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McNary Temperature Report #5
July 15 - 21, 2011

A total of 258,881 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 99.6% of the total collection. Daily flows for this week averaged 303.0kcfs. There has been court ordered spill since April 10. Spill averaged 183.1kcfs. The system mortality averaged 3.4% and sample tank mortality averaged 3.1%. Mortalities are being enumerated from the separator, the sample tanks and the recovery raceway. Collection for barging began July 20.

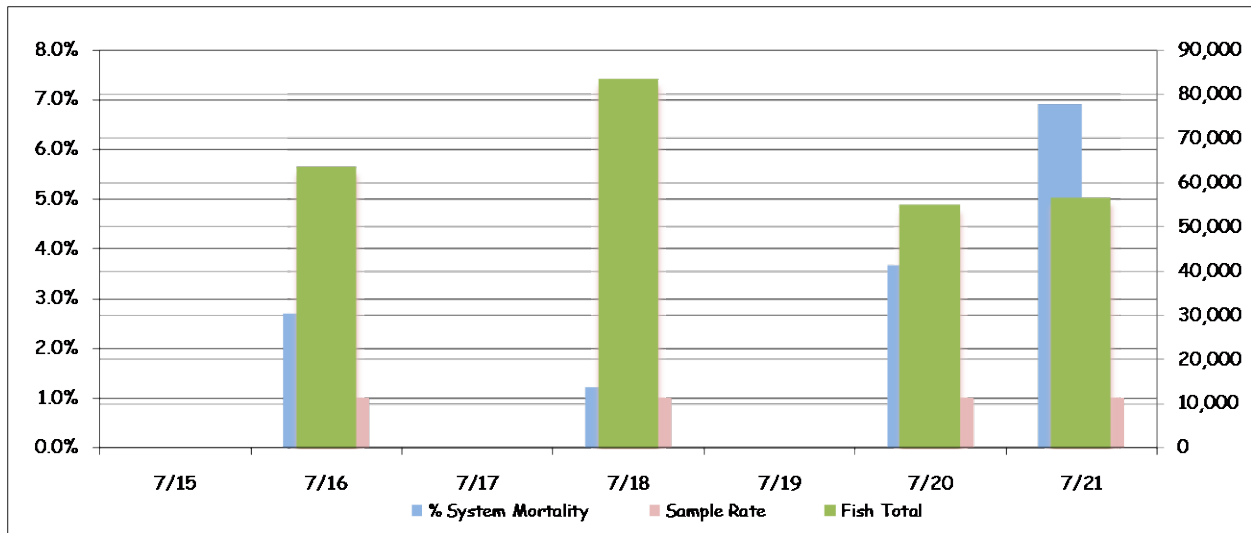


Figure 1: Collection and Mortality

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
7/15/11				337.5	117.2	215.6	69.2	87.4	1.8	11.0
7/16/11	63,602	2.59%	2.70%	325.6	121.7	199.2	70.6	81.1	3.1	9.0
7/17/11				283.0	118.4	159.9	69.4	82.0	1.8	21.0
7/18/11	83,592	1.70%	1.21%	292.7	119.0	169.0	70.8	83.6	2.7	25.0
7/19/11				302.8	109.1	189.0	68.4	74.7	7.4	35.0
7/20/11	54,989	5.09%	3.67%	289.7	104.2	180.8	67.2	79.8	1.7	15.0
7/21/11	56,698	3.64%	6.92%	289.4	116.4	168.3	69.4	79.6	6.8	33.0
Weekly Average	64,720	3.05%	3.35%	303.0	115.1	183.1	69.3	87.4	3.6	35.0

Fish are being bypassed back to the river with a 24-hour sample taken every other day until July 21. Units 2 and 7 have just come back online. Unit 1 and 10 are off for rewinding. All orifices are open.

Air temperatures have not changed much at the McNary JFF, with an average of 69.3°F for the week. Maximum hourly air temperature was 87.4°F on July 15 (Figure 2). The minimum temperature was 55.4°F on July 15 at 5:30a.m. Winds over the course of the week averaged 3.6mph with gust peaking up to 35.0mph on July 19.

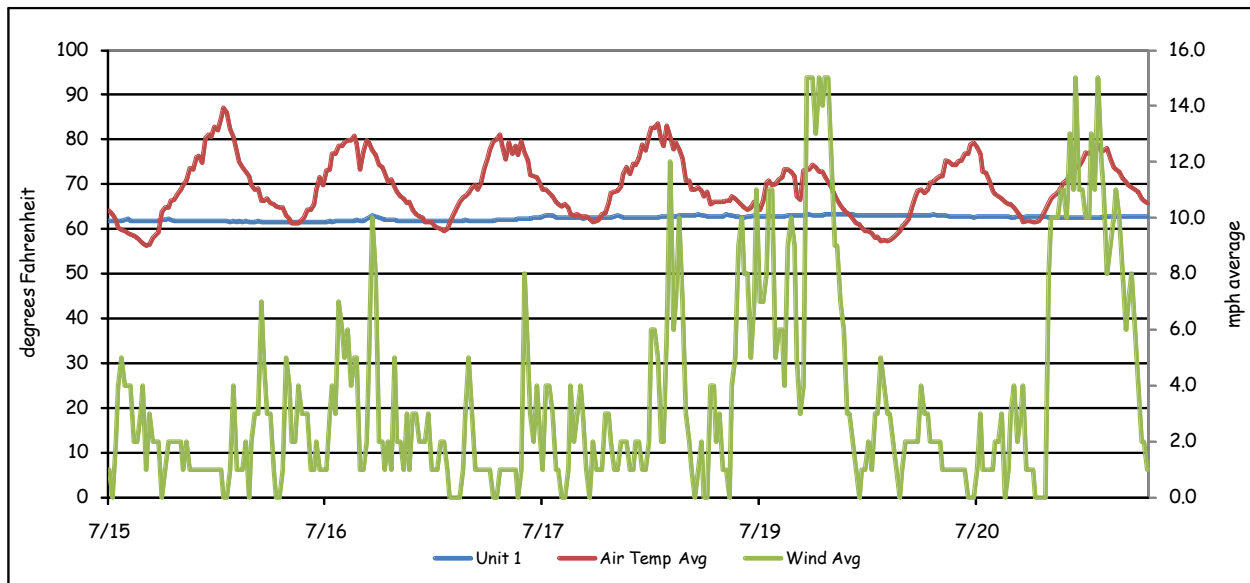


Figure 2: Weather and Forebay Water Temperature

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 71.8°F on July 15 at 5:00p.m., in front of unit 14. The average was 63.2°F across the forebay. Gatewell water temperatures for all units combined averaged 62.8°F (Table 3). Gatewell temperatures peaked at 66.6°F on July 20 in unit 6 at 5:30p.m.

Table 2: Forebay Water Temperatures

	Daily Average							Daily Max	
	1F	3F	5F	7F	8F	10F	12F		14F
7/15/11	61.9	63.5	64.1	62.2	62.1	62.5	64.2	64.6	71.8
7/16/11	61.8	62.4	62.5	61.9	61.9	62.4	62.8	62.7	64.6
7/17/11	62.2	63.0	63.8	62.8	62.6	63.2	64.1	64.3	70.0
7/18/11	63.0	63.4	63.9	62.9	62.9	63.4	64.4	64.3	66.9
7/19/11	62.9	63.0	63.2	63.1	63.0	63.5	63.5	63.6	64.8
7/20/11	63.2	63.7	64.5	63.7	64.2	64.1	64.6	64.3	67.4
7/21/11	62.6	62.7	62.6	62.6	62.6	62.9	63.2	63.0	65.3
Weekly Average	62.5	63.1	63.5	62.7	62.7	63.1	63.8	63.8	71.8

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
7/15/11	61.8	61.8	62.8	62.2	62.4	66.4	61.5	61.5	61.9
7/16/11	61.8	61.7	62.5	63.0	61.9	64.0	61.5	61.5	61.7
7/17/11	62.1	62.1	63.0	63.0	62.4	64.2	61.9	61.9	62.2
7/18/11	62.6	62.6	63.8	63.3	63.0	65.5	62.2	62.2	62.8
7/19/11	63.0	62.8	63.5	63.3	63.3	64.2	62.6	62.6	63.1
7/20/11	63.0	62.9	63.8	63.3	64.0	65.1	62.6	62.4	63.0
7/21/11	62.7	62.5	63.1	62.8	63.3	64.2	62.4	62.4	62.8
Weekly Average	62.4	62.3	63.2	63.0	62.9	64.8	62.1	62.1	62.5

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.

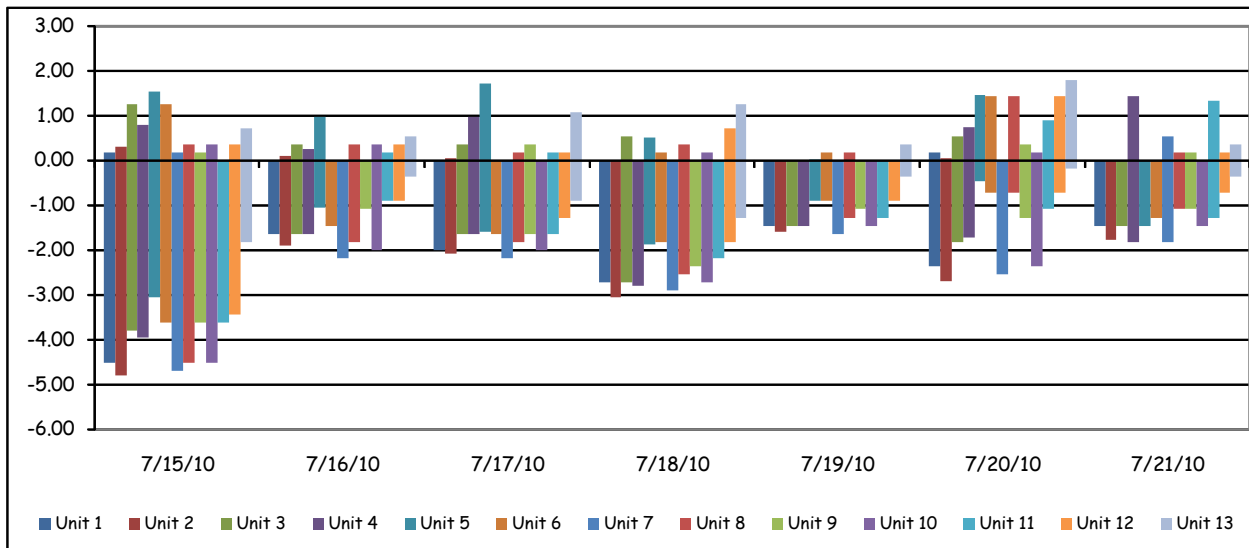


Figure 3: Gatewell Temperature Differentials for Units 1 - 14

Forebay differentials (Figure 4) are calculated by taking the forebay temperature and subtracting the corresponding gatewell temperature from it ($1F - \text{unit } 1$). 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.

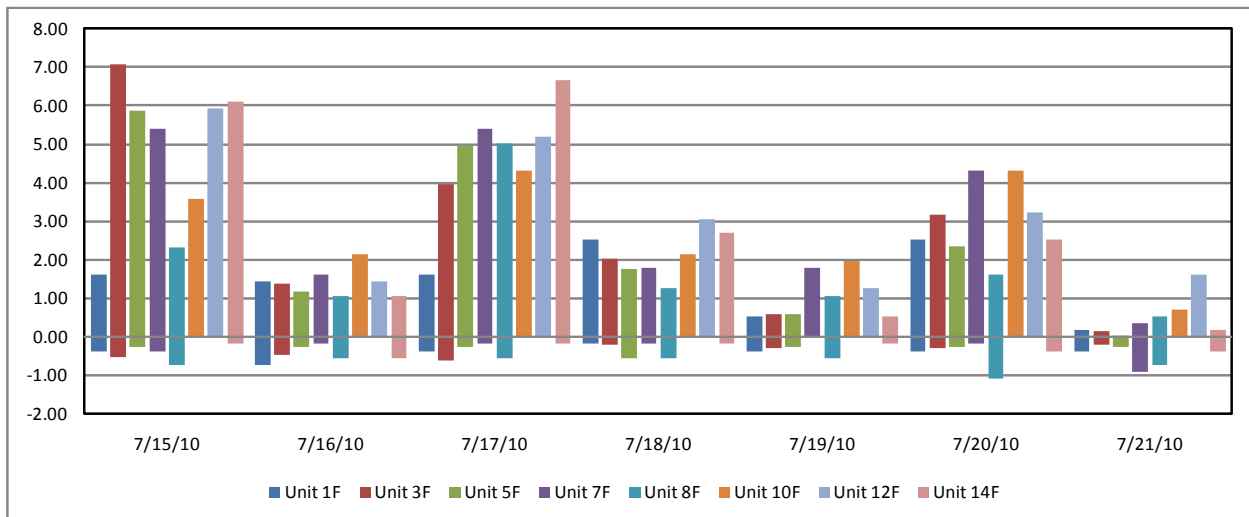


Figure 4: Temperature Differentials Between Forebay and Gatewell

Average water temperature in the collection channel was 63.0°F (Table 4) for the week. A maximum temperature of 65.8°F was recorded July 20 at 5:30p.m., below Unit 12. Temperatures at the separator averaged 62.6°F for the week with a maximum daily temperature of 64.6°F (Table 5). The temperature in raceway #1 averaged 62.7°F with a high of 64.8°F July 20 at 5:30pm.

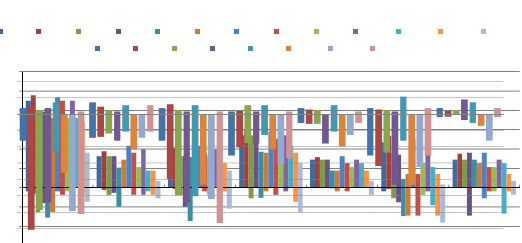


Table 4: Collection Channel Average and Maximum Water Temperatures

	Daily Avg.			Daily Max.		
	1	8	12	1	8	12
7/15/11	62.1	62.4	62.9	62.8	63.3	64.8
7/16/11	61.9	62.3	62.6	63.0	63.3	64.0
7/17/11	62.3	62.7	63.1	63.3	63.7	64.8
7/18/11	62.9	63.3	63.9	63.7	64.4	65.8
7/19/11	62.9	63.3	63.6	63.1	63.7	64.4
7/20/11	63.3	63.8	64.0	64.6	65.1	65.8
7/21/11	62.6	63.0	63.2	63.0	63.7	64.0
Average	62.6	62.9	63.3	63.3	63.9	64.8

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

	Daily Avg.			Daily Max.		
	Separator	Raceway 1	Dock	Separator	Raceway 1	Dock
7/15/11	62.1	62.2	61.8	63.0	63.0	62.0
7/16/11	61.9	62.0	61.8	63.0	63.0	62.3
7/17/11	62.4	62.4	62.1	63.3	63.3	62.6
7/18/11	63.0	63.0	62.6	63.7	63.7	63.1
7/19/11	62.9	63.0	62.9	63.1	63.1	63.1
7/20/11	63.4	63.4	63.0	64.6	64.8	63.4
7/21/11	62.6	62.7	62.6	63.0	63.0	62.9
Average	62.6	62.7	62.4	63.4	63.4	62.8

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
7/15/11	-0.2	-0.3	1.3
7/16/11	-0.1	-0.4	0.3
7/17/11	-0.1	0.0	1.0
7/18/11	0.1	-0.4	0.5
7/19/11	0.0	-0.3	-0.1
7/20/11	-0.1	0.4	0.5
7/21/11	0.0	-0.4	-0.1
Average	-0.1	-0.2	0.5
Maximum	2.2	4.7	5.0
Minimum	-1.4	-1.8	-0.5

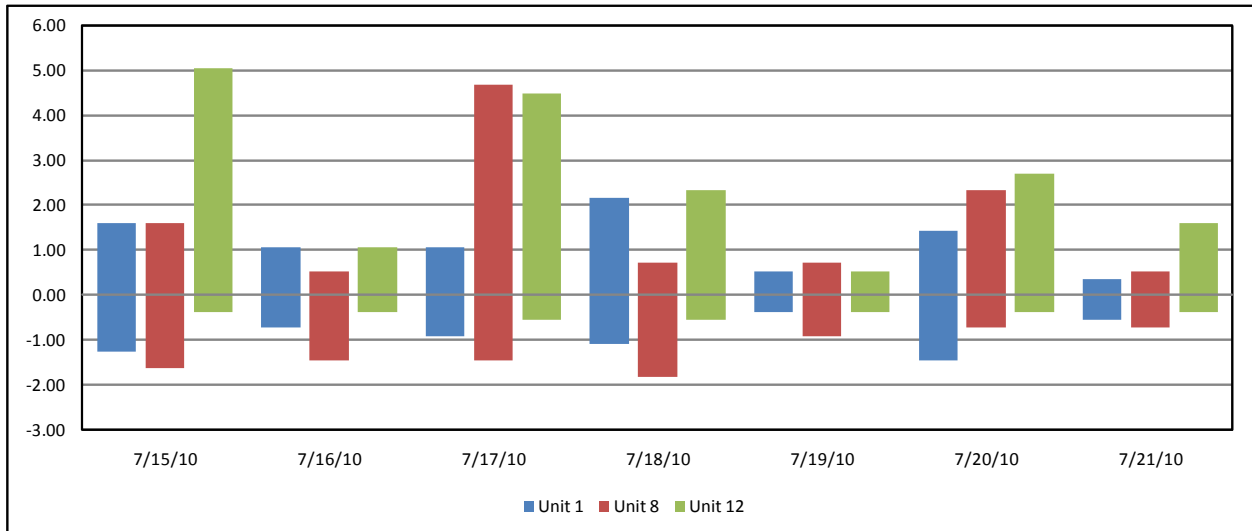


Figure 5: Temperature Differentials Between Forebay and Collection Channel

