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USACE Walla Walla District Biological Services: Temperature Monitoring Program at McNary Dam

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		Report Period:	August 19 to 25, 2016
Report No.	MCN TEMP 16-13		

Fish Collection

An estimated 168 juvenile salmonids were collected and 168 juvenile salmonids bypassed the McNary Juvenile Fish Facility (JFF; Table 1), comprising 100% subyearling Chinook salmon. There were 0 juvenile system mortalities (Figure 1).

River Conditions

Average river flow for this reporting period was 136,300 cubic feet per second (136.3 kcfs), with an average spill of 68.1 kcfs.

Weather Conditions

The weekly average daytime temperature for 0700 August 18 to 0700 August 25 was 79.0 °F. The weekly average nighttime temperature was 70.2 °F. Temperatures ranged from a maximum of 95.4 °F at 1630 on August 18 to a minimum of 53.9 °F from 0530 to 0600 on August 23.

Winds averaged 1.3 miles per hour (mph; Figure 2). The wind was highest at 0100 on August 19, with winds averaging 21 mph and gusts measuring up to 42 mph.

Probe Operations

All temperature monitoring activities proceeded as normal this week.

Water Temperatures

Water temperatures varied with air temperatures (Figure 3). The average forebay temperature (weekly average of 14 positions was 71.5 °F) was higher than the average

gatewell temperature (weekly average of 13 positions, Units 2 through 14, was 71.0 °F) and the collection channel temperature (weekly average of positions at C1 and C12 was 71.1 °F). The JFF temperature (weekly average of the separator and sample tank) was 71.7 °F.

The temperature differential was highest across the dam when the air temperatures were highest and there was no wind detected (Figure 4). The gatewells saw the largest average weekly temperature differential at 2.0 °F. The maximum gatewell temperature differential was 7.0 °F at 1730 on August 20 (U13 high; U6 low). The average weekly temperature differential across 14 forebay positions was 1.9 °F. The maximum forebay temperature differential was 8.3 °F at 1500 on August 18 (F9 high; F2 low). The average weekly temperature differential across the collection channel was 0.8 °F. The maximum collection channel temperature differential was 3.2 °F at 2000 on August 18 (C12 high; C1 low). The average weekly temperature differential across JFF was 0.2 °F. The maximum temperature differential was 0.36 °F at 1330 on August 18 and 1330 on August 21.

Temperature differentials through the dam were smaller than those seen across the dam (Figures 5 and 6). The average weekly temperature differential between the gatewells and forebay was 0.8 °F. The forebay was warmer than the gatewell on average at 12 units. The gatewell at Unit 2 was warmer than the forebay at Unit 2 on average. The largest temperature differential was 7.4 °F at Unit 4 from 1630 to 1700 on August 20 (forebay greater than gatewell). The average weekly temperature differential between the gatewell and collection channel at Unit 12 was 0.5 °F. The collection channel was warmer than the gatewell at Unit 12. The largest temperature differential was 3.1 °F at Unit 12 at 1700 on August 20 (collection channel greater than gatewell).

The spillway temperatures had the same diurnal pattern seen in the forebay. The temperature differential across the spillway was 0.9 °F. The weekly average across four spillbay positions was 71.5 °F. The maximum temperature was 78.5 °F; the minimum temperature was 69.3 °F.

The tailwater did not experience the large diurnal patterns seen in the forebay, spillway, and gatewells. The average weekly temperature of Tailwater 1, Tailwater 14, Wing Wall, and the JFF Outflow Pipe was 70.9 °F. The temperature differential was 1.0 °F across tailwater locations on average. The maximum temperature was 72.5 °F from 0200 to 0230 on

August 19. The minimum temperature was 69.7 °F, measured 18 times on August 24 and August 25.

Table 1
Bypass, Mortality, and River and Weather Conditions from 0700 August 18 to 0700 August 25

Date	Fish Collected	Fish Bypassed	Mortality		Avg. River Flow	Avg. Turbine Flow	Avg. Spill	Air Temperature		Wind Speed	
			Sample	Facility				Avg.	Max	Avg.	Max
Aug 18 – 19	32	32	0	0	136.2	63.2	68.2	82.6	95.4	3.4	18.0
Aug 19 – 20					159.3	74.9	79.7	76.0	90.7	1.1	10.0
Aug 20 – 21	28	28	0	0	156.1	73.6	77.9	76.0	92.1	0.0	0.0
Aug 21 – 22					117.2	54.2	58.4	76.4	93.4	3.6	12.0
Aug 22 – 23	36	36	0	0	122.3	56.5	61.1	67.2	80.1	0.1	1.0
Aug 23 – 24					137.7	64.2	68.8	69.3	83.6	0.2	2.0
Aug 24 – 25	72	72	0	0	125.3	57.9	62.8	73.4	88.0	0.8	6.0
Weekly Total	**168**	**168**	**0**	**0**	**136.3**	**63.5**	**68.1**	**62.4**		**1.3**	

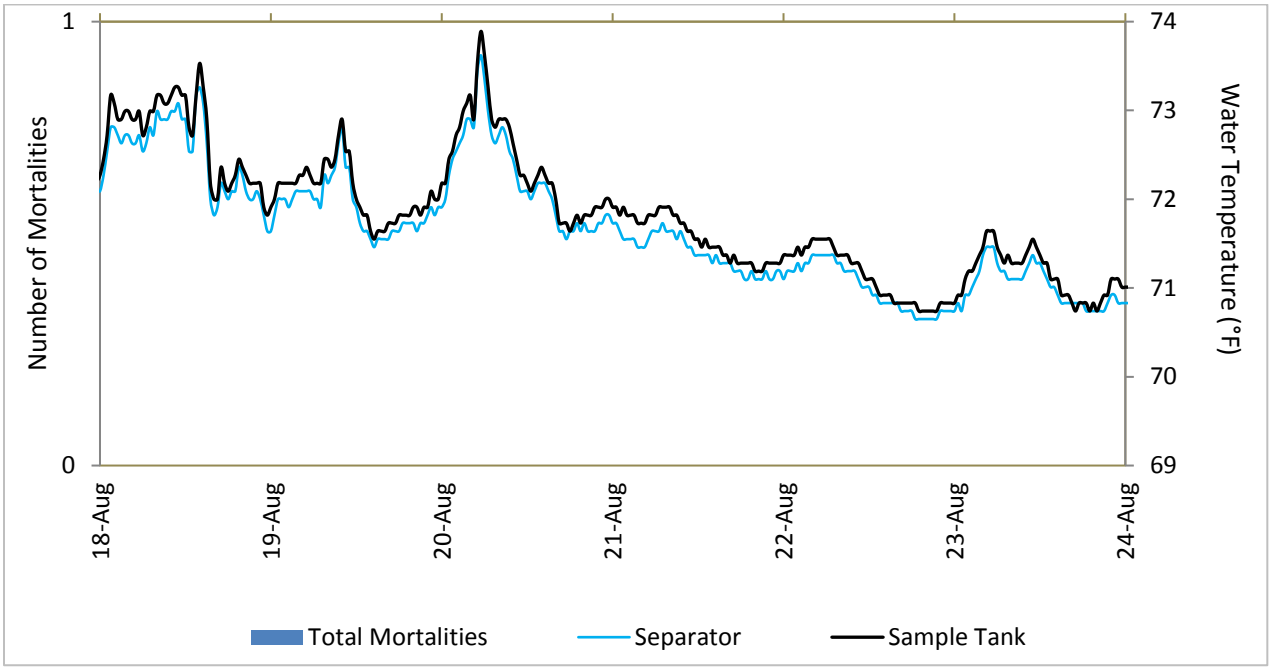

Figure 1
JFF Total System Mortalities and Two JFF Water Temperatures from 0700 August 18 to 0700 August 25
(There Were no Mortalities this Week)

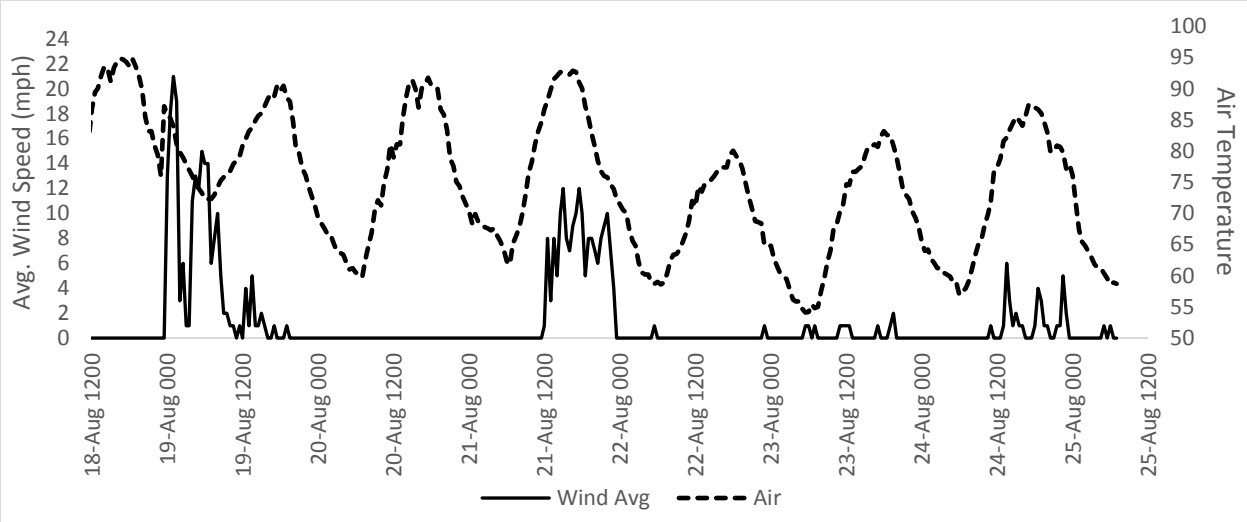

Figure 2

Average Wind Speed from 0700 August 18 to 0700 August 25

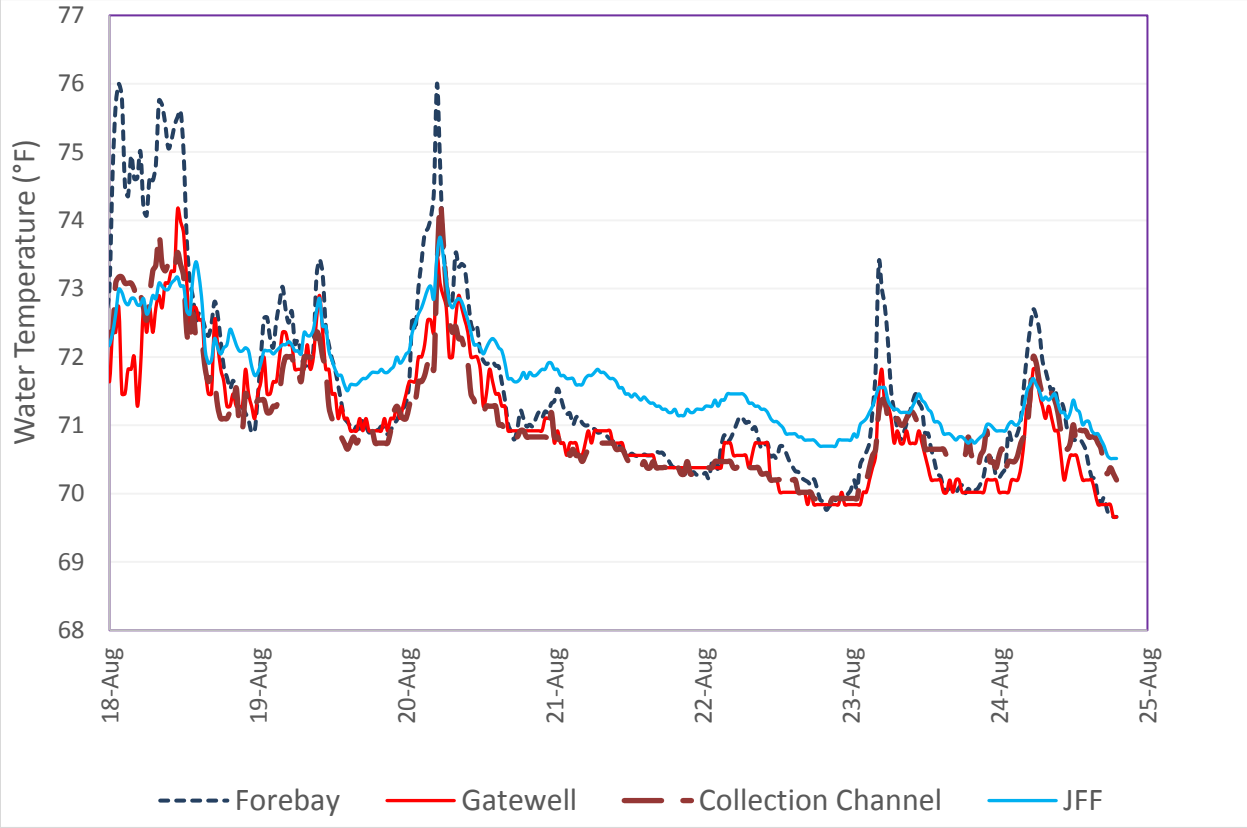

Figure 3

Average Water Temperatures for Four Dam Locations from 0700 August 18 to 0700 August 25

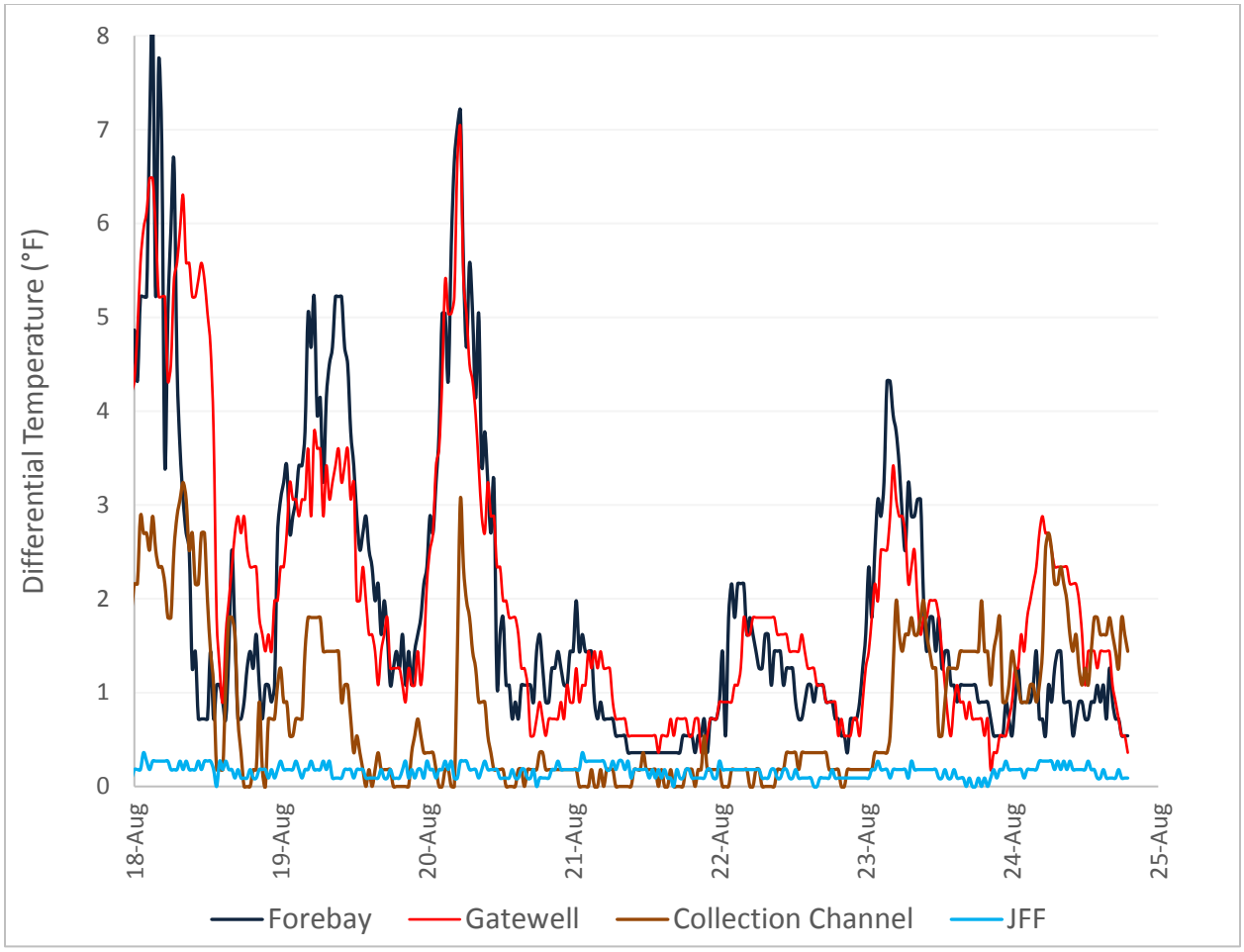

Figure 4

Average Differential Temperatures within Four Dam Locations from 0700 August 18 to 0700 August 25

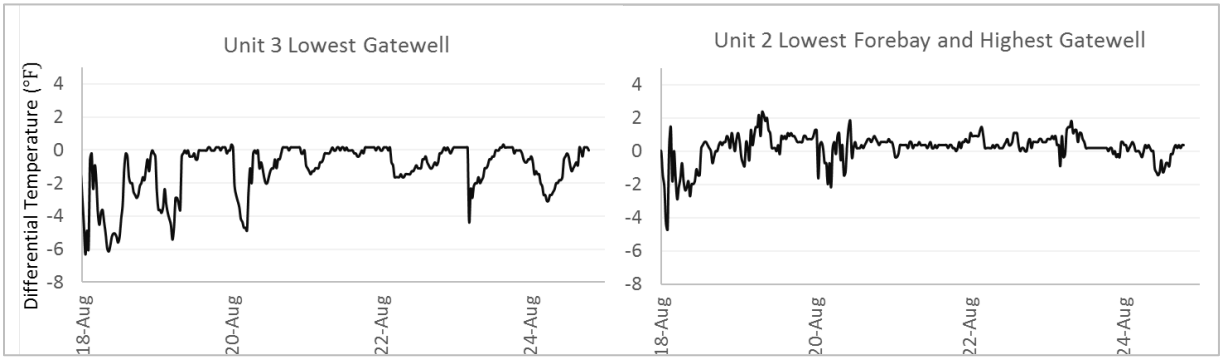

Figure 5

Gatewell and Forebay Differential Temperatures (Gatewell minus Forebay) for Units with the Highest and Lowest Weekly Average Temperature from 0700 August 18 to 0700 August 25

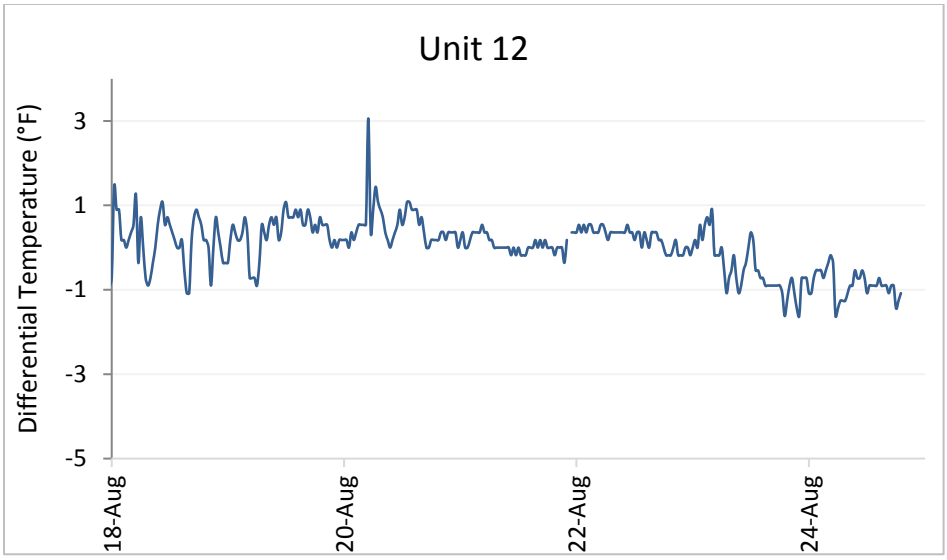

Figure 6
Gatewell and Collection Channel Differential Temperatures (Gatewell minus Collection Channel) for Unit 12 from 0700 August 18 to 0700 August 25