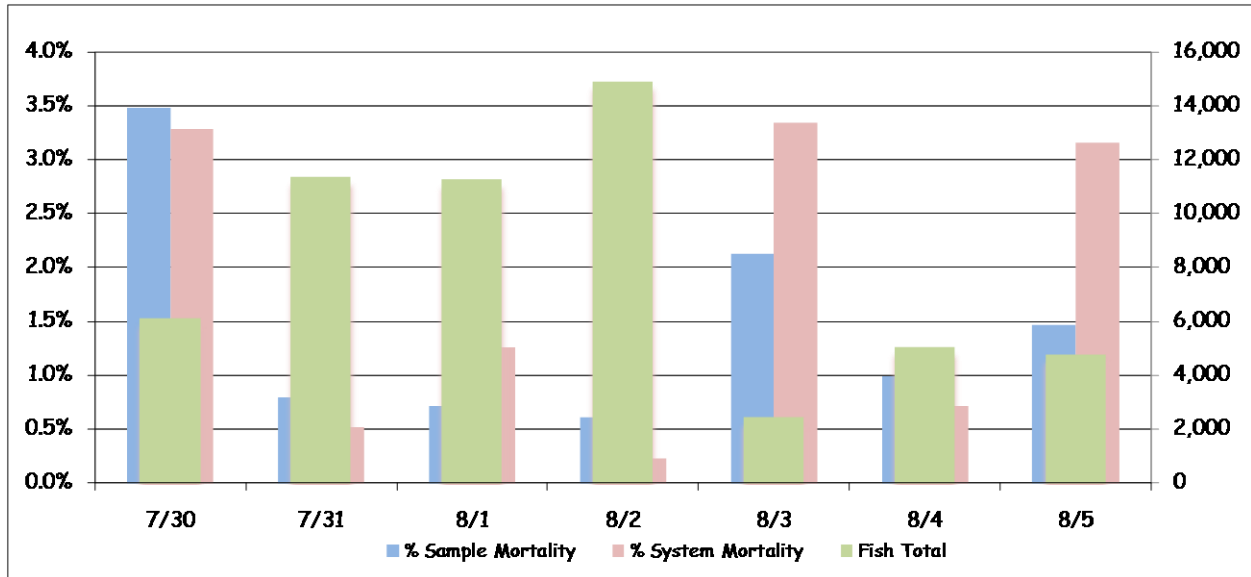




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**McNary Temperature Report #8**  
**July 30 – August 5, 2010**

A total of 55,910 juvenile salmonids were collected at the McNary Juvenile Fish Facility (JFF) for this weekly period. Peak collection day was August 2 with 14,900 fish (Figure 1 and Table 1). Subyearling fall chinook accounted for 99.9% of the total collection. Daily flows for this week averaged 137.3kcfs. There has been court ordered spill since April 10. Spill averaged 68.6kcfs. The system mortality averaged 1.3% and sample tank mortality averaged 1.2%. Mortalities are being enumerated from all raceways, the sample tanks and the recovery raceway.



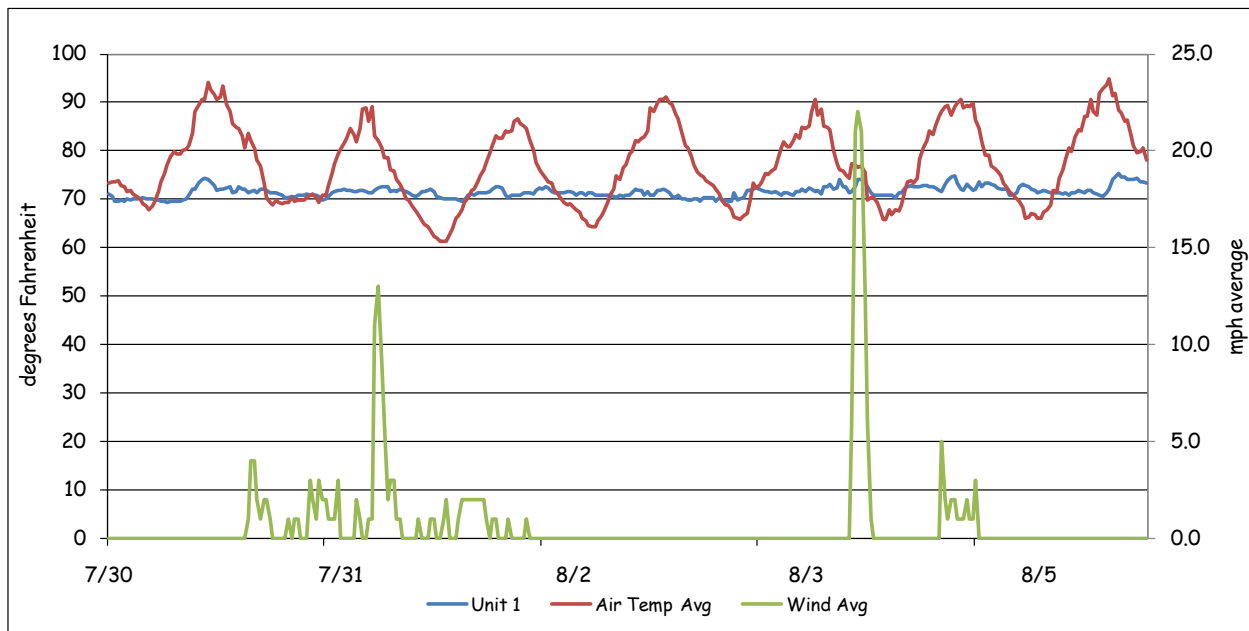
**Figure 1: Collection and Mortality**

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

|                       | Collection   | Mortality    |              | Total        | Flow        |             | Air Temp    |             | Wind Speed |             |
|-----------------------|--------------|--------------|--------------|--------------|-------------|-------------|-------------|-------------|------------|-------------|
|                       |              | Sample       | System       |              | Turbine     | Spill       | Avg.        | Max         | Avg.       | Max.        |
| 7/30/10               | 6,130        | 3.48%        | 3.28%        | 158.1        | 74.6        | 78.8        | 79.8        | 94.3        | 0.2        | 21.0        |
| 7/31/10               | 11,350       | 0.79%        | 0.51%        | 138.5        | 64.7        | 69.1        | 75.8        | 89.5        | 1.8        | 30.0        |
| 8/1/10                | 11,250       | 0.71%        | 1.25%        | 142.5        | 66.5        | 71.3        | 73.4        | 87.4        | 0.6        | 9.0         |
| 8/2/10                | 14,900       | 0.60%        | 0.23%        | 114.8        | 52.5        | 57.6        | 76.7        | 91.2        | 0.0        | 0.0         |
| 8/3/10                | 2,450        | 2.13%        | 3.35%        | 110.8        | 50.7        | 55.4        | 76.7        | 90.7        | 0.0        | 2.0         |
| 8/4/10                | 5,040        | 0.99%        | 0.71%        | 148.2        | 69.4        | 74.1        | 78.5        | 90.7        | 2.3        | 39.0        |
| 8/5/10                | 4,790        | 1.46%        | 3.15%        | 148.2        | 69.4        | 74.1        | 78.9        | 96.6        | 0.0        | 1.0         |
| <b>Weekly Average</b> | <b>7,987</b> | <b>1.15%</b> | <b>1.26%</b> | <b>137.3</b> | <b>64.0</b> | <b>68.6</b> | <b>77.1</b> | <b>96.6</b> | <b>0.7</b> | <b>39.0</b> |

Fish are being transported by barge with a 24-hour sample taken every day until the end of the barging contract, August 15. There will be units that are off line for the remainder of the season. Units 2 and 7 are off for rewinding. Units 3 and 4 are off for transformer replacement. This means that the probes in 3 and 4 will be put in the “A” slot and “C” slot respectively. All other orifices are open.

Air temperatures remained warmed at the McNary JFF, with an average over the week of 77.1 F. Maximum hourly air temperature was 96.6 F on August 5 (Figure 2). The minimum temperature was 61.2 F on August 1 from 5:30 until 7:00a.m. Winds over the course of the week averaged 0.7mph with gust peaking up to 39.0mph on August 4.



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

There are 36 temperature probes located through out 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 21, 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 78.4°F on August 4 at 4:30p.m., in front of unit 8. The average was 72.7°F across the forebay. Gateway water temperatures for all units combined averaged 70.7°F (Table 3). Gateway temperatures peaked at 75.9°F on August 4 in unit 12 at 8:00p.m.

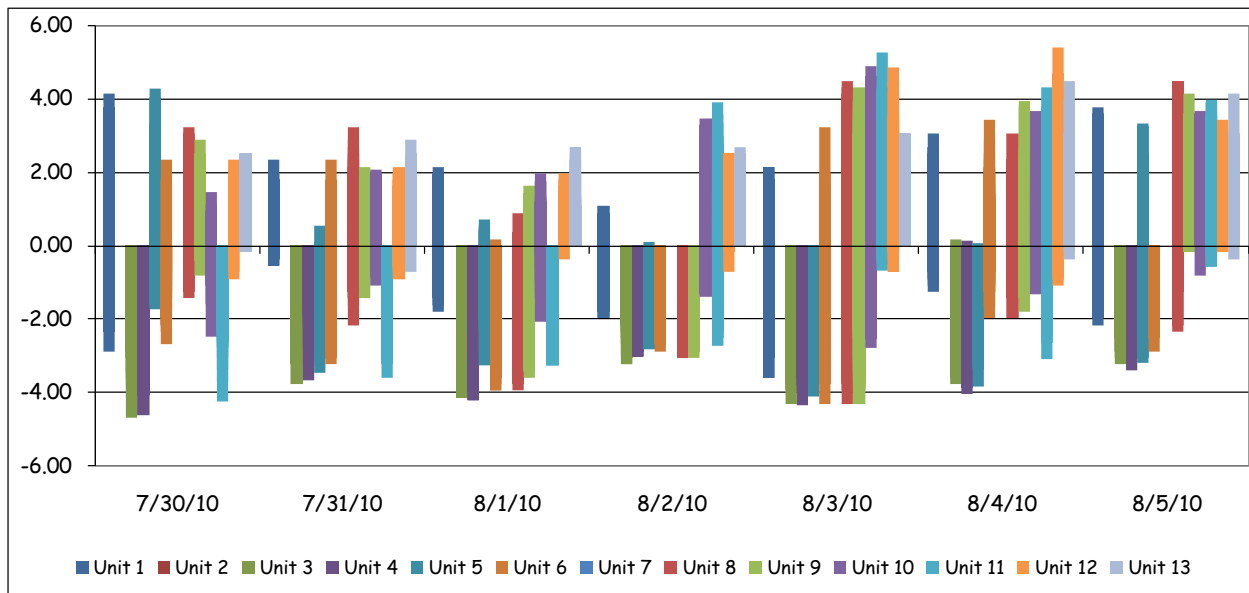
**Table 2: Forebay Water Temperatures**

|                       | Daily Average |      |      |      |      |      |      |      | Daily Max |
|-----------------------|---------------|------|------|------|------|------|------|------|-----------|
|                       | 1F            | 3F   | 5F   | 7F   | 8F   | 10F  | 12F  | 14F  |           |
| 7/30/10               | 72.3          | 71.7 | 72.6 | 72.2 | 72.6 | 71.8 | 72.2 | 71.7 | 77.7      |
| 7/31/10               | 72.7          | 71.2 | 71.4 | 71.4 | 71.7 | 71.2 | 71.3 | 70.7 | 77.7      |
| 8/1/10                | 73.0          | 71.4 | 72.0 | 71.2 | 71.4 | 72.2 | 72.6 | 71.4 | 77.7      |
| 8/2/10                | 73.8          | 72.3 | 72.9 | 72.3 | 72.3 | 73.0 | 73.7 | 72.2 | 77.4      |
| 8/3/10                | 75.1          | 73.7 | 74.0 | 73.2 | 73.8 | 74.3 | 74.3 | 72.6 | 77.1      |
| 8/4/10                | 74.0          | 72.8 | 73.2 | 72.8 | 73.2 | 73.2 | 73.5 | 72.0 | 78.4      |
| 8/5/10                | 73.8          | 72.7 | 73.2 | 73.6 | 73.9 | 73.8 | 73.5 | 72.1 | 77.7      |
| <b>Weekly Average</b> | 73.6          | 72.3 | 72.8 | 72.4 | 72.7 | 72.8 | 73.0 | 71.8 | 78.4      |

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

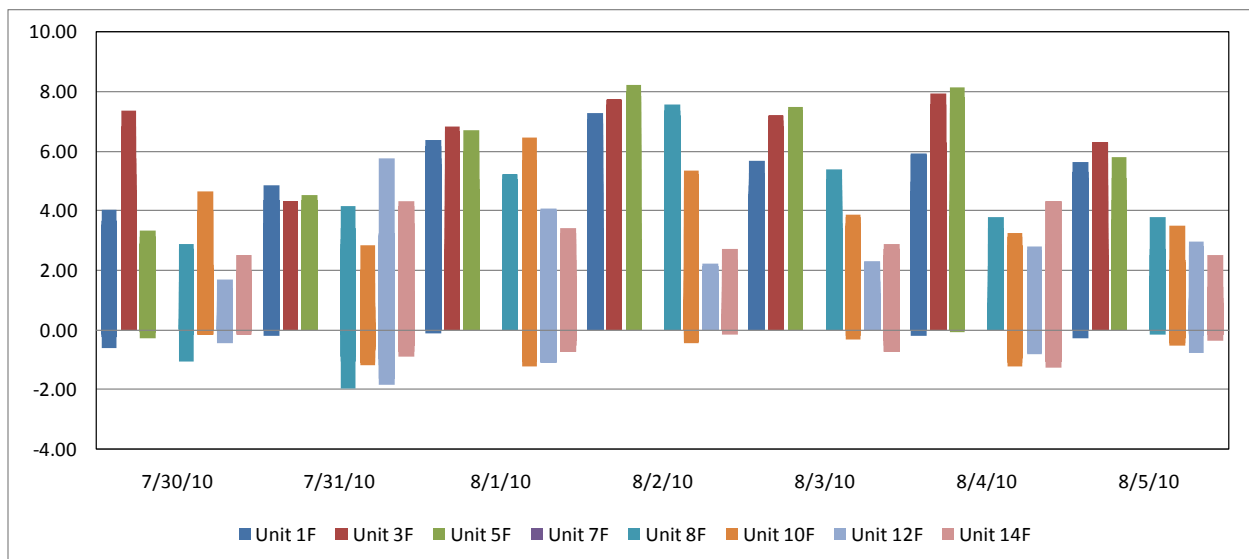
|                | Daily Avg. |      |      | Daily Max. |      |      | Daily Min. |      |      |
|----------------|------------|------|------|------------|------|------|------------|------|------|
|                | 1          | 7    | 14   | 1          | 7    | 14   | 1          | 7    | 14   |
| 7/30/10        | 71.0       | 69.1 | 71.0 | 74.3       | 70.4 | 73.4 | 69.3       | 68.6 | 70.0 |
| 7/31/10        | 71.4       | 68.6 | 70.5 | 72.7       | 68.9 | 72.1 | 69.8       | 68.3 | 69.4 |
| 8/1/10         | 71.1       | 68.7 | 70.8 | 72.7       | 69.2 | 72.7 | 69.6       | 68.3 | 69.4 |
| 8/2/10         | 70.9       | 69.1 | 71.4 | 72.1       | 69.5 | 72.1 | 69.4       | 68.9 | 70.5 |
| 8/3/10         | 71.4       | 69.1 | 71.6 | 73.9       | 69.5 | 73.4 | 69.4       | 68.9 | 70.3 |
| 8/4/10         | 72.4       | 69.7 | 71.6 | 74.8       | 71.3 | 73.4 | 70.3       | 69.2 | 70.2 |
| 8/5/10         | 72.2       | 70.1 | 71.8 | 75.2       | 70.4 | 73.2 | 70.5       | 69.8 | 70.9 |
| <b>Average</b> | 71.5       | 69.1 | 71.2 | 73.7       | 69.9 | 72.9 | 69.8       | 68.8 | 70.1 |

The differences in temperatures between the gateway at unit 1 and the gateway at unit 14 are illustrated in Figure 3. This graph takes the temperature in the gateway and subtracts unit 14 from that gateway (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:** 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 through out a 24-hour period.



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

Average water temperature in the collection channel was 71.2°F (Table 4) for the week. A maximum temperature of 74.1°F was recorded August 4 at 5:00p.m. below Unit 8. Temperatures at the separator averaged 70.4°F for the week with a maximum daily temperature of 72.3°F (Table 5). The temperature in raceway #1 averaged 70.5°F with a high of 72.7°F August 4.

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

|                | Daily Avg. |      |      | Daily Max. |      |      |
|----------------|------------|------|------|------------|------|------|
|                | 1          | 8    | 12   | 1          | 8    | 12   |
| <b>7/30/10</b> | 70.6       | 70.8 | 71.2 | 71.6       | 72.0 | 72.9 |
| <b>7/31/10</b> | 70.1       | 70.2 | 70.8 | 70.9       | 71.4 | 72.3 |
| <b>8/1/10</b>  | 70.0       | 70.1 | 71.0 | 70.5       | 70.9 | 72.5 |
| <b>8/2/10</b>  | 70.6       | 70.8 | 71.8 | 71.1       | 71.6 | 72.3 |
| <b>8/3/10</b>  | 71.2       | 72.0 | 72.3 | 72.5       | 74.1 | 73.4 |
| <b>8/4/10</b>  | 71.6       | 72.0 | 72.0 | 72.9       | 74.1 | 73.8 |
| <b>8/5/10</b>  | 71.9       | 72.4 | 72.0 | 73.0       | 73.8 | 73.2 |
| <b>Average</b> | 70.8       | 71.2 | 71.6 | 71.8       | 72.6 | 72.9 |

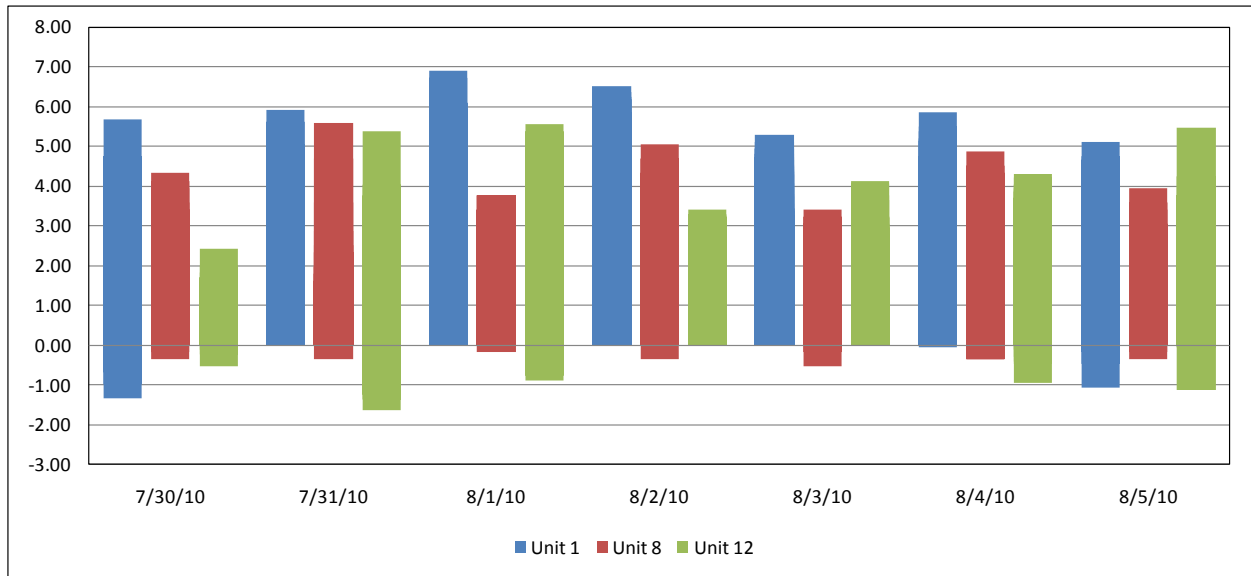
**Table 5: Raceway, Barge Dock and Separator Maximum and Average Water Temperatures**

|                | Daily Avg. |           |      | Daily Max. |           |      |
|----------------|------------|-----------|------|------------|-----------|------|
|                | Separator  | Raceway 1 | Dock | Separator  | Raceway 1 | Dock |
| <b>7/30/10</b> | 70.1       | 70.2      | 69.5 | 71.2       | 71.2      | 69.8 |
| <b>7/31/10</b> | 69.6       | 69.7      | 69.3 | 70.2       | 70.3      | 69.8 |
| <b>8/1/10</b>  | 69.6       | 69.7      | 69.4 | 70.0       | 70.0      | 69.8 |
| <b>8/2/10</b>  | 70.1       | 70.1      | 69.7 | 70.5       | 70.5      | 70.1 |
| <b>8/3/10</b>  | 70.7       | 70.8      | 69.9 | 71.6       | 71.8      | 70.1 |
| <b>8/4/10</b>  | 71.2       | 71.2      | 70.4 | 72.3       | 72.5      | 71.3 |
| <b>8/5/10</b>  | 71.6       | 71.7      | 70.8 | 72.3       | 72.7      | 71.0 |
| <b>Average</b> | 70.4       | 70.5      | 69.9 | 71.2       | 71.3      | 70.3 |

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   |
|----------------|------|------|------|
| <b>7/30/10</b> | 1.8  | 1.8  | 0.9  |
| <b>7/31/10</b> | 2.7  | 1.5  | 0.5  |
| <b>8/1/10</b>  | 3.0  | 1.3  | 1.5  |
| <b>8/2/10</b>  | 3.3  | 1.5  | 1.9  |
| <b>8/3/10</b>  | 3.9  | 1.8  | 1.9  |
| <b>8/4/10</b>  | 2.5  | 1.3  | 1.5  |
| <b>8/5/10</b>  | 2.0  | 1.5  | 1.5  |
| <b>Average</b> | 2.7  | 1.5  | 1.4  |
| <b>Maximum</b> | 6.9  | 5.6  | 5.6  |
| <b>Minimum</b> | -1.3 | -0.5 | -1.6 |



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