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McNary Temperature Report #3
June 25 – July 1, 2010

A total of 419,162 juvenile salmonids were collected at the McNary Juvenile Fish Facility (JFF) for this weekly period. Peak collection day was June 26, with 195,570 fish (Figure 1 and Table 1). Subyearling fall chinook accounted for 99.5% of the total collection. Daily flows for this week averaged 316.9kcfs. There has been court ordered spill since April 10. Spill averaged 154.7kcfs. The system mortality averaged 0.07% and sample tank mortality averaged 0.55%. Mortalities are being enumerated from the separator, the sample tanks and raceway 9W.

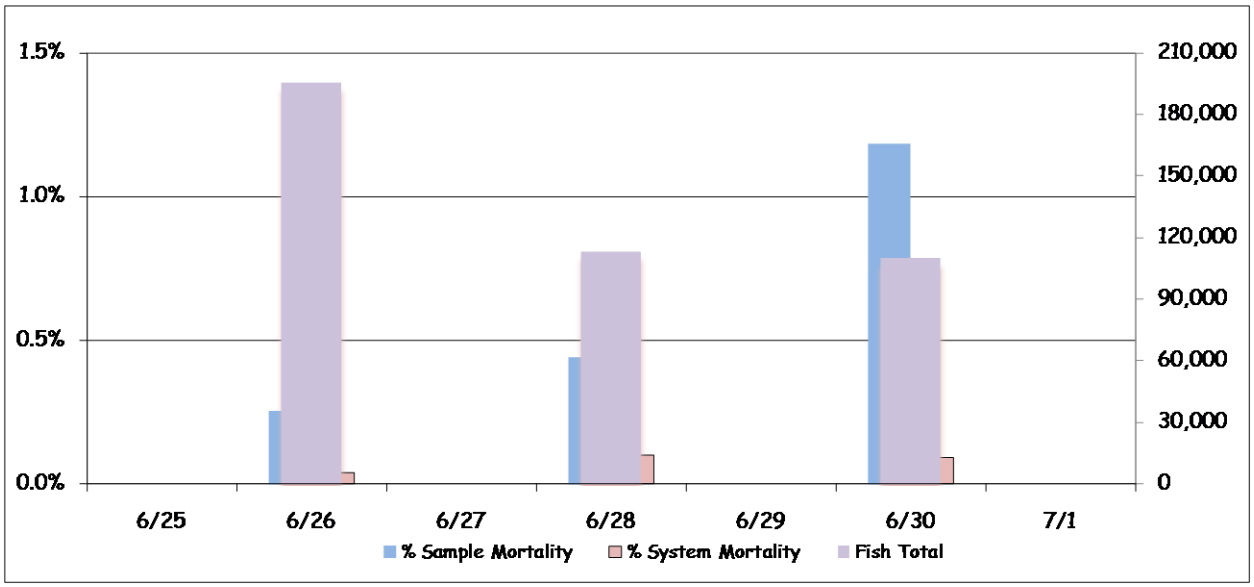

Figure 1: Collection and Mortality

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
6/25/10				332.9	164.9	163.4	71.5	85.3	2.2	17.0
6/26/10	195,570	0.26%	0.04%	333.2	171.2	157.3	71.2	85.1	2.1	17.0
6/27/10				313.9	157.2	152.0	72.3	87.4	2.1	12.0
6/28/10	113,505	0.44%	0.10%	308.9	149.0	155.2	73.7	90.5	2.1	15.0
6/29/10				307.9	151.5	151.7	69.7	79.4	4.8	26.0
6/30/10	110,087	1.18%	0.09%	324.8	165.0	155.1	63.1	73.5	1.7	14.0
7/1/10				296.6	143.7	148.2	64.2	77.0	3.2	22.0
Weekly Average	139,721	0.55%	0.07%	316.9	157.5	154.7	69.4	90.5	2.6	26.0

Fish are being bypassed daily with a 24-hour sample taken every other day. In the month of June, the sample will be enumerated on the even numbered days. 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 "B" slot respectively. Unit 2 has the orifices closed due to oil in the gatewells. It is best to leave those closed at this point as that water is considerably warmer than the collection channel. All other orifices are open.

Air temperatures are warming at the McNary JFF, with an average over the week of 70.0°F. Maximum hourly air temperature was 90.5°F on June 28 (Figure 2). The minimum temperature was 53.3°F on June 30 at 5:30 a.m. Winds over the course of the week averaged 2.6mph with gust peaking up to 26.0mph on June 29.

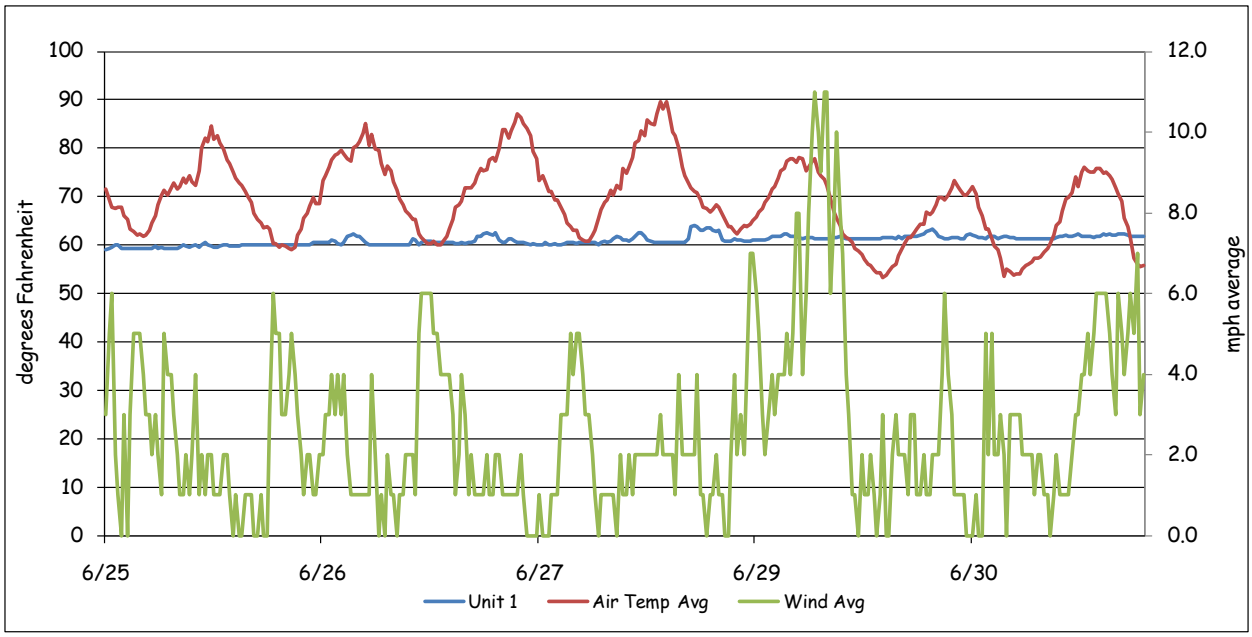

Figure 2: Weather and Forebay Water Temperature

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 gatewell 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 period with 68.1°F on June 28 from 2:00 until 3:00 p.m. in front of unit 8. The average was 61.9°F across the forebay for the week. Gatewell water temperatures for all units combined averaged 61.4°F (Table 3). Gatewell temperatures peaked at 65.8°F on June 28 in unit 6 at 5:30 p.m.

Table 2: Forebay Water Temperatures

	Daily Average								Daily
	1F	3F	5F	7F	8F	10F	12F	14F	Max
6/25/10	59.9	60.6	60.9	60.9	60.9	61.0	60.9	60.1	64.0
6/26/10	60.7	61.6	61.6	61.7	61.6	61.6	61.4	60.6	64.4
6/27/10	61.2	61.6	62.1	62.7	62.6	62.7	62.5	61.8	65.7
6/28/10	61.6	62.0	62.8	63.3	63.5	63.6	63.4	61.8	68.1
6/29/10	61.6	61.9	62.1	62.0	62.1	62.1	61.9	61.6	63.9
6/30/10	62.0	62.6	62.7	62.7	62.8	63.1	63.1	62.2	66.3
7/1/10	61.7	61.4	61.6	61.7	61.8	62.2	62.1	61.5	63.9
Weekly Average	61.2	61.7	62.0	62.2	62.2	62.3	62.2	61.4	68.1

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
6/25/10	59.6	59.6	60.1	60.4	60.5	61.9	59.0	59.1	59.4
6/26/10	60.3	60.7	60.6	62.2	62.8	62.6	59.9	59.6	59.9
6/27/10	60.7	60.9	61.1	62.6	63.4	63.0	59.9	59.9	60.1
6/28/10	61.0	61.2	61.1	64.0	63.4	62.4	60.1	60.2	60.4
6/29/10	61.6	61.6	61.8	63.5	63.1	62.4	60.8	60.5	61.2
6/30/10	61.7	62.0	62.2	63.3	64.2	63.7	61.3	61.1	61.5
7/1/10	61.7	61.2	61.7	62.2	61.9	62.2	61.2	61.1	61.3
Average	60.9	61.0	61.2	62.6	62.7	62.6	60.3	60.2	60.5

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.

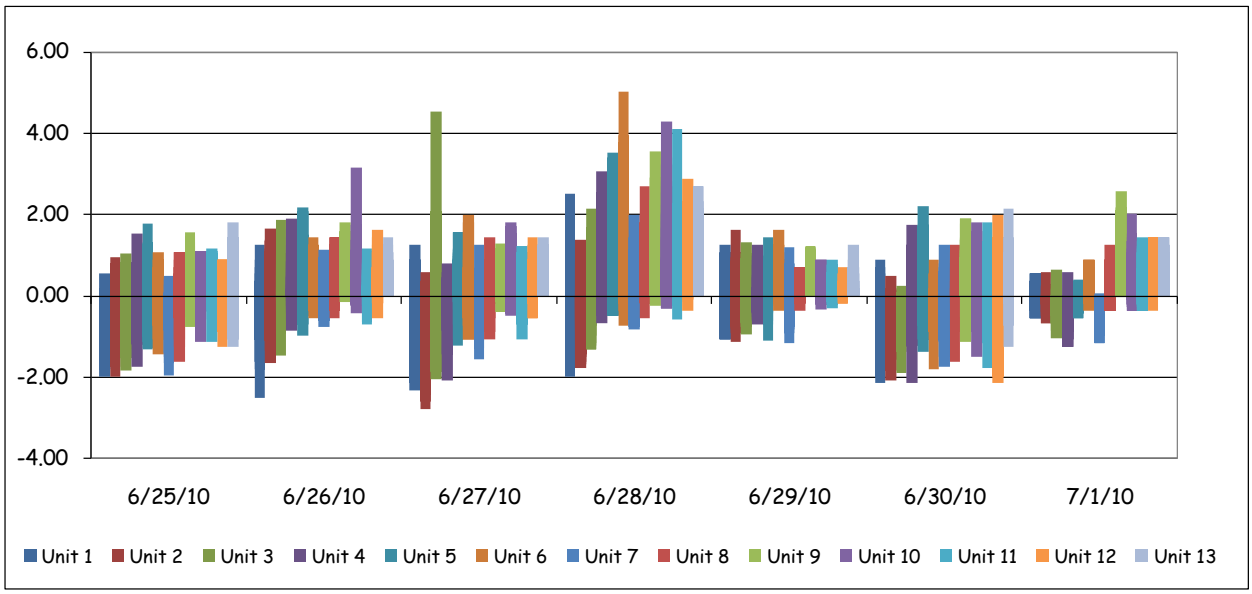

Figure 3: Gatewell Temperature Differentials for Units 1 - 14

Forebay differentials (Figure 4) are calculated by taking the forbay 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.

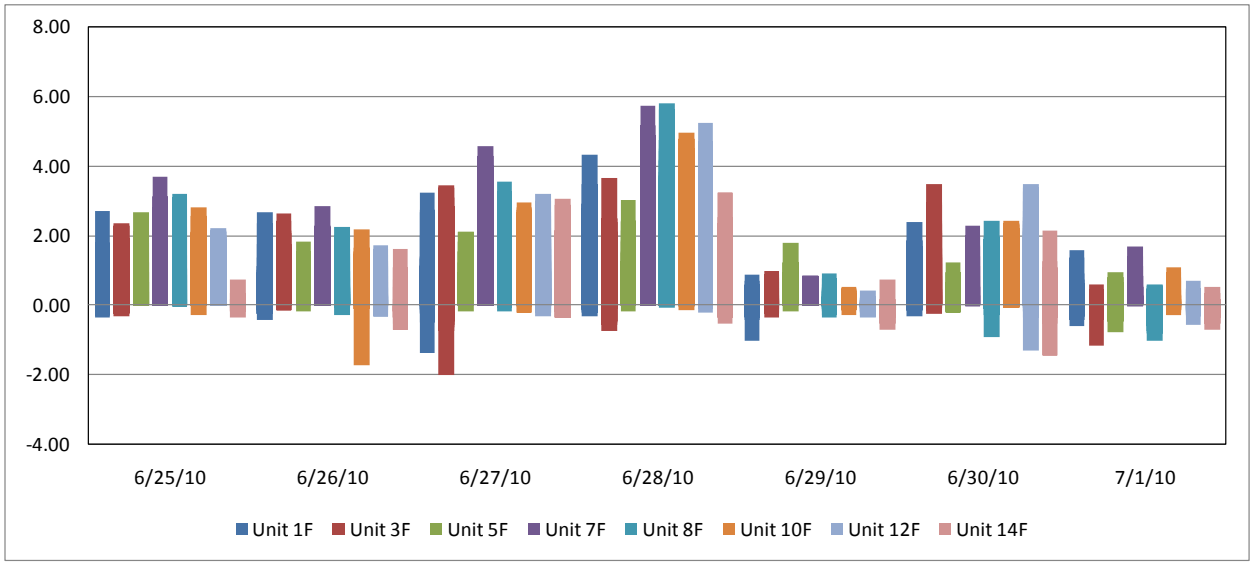

Figure 4: Temperature Differentials Between Forebay and Gatewell

Average water temperature in the collection channel was 61.3°F (Table 4) for the week. A maximum temperature of 63.7°F was recorded June 30 at 10:30 p.m. below Unit 12. Temperatures at the separator averaged 61.2°F for the period with a maximum daily temperature of 63.3.°F (Table 5). The temperature in raceway #1 averaged 61.2°F with a high of 63.1°F June 30.

Table 4: Collection Channel Average and Maximum Water Temperatures

	Daily Avg.			Daily Max.		
	1	**8**	**12**	**1**	**8**	**12**
6/25/10	60.1	59.9	60.0	61.2	61.3	61.5
6/26/10	61.0	60.7	60.8	62.6	62.1	62.4
6/27/10	61.2	61.0	61.1	62.2	62.2	62.6
6/28/10	61.6	61.4	61.3	63.3	63.5	63.1
6/29/10	61.9	61.6	61.7	63.0	62.4	62.2
6/30/10	62.3	62.1	62.2	63.5	63.7	63.7
7/1/10	61.8	61.7	61.8	62.2	62.6	62.4
Average	61.4	61.2	61.3	62.6	62.5	62.6

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

	Daily Avg.			Daily Max.		
	Separator	**Raceway 1**	**Dock**	**Separator**	**Raceway 1**	**Dock**
6/25/10	59.9	60.0	59.5	61.0	61.2	61.1
6/26/10	60.8	60.8	60.1	62.2	62.2	60.6
6/27/10	61.0	61.1	60.3	61.9	62.1	60.6
6/28/10	61.4	61.4	60.5	63.0	63.0	61.1
6/29/10	61.7	61.8	61.2	62.6	62.6	61.4
6/30/10	62.1	62.1	61.5	63.3	63.1	61.7
7/1/10	61.6	61.6	61.5	62.2	62.1	62.0
Average	61.2	61.2	60.7	62.3	62.3	61.2

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**
6/25/10	-0.2	1.0	0.9
6/26/10	-0.3	0.8	0.7
6/27/10	0.0	1.6	1.4
6/28/10	0.0	2.1	2.1
6/29/10	-0.3	0.4	0.2
6/30/10	-0.2	0.7	0.9
7/1/10	-0.1	0.1	0.3
Average	-0.2	1.0	0.9
Maximum	4.2	6.2	5.4
Minimum	-2.5	-1.0	-0.3

Figure 5: Temperature Differentials Between Forebay and Collection Channel