FINAL

2008 Water Quality Monitoring
Mill River
Hamden and New Haven, CT

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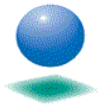
Prepared for

Regional Water Authority

Prepared by



List of Figures

List of Tables

2008 Mill River Water Quality Monitoring

Introduction

This report presents results of continuing studies by the Regional Water Authority (RWA) to document dissolved oxygen (DO) and salinity concentrations in the Mill River downstream of the Lake Whitney water supply reservoir. The objective of these studies, which began in 1998, is to monitor DO and salinity in the Mill River as they relate to potential impacts from reactivating Lake Whitney as a public water supply. The lake served as a water supply from 1862 until its use was temporarily discontinued in 1991. The RWA resumed water withdrawals from the reservoir during the summer of 2005 concurrent with completion of the new Lake Whitney Water Treatment Plant (WTP).

As part of a comprehensive environmental assessment of the WTP project, studies of DO and salinity patterns in the lower Mill River were conducted in 1998 and annually since 2000. DO and salinity were both recognized as important parameters to be considered in developing an environmental management plan for the Lake Whitney water withdrawals (Lake Whitney WTP Environmental Evaluation Team, 1999).

Based on the analysis of data collected from 1998 to 2003, 7.0 milligrams per liter (mg/L) was selected as a reasonable target DO level for the plunge pool in the Mill River immediately below the Lake Whitney Dam (CH2M HILL, 2003). Based on analysis of data collected during that period, under most circumstances this will result in surface water DO concentration above 5.0 mg/L at the Orange Street Bridge during dry weather conditions. However DO concentrations slightly below 5.0 mg/L were occasionally observed before water withdrawals from the lake resumed in 2005.

Past monitoring has identified negative effects on Orange Street Bridge DO concentrations during wet weather, believed to be from input of organic matter from urban runoff and Combined Sewer Overflows (CSOs). To evaluate the effects of lake withdrawals more directly, DO and salinity have been regularly monitored further upstream at the footbridge in East Rock Park since the summer of 2003 where the influence of CSOs and tidal flows are presumed to be lesser factors.

DO and salinity sampling was performed every week between July 3 and September 26, 2008, as part of the continuing monitoring and assessment effort. Because of low DO concentrations during the late summer in prior years, the normal monitoring period of July through August has been extended through the last week of September.

Rainfall patterns were erratic during 2008, compared to previous years' sampling efforts, including periods of no rainfall during the monitoring period. When there was rain, it was for prolonged periods of time that sometimes lasted over several days (Figure 1) and produced high amounts of precipitation. The recorded precipitation from June to September was 25.2 inches at the Lake Whitney rain gauge. This was the wettest summer since monitoring began in the river and the second wettest in the RWA's 97-year Lake Whitney rain gauge record.

The average precipitation from June to September over the 11-year sampling period is 16.0 inches.

Figure 2 presents the rainfall in the 72 hours preceding each sampling event. When analyzing the DO data, it is important to note influences from stormwater runoff. Rainfall accumulation greater than 0.12 inch was considered as a wet- weather measurement event. Rainfall of less than or equal to 0.12 inch was considered a dry-weather event (in the 72 hours preceding each sampling event). Wet-weather measurements were taken on July 25, August 8, August 15, September 5, September 12, and September 26, with rainfall ranging from 0.28 to 1.8 inches. The remaining events had no rainfall (July 11, July 18, August 22, August 29, and September 19) or very little rainfall (July 3 and August 1 = 0.04 inch) in the 72 hours before measurements.

The WTP was first operational in April 2005 and continued operation through 2008. Water withdrawals in 2008 were high from January to the first week of April, and low from the second week of April to the end of September (Figure 3). From January 1 through September 30, water withdrawals averaged 38 percent of the maximum Connecticut Department of Environmental Protection (DEP) registered maximum daily diversion amount and ranged from 22 to 85 percent of the registered maximum.

Figure 4 presents the Lake Whitney Dam downstream flow in the Mill River from January 2008 to September 2008. Flows ranged from an estimated 17 to 573 million gallons per day (MGD) with an average of 88 MGD. Flow is calculated based on the lake level at the spillway and when applicable, measured or estimated downstream releases via the artificial waterfall and/or the blowoff. The Management Plan specifies the initial minimum release is 4.2 MGD when the lake level falls below spillway elevation. Figure 5 presents the estimated flow in the Mill River for each of the sampling dates in 2008. Sampling date flows ranged from 24 MGD on July 11 and July 18 to 85 MGD on July 25. There were no minimum release events in 2008.

Monitoring Methods

From July 3 to September 26, 2008, the RWA conducted weekly dawn DO and salinity monitoring at and below the Lake Whitney dam (i.e., the spillway, plunge pool, the footbridge, the Orange Street Bridge, and both sides of the tidegates) (Figure 6). Table 1 presents a summary of the 2008 Mill River measurements.

As in the previous several years, the weekly data were collected using a Hydrolab Quanta multi-parameter meter that was calibrated before each set of water quality measurements. The weekly monitoring data were collected during the early morning when DO is expected to be at its minimum daily concentration. Measurements were collected at one depth at the spillway and plunge pool. At the footbridge, Orange Street Bridge, and the tidegates, measurements were taken near the surface (0.1- to 0.2-meter depth) and near the bottom to account for the possible presence of distinct water layers caused by salinity intrusion from Long Island Sound. All weekly monitoring data are presented in Attachment A.

TABLE 1
Mill River Monitoring Data Collected in 2008

Frequency/Dates	Locations	Parameters
Weekly – July 3 through September 26 (early morning)	Spillway	Temperature, DO, salinity, specific conductance, pH
	Plunge Pool	
	Footbridge	
	Orange St.	
	Tidegates (North and South)	

Monitoring Results

Salinity

The weekly salinity monitoring data are presented in Figure 7 (surface layer) and Figure 8 (bottom layer). In general, increasing salinity at tidally influenced monitoring stations occurs during periods of lower freshwater flow from Lake Whitney. Elevated flows from historically high precipitation in 2008 resulted in relatively low salinities at these stations. Salinity was markedly lower at Orange Street in 2008 than in 2007, with only 2 of 13 measurements in the surface layer exceeding 1 part per thousand (ppt). In the bottom layer at Orange Street, no measurements exceeded 10 ppt. The highest salinity measurements at Orange Street were observed between August 22 and September 5. During this time, the average daily river flows as estimated at the spillway ranged from 22 to 33 MGD. There was no measurable tidal influx of saline waters at the footbridge station in 2008, with all measurements at this location not significantly different from upstream freshwater monitoring stations.

As expected, compared to upstream locations, salinity levels were elevated at the tide gates, with concentrations ranging from 2 to 20 ppt in the bottom waters and from 1 to 19 ppt at the surface.

Figure 9 presents surface salinities at Orange Street and the footbridge with river flow as measured at Lake Whitney Dam (spillway overflow). The salinity at Orange Street increased as the flow gradually decreased from the end of August to the beginning of September.

Dissolved Oxygen

Weekly surface layer DO measurements from the Mill River at the spillway, the plunge pool, the footbridge, Orange Street Bridge, and the tide gates are shown in Figure 10. Bottom layer measurements are shown in Figure 11. Table 2 summarizes all of the 2008 DO concentrations at the spillway; plunge pool, footbridge, Orange Street Bridge, and tidegates, including average, minimum, and maximum DO concentrations. Average DO readings for all weekly monitoring from 2001 to 2008 are presented in Table 3.

TABLE 2

Weekly Dissolved Oxygen Concentrations

Date	Spillway	Plunge Pool	Footbridge Surface	Footbridge Bottom	Orange Ave Surface	Orange Ave Bottom	North Tidegate Surface	North Tidegate Bottom	South Tidegate Surface	South Tidegate Bottom
7/3/2008	8.3	7.5	5.8	5.7	6.0	5.7	5.6	5.4	6.4	6.2
7/11/2008	7.6	7.0	**4.7**	**4.5**	5.5	**4.8**	5.1	**4.8**	**4.0**	**4.0**
7/18/2008	9.3	7.5	5.0	5.0	6.0	**3.6**	**3.2**	**3.8**	6.1	6.0
7/25/2008	7.3	7.7	6.8	6.8	5.9	5.9	5.3	**3.2**	5.0	**4.8**
8/1/2008	12.0	7.7	5.8	5.8	**4.9**	**4.6**	**4.1**	**3.5**	5.3	5.2
8/8/2008	8.3	7.6	6.6	6.3	5.3	5.2	**4.4**	**2.8**	**2.7**	**1.5**
8/15/2008	11.4	8.1	5.9	5.7	5.4	5.2	**4.4**	**3.6**	5.1	**4.7**
8/22/2008	9.4	7.8	**4.4**	**3.6**	**4.4**	**2.3**	**3.4**	**2.8**	**3.9**	**3.8**
8/29/2008	10.6	7.3	**4.5**	**4.6**	5.2	**4.1**	5.7	**3.9**	5.4	5.5
9/5/2008	10.3	7.1	**3.4**	**2.9**	5.3	**4.1**	**4.9**	**3.5**	**4.8**	5.2
9/12/2008	**4.7**	7.4	6.2	6.1	5.8	5.6	6.1	5.8	6.2	6.2
9/19/2008	7.5	7.6	6.1	5.9	6.9	**4.6**	6.0	5.3	5.7	5.7
9/26/2008	7.7	8.2	6.8	6.8	7.1	6.7	6.8	6.5	6.4	6.0
Average	8.8	7.6	5.5	5.4	5.7	4.8	5.0	4.2	5.1	5.0
Min	4.7	7.0	3.4	2.9	4.4	2.3	3.2	2.8	2.7	1.5
Max	12.0	8.2	6.8	6.8	7.1	6.7	6.8	6.5	6.4	6.2

Notes:

Bold represents DO concentrations less than the Connecticut DEP water quality standard of 5.0 mg/L.

TABLE 3
Average Mill River Surface Dissolved Oxygen, 2001 – 2008 Weekly Measurements

Station	2001	2002	2003	2004*	2005	2006	2007	2008
Spillway	8.0	8.0	8.0	8.2	7.6	8.4	7.3	8.8
Plunge Pool	7.7	7.9	7.9	4.1	7.5	7.7	7.4	7.6
Footbridge	NA	NA	6.5	6.0	5.2	5.5	5.0	5.5
Orange St. Bridge	5.9	6.2	6.4	6.8	5.3	6.7	5.9	5.7
Tide Gates Upstream	NA	NA	6.2	6.2	5.1	6.1	5.5	5.0
Tide Gates Downstream	NA	NA	6.6	6.1	5.6	5.8	5.6	5.1

Notes:

- Flow bypassed around plunge pool July 6 - August 27, 2004 for lake drawdown
- Average represents only weeks sampled during the summer—not the entire year. The number of weeks per year varied depending on weather patterns.

NA = No data available

Figure 12 presents the DO at the plunge pool, Orange Street (surface and bottom), and the footbridge (surface and bottom), along with the flow in the river as measured at the Lake Whitney Dam. The DO at the plunge pool always measured 7.0 mg/L or greater. In general, DO concentrations near the bottom of the water column were not substantially different from DO concentrations near the surface at the Orange Street monitoring location. This is likely due to the lack of salinity stratification at this location in 2008. At Orange Street, surface DO was below 5.0 mg/L only on August 1 (4.9 mg/L) and August 22 (4.4 mg/L). Bottom DO at Orange Street was below 5.0 mg/L during 7 of the 13 sampling events: July 11 and 18, August 1, 22, and 29, and September 5 and 19. Surface and bottom DO concentrations at the footbridge were less than 5.0 mg/L for 4 of the 13 sampling events (July 11, August 22, August 29, and September 5).

Substantially lower DO values were observed at the footbridge on September 5, with DO measurements of 3.4 mg/L at the surface and 2.9 mg/L at the bottom. These measurements, which were the lowest surface DO values observed at this location in the 2008 monitoring period, followed a prolonged period with no rain and lower river flows.

Surface DO concentrations at the footbridge station were more negatively affected by lower river flows than at the Orange Street Bridge. This is most likely attributable to a combination of factors, as summarized below, all of which can be exacerbated by low river flow. The river is relatively flat and broad in the vicinity of the footbridge, and natural aeration is limited by the low velocity. The area is heavily vegetated and the bottom sediments are organically enriched, which exerts considerable benthic oxygen demand. If there is less water present, the demand lowers the DO to a greater extent. Similarly, the source water in this stretch has a high oxygen demand from the organically enriched lake waters and the longer the water is in this stretch, the more DO is reduced.

Conclusions

This report summarizes the information obtained from the fourth year of data collection during operation of the new Lake Whitney WTP. Rainfall in 2008 primarily occurred in prolonged rainfall events between periods of dry weather. This was the wettest summer since monitoring began in 1998. The following conclusions can be drawn from the data collected in 2008:

- Record high precipitation in 2008, resulted in lower salinities at the Orange Street Bridge and footbridge stations. The highest salinities at Orange Street occurred at lower river flows in late summer. At the footbridge station, freshwater conditions prevailed for the entire monitoring period.
- At the tidally influenced stations (footbridge and Orange Street), the lowest DO values were recorded during brief periods of lower river flow. DO readings at Orange St in summer 2008 were comparable to those in 2007, which was a dryer summer. However, higher river flows in 2008 appeared to reduce the frequency of low DO readings at the footbridge. There were four surface DO measurements at the footbridge less than 5 mg/L during the June through September monitoring period as compared to eight in 2007. The three lowest 2008 readings occurred a period of lower river flow in late summer. This is consistent with prior year observations that DO at the footbridge appears to be more affected by reductions in river flow than the Orange Street bridge station.
- During the 2008 monitoring period, the water treatment plant was operating at low withdrawal rates (Figure 3) as dictated by operational needs and Management Plan restrictions. Although these water withdrawals incrementally affected downstream flows, data collected to date suggests that factors such as stormwater quality, natural flow variations, and tidal influences play a greater role in determining river DO concentrations than the current range of water withdrawals.

Literature Cited

Lake Whitney WTP Environmental Evaluation Team (1999). *Lake Whitney Water Treatment Plant Environmental Evaluation, Vol. 1: Environmental Evaluation Team Final Report.* Report prepared for the South Central Connecticut Regional Water Authority, New Haven, CT.

CH2M Hill, 2003. *1998– 2003 Comprehensive Dissolved Oxygen Monitoring in the Lower Mill River, Hamden and New Haven, CT.* Report prepared for the South Central Connecticut Regional Water Authority, New Haven, CT.

Figures

Figure 1 - Precipitation at Lake Whitney
January - September 2008

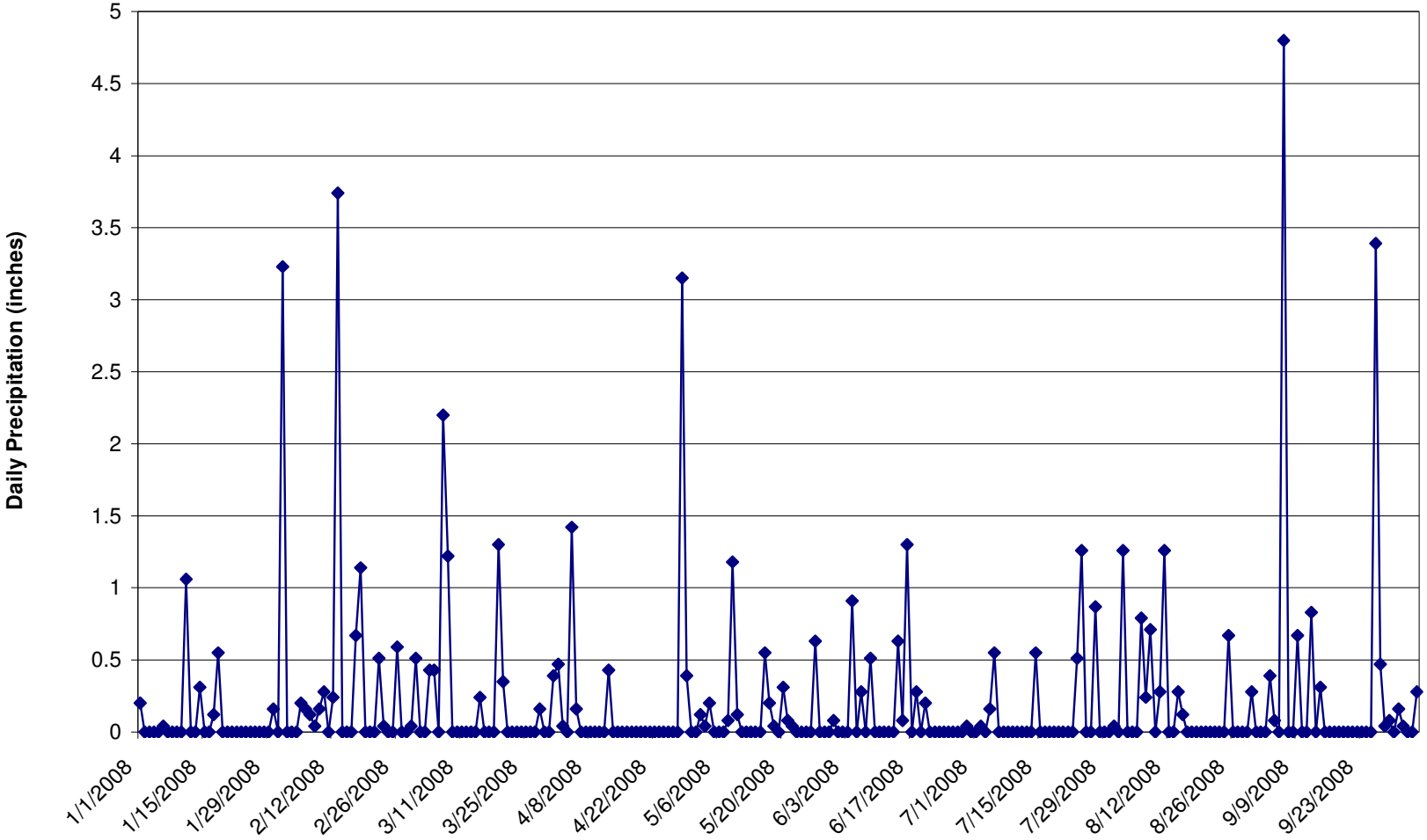


Figure 2: 2008 Sampling Event Precipitation (72 hours Prior to each Sampling Event)

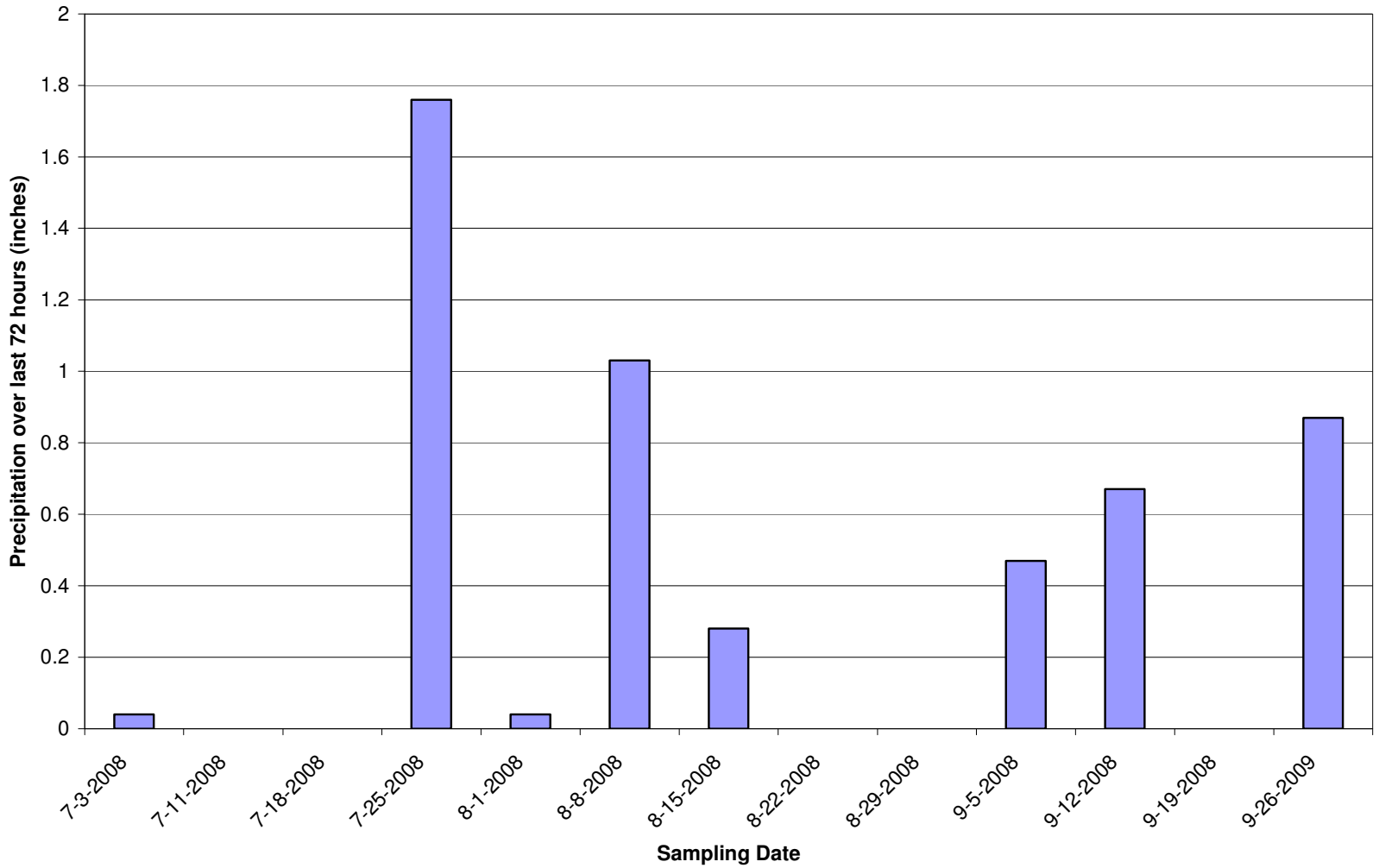


Figure 3: Lake Whitney Water Treatment Plant Daily Withdrawls
January - September 2008

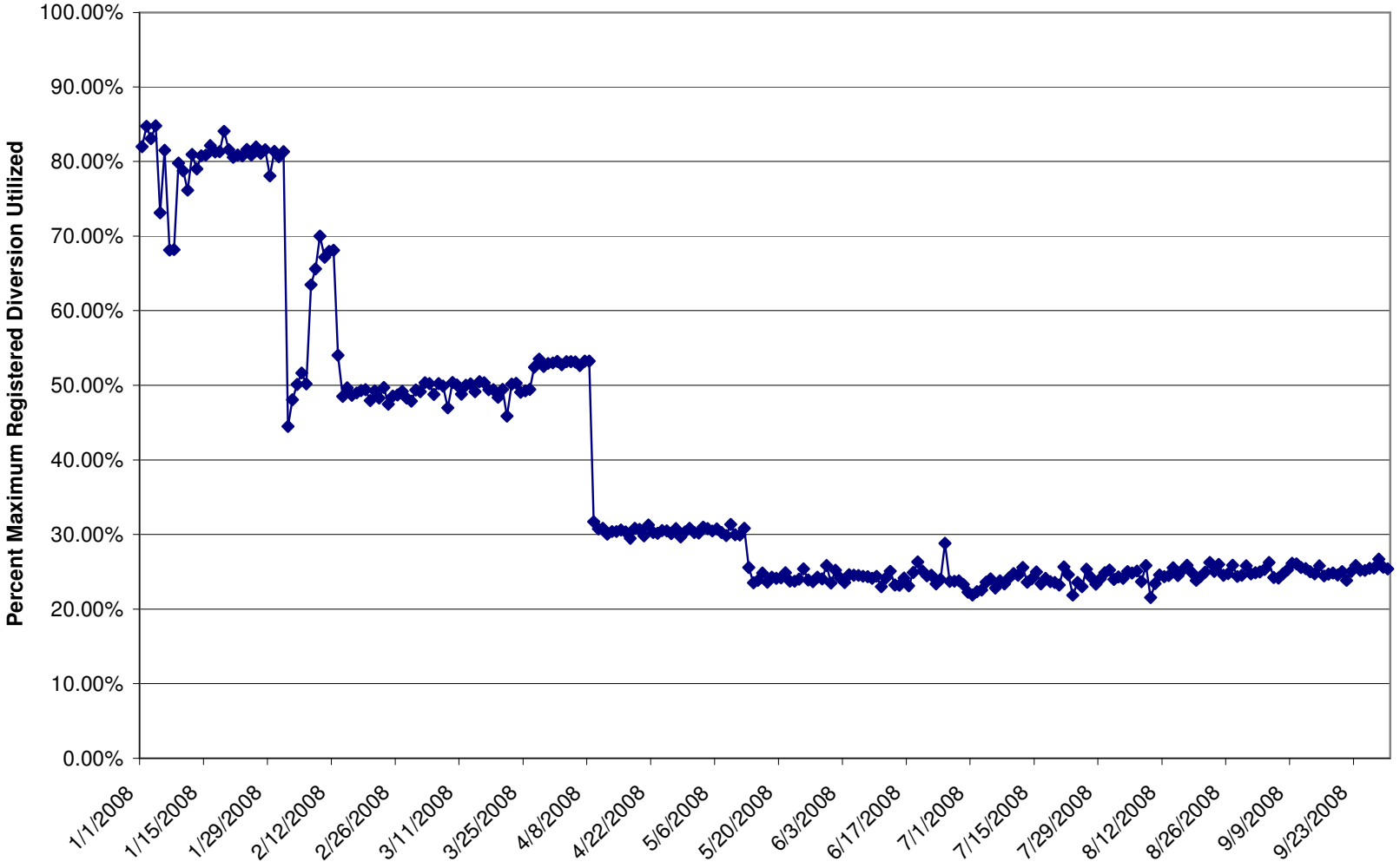


Figure 4: Lake Whitney Dam Downstream Flow
January - September 2008

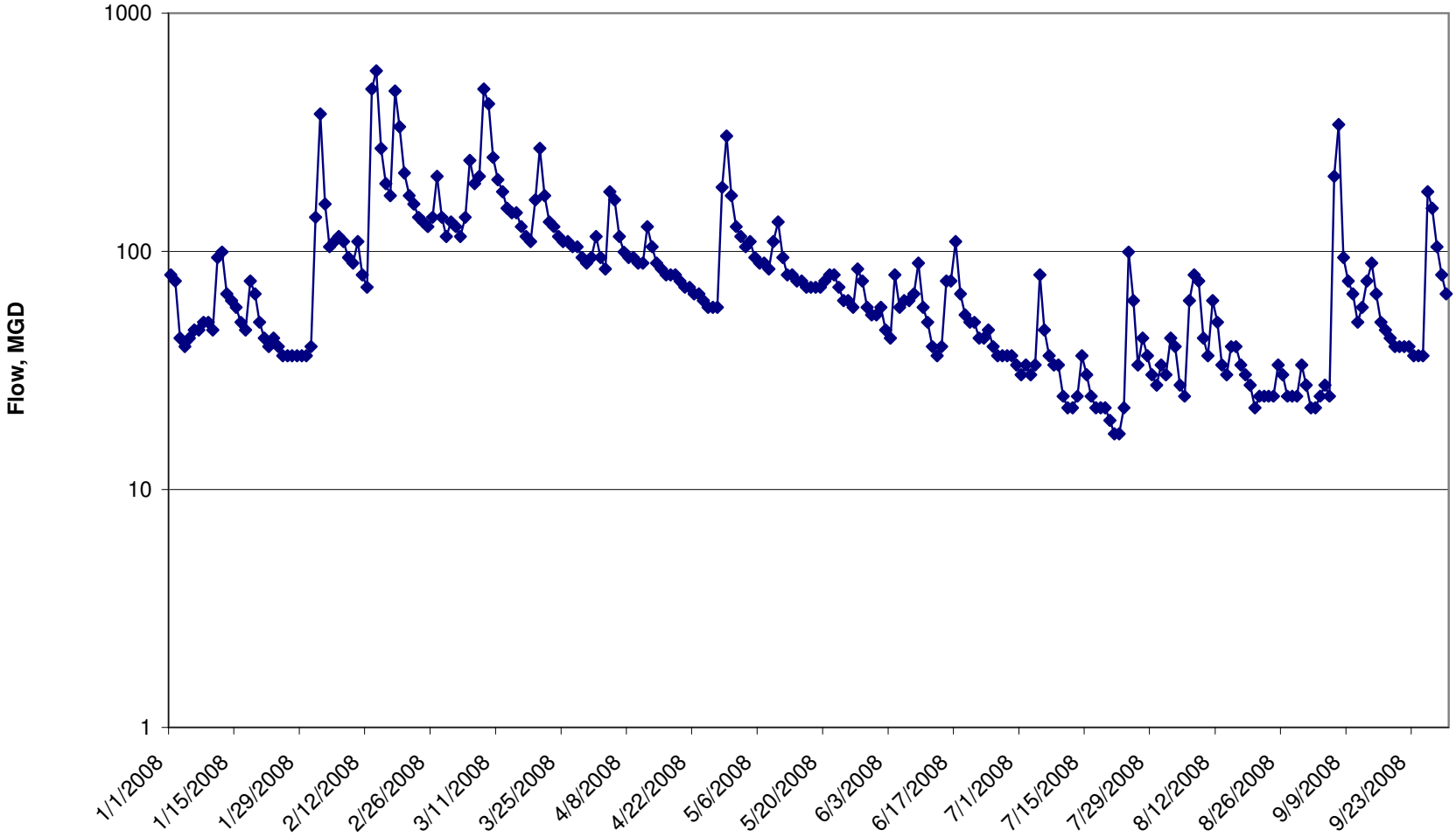


Figure 5: 2008 Mill River Sampling Event Daily Average Flow

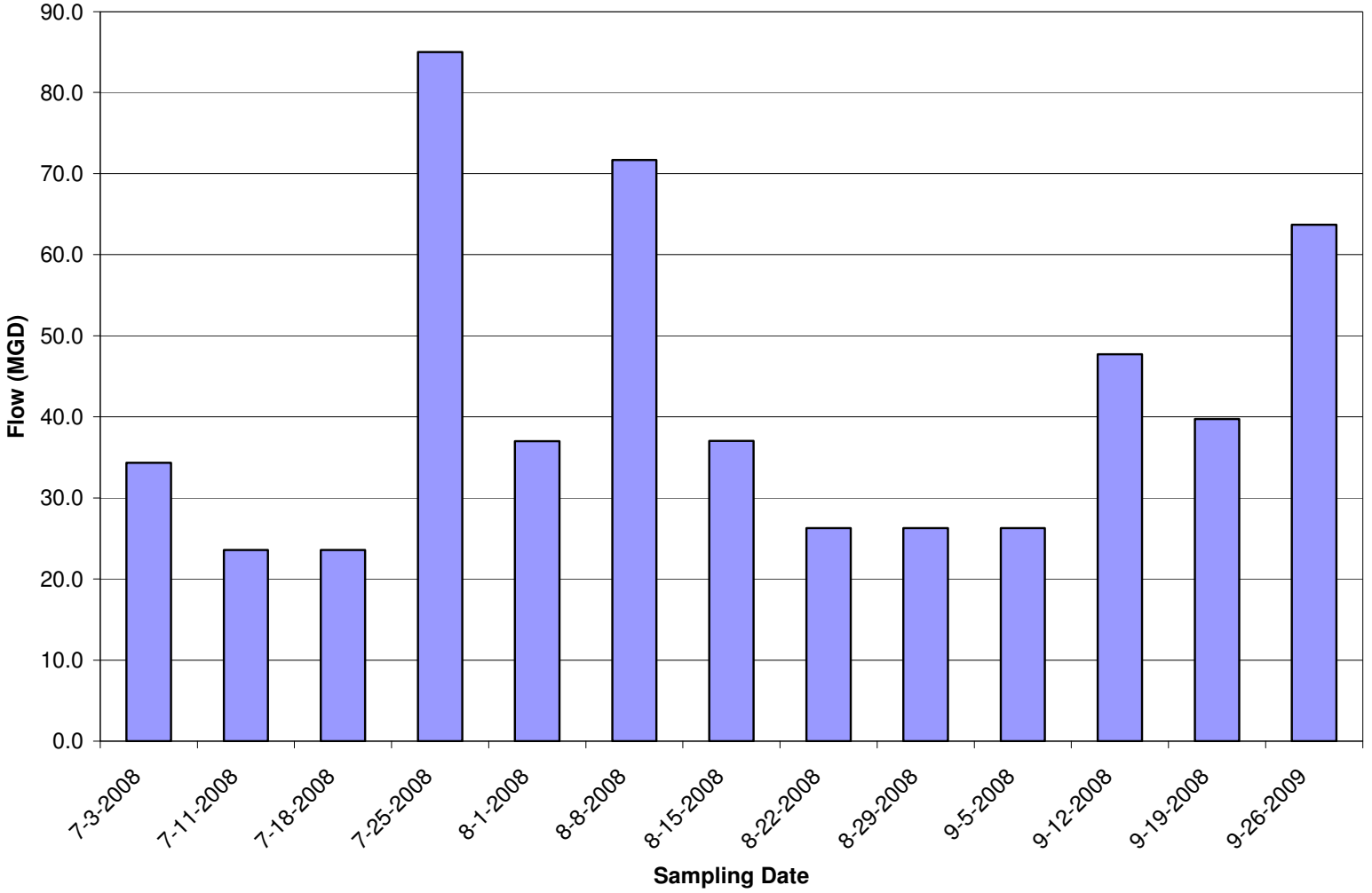


FIGURE 6
Locations Sampled During Mill River Monitoring

Figure 7: 2008 Mill River Surface Salinity

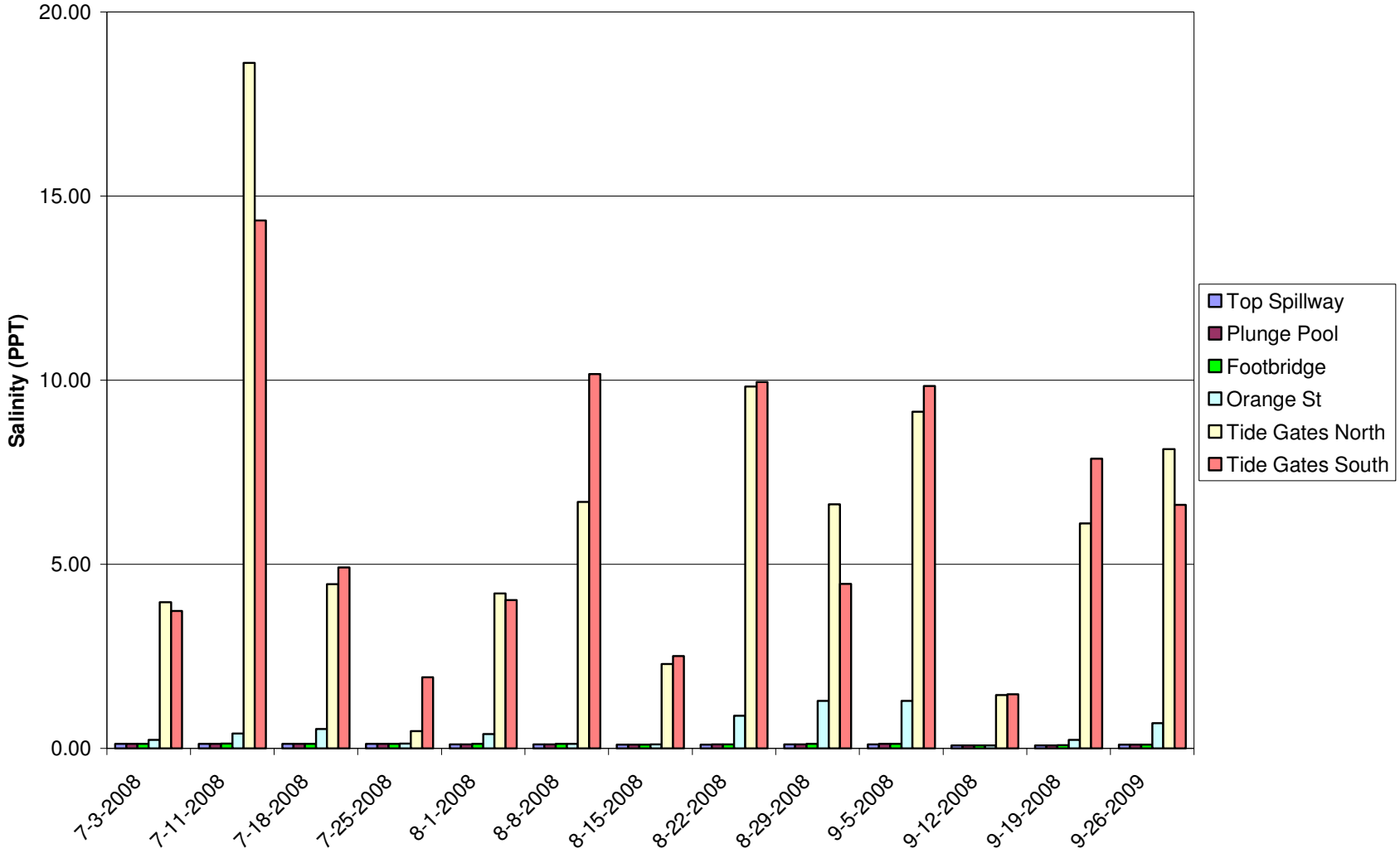


Figure 8: 2008 Mill River Bottom Salinity

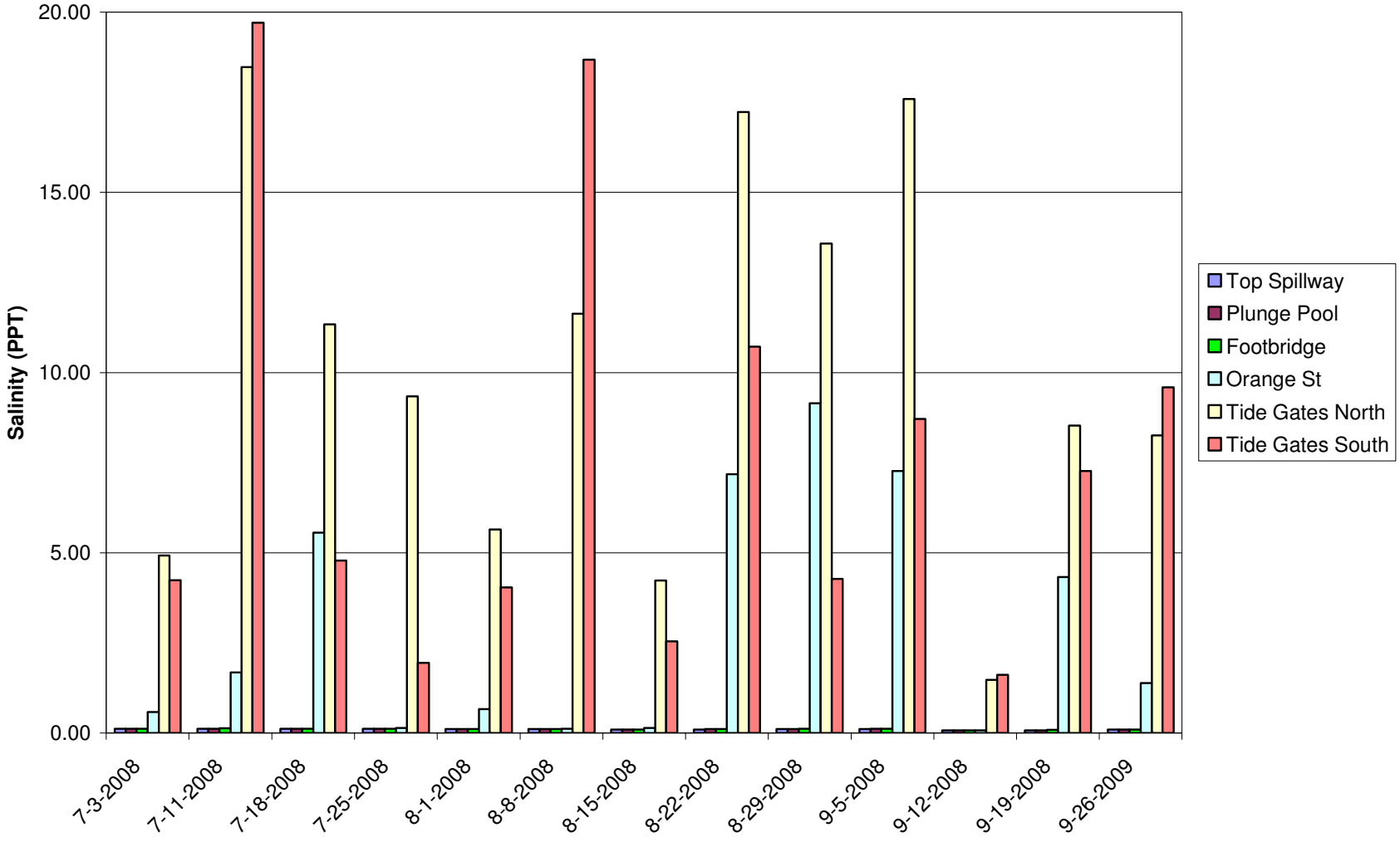


Figure 9: Mill River Downstream Surface Salinity with Flow

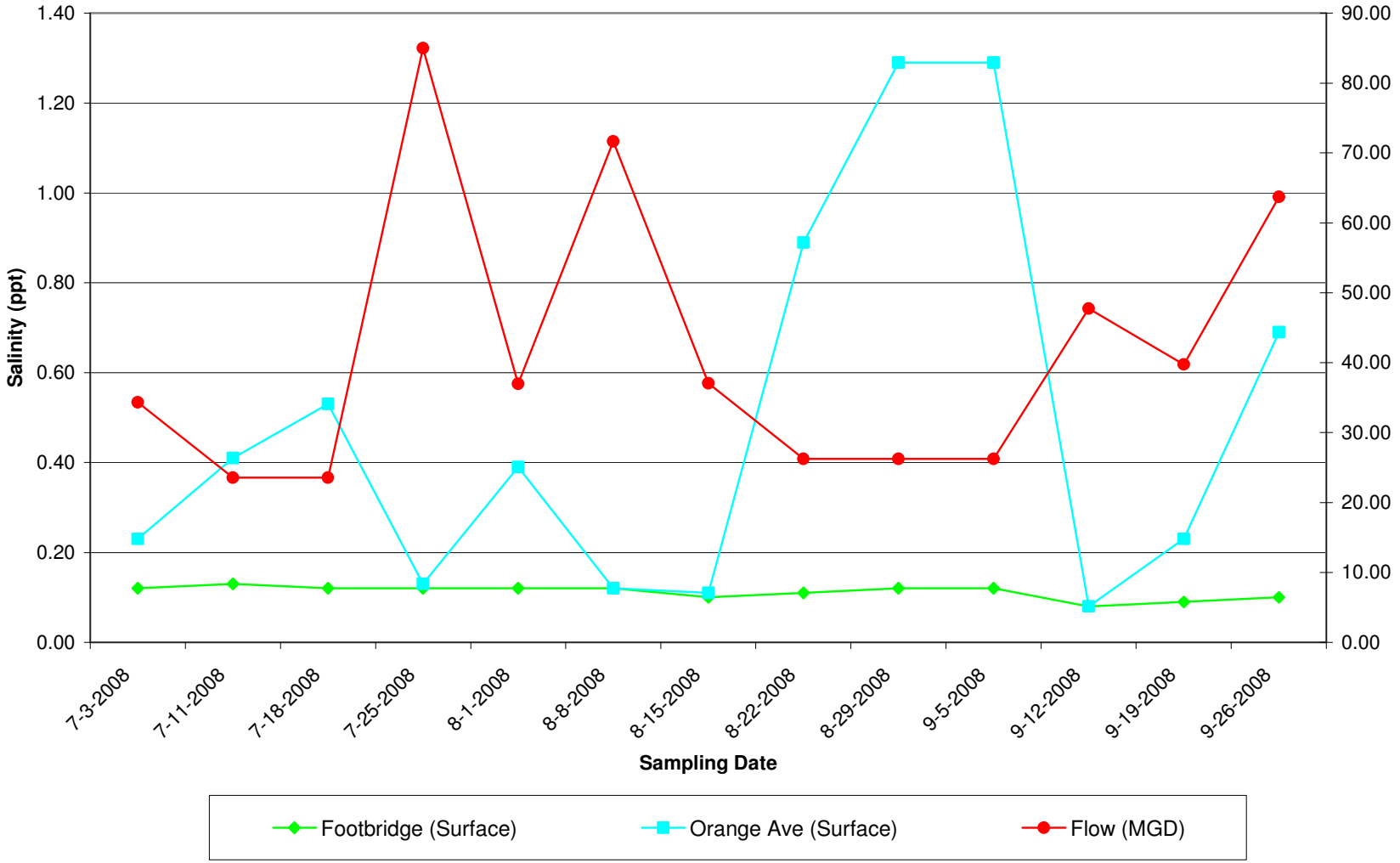


Figure 10: 2008 Mill River Surface Dissolved Oxygen

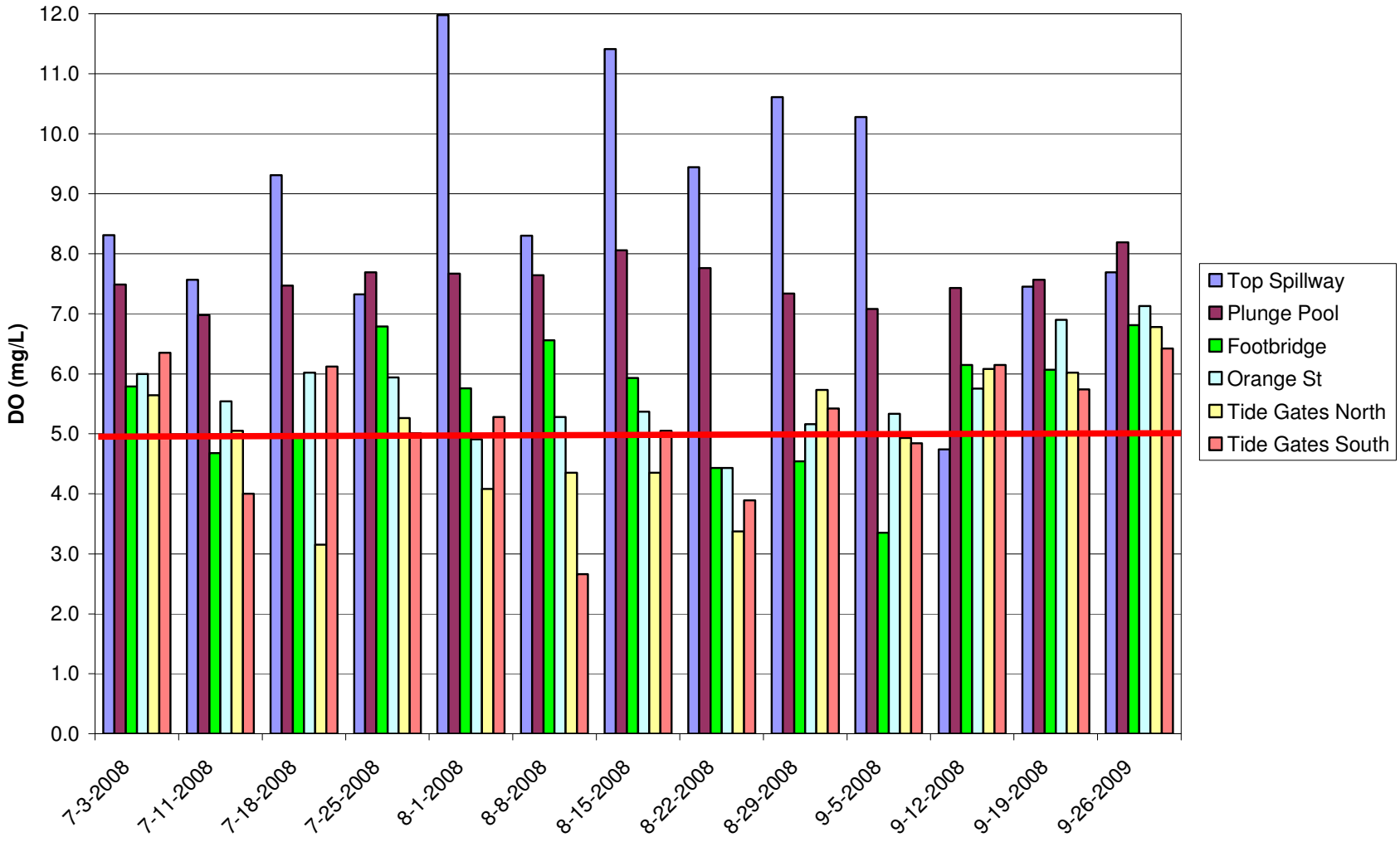


Figure 11: 2008 Mill River Bottom Dissolved Oxygen

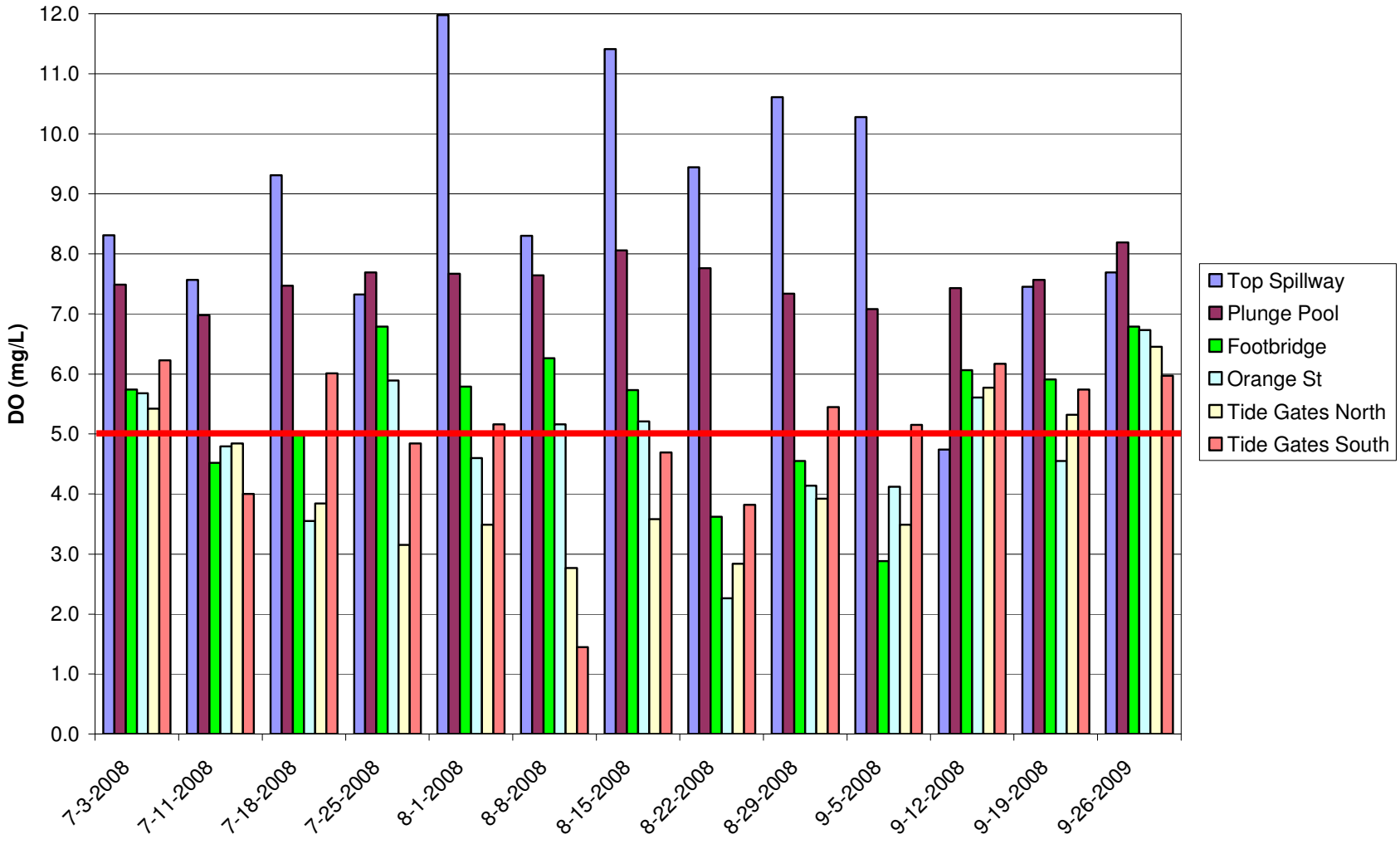
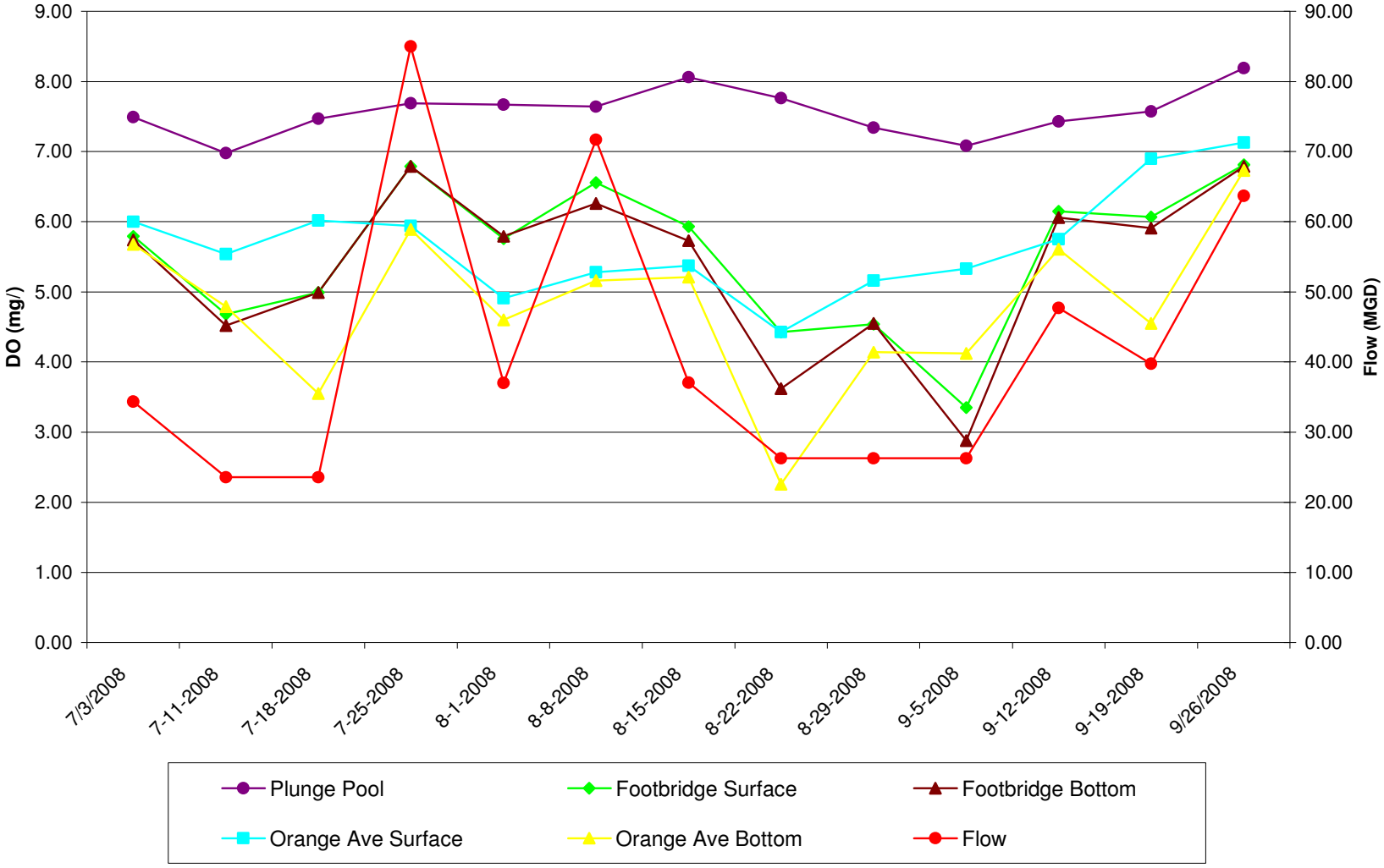


Figure 12: Mill River Downstream DO With Flow



Attachment A
Weekly Monitoring Data

DATE	Station	Time	Depth (m)	Temp (C)	SpC (mS/cm)	Salinity (PSS)	pH	DO (mg/l)	DO%	Tide Stage	Dry or Wet
7/3/2008	Lake Whitney Above spillway	5:45	0.20	25.67	0.24	0.12	7.72	8.31	101.90	Low	Wet
7/3/2008	Plunge Pool	5:50	0.20	24.82	0.24	0.12	7.76	7.49	90.40	Low	Wet
7/3/2008	Footbridge	5:25	0.20	24.04	0.243	0.12	7.24	5.79	68.90	Low	Wet
7/3/2008	Footbridge	5:30	0.70	24.06	0.242	0.12	7.24	5.74	68.30	Low	Wet
7/3/2008	Orange St Bridge	5:10	0.20	25.11	0.47	0.23	7.21	6.00	72.90	Low	Wet
7/3/2008	Orange St Bridge	5:15	0.80	25.22	1.168	0.58	7.22	5.68	69.30	Low	Wet
7/3/2008	North side Tide Gates	6:00	0.20	24.74	7.23	3.97	7.10	5.64	69.70	Low	Wet
7/3/2008	North side Tide Gates	6:05	0.60	24.74	8.84	4.93	7.01	5.42	67.30	Low	Wet
7/3/2008	South side Tide Gates	6:10	0.10	24.69	6.84	3.74	7.08	6.35	78.60	Low	Wet
7/3/2008	South side Tide Gates	6:15	0.40	24.71	7.69	4.24	7.05	6.23	77.10	Low	Wet
7/11/2008	Lake Whitney Above spillway	5:45	0.20	26.49	0.254	0.12	7.72	7.57	94.20	Mid	Dry
7/11/2008	Plunge Pool	5:50	0.20	24.95	0.255	0.12	7.76	6.98	84.40	Mid	Dry
7/11/2008	Footbridge	5:30	0.20	24.07	0.261	0.13	7.15	4.68	55.70	Mid	Dry
7/11/2008	Footbridge	5:35	0.70	24.09	0.261	0.13	7.14	4.52	53.80	Mid	Dry
7/11/2008	Orange St Bridge	5:15	0.30	25.28	0.835	0.41	6.97	5.54	67.70	Mid	Dry
7/11/2008	Orange St Bridge	5:20	0.80	26.16	3.21	1.68	6.84	4.79	60.00	Mid	Dry
7/11/2008	North side	6:00	0.20	24.49	30.1	18.62	6.84	5.05	67.90	Mid	Dry

DATE	Station	Time	Depth (m)	Temp (C)	SpC (mS/cm)	Salinity (PSS)	pH	DO (mg/l)	DO%	Tide Stage	Dry or Wet
	Tide Gates										
7/11/2008	North side Tide Gates	6:05	0.60	24.47	29.9	18.48	6.78	4.84	65.00	Mid	Dry
7/11/2008	South side Tide Gates	6:10	0.20	25.04	23.7	14.34	6.74	4.00	53.00	Mid	Dry
7/11/2008	South side Tide Gates	6:15	0.90	24.42	31.7	19.71	6.69	4.00	54.00	Mid	Dry
7/18/2008	Lake Whitney Above spillway	6:10	0.20	27.06	0.247	0.12	8.09	9.31	117.10	Mid	Dry
7/18/2008	Plunge Pool	6:15	0.20	25.85	0.249	0.12	8.11	7.47	91.90	Mid	Dry
7/18/2008	Footbridge	5:42	0.20	25.09	0.255	0.12	7.30	4.99	60.50	Mid	Dry
7/18/2008	Footbridge	5:55	0.50	25.07	0.256	0.12	7.32	4.99	60.60	Mid	Dry
7/18/2008	Orange St Bridge	5:20	0.30	26.46	1.077	0.53	7.25	6.02	75.10	Mid	Dry
7/18/2008	Orange St Bridge	5:37	0.80	26.49	9.88	5.56	6.89	3.55	45.80	Mid	Dry
7/18/2008	North side Tide Gates	6:30	0.20	25.78	8.05	4.46	7.35	3.15	68.20	Mid	Dry
7/18/2008	North side Tide Gates	6:40	0.80	25.94	19.1	11.34	7.04	3.84	50.70	Mid	Dry
7/18/2008	South side Tide Gates	6:42	0.20	25.78	8.82	4.92	7.18	6.12	77.60	Mid	Dry
7/18/2008	South side Tide Gates	6:44	0.40	25.77	8.6	4.79	7.16	6.01	76.10	Mid	Dry
7/25/2008	Lake Whitney	6:10	0.20	25.68	0.254	0.12	8.19	7.32	89.90	High	Wet

DATE	Station	Time	Depth (m)	Temp (C)	SpC (mS/cm)	Salinity (PSS)	pH	DO (mg/l)	DO%	Tide Stage	Dry or Wet
	Above spillway										
7/25/2008	Plunge Pool	6:20	0.20	25.38	0.256	0.12	8.12	7.69	93.90	High	Wet
7/25/2008	Footbridge	5:48	0.20	25.16	0.256	0.12	7.79	6.79	82.40	High	Wet
7/25/2008	Footbridge	5:54	0.90	25.17	0.256	0.12	7.82	6.79	82.50	High	Wet
7/25/2008	Orange St Bridge	5:22	0.20	24.98	0.276	0.13	7.63	5.94	71.90	High	Wet
7/25/2008	Orange St Bridge	5:31	0.80	24.99	0.28	0.14	7.57	5.89	71.30	High	Wet
7/25/2008	North side Tide Gates	6:45	0.20	24.75	0.958	0.47	7.75	5.26	63.60	High	Wet
7/25/2008	North side Tide Gates	6:52	0.90	24.49	16	9.34	7.15	3.15	40.00	High	Wet
7/25/2008	South side Tide Gates	6:56	0.20	24.79	3.68	1.93	7.43	5.01	61.40	High	Wet
7/25/2008	South side Tide Gates	7:03	1.40	24.81	3.7	1.95	7.50	4.84	59.70	High	Wet
8/1/2008	Lake Whitney Above spillway	5:55	0.20	26.57	0.23	0.11	8.75	11.98	149.40	Mid	Wet
8/1/2008	Plunge Pool	6:00	0.30	25.98	0.231	0.11	8.74	7.67	94.50	Mid	Wet
8/1/2008	Footbridge	5:40	0.20	25.58	0.232	0.11	8.27	5.76	70.40	Mid	Wet
8/1/2008	Footbridge	5:45	0.70	25.45	0.231	0.11	8.29	5.79	70.80	Mid	Wet
8/1/2008	Orange St Bridge	5:20	0.20	25.83	0.794	0.39	7.94	4.91	60.60	Mid	Wet
8/1/2008	Orange St Bridge	5:25	0.80	25.88	1.329	0.66	7.95	4.60	56.90	Mid	Wet
8/1/2008	North side Tide Gates	6:15	0.20	25.86	7.63	4.21	7.96	4.08	51.80	Mid	Wet

DATE	Station	Time	Depth (m)	Temp (C)	SpC (mS/cm)	Salinity (PSS)	pH	DO (mg/l)	DO%	Tide Stage	Dry or Wet
8/1/2008	North side Tide Gates	6:20	0.60	25.90	10.04	5.65	7.68	3.49	44.50	Mid	Wet
8/1/2008	South side Tide Gates	6:30	0.20	25.82	7.32	4.03	7.65	5.28	66.70	Mid	Wet
8/1/2008	South side Tide Gates	6:35	0.40	25.81	7.34	4.04	7.42	5.16	65.10	Mid	Wet
8/8/2008	Lake Whitney Above spillway	6:00	0.20	24.47	0.23	0.11	8.29	8.30	99.60	High	Wet
8/8/2008	Plunge Pool	6:10	0.30	24.17	0.232	0.11	8.28	7.64	91.10	High	Wet
8/8/2008	Footbridge	5:50	0.20	23.89	0.251	0.12	7.99	6.56	77.80	High	Wet
8/8/2008	Footbridge	5:55	1.20	23.84	0.232	0.11	8.02	6.26	74.20	High	Wet
8/8/2008	Orange St Bridge	5:39	0.20	23.78	0.247	0.12	7.74	5.47	64.70	High	Wet
8/8/2008	Orange St Bridge	5:43	1.00	23.77	0.244	0.12	7.73	5.42	64.30	High	Wet
8/8/2008	North side Tide Gates	6:20	0.20	24.08	11.78	6.70	7.37	4.35	54.00	High	Wet
8/8/2008	North side Tide Gates	6:25	1.20	24.17	19.6	11.64	7.21	2.77	35.40	High	Wet
8/8/2008	South side Tide Gates	6:30	0.20	24.40	17.3	10.17	7.18	2.66	34.00	High	Wet
8/8/2008	South side Tide Gates	6:35	1.00	24.28	30.2	18.68	6.91	1.45	19.50	High	Wet
8/15/2008	Lake Whitney Above spillway	6:15	0.30	23.38	0.204	0.10	8.65	11.41	134.10	Low	Wet

DATE	Station	Time	Depth (m)	Temp (C)	SpC (mS/cm)	Salinity (PSS)	pH	DO (mg/l)	DO%	Tide Stage	Dry or Wet
8/15/2008	Plunge Pool	6:20	0.30	22.95	0.206	0.10	8.71	8.06	93.90	Low	Wet
8/15/2008	Footbridge	6:00	0.30	22.49	0.209	0.10	8.20	5.93	68.30	Low	Wet
8/15/2008	Footbridge	6:05	0.80	22.35	0.21	0.10	8.23	5.73	66.10	Low	Wet
8/15/2008	Orange St Bridge	5:40	0.30	23.08	0.224	0.11	7.81	5.37	62.70	Low	Wet
8/15/2008	Orange St Bridge	5:50	0.90	23.10	0.294	0.14	7.84	5.21	60.70	Low	Wet
8/15/2008	North side Tide Gates	6:30	0.30	22.91	4.33	2.29	7.64	4.35	51.50	Low	Wet
8/15/2008	North side Tide Gates	6:40	0.80	23.22	7.68	4.23	7.37	3.58	43.10	Low	Wet
8/15/2008	South side Tide Gates	6:45	0.40	22.94	4.71	2.51	7.29	5.05	59.80	Low	Wet
8/15/2008	South side Tide Gates	6:55	0.60	22.95	4.77	2.54	7.25	4.69	55.60	Low	Wet
8/22/2008	Lake Whitney Above spillway	6:05	0.30	23.04	0.214	0.10	8.41	9.44	110.30	High	Dry
8/22/2008	Plunge Pool	6:10	0.30	21.90	0.218	0.11	8.41	7.76	88.70	High	Dry
8/22/2008	Footbridge	5:50	0.20	21.44	0.227	0.11	7.64	4.43	50.20	High	Dry
8/22/2008	Footbridge	5:55	0.90	21.29	0.231	0.11	7.56	3.62	40.90	High	Dry
8/22/2008	Orange St Bridge	5:35	0.30	21.78	1.76	0.89	7.19	4.43	50.80	High	Dry
8/22/2008	Orange St Bridge	5:40	0.90	23.77	12.56	7.18	6.79	2.26	28.00	High	Dry
8/22/2008	North side Tide Gates	6:25	0.20	22.27	16.8	9.83	7.09	3.37	41.20	High	Dry
8/22/2008	North side Tide	6:30	0.60	22.84	28.1	17.23	6.84	2.84	36.70	High	Dry

DATE	Station	Time	Depth (m)	Temp (C)	SpC (mS/cm)	Salinity (PSS)	pH	DO (mg/l)	DO%	Tide Stage	Dry or Wet
	Gates										
8/22/2008	South side Tide Gates	6:35	0.20	22.19	17	9.95	6.93	3.89	47.60	High	Dry
8/22/2008	South side Tide Gates	6:45	0.80	22.29	18.2	10.72	6.90	3.82	47.00	High	Dry
8/29/2008	Lake Whitney Above spillway	6:10	0.20	22.81	0.233	0.11	8.47	10.61	123.10	Low	Dry
8/29/2008	Plunge Pool	6:15	0.20	21.34	0.233	0.11	8.51	7.34	82.90	Low	Dry
8/29/2008	Footbridge	5:55	0.20	21.07	0.247	0.12	7.56	4.54	51.10	Low	Dry
8/29/2008	Footbridge	6:00	0.60	21.04	0.249	0.12	7.58	4.55	51.10	Low	Dry
8/29/2008	Orange St Bridge	5:35	0.30	21.94	2.51	1.29	7.31	5.16	59.40	Low	Dry
8/29/2008	Orange St Bridge	5:45	0.60	23.86	15.7	9.15	6.89	4.14	52.00	Low	Dry
8/29/2008	North side Tide Gates	6:25	0.20	22.23	11.67	6.63	7.46	5.73	68.10	Low	Dry
8/29/2008	North side Tide Gates	6:30	0.50	23.28	22.6	13.58	7.09	3.92	50.10	Low	Dry
8/29/2008	South side Tide Gates	6:40	0.30	21.71	8.1	4.47	7.20	5.42	63.50	Low	Dry
8/29/2008	South side Tide Gates	6:45	0.50	21.73	7.78	4.28	7.17	5.45	63.80	Low	Dry
9/5/2008	Lake Whitney Above spillway	6:11	0.20	24.49	0.237	0.11	8.63	10.28	123.40	High	Wet
9/5/2008	Plunge Pool	6:22	0.30	23.87	0.239	0.12	8.66	7.08	83.90	High	Wet

DATE	Station	Time	Depth (m)	Temp (C)	SpC (mS/cm)	Salinity (PSS)	pH	DO (mg/l)	DO%	Tide Stage	Dry or Wet
9/5/2008	Footbridge	5:47	0.20	23.68	0.247	0.12	7.75	3.35	39.70	High	Wet
9/5/2008	Footbridge	5:52	0.70	23.49	0.248	0.12	7.72	2.88	34.10	High	Wet
9/5/2008	Orange St Bridge	5:24	0.20	24.20	2.51	1.29	7.31	5.33	64.10	High	Wet
9/5/2008	Orange St Bridge	5:30	0.60	24.79	12.69	7.27	6.90	4.12	52.10	High	Wet
9/5/2008	North side Tide Gates	6:45	0.20	24.14	15.7	9.15	7.35	4.93	62.20	High	Wet
9/5/2008	North side Tide Gates	6:48	0.50	23.77	28.6	17.59	7.08	3.49	46.00	High	Wet
9/5/2008	South side Tide Gates	6:51	0.20	23.97	16.8	9.84	7.11	4.84	61.20	High	Wet
9/5/2008	South side Tide Gates	6:55	0.90	24.03	15	8.71	7.11	5.15	64.80	High	Wet
9/12/2008	Lake Whitney Above spillway	6:10	0.30	21.10	0.156	0.08	6.70	4.74	53.40	Low	Wet
9/12/2008	Plunge Pool	6:20	0.30	20.72	0.161	0.08	6.93	7.43	82.90	Low	Wet
9/12/2008	Footbridge	5:50	0.20	20.41	0.162	0.08	6.77	6.15	68.10	Low	Wet
9/12/2008	Footbridge	5:55	0.70	20.31	0.164	0.08	6.71	6.06	67.10	Low	Wet
9/12/2008	Orange St Bridge	5:35	0.40	20.23	0.167	0.08	6.88	5.75	63.50	Low	Wet
9/12/2008	Orange St Bridge	5:40	0.90	20.23	0.169	0.08	6.77	5.61	62.10	Low	Wet
9/12/2008	North side Tide Gates	6:40	0.20	20.49	2.82	1.45	6.77	6.08	68.30	Low	Wet
9/12/2008	North side Tide Gates	6:45	0.70	20.49	2.85	1.47	6.75	5.77	64.80	Low	Wet
9/12/2008	South side	6:50	0.20	20.46	2.84	1.47	6.74	6.15	69.00	Low	Wet

DATE	Station	Time	Depth (m)	Temp (C)	SpC (mS/cm)	Salinity (PSS)	pH	DO (mg/l)	DO%	Tide Stage	Dry or Wet
	Tide Gates										
9/12/2008	South side Tide Gates	7:00	0.70	20.54	3.1	1.61	6.72	6.17	69.40	Low	Wet
9/19/2008	Lake Whitney Above spillway	6:10	0.30	20.07	0.172	0.08	6.91	7.45	82.00	High	Dry
9/19/2008	Plunge Pool	6:20	0.30	19.23	0.173	0.08	7.04	7.57	81.90	High	Dry
9/19/2008	Footbridge	5:55	0.20	18.13	0.177	0.09	6.76	6.07	64.30	High	Dry
9/19/2008	Footbridge	6:00	1.00	18.15	0.178	0.09	6.71	5.91	62.70	High	Dry
9/19/2008	Orange St Bridge	5:35	0.30	18.85	0.488	0.23	6.91	6.90	74.30	High	Dry
9/19/2008	Orange St Bridge	5:45	0.90	20.43	7.86	4.33	6.66	4.55	52.00	High	Dry
9/19/2008	North side Tide Gates	6:30	0.10	19.27	10.86	6.11	6.67	6.02	68.10	High	Dry
9/19/2008	North side Tide Gates	6:35	0.70	19.62	14.78	8.53	6.60	5.32	60.90	High	Dry
9/19/2008	South side Tide Gates	6:40	0.20	19.45	13.73	7.87	6.58	5.74	65.30	High	Dry
9/19/2008	South side Tide Gates	6:45	0.70	19.42	12.75	7.27	6.58	5.74	65.30	High	Dry
9/26/2008	Lake Whitney Above spillway	6:15	0.30	18.35		0.10	7.38	7.69	81.90	Low	Wet
9/26/2008	Plunge Pool	6:20	0.20	18.13		0.10	7.48	8.19	86.30	Low	Wet
9/26/2008	Footbridge	5:55	0.20	17.26		0.10	7.20	6.81	70.90	Low	Wet
9/26/2008	Footbridge	6:05	0.80	17.28		0.10	7.15	6.79	70.70	Low	Wet

DATE	Station	Time	Depth (m)	Temp (C)	SpC (mS/cm)	Salinity (PSS)	pH	DO (mg/l)	DO%	Tide Stage	Dry or Wet
9/26/2008	Orange St Bridge	5:35	0.30	16.69		0.69	7.38	7.13	73.70	Low	Wet
9/26/2008	Orange St Bridge	5:45	0.80	17.09		1.39	7.26	6.73	70.40	Low	Wet
9/26/2008	North side Tide Gates	6:30	0.20	17.95		8.13	7.28	6.78	75.40	Low	Wet
9/26/2008	North side Tide Gates	6:40	0.80	17.96		8.26	7.13	6.45	71.90	Low	Wet
9/26/2008	South side Tide Gates	6:45	0.20	17.66		6.62	7.11	6.42	70.40	Low	Wet
9/26/2008	South side Tide Gates	6:50	1.00	18.15		9.59	7.02	5.97	67.40	Low	Wet