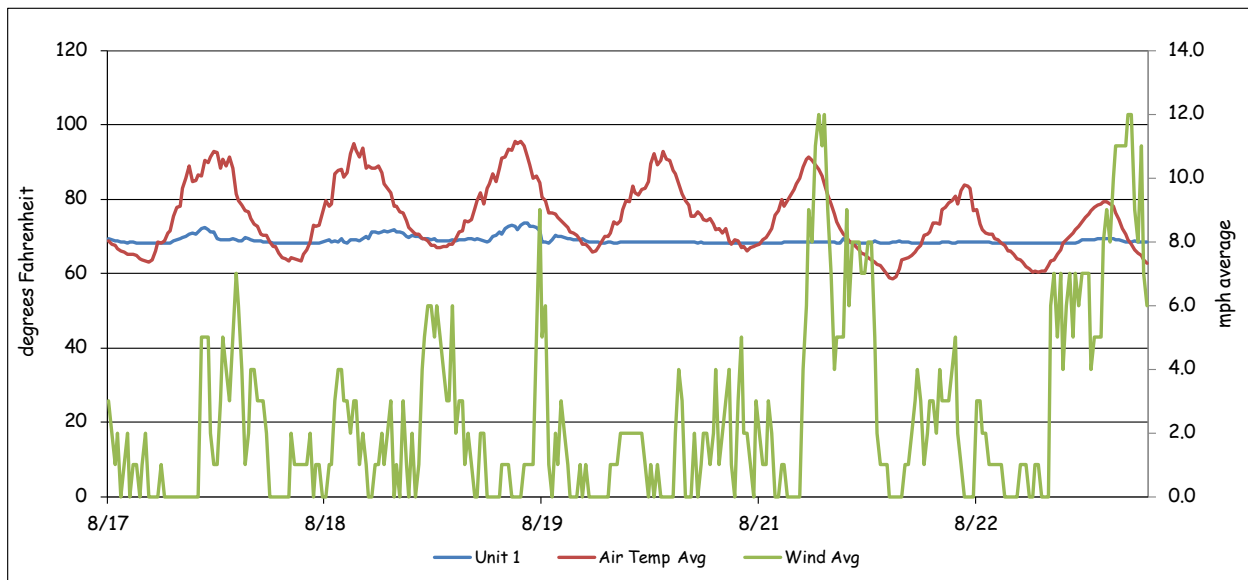


**Figure 1: Collection and Mortality**

**Table 1: Collection and Mortality With Daily and Weekly Averages**

|                       | Mortality  |        |        | Flow  |         |       | Air Temp |      | Wind Speed |      |
|-----------------------|------------|--------|--------|-------|---------|-------|----------|------|------------|------|
|                       | Collection | Sample | System | Total | Turbine | Spill | Avg.     | Max. | Avg.       | Max. |
| 8/17/12               | 21,800     | 0.00%  | 0.02%  | 178.4 | 84.3    | 89.4  | 76.4     | 94.3 | 1.8        | 10.0 |
| 8/18/12               | 19,500     | 0.77%  | 0.58%  | 207.3 | 98.8    | 103.8 | 77.4     | 95.6 | 1.4        | 12.0 |
| 8/19/12               | 13,950     | 0.36%  | 0.41%  | 189.3 | 90.0    | 94.6  | 78.8     | 95.9 | 2.2        | 20.0 |
| 8/20/12               | 13,250     | 0.38%  | 0.32%  | 206.8 | 98.5    | 103.7 | 77.5     | 93.4 | 0.9        | 11.0 |
| 8/21/12               | 15,750     | 0.32%  | 0.46%  | 198.6 | 94.2    | 99.7  | 75.6     | 91.2 | 3.6        | 25.0 |
| 8/22/12               | 21,750     | 0.46%  | 0.55%  | 193.6 | 91.9    | 97.0  | 69.8     | 84.1 | 2.7        | 19.0 |
| 8/23/12               | 21,700     | 1.38%  | 0.91%  | 202.9 | 96.5    | 101.7 | 68.6     | 79.6 | 5.2        | 31.0 |
| <b>Weekly Average</b> | 18,243     | 0.55%  | 0.48%  | 196.7 | 93.5    | 98.6  | 74.9     | 95.9 | 2.5        | 31.0 |

Air temperatures at the McNary JFF averaged 74.9°F for the week. Maximum hourly air temperature was 95.9°F on August 19 (Figure 2). The minimum temperature was 58.3°F on August 22 at 7:00a.m. Winds over the course of the week averaged 2.5mph with gust peaking up to 31.0mph on August 23.



**Figure 2: Weather and Forebay Water Temperature**

There are 36 temperature probes located throughout the Project and the JFF. These probes are set to record temperatures at 30-minute intervals. These probes are located at the following locations:

- 1) Forebay, near elevation 335 approximately 5 feet below the surface. These are attached to the pier noses in front of turbine units 1, 3, 5, 7, 8, 10, 12, and 14.
- 2) In front of spillbays 22, 17, 12, 7 and 2, approximately 5 feet below the surface. These probes are hung in the center of the spillbay, on the tailrace side.
- 3) Attached to the handrail in the center of the “B” turbine gateway slots, approximately 2 to 3 feet below the surface, in all 14 turbine units.
- 4) Tailwater locations are at turbine unit 1 and 14 (tailrace), and the wingwall of the navigation lock. These were placed 5 feet below the water surface.
- 5) The collection channel had probes installed below turbine units 12, 8 and past unit 1 at the beginning of the transition screen.
- 6) The barge transportation dock.

- 7) Fish separator.
- 8) Transport holding raceway #1 at a depth of 2 – 3 feet.

Forebay water temperatures (Table 2) peaked this week with 75.9°F on August 17 at 1:30p.m., in front of unit 1. The average was 69.9°F across the forebay. Gatewell water temperatures for all units combined averaged 69.4°F (Table 3). Gatewell temperatures peaked at 74.1°F on August 19 in unit 4 from 5:30p.m. until 7:00p.m.

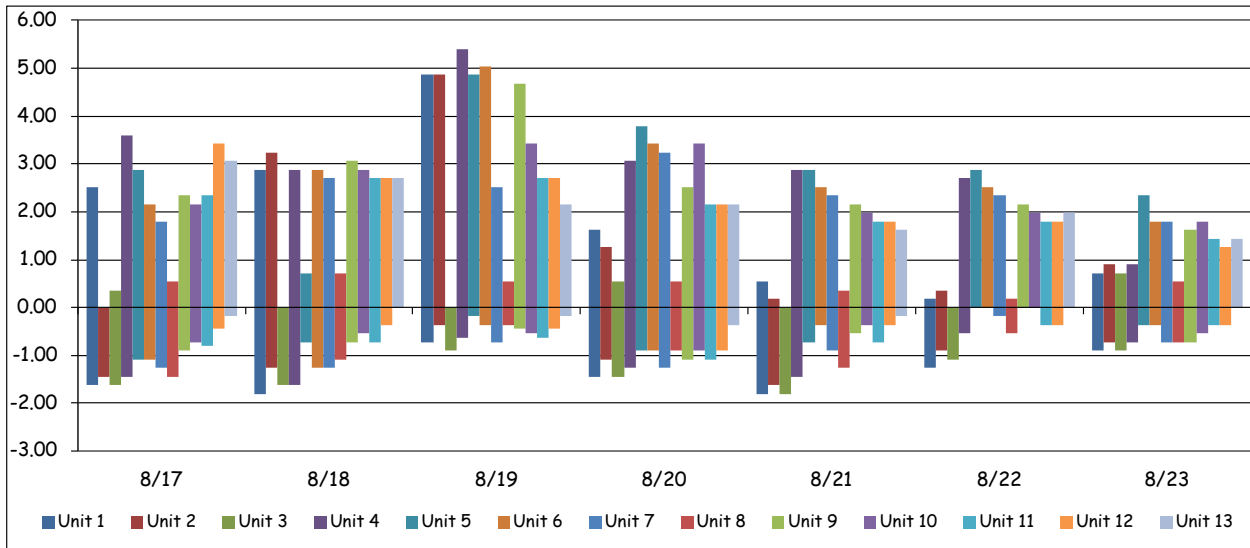
**Table 2: Forebay Water Temperatures**

|                       | Daily Average |      |      |      |      |      |      |      | Daily Max |
|-----------------------|---------------|------|------|------|------|------|------|------|-----------|
|                       | 1F            | 3F   | 5F   | 7F   | 8F   | 10F  | 12F  | 14F  |           |
| 8/17/12               | 69.9          | 69.8 | 70.2 | 70.5 | 70.2 | 70.5 | 70.7 | 70.7 | 75.9      |
| 8/18/12               | 69.6          | 69.4 | 69.5 | 70.1 | 69.9 | 70.3 | 70.3 | 69.8 | 72.0      |
| 8/19/12               | 70.8          | 70.4 | 71.2 | 70.5 | 70.1 | 70.6 | 70.5 | 70.2 | 75.6      |
| 8/20/12               | 70.1          | 70.0 | 70.4 | 70.3 | 69.7 | 70.1 | 70.0 | 69.8 | 73.0      |
| 8/21/12               | 69.6          | 69.4 | 70.3 | 70.1 | 69.6 | 69.9 | 69.9 | 69.7 | 72.1      |
| 8/22/12               | 69.8          | 69.6 | 70.0 | 69.8 | 69.0 | 69.6 | 69.5 | 69.4 | 71.6      |
| 8/23/12               | 68.7          | 68.8 | 69.1 | 69.1 | 68.6 | 69.0 | 69.1 | 69.0 | 70.9      |
| <b>Weekly Average</b> | 69.8          | 69.6 | 70.1 | 70.1 | 69.6 | 70.0 | 70.0 | 69.8 | 75.9      |

**Table 3: Gatewell Water Temperatures for Units 1, 7 & 14**

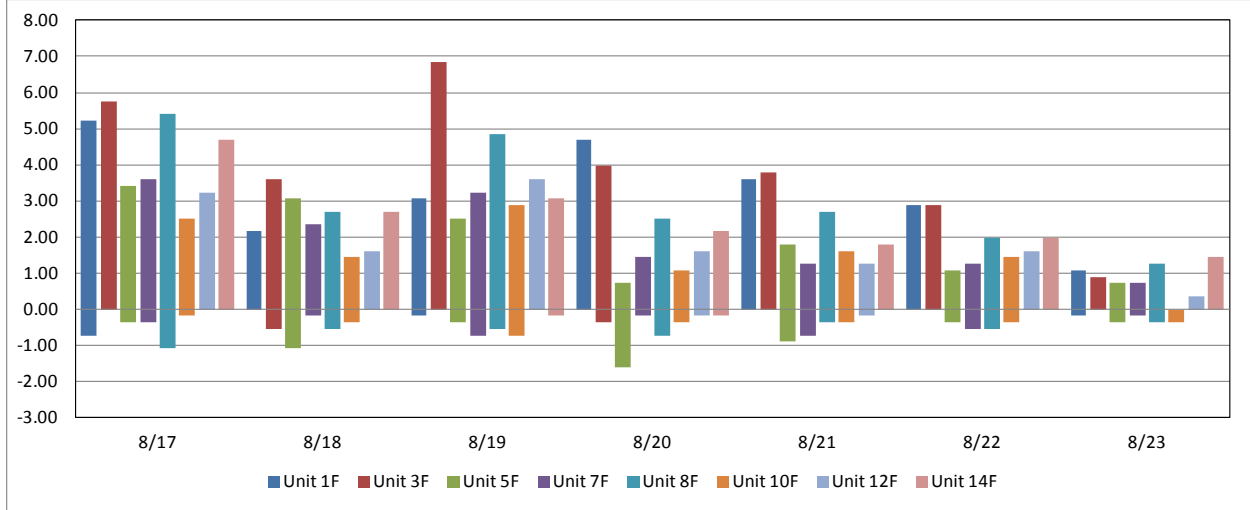
|                       | Daily Avg. |      |      | Daily Max. |      |      | Daily Min. |      |      |
|-----------------------|------------|------|------|------------|------|------|------------|------|------|
|                       | 1          | 7    | 14   | 1          | 7    | 14   | 1          | 7    | 14   |
| 8/17/12               | 69.2       | 69.6 | 69.3 | 72.3       | 71.6 | 70.2 | 68.2       | 68.4 | 68.5 |
| 8/18/12               | 69.1       | 69.7 | 69.2 | 71.6       | 71.4 | 70.3 | 68.0       | 68.5 | 68.7 |
| 8/19/12               | 70.1       | 69.8 | 68.9 | 73.6       | 71.2 | 69.4 | 68.2       | 68.7 | 68.5 |
| 8/20/12               | 68.6       | 69.9 | 69.0 | 70.2       | 72.0 | 69.8 | 68.2       | 68.4 | 68.5 |
| 8/21/12               | 68.3       | 69.8 | 69.2 | 69.3       | 71.4 | 70.0 | 68.2       | 68.7 | 68.4 |
| 8/22/12               | 68.3       | 69.6 | 68.7 | 68.7       | 70.9 | 69.4 | 68.0       | 68.5 | 68.4 |
| 8/23/12               | 68.5       | 69.0 | 68.6 | 69.3       | 70.5 | 69.1 | 68.2       | 68.4 | 68.4 |
| <b>Weekly Average</b> | 68.9       | 69.6 | 69.0 | 70.7       | 71.3 | 69.7 | 68.1       | 68.5 | 68.5 |

The differences in temperatures between the gatewell at unit 1 and the gatewell at unit 14 are illustrated in Figure 3. This graph takes the temperature in the gatewell and subtracts unit 14 from that gatewell (unit 1 – 14). It then continues down the powerhouse subtracting unit 14 from each consecutive unit. A negative number indicates that unit 14 was the warmer unit. Conversely, a positive number indicates that unit 1 was warmer. This shows the reader the amount of variance from one end of the powerhouse to the other that can be seen through out a 24-hour period.



**Figure 3:** Average Gatewell Temperature Differentials for Units 1 - 14

Forebay differentials (Figure 4) are calculated by taking the forebay temperature and subtracting the corresponding gatewell temperature from it (1F – unit 1). A negative number would indicate that the gatewell was warmer. Conversely, a positive number indicates that the forebay is warmer. Again, this shows the reader the amount of variance that can be seen between the forebay and the gatewell throughout a 24-hour period.



**Figure 4:** Average Temperature Differentials Between Forebay and Gatewell

Average water temperature in the collection channel was 69.4°F (Table 4) for the week. A maximum temperature of 71.8°F was recorded on August 17 at 4:00pm, below Unit 12. Temperatures at the separator averaged 69.1°F for the week with a maximum daily temperature of 71.1°F (Table 5). The temperature in raceway #1 averaged 69.6°F with a high of 71.6°F August 19 from 6:00pm. Until 7:00p.m.

**Table 4: Collection Channel Average and Maximum Water Temperatures**

|                       | Daily Avg. |      |      | Daily Max. |      |      |
|-----------------------|------------|------|------|------------|------|------|
|                       | 1          | 8    | 12   | 1          | 8    | 12   |
| 8/17/12               | 69.2       | 69.8 | 70.1 | 70.9       | 71.4 | 71.8 |
| 8/18/12               | 69.1       | 69.7 | 69.8 | 70.5       | 70.9 | 70.5 |
| 8/19/12               | 69.5       | 69.7 | 69.7 | 71.1       | 70.9 | 70.5 |
| 8/20/12               | 69.1       | 69.5 | 69.7 | 70.0       | 70.3 | 70.2 |
| 8/21/12               | 69.0       | 69.5 | 69.7 | 69.6       | 70.0 | 70.5 |
| 8/22/12               | 68.8       | 69.1 | 69.3 | 69.6       | 70.0 | 70.0 |
| 8/23/12               | 68.5       | 68.8 | 69.1 | 69.1       | 69.4 | 69.6 |
| <b>Weekly Average</b> | 69.0       | 69.4 | 69.6 | 70.1       | 70.4 | 70.4 |

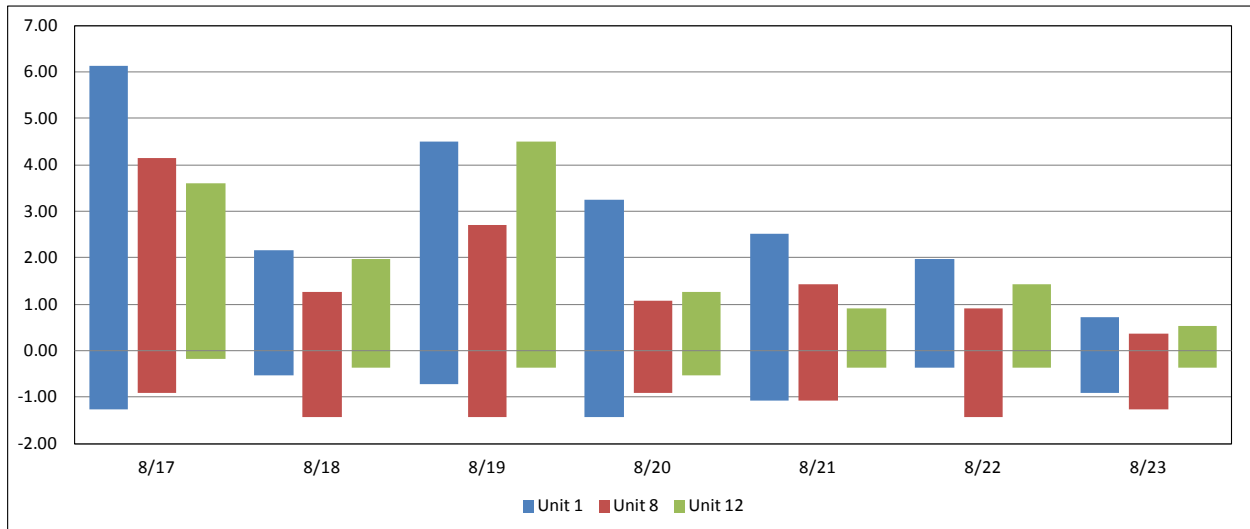
**Table 5: Raceway, Barge Dock and Separator Maximum and Average Water Temperatures**

|                       | Daily Avg. |           |      | Daily Max. |           |      |
|-----------------------|------------|-----------|------|------------|-----------|------|
|                       | Separator  | Raceway 1 | Dock | Separator  | Raceway 1 | Dock |
| 8/17/12               | 69.2       | 69.8      | 68.9 | 70.9       | 71.4      | 69.8 |
| 8/18/12               | 69.1       | 69.6      | 68.7 | 70.5       | 71.1      | 69.8 |
| 8/19/12               | 69.5       | 70.1      | 68.9 | 71.1       | 71.6      | 69.4 |
| 8/20/12               | 69.2       | 69.7      | 69.1 | 70.0       | 70.5      | 69.6 |
| 8/21/12               | 69.1       | 69.6      | 68.9 | 69.6       | 70.2      | 69.4 |
| 8/22/12               | 68.8       | 69.3      | 68.8 | 69.6       | 70.2      | 69.1 |
| 8/23/12               | 68.5       | 69.1      | 68.7 | 69.1       | 69.6      | 69.4 |
| <b>Weekly Average</b> | 69.1       | 69.6      | 68.9 | 70.1       | 70.6      | 69.5 |

Collection channel differentials (Table 6) are calculated by taking the forebay temperature and subtracting the collection channel temperature from it at the three corresponding points. This is an average of the variances between the forebay and the collection channel. A negative number indicates that the collection channel was warmer. A positive number indicates the forebay was warmer. The graph (Figure 5) shows the variance through out the week.

**Table 6: Average Differences between Forebay and Collection Channel**

|                | 1    | 8    | 12   |
|----------------|------|------|------|
| 8/17/12        | 0.7  | 0.5  | 0.7  |
| 8/18/12        | 0.4  | 0.2  | 0.5  |
| 8/19/12        | 1.3  | 0.4  | 0.8  |
| 8/20/12        | 1.0  | 0.2  | 0.3  |
| 8/21/12        | 0.6  | 0.1  | 0.2  |
| 8/22/12        | 1.0  | -0.1 | 0.2  |
| 8/23/12        | 0.2  | -0.1 | 0.0  |
| <b>Average</b> | 0.7  | 0.2  | 0.4  |
| <b>Maximum</b> | 6.1  | 4.1  | 4.5  |
| <b>Minimum</b> | -1.4 | -1.4 | -0.5 |



**Figure 5: Average Temperature Differentials Between Forebay and Collection Channel**