PSMFC McNary Dam, P.O. Box 1230, Umatilla, Oregon 97882
Phone (541) 922-3630 Fax (541) 922-4101

McNary Temperature Report #1
June 15 – 17, 2010

A total of 32,310 juvenile salmonids were collected at the McNary Juvenile Fish Facility (JFF) for this 3 day period. The only sampling day was June 16 (Figure 1 and Table 1). Subyearling fall chinook accounted for 84.1% of the total collection. Daily flows for those three days averaged 332.4kcfs. There has been court ordered spill since April 10. Spill averaged 160.3kcfs. The three day system mortality averaged 1.97% and sample tank mortality averaged 6.31%. Mortalities are being enumerated from the separator, the sample tanks and raceway 9W.

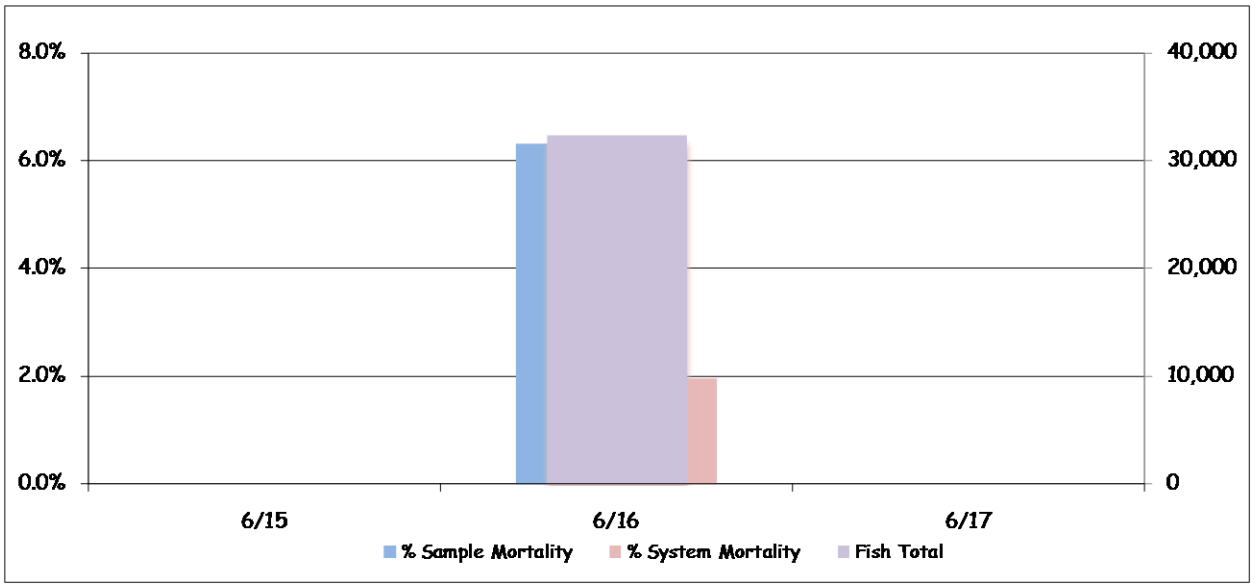

Figure 1: Collection and Mortality

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
6/15/10	0	0.00%	0.00%	306.80	167.60	134.50	59.2	69.8	6.6	29.0
6/16/10	32,310	6.31%	1.97%	339.70	168.70	166.30	56.2	65.2	3.2	19.0
6/17/10	0	0.00%	0.00%	350.60	165.90	180.10	61.1	71.6	4.8	24.0
Weekly Average	10,770	6.31%	1.97%	332.37	167.40	160.30	58.8	71.6	4.9	29.0

Fish are being bypassed daily with a 24-hour sample taken every other day. In the month of June, the sample will be counted on the even numbered days.

Air temperatures are cool at the McNary JFF, with an average over three days of 58.8°F. Maximum hourly air temperature was 70.9°F on June 17 (Figure 2). The minimum temperature was 47.9°F on June 16 at 4:30 a.m. Winds over the course of the week averaged 4.9mph with gust peaking up to 29.0mph on June 15.

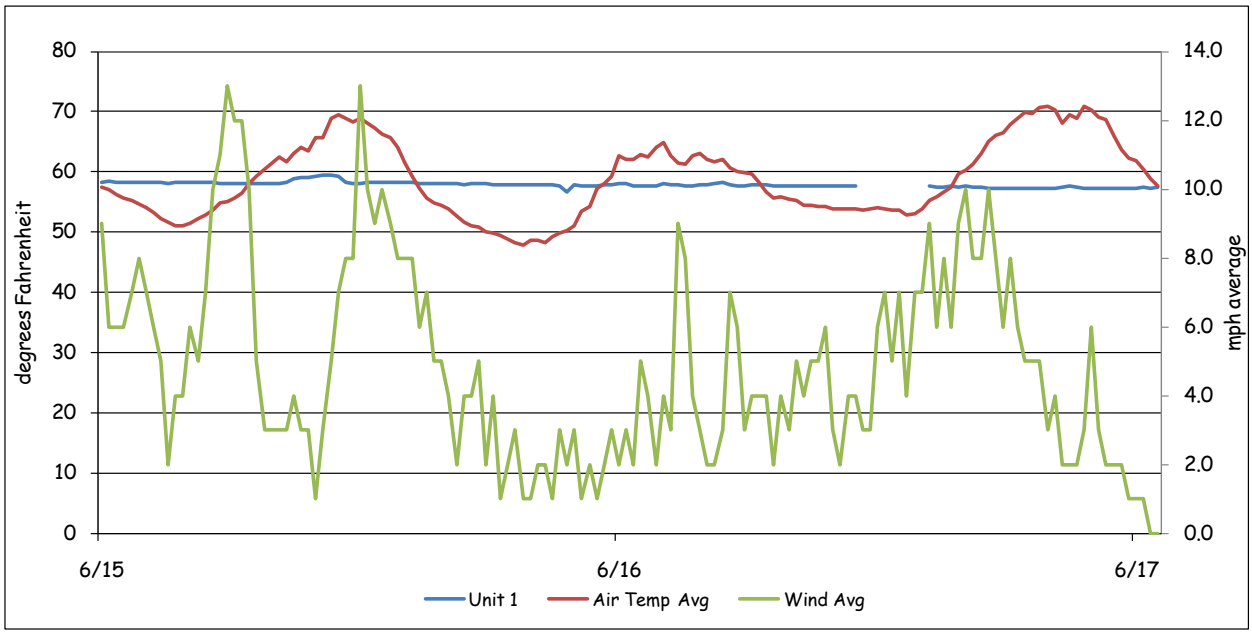

Figure 2: Weather and Forebay Water Temperature

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 60.8°F on June 15 at 3:30 p.m. in front of unit 7. The average was 58.0°F across the forebay for the week. Gatewell water temperatures for all units combined also averaged 58.0°F (Table 3). Gatewell temperatures peaked at 60.3°F on June 15 in unit 9 from 3:30 until 5:00 p.m.

Table 2: Forebay Water Temperatures

	Daily Average								
	1F	**3F**	**5F**	**7F**	**8F**	**10F**	**12F**	**14F**	**Daily Max**
6/15/10	58.3	58.4	58.5	58.8	58.6	58.7	58.6	58.3	60.8
6/16/10	57.8	58.0	58.0	58.2	58.0	58.0	57.9	57.8	59.4
6/17/10	57.3	57.5	57.5	57.7	57.6	57.7	57.5	57.3	58.8
Weekly Average	57.8	58.0	58.0	58.2	58.1	58.1	58.0	57.8	58.0

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**
6/15/10	58.3	58.3	58.7	59.4	59.4	59.5	58.1	57.7	58.1
6/16/10	57.9	57.7	58.0	58.3	58.2	58.3	56.7	57.4	57.7
6/17/10	57.4	57.3	57.6	57.7	57.7	58.1	57.2	56.8	57.2
Average	57.9	57.8	58.1	58.5	58.4	58.6	57.3	57.3	57.7

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.

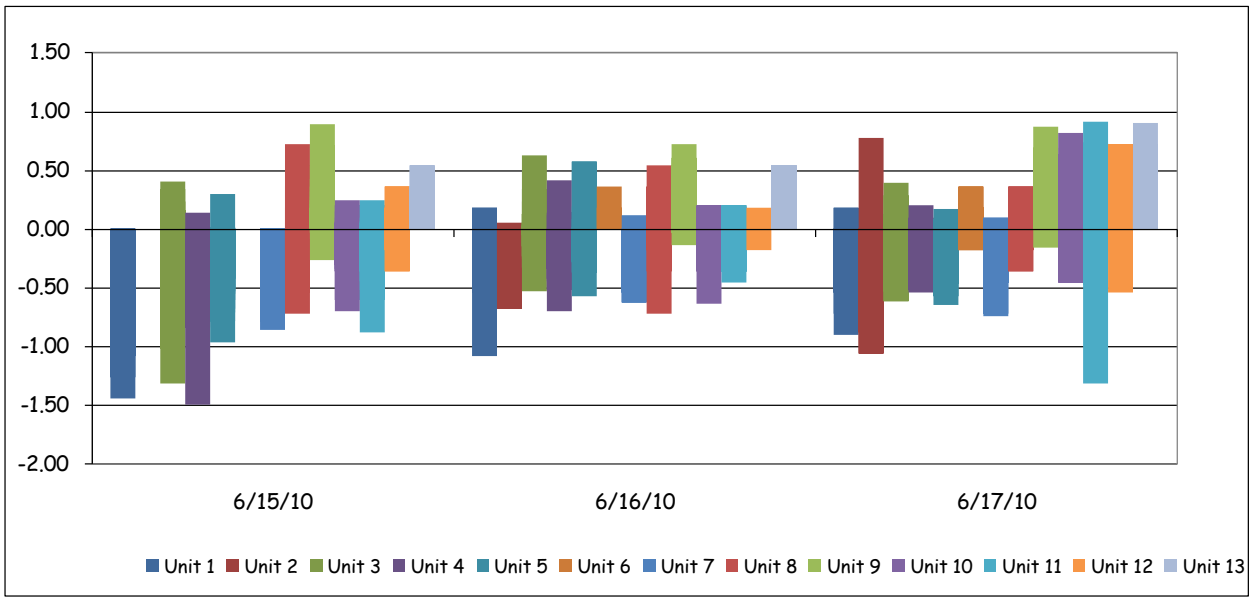

Figure 3: Gatewell Temperature Differentials for Units 1 - 14

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.

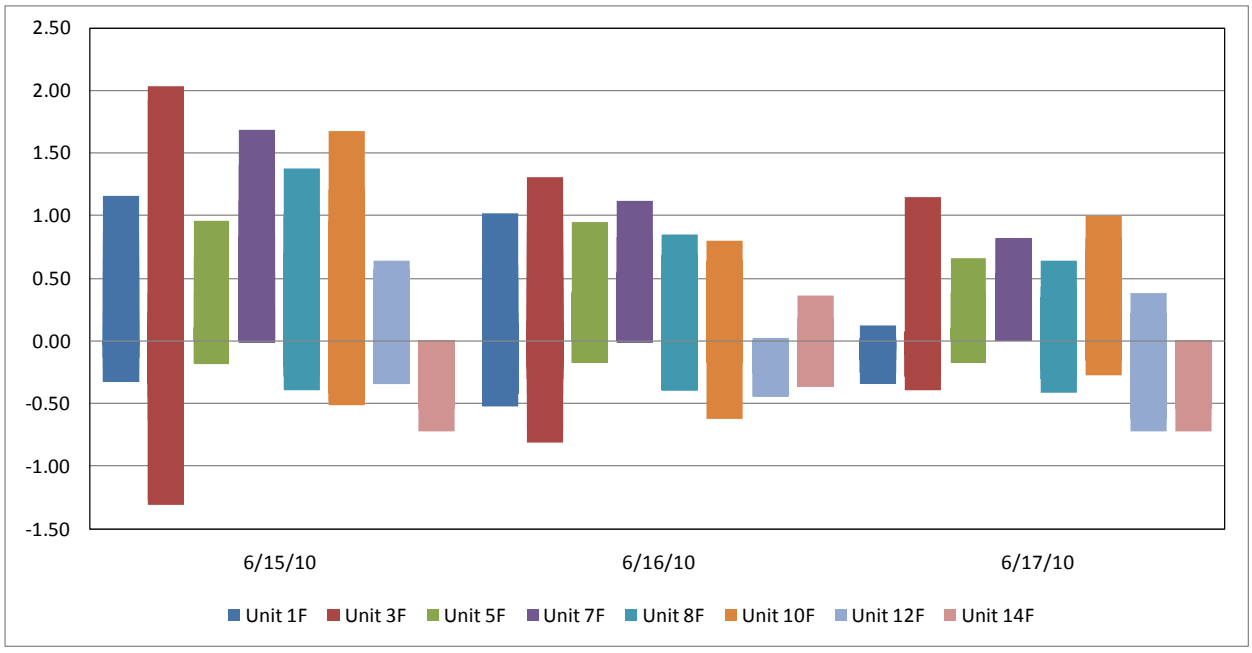

Figure 4: Temperature Differentials Between Forebay and Gatewell

Average water temperature in the collection channel was 58.0°F (Table 4) for three days. A maximum temperature of 59.4°F was recorded June 15 from 3:00 until 6:00 p.m. below Units 1, 8 and 12. Temperatures at the separator averaged 57.6°F for

the period with a maximum daily temperature of 58.3°F (Table 5). The temperature in raceway #1 averaged 57.9°F with a high of 59.4°F June 15.

Table 4: Collection Channel Average and Maximum Water Temperatures

	Daily Avg.			Daily Max.		
	1	**8**	**12**	**1**	**8**	**12**
6/15/10	58.6	58.4	58.5	59.4	59.4	59.4
6/16/10	58.1	57.8	57.9	58.5	58.1	58.3
6/17/10	57.6	57.3	57.4	57.9	57.9	58.1
Average	58.1	57.8	57.9	58.6	58.5	58.6

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

	Daily Avg.			Daily Max.		
	Separator	**Raceway 1**	**Dock**	**Separator**	**Raceway 1**	**Dock**
6/15/10		58.4			59.4	
6/16/10	57.9	57.8		58.3	58.3	
6/17/10	57.5	57.5		57.7	59.0	
Average	57.6	57.9		58.0	58.9	

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**
6/15/10	-0.3	0.3	0.2
6/16/10	-0.4	0.3	0.0
6/17/10	-0.4	0.3	0.1
Average	-0.3	0.3	0.1
Maximum	1.2	1.7	0.8
Minimum	-1.4	-0.2	-0.3

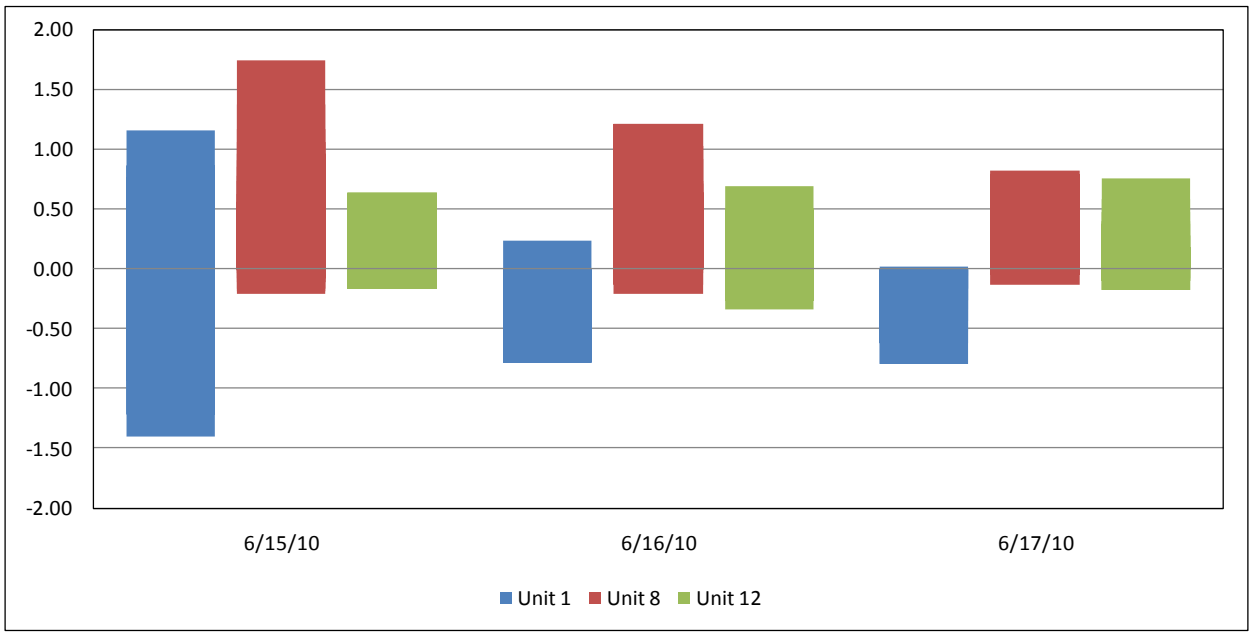

Figure 5: Temperature Differentials Between Forebay and Collection Channel