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McNary Temperature Report #12
August 27 - 31, 2010

The last five days of August saw a total of 31,680 juvenile salmonids collected at the McNary Juvenile Fish Facility (JFF). Peak collection day was August 31 with 12,925 fish (Figure 1 and Table 1). Subyearling fall chinook accounted for 100.0% of the total collection. Daily flows for this 5-day period averaged 105.8kcfs. There has been court ordered spill since April 10 and ended September 1. Spill averaged 49.1kcfs. The system mortality averaged 0.6% and sample tank mortality averaged 0.5%. Mortalities are being enumerated from all raceways, the sample tanks and the recovery raceway.

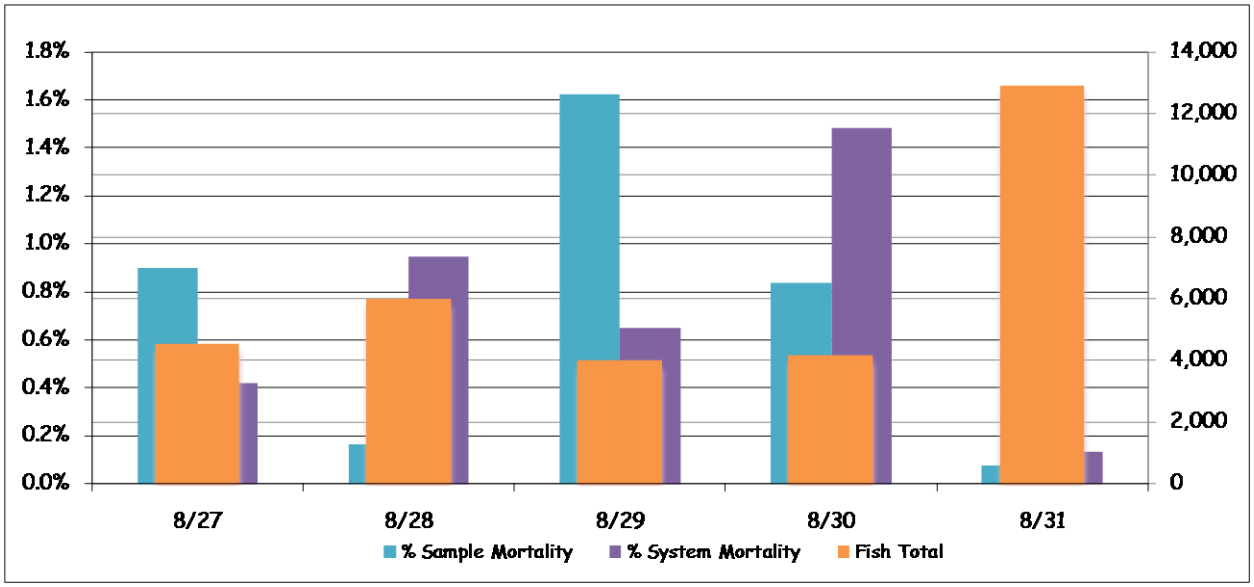

Figure 1: Collection and Mortality

Table 1: Collection and Mortality With Daily and Weekly Averages

		Mortality		Flow			Air Temp		Wind Speed	
	Collection	Sample	System	Total	Turbine	Spill	Avg.	Max	Avg.	Max.
8/27/10	4,540	0.90%	0.42%	111.6	51.0	55.9	63.7	74.2	1.4	16.0
8/28/10	6,025	0.17%	0.95%	120.8	55.4	60.7	64.1	74.7	1.0	13.0
8/29/10	4,005	1.62%	0.65%	104.7	51.2	48.8	63.4	75.1	2.3	16.0
8/30/10	4,185	0.84%	1.48%	97.7	51.1	41.9	63.8	73.9	1.0	11.0
8/31/10	12,925	0.08%	0.13%	94.1	50.9	38.4	62.0	68.4	3.0	26.0
Weekly Average	6,336	0.51%	0.57%	105.8	51.9	49.1	63.4	75.1	1.7	26.0

Fish are being transported by truck with a 24-hour sample taken every day until the end of the season. The one exception to this was August 31 when unusually large amounts of fish were collected. 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 over this 5-day period averaged 63.4°F. Maximum hourly air temperature was 75.1°F on August 29 (Figure 2). The minimum temperature was 52.6°F on August 27 at 6:30a.m. Winds over the course of the week averaged 1.7mph with gusts peaking up to 26.0mph on August 31.

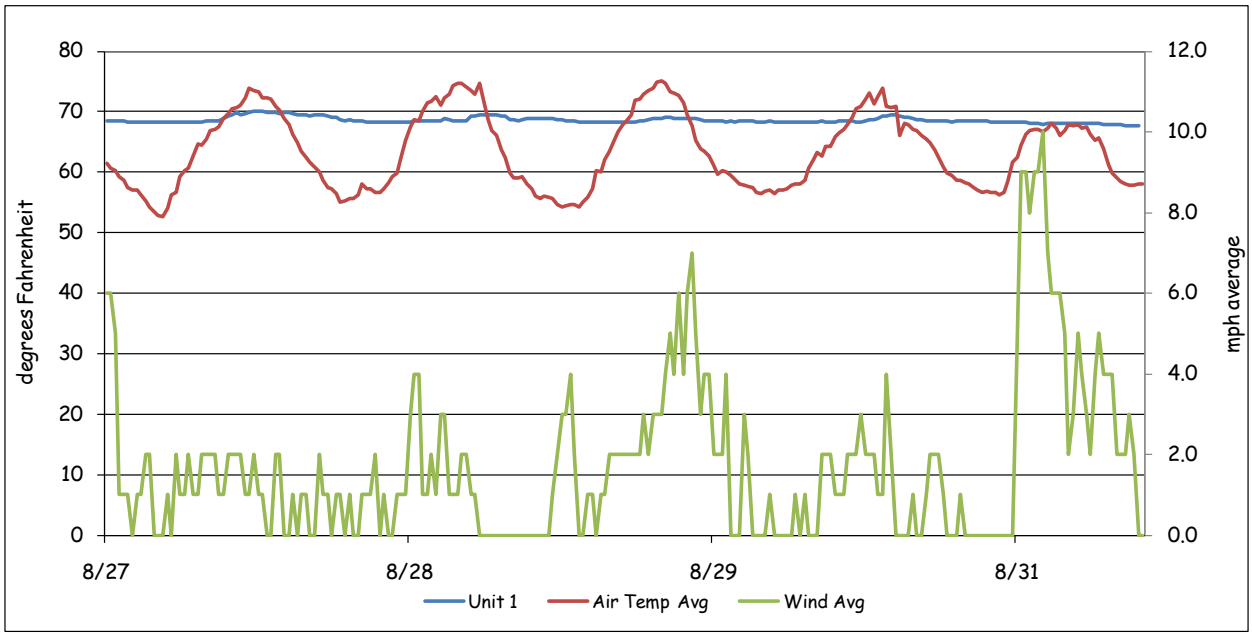

Figure 2: Weather and Forebay Water Temperature

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 week with 70.4°F on August 27 at 5:30p.m., in front of unit 1. The average was 68.6°F across the forebay. Gatewell water temperatures for all units combined averaged 68.3°F (Table 3). Gatewell temperatures peaked at 69.98°F on August 27 in unit 1 from 5:00p.m. until 6:30p.m.

Table 2: Forebay Water Temperatures

	Daily Average								Daily
	1F	3F	5F	7F	8F	10F	12F	14F	Max
8/27/10	69.0	68.8	69.0	69.1	69.1	69.0	68.8	68.4	70.4
8/28/10	68.9	68.7	69.0	69.0	69.0	68.9	68.8	68.4	69.8
8/29/10	68.7	68.4	68.7	68.8	68.8	68.5	68.5	68.1	69.6
8/30/10	68.7	68.4	68.6	68.6	68.5	68.4	68.4	67.9	69.8
8/31/10	68.2	67.9	68.2	68.2	68.1	68.0	68.0	67.6	68.9
Weekly Average	68.7	68.4	68.7	68.8	68.7	68.6	68.5	68.1	70.4

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
8/27/10	68.9	68.3	68.6	70.0	68.5	69.1	68.2	68.2	68.2
8/28/10	68.7	68.2	68.6	69.4	68.2	69.1	68.2	68.2	68.2
8/29/10	68.6	68.2	68.2	69.1	68.2	68.5	68.2	68.2	68.0
8/30/10	68.6	68.1	68.1	69.4	68.2	68.5	68.4	67.8	68.0
8/31/10	68.1	67.8	67.8	68.5	68.0	68.2	67.6	67.6	67.5
Average	68.6	68.1	68.3	69.3	68.2	68.7	68.1	68.0	68.0

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.

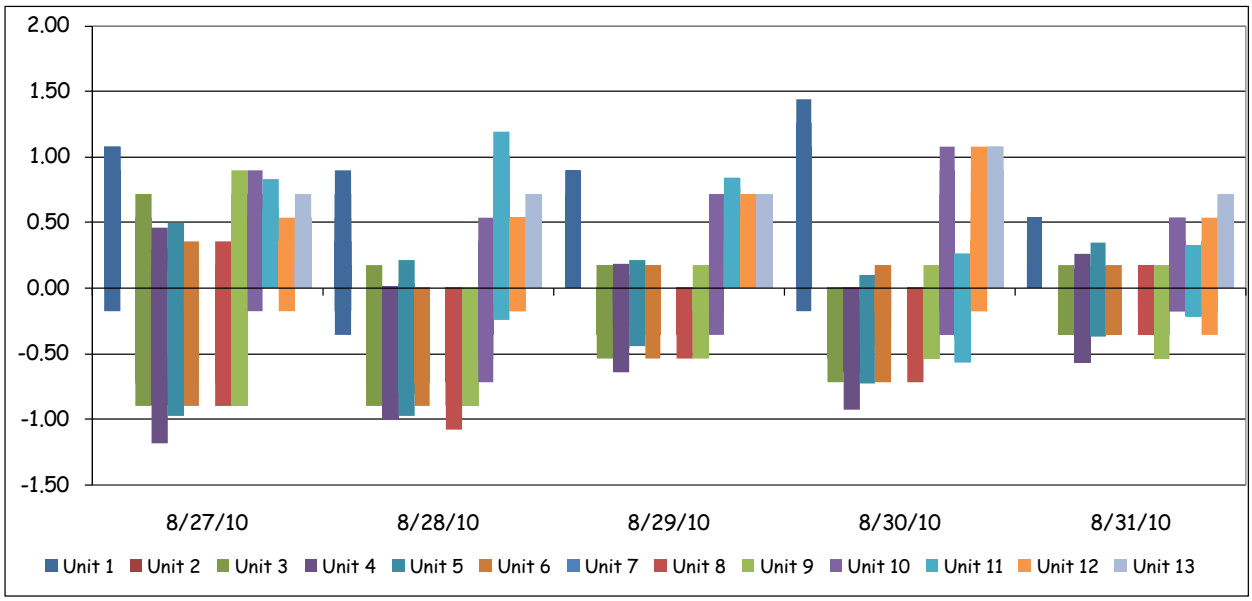

Figure 3: Gatewell Temperature Differentials for Units 1 - 14

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.

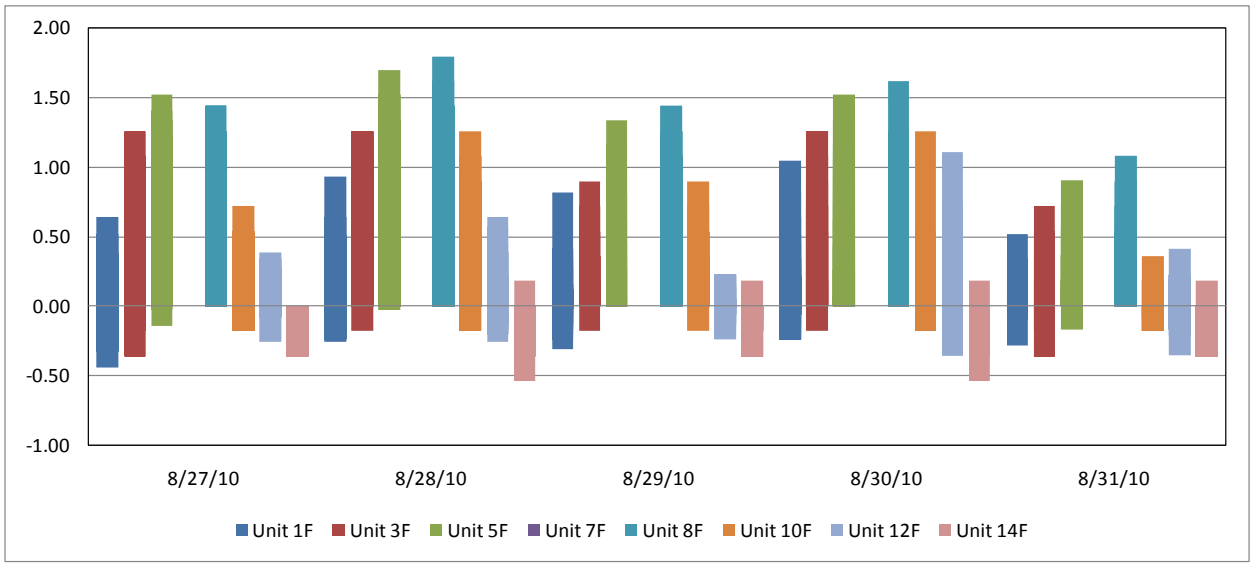

Figure 4: Temperature Differentials Between Forebay and Gatewell

Average water temperature in the collection channel was 68.2°F (Table 4) for five days. A maximum temperature of 69.3°F was recorded August 27 at 4:30p.m. below Unit 1 and from 9:30 until 11:00p.m. below Unit 12. Temperatures at the separator averaged 68.2°F for these five days with a maximum daily temperature of 69.1°F (Table 5). The temperature in raceway #1 averaged 68.2°F with a high of 69.1°F August 27 from 5:00 until 6:00 in the evening.

Table 4: Collection Channel Average and Maximum Water Temperatures

	Daily Avg.			Daily Max.		
	1	**8**	**12**	**1**	**8**	**12**
8/27/10	68.7	68.4	68.6	69.3	68.7	69.3
8/28/10	68.5	68.2	68.6	68.7	68.5	69.1
8/29/10	68.3	68.0	68.3	68.5	68.2	68.7
8/30/10	68.2	67.9	68.1	68.4	68.0	68.5
8/31/10	67.9	67.6	67.9	68.0	67.8	68.4
Average	68.3	68.0	68.3	68.6	68.3	68.8

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

	Daily Avg.			Daily Max.		
	Separator	**Raceway 1**	**Dock**	**Separator**	**Raceway 1**	**Dock**
8/27/10	68.5	68.5	68.7	69.1	69.1	69.3
8/28/10	68.4	68.3	68.5	68.7	68.7	68.7
8/29/10	68.1	68.1	68.4	68.4	68.4	68.7
8/30/10	68.0	68.0	68.4	68.2	68.2	68.4
8/31/10	67.8	67.8	68.0	67.8	67.8	68.1
Average	68.2	68.2	68.4	68.4	68.4	68.6

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**
8/27/10	0.3	0.7	0.2
8/28/10	0.4	0.8	0.3
8/29/10	0.3	0.8	0.3
8/30/10	0.5	0.7	0.3
8/31/10	0.2	0.5	0.2
Average	0.4	0.7	0.2
Maximum	1.4	1.6	1.1
Minimum	-0.3	0.0	-0.8

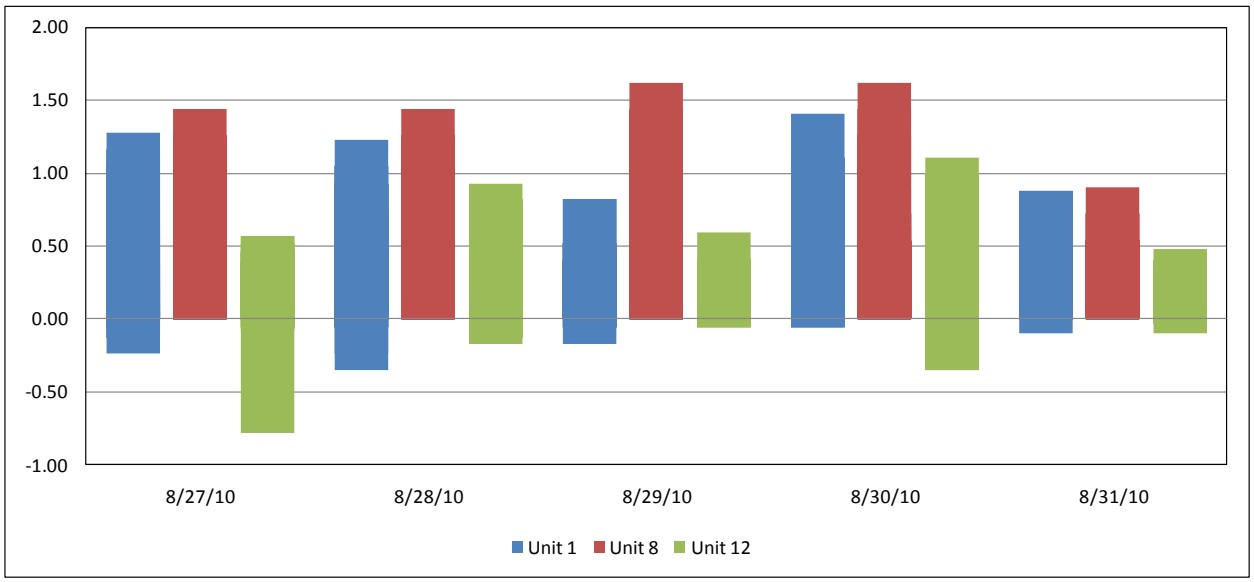

Figure 5: Temperature Differentials Between Forebay and Collection Channel