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McNary Temperature Report #3
June 29 – July 5, 2012

A total of 109,602 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 99.4% of the total collection. Daily flows for this week averaged 375.2kcf. Spill averaged 240.6kcf (64.1%). The system mortality averaged 0.01% for the week. Sample tank mortality averaged 0.4%. Mortalities are being enumerated from the separator, sample tanks and the recovery raceway before being returned to the river.

Fish are being sampled every other day with bypass return to the river. Units 3 and 8 are off for rewinding. All orifices are open.

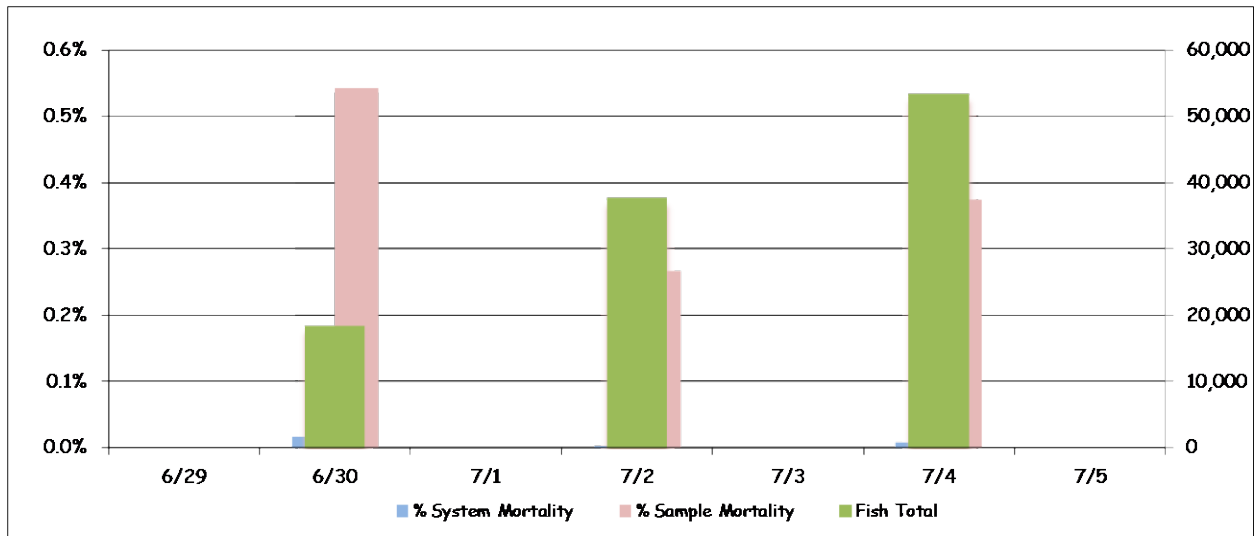


Figure 1: Collection and Mortality

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
6/29/12				393.8	106.8	282.3	72.2	83.4	2.4	20.0
6/30/12	18,502	0.54%	0.02%	393.2	126.9	261.6	67.0	72.3	2.2	14.0
7/1/12				390.6	130.9	254.9	70.4	81.8	3.6	22.0
7/2/12	37,700	0.27%	0.00%	385.8	132.0	249.1	68.5	85.3	2.8	26.0
7/3/12				361.4	131.0	225.7	66.1	72.1	8.8	36.0
7/4/12	53,400	0.37%	0.01%	344.5	136.8	203.0	63.2	76.3	1.6	10.0
7/5/12				357.3	145.1	207.5	67.7	86.7	1.6	10.0
Weekly Average	36,534	0.37%	0.01%	375.2	129.9	240.6	67.9	86.7	3.3	36.0

Air temperatures at the McNary JFF averaged 67.9°F for the week. Maximum hourly air temperature was 86.7°F on July 5 (Figure 2). The minimum temperature was 49.5°F on July 4 at 6:30a.m. Winds over the course of the week averaged 3.3mph with gust peaking up to 36.0mph on July 3.

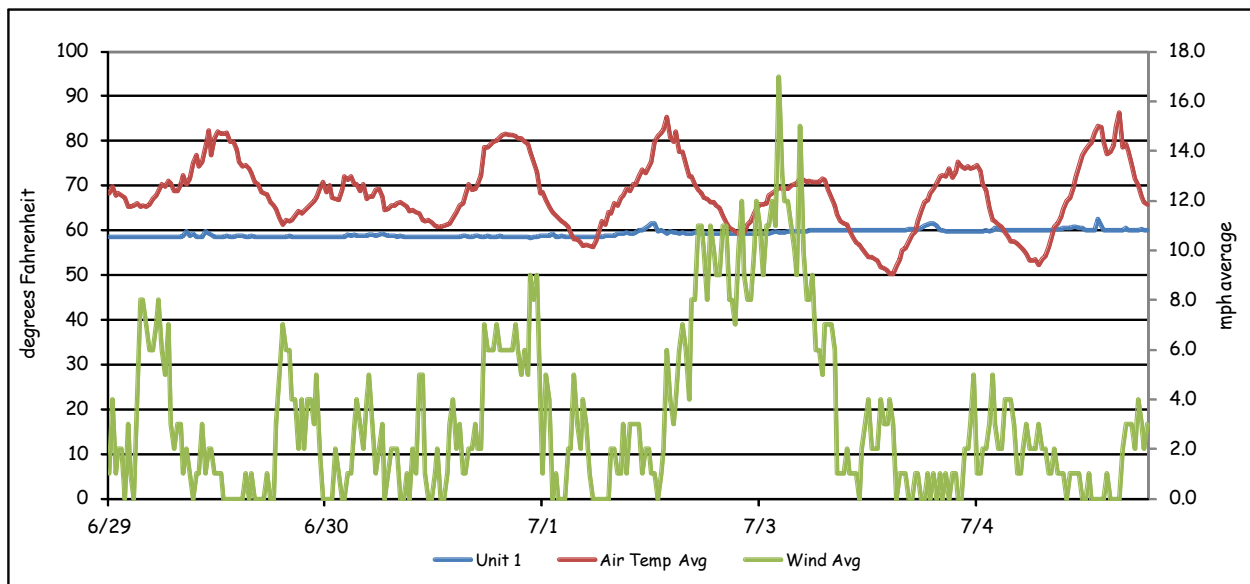


Figure 2: Weather and Forebay Water Temperature

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 71.6°F on July 5 at 3:30p.m., in front of unit 10. The average was 60.1°F across the forebay. Gatewell water temperatures for all units combined averaged 59.7°F (Table 3). Gatewell temperatures peaked at 63.7°F on July 5 in unit 6 at 4:30p.m.

Table 2: Forebay Water Temperatures

	Daily Average								Daily Max
	1F	3F	5F	7F	8F	10F	12F	14F	
6/29/12	59.0	58.9	60.1	59.7	58.6	58.8	60.1	60.5	64.6
6/30/12	58.9	59.0	59.3	59.0	58.8	58.9	59.1	59.2	61.0
7/1/12	58.7	58.7	59.2	59.0	58.4	58.5	59.4	59.7	61.2
7/2/12	59.9	59.2	60.4	59.8	59.0	59.2	60.4	60.8	64.6
7/3/12	59.6	59.8	59.9	59.8	59.5	59.7	59.9	60.2	60.4
7/4/12	60.4	60.5	61.0	61.4	60.6	61.3	61.6	61.9	65.5
7/5/12	60.7	60.7	62.4	62.9	61.3	63.3	63.4	63.2	71.6
Weekly Average	59.6	59.5	60.3	60.2	59.4	60.0	60.5	60.8	71.6

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
6/29/12	58.7	59.1	59.6	59.7	61.5	61.9	58.5	58.6	59.0
6/30/12	58.7	58.7	59.2	59.4	59.0	59.4	58.5	58.3	58.8
7/1/12	58.7	59.0	59.6	59.2	60.1	60.6	58.3	58.5	59.0
7/2/12	59.3	59.4	60.2	61.5	60.4	62.4	58.5	58.6	59.2
7/3/12	59.6	59.8	60.3	60.1	60.1	60.6	59.4	59.4	59.9
7/4/12	60.1	60.4	60.9	61.5	62.4	61.5	59.7	59.9	60.6
7/5/12	60.2	60.7	61.2	62.6	62.4	62.6	59.9	60.1	60.6
Weekly Average	59.3	59.6	60.1	60.6	60.9	61.3	58.9	59.1	59.6

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.

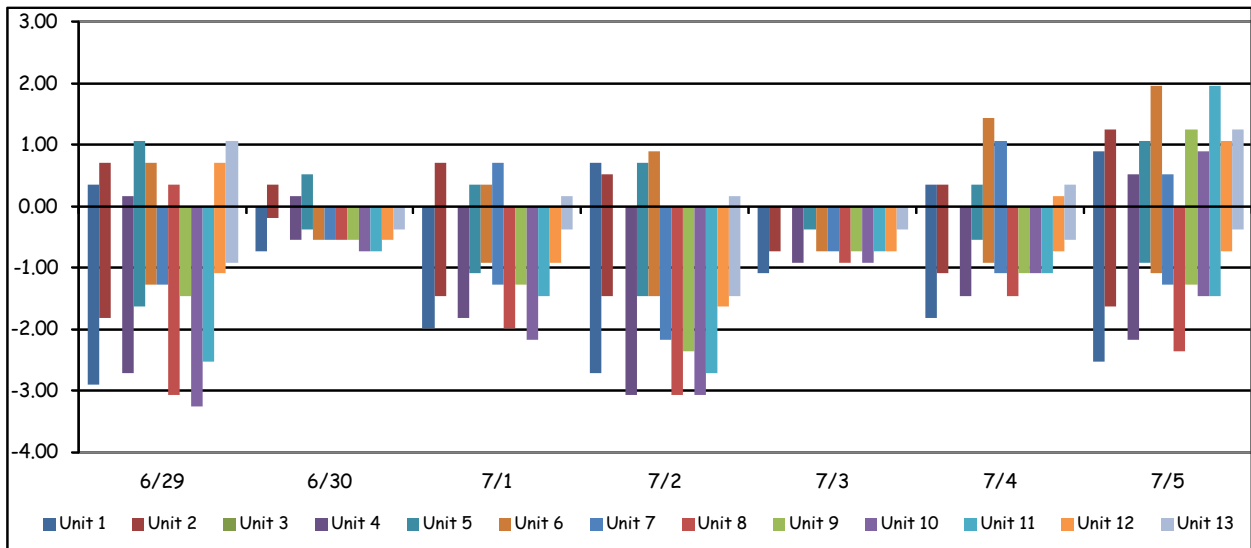


Figure 3: Average Gatewell Temperature Differentials for Units 1 - 14

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.

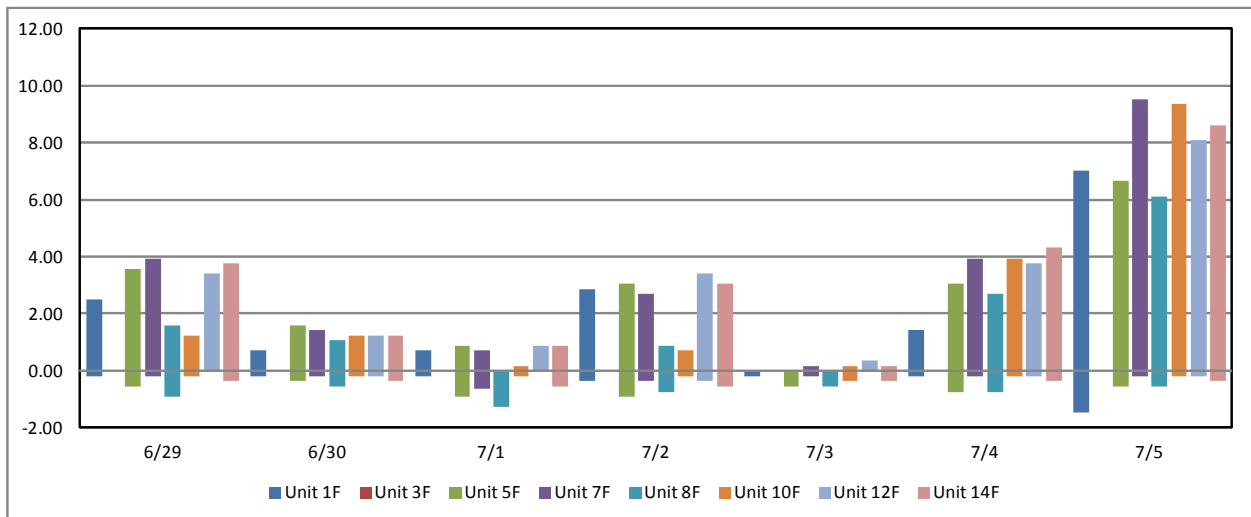


Figure 4: Average Temperature Differentials Between Forebay and Gatewell

Average water temperature in the collection channel was 59.8°F (Table 4) for the week. A maximum temperature of 62.96°F was recorded from 7:30pm until 8:30pm, below Unit 12. Temperatures at the separator averaged 59.5°F for the week with a maximum daily temperature of 61.9°F (Table 5). The temperature in raceway #1 averaged 59.99°F with a high of 62.2°F July 5 at 8:30pm.

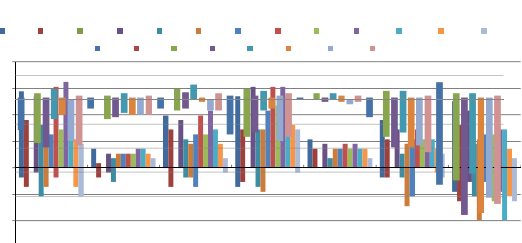


Table 4: Collection Channel Average and Maximum Water Temperatures

	Daily Avg.			Daily Max.		
	1	8	12	1	8	12
6/29/12	58.8	59.2	59.6	59.7	60.3	61.5
6/30/12	58.6	59.0	59.2	58.8	59.4	59.4
7/1/12	58.7	59.1	59.6	59.0	59.7	60.4
7/2/12	59.2	59.7	60.1	60.1	60.4	61.5
7/3/12	59.6	60.0	60.2	60.1	60.4	60.4
7/4/12	60.2	60.6	60.8	60.8	61.2	61.5
7/5/12	60.5	61.1	61.2	61.7	62.8	63.0
Weekly Average	59.4	59.8	60.1	60.0	60.6	61.1

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

	Daily Avg.			Daily Max.		
	Separator	Raceway 1	Dock	Separator	Raceway 1	Dock
6/29/12	58.9	59.5	58.6	59.7	60.4	59.4
6/30/12	58.7	59.2	58.6	59.0	59.4	58.8
7/1/12	58.8	59.3	58.5	59.0	59.7	58.6
7/2/12	59.3	59.9	58.9	60.3	60.8	59.4
7/3/12	59.7	60.2	59.6	60.1	60.6	59.9
7/4/12	60.2	60.7	59.9	60.8	61.2	60.1
7/5/12	60.6	61.2	60.0	61.9	62.2	60.3
Average	59.4	60.0	59.2	60.1	60.6	59.5

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
6/29/12	0.1	-0.7	0.5
6/30/12	0.3	-0.2	-0.1
7/1/12	0.1	-0.8	-0.2
7/2/12	0.6	-0.7	0.3
7/3/12	0.1	-0.5	-0.3
7/4/12	0.2	0.0	0.8
7/5/12	0.2	0.3	2.4
Average	0.2	-0.4	0.5
Maximum	6.5	4.7	8.3
Minimum	-1.6	-2.3	-1.1

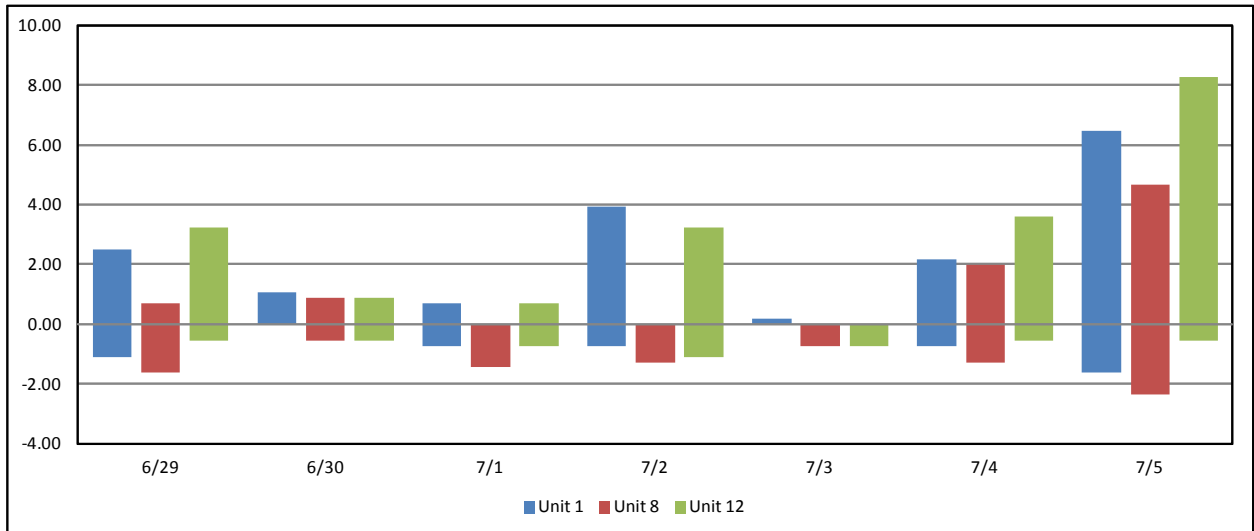


Figure 5: Average Temperature Differentials Between Forebay and Collection Channel

