

Appendix I

Dissolved Oxygen and Temperature Data Summaries

Dissolved Oxygen & Temperature Data Summary for Middle Rouge Subwatershed

3/12/00

Introduction

Beginning in 1993, the RPO and its grantees have measured dissolved oxygen (DO) and temperature at various sites throughout the Middle Rouge Subwatershed, including:

- Numerous river locations
- Four storm water outfalls
- The inlet and outlet of several nonpoint source evaluation projects.
- The effluent of the newly constructed Dearborn Heights CSO Basin.

This packet addresses DO and temperature results from river monitoring only, and the data summarized are only from some of the river monitoring surveys performed. A complete list of DO and temperature river monitoring performed by the RPO is presented in Table 1. A map and table identifying all river monitoring locations in the Middle Rouge Subwatershed have been provided separately.

Data results should be viewed in light of several significant changes which have occurred in the subwatershed in recent years.

- Approximately half of the Dearborn Heights CSO areas tributary in the Lower Rouge have been controlled by a CSO basin which became operational in the Fall of 1997. The treated effluent enters the Middle Rouge River just east of Telegraph Road.
- All CSO areas in Plymouth Township, Livonia, Westland, and Garden City which are tributary to the Middle Rouge River were controlled by sewer separation projects. However, due to problems with some of these projects, untreated sanitary sewer overflows are still occurring during some precipitation events.
- The Newburgh Lake remediation project took place in 1997-98, which included completely emptying the lake.

Dry Weather Grab DO Observations (Figure 1 and Table 2)

Note: Grab sampling results depend greatly on the time of day when sampling occurred.

- At both sites monitored, mean dry weather water temperature is highest in 1998 and lowest in 1997.
- At both sites monitored, mean dry weather DO is highest in 1997 and lowest in 1998.

- At both sites the mean dry weather DO in 1999 is about 1 mg/l higher than in 1997. This does not necessarily mean that conditions are worsening. Sampling results depend on the time of day and the water temperature at the time the sample was taken.
- Excursions below the water quality standard of 5 mg/l occurred at both sites (D06 and D05) but only occurred during 1998.

Middle-1 Dry and Wet Weather Grab DO Survey

A special grab survey at seven Middle-1 sampling locations was conducted in 1997. The results are described in the 1997 Baseline Data Summary Report. Several key findings are summarized below.

- The DO measurements were always above the standard of 5.0 mg/l.
- The DO measurements were not significantly different between dry and wet weather.
- The dry and wet weather mean DO concentrations at all sites were between 7 and 9 mg/l.

Continuous DO Data Observations (Figure 2 and Table 3)

Note: Continuous data obviously include dry and wet weather influences, but mean values are dominated by the dry weather influence due simply because there are far more dry weather days than wet.

- The coolest year to date at each site was 1994. The coolest temperatures were recorded at Johnson Creek at Seven Mile (D03) while the warmest temperatures were recorded on the Middle Rouge at Merriman Road (D07).
- The highest mean DO concentrations have occurred at Johnson Creek at Seven Mile Rd. (D03).
- Some excursions below the water quality standard of 5 mg/l have occurred at all sites with the exception of D03. The most significant excursions have occurred at Hines Dr. near Ford Rd. (D06).

Wet Weather DO Data Observations (Figure 3)

Note: Wet weather DO impacts are best understood by looking at individual wet weather events. PRELIMINARY DATA from 1999 are used in this discussion.

- Figure 3 shows the river's response to a rain event as measured at Hines Dr. near Ford Rd. (D06) which is downstream of several uncontrolled CSOs in Dearborn Heights, several sewer separation projects resulting in SSOs, and the Dearborn Heights CSO basin. The rain event shown caused a significant DO depression which lasted about 1 day and was below the water quality standard of 5 mg/l for at least 12 hours. To date, such depressions have only been observed in sewage-impacted river reaches.

Figure 1
Lower Rouge River Dry Weather Grab DO Summary

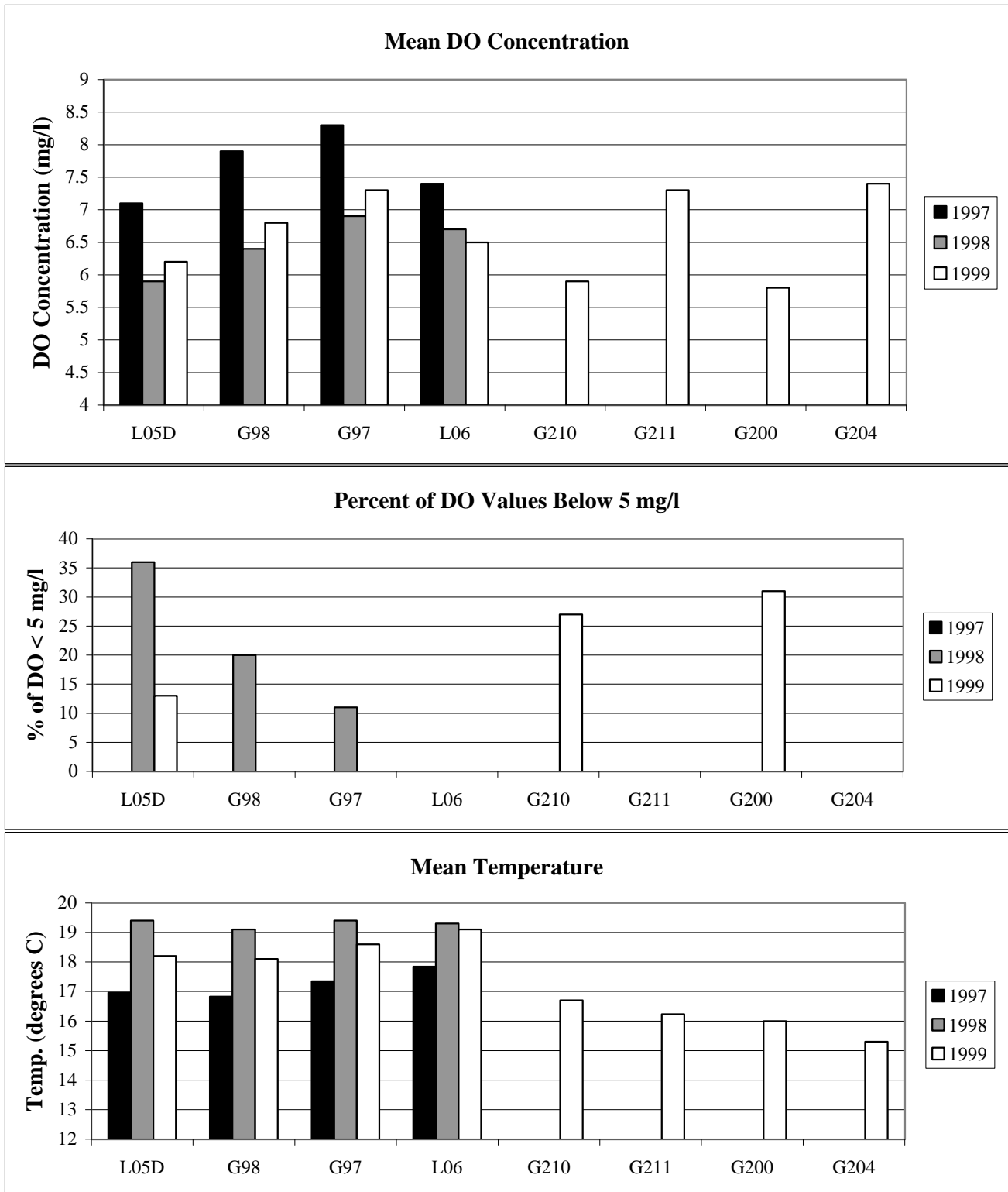


Figure 2
Lower Rouge River Continuous DO and Temperature Summary

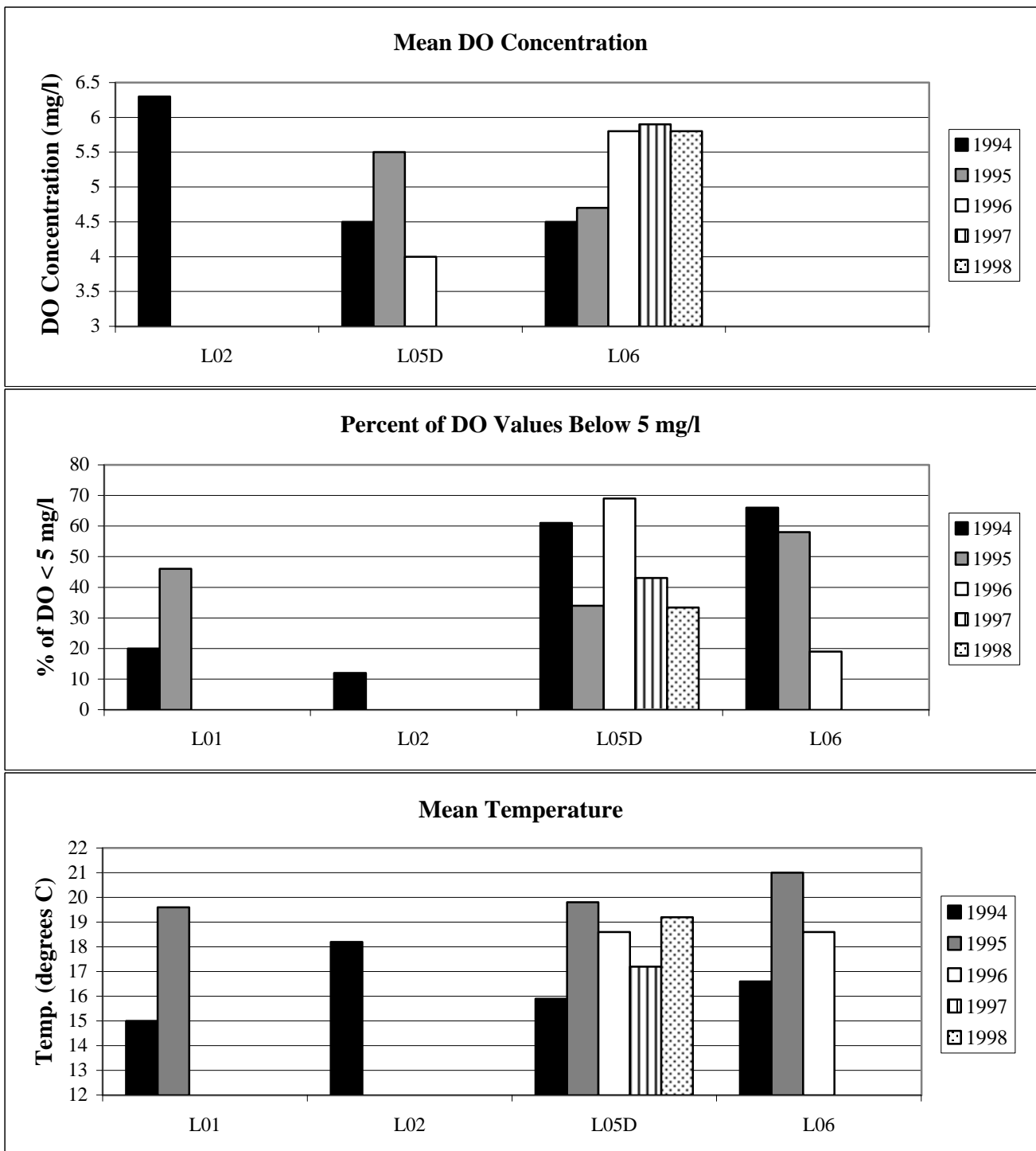


Figure 3
Lower Rouge River @ L05D: 5/15/99-5/23/99
Preliminary Level, DO and Temperature

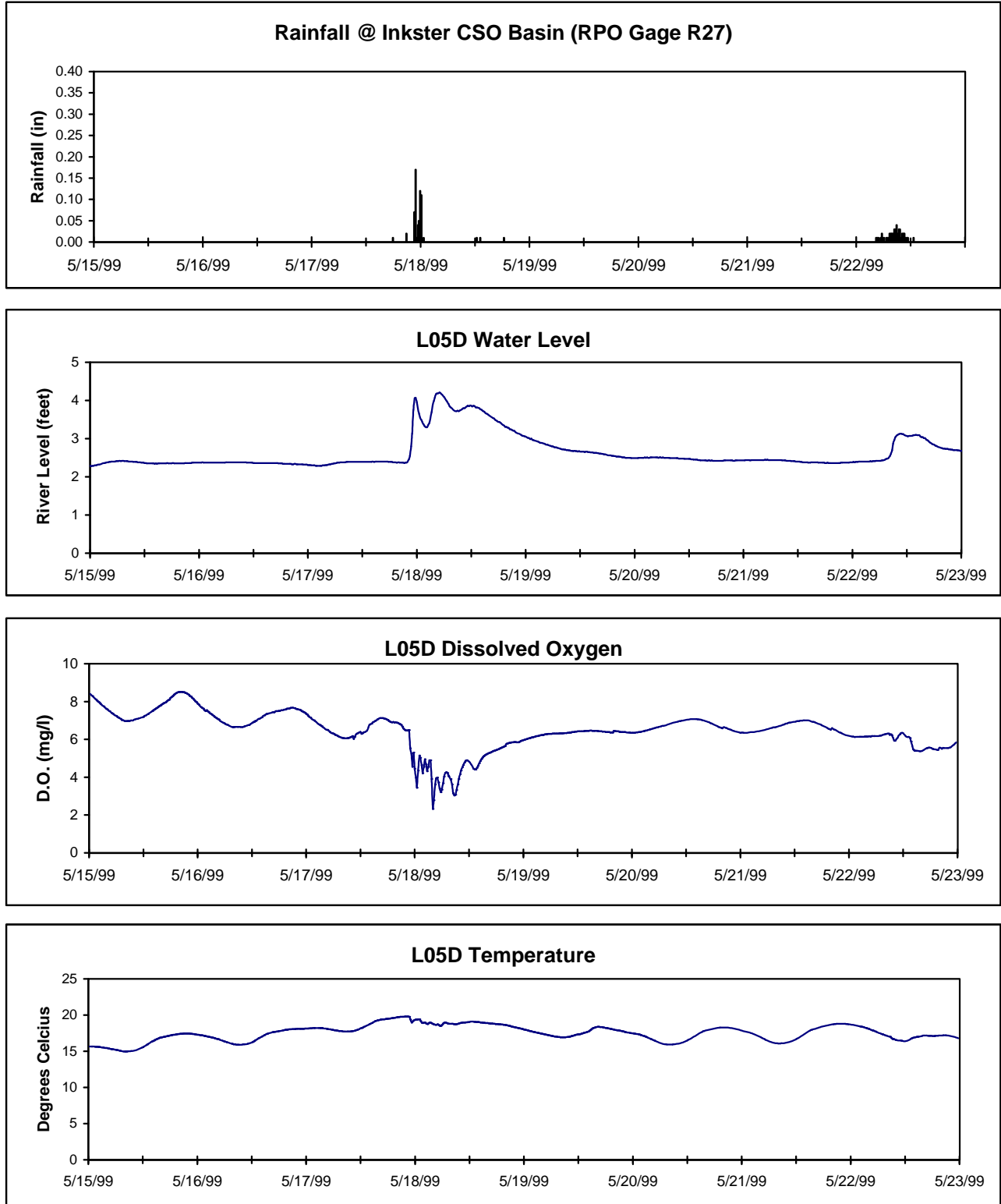


Table 1
Lower Storm Water Management Areas
Summary of Dissolved Oxygen and Temperature River Monitoring Performed by RPO

Type of River Monitoring	Year	Number of Events	Event Dates	Monitoring Locations															
				G66	G67	G68	G69	G92	G93	G95	G97	G98	G200	G204	G210	G211	L01	L02	L05
Dry Weather Monitoring																			
River Profile Survey	1995	3	Aug 24, Sep 1 and 15																
Bi-Weekly Surveys	1997	Varies	May-Oct																
	1998	Varies	May-Oct																
	1999	Varies	May-Oct																
Watershed-Wide Surveys	1996	1	Jul 11																
	1997	2	Jul 25, Sep 8																
	1998	2	Jun 4, Sep 24																
	1999	2	Jun 23, Aug 30	Site locations for 1999 not yet verified.															
Wet Weather Monitoring																			
Inkster CSO Basin Evaluation	1997	2	July 2-4, Sep 9-11																
Continuous Monitoring																			
Baseline Survey	1994	N/A	April-November																
	1995	N/A	May-October																
	1996	N/A	May 1-September 25																
	1997	N/A	April 1-October 31																
	1998	N/A	April 1-October 31																
	1999	N/A	May 10-November 1																

Table 2
Lower Rouge Dry Weather Grab DO Summary

Site	Parameter	DO			Temperature		
		1997	1998	1999	1997	1998	1999
L05D	MEAN	7.1	5.9	6.2	17.0	19.4	18.2
	N	24	31	15	23	22	15
	MAX	8.9	8.5	8.9	23.1	23.9	22.6
	MIN	5.4	3.4	4.7	9.9	10.7	11.3
	% < 5 mg/L	0	36	13			
G98	MEAN	7.9	6.4	6.8	16.8	19.1	18.1
	N	23	30	15	22	22	15
	MAX	9.6	8.7	8.9	22.2	23.9	22.6
	MIN	6.8	3.7	5.5	10.6	11.0	11.6
	% < 5 mg/L	0	20	0			
G97	MEAN	8.3	6.9	7.3	17.4	19.4	18.6
	N	24	27	15	23	20	15
	MAX	9.7	8.2	8.6	22.3	24.5	22.8
	MIN	7.1	4.8	6.5	11.9	11.8	12.5
	% < 5 mg/L	0	11	0			
L06	MEAN	7.4	6.7	6.5	17.8	19.3	19.1
	N	25	21	15	24	12	15
	MAX	9.0	7.6	7.7	22.5	22.7	22.8
	MIN	6.3	5.6	5.5	12.0	13.5	13.8
	% < 5 mg/L	0	0	0			
G210	MEAN			5.9			16.7
	N			15			15
	MAX			9.0			23.1
	MIN			3.3			8.9
	% < 5 mg/L			27			
G211	MEAN			7.3			16.2
	N			15			15
	MAX			10.4			21.7
	MIN			5.7			7.7
	% < 5 mg/L			0			
G200	MEAN			5.8			16.0
	N			13			13
	MAX			8.5			21.1
	MIN			3.4			6.3
	% < 5 mg/L			31			
G204	MEAN			7.4			15.3
	N			13			13
	MAX			9.8			21.2
	MIN			5.8			6.3
	% < 5 mg/L			0			

Table 3
Lower Rouge Continuous DO and Temperature Summary

Site	Parameter	DO					Temperature				
		1994	1995	1996	1997	1998	1994	1995	1996	1997	1998
L01	MEAN	6.7	5.0				15.0	19.6			
	N	16591	9316				19357	9686			
	MAX	14.9	8.0				25.5	26.2			
	MIN	1.9	1.1				5.1	10.8			
	STD	2.2	1.1				4.4	2.9			
	% < 5 mg/L	20	46								
L02	MEAN	6.3					18.2				
	N	3689					4504				
	MAX	11.2					26.8				
	MIN	3.8					8.5				
	STD	1.0					2.7				
	% < 5 mg/L	12									
L05D	MEAN	4.5	5.5	4.0	5.9	5.8	15.9	19.8	18.6	17.2	19.2
	N	15989	10387	10083	16085	13260	18869	11742	13487	16950	14143
	MAX	15.7	11.5	29.7	14.3	10.9	26.7	25.9	24.3	25.1	28.0
	MIN	0.0	0.0	0.0	0.0	0.6	2.5	11.8	8.1	7.2	10.6
	STD	3.1	1.7	3.4	2.3	1.6	4.4	3.3	3.1	3.8	3.4
	% < 5 mg/L	61	34	69	43	33.4					
L06	MEAN	4.5	4.7	5.8			16.6	21.0	18.6		
	N	12451	13834	12687			14563	13835	12687		
	MAX	14.0	7.4	10.5			24.3	26.5	23.7		
	MIN	0.0	0.3	0.1			6.9	15.1	7.7		
	STD	2.3	1.2	1.6			4.0	1.9	3.2		
	% < 5 mg/L	66	58	19							

Dissolved Oxygen & Temperature Data Summary for Main 1-2 Rouge Subwatershed

3/12/00

Introduction

Beginning in 1993, the RPO and its grantees have measured dissolved oxygen (DO) and temperature at various sites throughout the Main 1-2 Rouge Subwatershed, including:

- Numerous river locations
- The effluent of the newly constructed Acacia Park, Birmingham and Bloomfield Village CSO basins.

This packet addresses DO and temperature results from river monitoring only, and the data summarized are only from some of the river monitoring surveys performed. A complete list of DO and temperature river monitoring performed by the RPO is presented in Table 1. A map and table identifying all river monitoring locations in the Main 1-2 Rouge Subwatershed have been provided separately.

Data results should be viewed in light of the fact that all CSOs in the subwatershed were controlled by early in 1998.

Dry Weather Grab DO Observations (Figure 1 and Table 2)

Note: Grab sampling results depend greatly on the time of day when sampling occurred.

- At all sites monitored in 1997, mean dry weather water temperature in 1997 was the lowest of the three years monitored.
- Of the sites monitored all three years, the site with the lowest mean dry weather water temperature for each year monitored was Franklin Br. at Twelve Mile Rd. (G46).
- Of the sites monitored all three years the highest mean dry weather DO concentrations each year occurred at Franklin Br. at Twelve Mile Rd. (G46) while the lowest occurred at Main Rouge at Riverside Dr. (G58) and Evans Ditch at Berg Road (M05).
- At the sites monitored all three years, the mean dry weather DO in 1999 is always lower than in 1997 by amounts up to 1.5 mg/l. This does not necessarily mean conditions are worsening given that river temperature was lower in 1997. Sampling results depend on the time of day and the water temperature at the time the sample was taken.

- Significant excursions below the water quality standard of 5 mg/l occurred at three sites (Evans Ditch at Berg Rd.–M05; Main Rouge at Riverside Dr.–G58 and Unknown drain upstream of Bloomfield Basin-G49). At least two other RPO monitoring activities have identified Beverly Impoundment, which is represented by Site G58, as having very low DO concentrations at certain times of the year.

Continuous DO Data Observations (Figure 2 and Table 3)

Note: Continuous data obviously include dry and wet weather influences, but mean values are dominated by the dry weather influence due simply because there are far more dry weather days than wet.

- There are not sufficient data for a meaningful comparison of mean water temperature between sites. However, the data show that 1994 and 1997 were the coolest of the years monitored.
- The lowest mean DO concentrations have occurred at Adams Road (M01).
- Some excursions below the water quality standard of 5 mg/l have occurred at each site. The most significant excursions have occurred at Adams Road (M01) and Lahser Road (M03).

Figure 1
Main 1 & 2 Rouge River Dry Weather Grab DO Summary

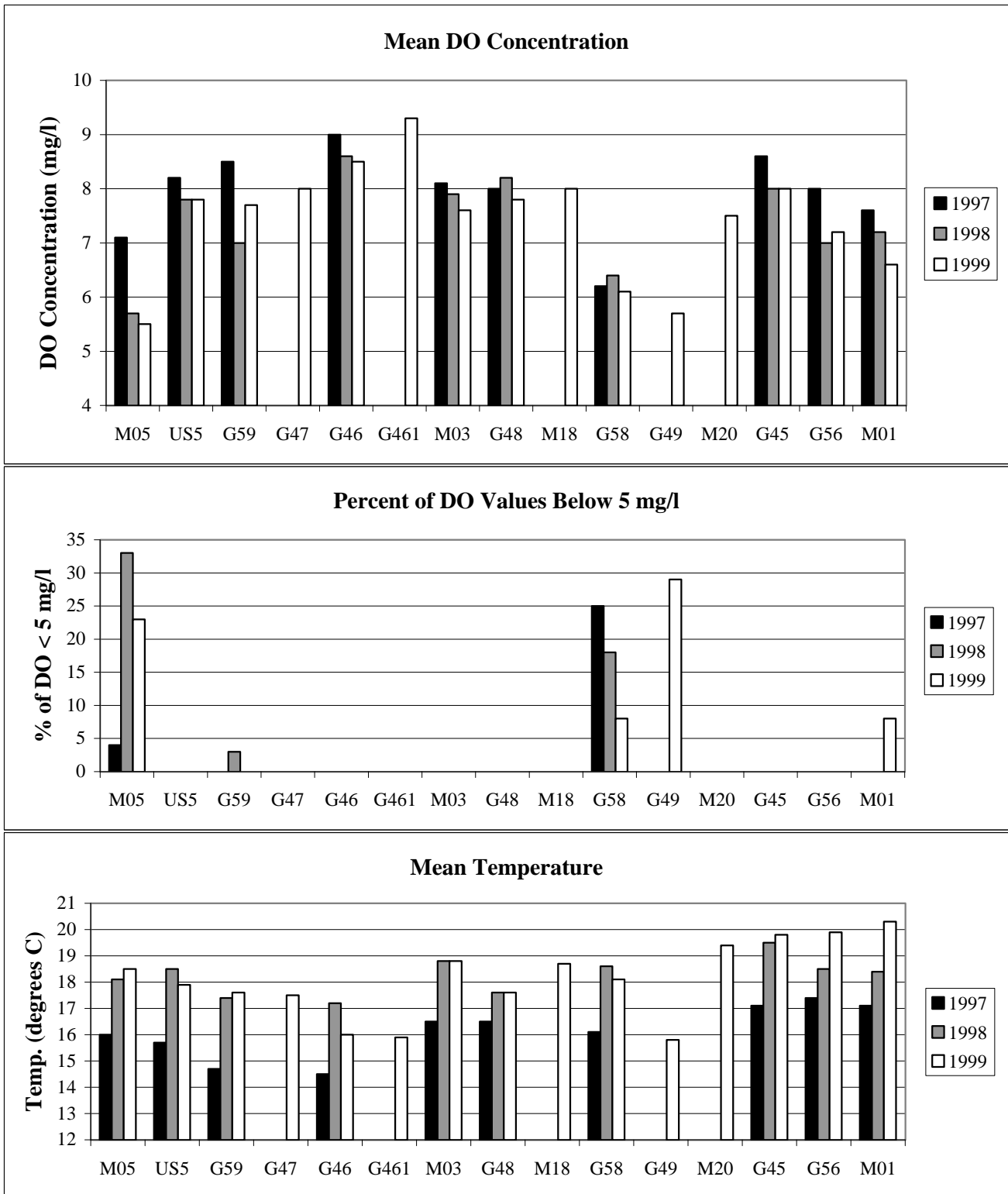


Figure 2
Main 1 & 2 Rouge River Continuous DO and Temperature Summary

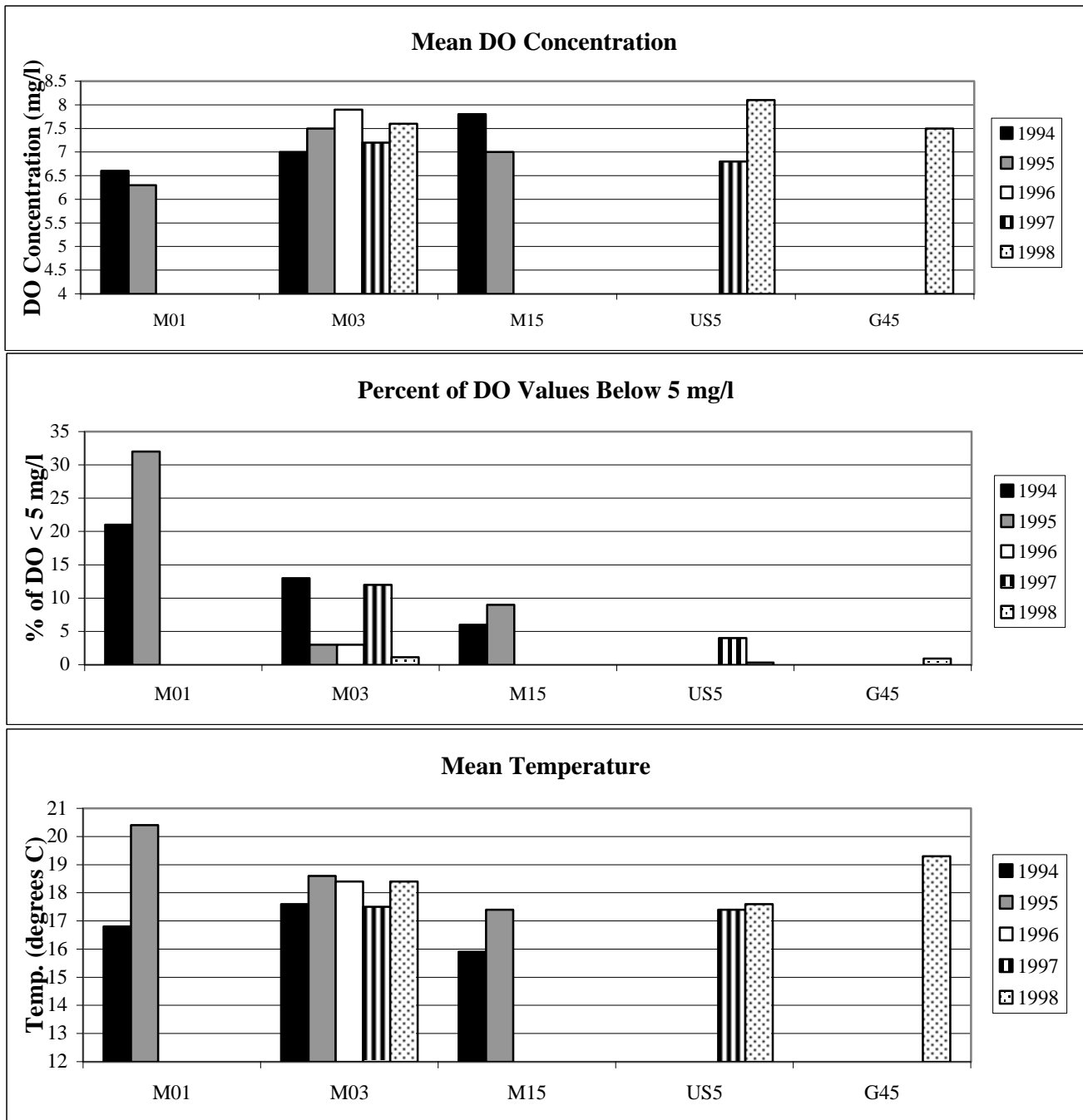


Table 1
Main 3 & 4 Storm Water Management Areas
Summary of Dissolved Oxygen and Temperature River Monitoring Performed by RPO

Type of River Monitoring	Year	Number of Events	Event Dates	Monitoring Locations														
				Main 3 & 4										Other				
				G41	G42	G43	M05	M10	M12	M14	M15	M19	US5	US7	D06	L05	U05	
Dry Weather Monitoring																		
River Profile Survey	1995	3	Aug 24, Sep 5 and 15															
Bi-Weekly Surveys	1997	varies	May-Oct															
	1998	varies	May-Oct															
	1999	varies	May-Oct															
Watershed-Wide Surveys	1996	1	Jul 11															
	1997	2	Jul 25, Sep 8															
	1998	2	Jun 4, Sep 24															
	1999	2	Jun 23, Aug 30															
				Site locations for 1999 not yet verified.														
Wet Weather Monitoring																		
Inkster CSO Basin Evaluation	1997	2	Jul 2-4, Sep 9-11															
Redford CSO Basin Evaluation	1997	2	Jul 2-4, Sep 9-11															
	1998	3	Aug 6-7, Aug 24-25, Oct 7-8															
Oakland County CSO Basin Eval.	1998	3	Aug 6-7, Aug 24-25, Oct 7-8															
Dry/Wet Weather Monitoring																		
Vertical Profiling	1997	varies	May-Oct															
	1998	varies	May-Oct															
	1999	varies	May-Oct															
Continuous Monitoring																		
Baseline Survey	1994	N/A	April-November															
	1995	N/A	May-October															
	1996	N/A	May 1-September 25															
	1997	N/A	April 1-October 31															
	1998	N/A	April 1-October 31															
	1999	N/A	May 10-November 1															

Table 2
Main 1 & 2 Rouge Dry Weather Grab DO Summary

Site	Parameter	DO			Temperature		
		1997	1998	1999	1997	1998	1999
M05	MEAN	7.1	5.7	5.5	16.0	18.1	18.5
	N	24	40	13	23	27	13
	MAX	12.0	9.8	9.1	23.4	23.4	23.2
	MIN	4.3	1.6	3.2	6.7	7.4	9.3
	% < 5 mg/L	4	33	23			
US5	MEAN	8.2	7.8	7.8	15.7	18.5	17.9
	N	24	36	13	23	31	13
	MAX	10.6	10.8	9.5	22.8	24.2	22.5
	MIN	6.4	6.3	6.3	6.1	8.2	9.3
	% < 5 mg/L	0	0	0			
G59	MEAN	8.5	7.0	7.7	14.7	17.4	17.6
	N	11	71	14	11	57	14
	MAX	10.7	10.4	9.3	17.9	24.2	22.5
	MIN	7.6	4.4	6.8	5.9	7.1	9.3
	% < 5 mg/L	0	3	0			
G47	MEAN			8.0			17.5
	N			13			13
	MAX			9.2			22.2
	MIN			6.8			9.1
	% < 5 mg/L			0			
G46	MEAN	9.0	8.6	8.5	14.5	17.2	16.0
	N	24	45	14	23	34	14
	MAX	11.8	11.2	10.0	21.1	22.6	21.3
	MIN	7.0	6.5	6.6	5.9	6.7	8.9
	% < 5 mg/L	0	0	0			
G461	MEAN			9.3			15.9
	N			12			12
	MAX			12.0			20.6
	MIN			7.4			9.7
	% < 5 mg/L			0			
M03	MEAN	8.1	7.9	7.6	16.5	18.8	18.8
	N	24	40	13	23	33	13
	MAX	10.7	10.2	9.0	24.6	25.4	23.7
	MIN	5.8	6.0	6.6	5.9	7.4	9.5
	% < 5 mg/L	0	0	0			
G48	MEAN	8.0	8.2	7.8	16.5	17.6	17.6
	N	24	14	9	23	14	9
	MAX	10.8	13.4	10.5	24.5	23.7	23.4
	MIN	6.2	6.2	6.4	5.7	7.6	9.8
	% < 5 mg/L	0	0	0			

Table 2 (continued)
Main 1 & 2 Rouge Dry Weather Grab DO Summary

Site	Parameter	DO			Temperature		
		1997	1998	1999	1997	1998	1999
M18	MEAN			8.0			18.7
	N			13			13
	MAX			9.9			23.4
	MIN			6.7			9.8
	% < 5 mg/L			0			
G58	MEAN	6.2	6.4	6.1	16.2	18.6	18.1
	N	24	40	12	23	29	12
	MAX	10.0	8.9	7.7	23.2	24.7	22.9
	MIN	2.7	4.1	4.7	5.6	7.8	9.8
	% < 5 mg/L	25	18	8			
G49	MEAN			5.7			15.8
	N			14			14
	MAX			7.8			19.4
	MIN			2.8			9.2
	% < 5 mg/L			29			
M20	MEAN			7.5			19.4
	N			13			13
	MAX			9.4			24.2
	MIN			5.7			9.9
	% < 5 mg/L			0			
G45	MEAN	8.6	8.0	8.0	17.2	19.5	19.8
	N	24	39	13	23	29	12
	MAX	11.2	10.3	9.8	25.0	26.4	25.1
	MIN	7.0	6.5	6.5	5.9	9.2	10.0
	% < 5 mg/L	0	0	0			
G56	MEAN	8.0	7.0	7.2	17.4	18.5	19.9
	N	24	16	11	23	14	11
	MAX	10.9	9.7	9.3	26.0	25.8	24.9
	MIN	5.3	5.2	5.4	5.5	8.5	9.6
	% < 5 mg/L	0	0	0			
M01	MEAN	7.6	7.2	6.6	17.1	18.4	20.3
	N	24	18	12	23	15	12
	MAX	11.0	10.0	8.7	25.5	25.1	23.9
	MIN	5.4	5.2	4.8	5.8	8.2	13.4
	% < 5 mg/L	0	0	8			

Table 3
Main 3 & 4 Rouge Continuous DO and Temperature Summary

Site	Parameter	DO					Temperature				
		1994	1995	1996	1997	1998	1994	1995	1996	1997	1998
US7	MEAN	6.4	5.9	5.9	5.5	5.4	15.2	19.1	18.5	16.9	18.3
	N	18612	10544	12718	16362	15616	18628	13376	13281	16447	17603
	MAX	14.6	14.9	12.9	11.3	14.7	25.0	26.3	24.5	24.7	29.9
	MIN	0.0	0.4	0.0	0.0	0.7	3.1	10.4	8.5	5.10	6.9
	STD	2.4	1.3	2.2	2.0	1.9	4.5	3.6	3.2	4.1	4.0
	% < 5 mg/L	31	23	36	40	39.2					
M10	MEAN	5.4	3.7				16.3	20.0			
	N	18600	13335				19280	21639			
	MAX	14.3	7.1				27.4	26.0			
	MIN	0.0	0.4				4.1	11.1			
	STD	2.7	1.0				4.8	3.0			
	% < 5 mg/L	53	89								
M12	MEAN	7.1	6.6				18.8	22.0			
	N	14500	13560				19554	13599			
	MAX	18.9	17.0				32.7	32.2			
	MIN	0.0	0.0				3.5	11.9			
	STD	2.4	2.1				6.2	4.2			
	% < 5 mg/L	17	19								
M15	MEAN	7.8	7.0				15.9	17.4			
	N	11727	5193				12080	6795			
	MAX	14.7	10.0				24.8	24.3			
	MIN	0.1	3.6				6.6	9.6			
	STD	1.9	1.4				3.9	4.0			
	% < 5 mg/L	6	9								
US5	MEAN				6.8	8.1				17.4	17.6
	N				14269	15454				14269	16812
	MAX				12.4	11.5				24.6	25.6
	MIN				2.7	3.1				4.3	7.5
	STD				1.5	1.1				4.2	4.0
	% < 5 mg/L				4	0.3					
U05	MEAN	6.9	6.7	5.9	6.8	6.6	16.5	18.4	18.2	17.0	17.9
	N	15886	10072	13220	13650	12832	16371	11672	13321	14897	14278
	MAX	12.7	10.7	12.9	12.2	10.9	25.3	27.0	25.6	25.0	26.3
	MIN	3.0	0.0	1.9	1.2	1.6	6.9	10.0	9.0	4.8	5.8
	STD	1.4	1.6	1.5	1.9	1.3	4.0	3.6	3.2	4.4	4.1
	% < 5 mg/L	6	9	28	21	9.6					
L05D	MEAN	4.5	5.5	4.0	5.9	5.8	15.9	19.8	18.6	17.2	19.2
	N	15989	10387	10083	16085	13260	18869	11742	13487	16950	14143
	MAX	15.7	11.5	29.7	14.3	10.9	26.7	25.9	24.3	25.1	28.0
	MIN	0.0	0.0	0.0	0.0	0.6	2.5	11.8	8.1	7.2	10.6
	STD	3.1	1.7	3.4	2.3	1.6	4.4	3.3	3.1	3.8	3.4
	% < 5 mg/L	61	34	69	43	33.4					
D06	MEAN	8.0	7.2	7.1	6.5	6.8	15.8	19.9	19.4	17.5	19.6
	N	12558	12058	12151	15148	12037	15611	13500	13830	17080	14343
	MAX	15.1	10.6	11.5	12.3	10.5	26.7	27.9	26.3	26.1	26.3
	MIN	0.5	0.3	0.2	0.0	0.3	4.1	11.3	9.1	5.0	11.4
	STD	2.2	1.2	1.3	2.3	1.4	5.1	3.7	3.4	4.5	3.3
	% < 5 mg/L	10	4	3	25.0	10.3					

Dissolved Oxygen & Temperature Data Summary for Main 3-4 Rouge Subwatershed

3/12/00

Introduction

Beginning in 1993, the RPO and its grantees have measured dissolved oxygen (DO) and temperature at various sites throughout the Main 3-4 Rouge Subwatershed, including:

- At least one storm water outfall
- At least one uncontrolled CSO
- The effluent of the newly constructed Seven Mile, Puritan-Fenkell and Hubbell-Southfield CSO facilities

This packet addresses DO and temperature results from river monitoring only, and the data summarized are only from some of the river monitoring surveys performed. A complete list of DO and temperature river monitoring performed by the RPO is presented in Table 1. A map and table identifying all river monitoring locations in the Main 3-4 Rouge Subwatershed have been provided separately.

Data results should be viewed in light of the fact that three new CSO basins in Detroit became operational in 1999. In addition, major CSO control projects were implemented before 1996 and 1998 on each of the four major subwatersheds upstream of the Main 3-4: the Lower, Middle, Upper, and Main 1-2.

Dry Weather Grab DO Observations (Figure 1 and Table 2)

Note: Grab sampling results depend greatly on the time of day when sampling occurred.

- Mean dry weather water temperatures at each site were lowest in 1997, and almost always highest in 1998.
- Dry weather water temperatures were coolest at the Main Rouge sites between Beech Rd (US5) and Schoolcraft east of Telegraph Rd. (M19). The Main Rouge at Greenfield Rd. (M12) was significantly warmer than all other sites.
- The highest mean dry weather DO concentrations each year occurred at Beech Rd. (US5) while the lowest have occurred at Evans Ditch at Berg Rd. (M05) and Greenfield Rd. (M12).
- Significant excursions below the water quality standard of 5 mg/l have occurred at all sites except for Beech Rd. (US5). However, such excursions only occurred at two of the seven sites in the most recent year of data (1999).

Dry/Wet Weather Vertical Profiling

Vertical DO profile measurements were made at Greenfield Rd. (M12) in 1997 and 1998 and at Jefferson Ave. (M14) in 1999. Every 1 to 2 weeks, DO was measured at several depths at the river centerline and at the cross-section quarter points.

These vertical profile measurements show significant excursions below the water quality standard of 5 mg/l in each year monitored. For example in 1997, at least one measurement at Greenfield Road (M12) was below 5 mg/l at 85 percent of the site visits.

Continuous DO Data Observations (Figure 2 and Table 3)

Note: Continuous data obviously include dry and wet weather influences, but mean values are dominated by the dry weather influence due simply because there are far more dry weather days than wet.

- It is clear that 1994 was the coolest year to date averaging at least two degrees cooler than the later years. The warmest temperature have occurred at Greenfield Rd. (M12).
- The lowest mean DO concentrations have occurred on the Lower Rouge at Military Road (L05D) and on the Main Rouge at U of M Dearborn (M10).
- Some excursions below the water quality standard of 5 mg/l have occurred at each site. The most significant excursions have occurred on the Lower Rouge at Military Rd. (L05D) and at U of M Dearborn (M10).

Wet Weather DO Data Observations (Figure 3)

Note: Wet weather DO impacts are best understood by looking at individual wet weather events. PRELIMINARY DATA from 1999 are used in this discussion.

- Figure 3 shows the river's response to two wet weather events at Plymouth Rd. (US7). The first rain event shown caused a significant DO depression. River DO concentrations were below the water quality standard of 5 mg/l for about 1 day. To date, such depressions have only been observed in sewage-impacted river reaches. Similar depressions occur at the downstream end of the Lower, Middle and Upper Rouge as shown in Figures 4 through 6, respectively.

Figure 1
Main 3 & 4 Rouge River Dry Weather Grab DO Summary

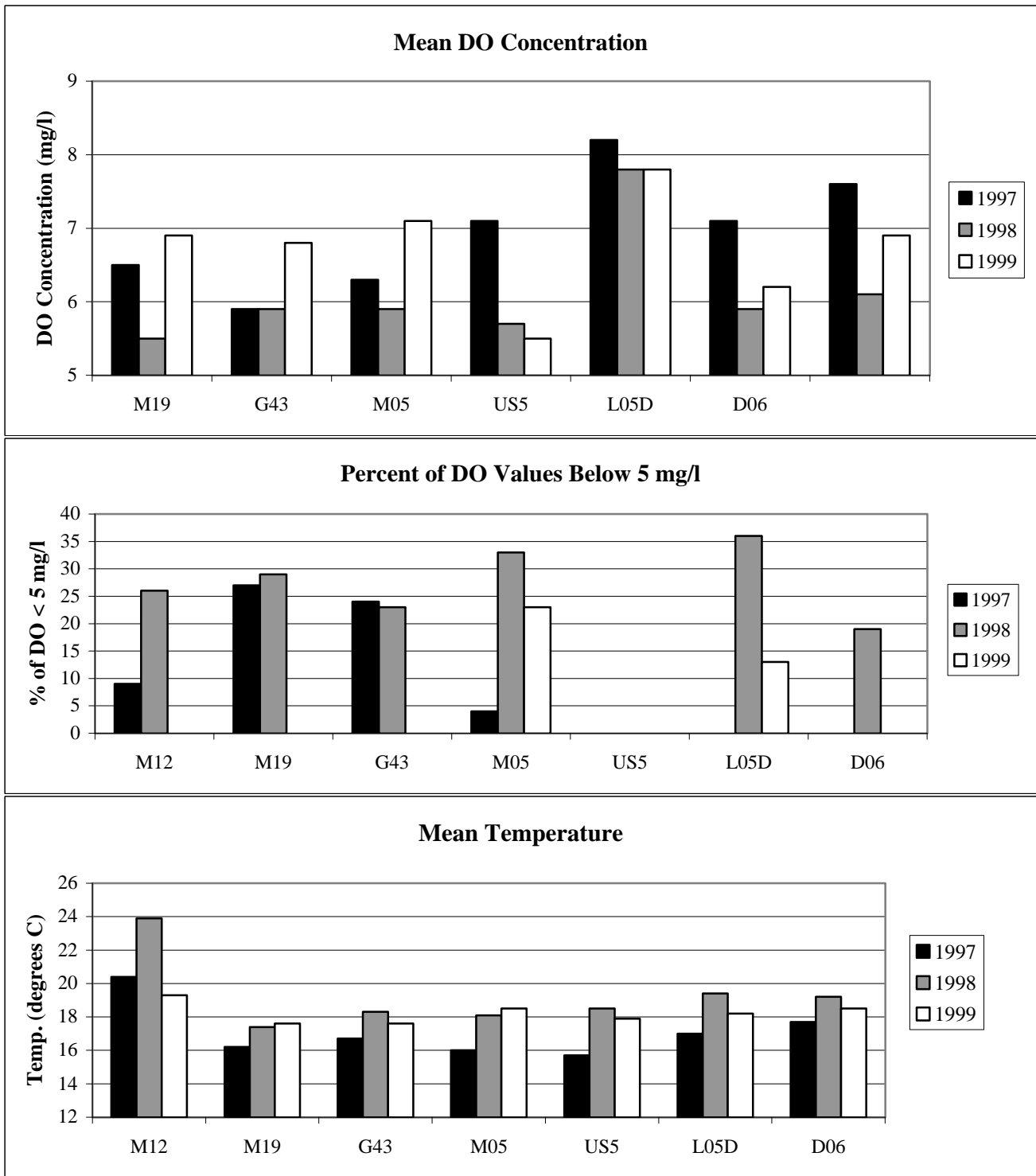


Figure 2
Main 3 & 4 Rouge River Continuous DO and Temperature Summary

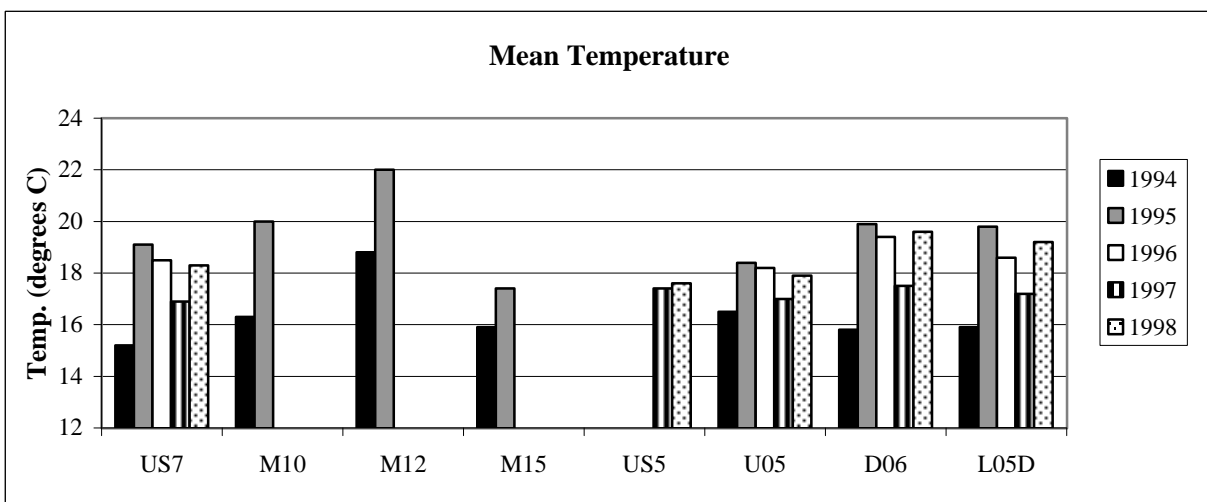
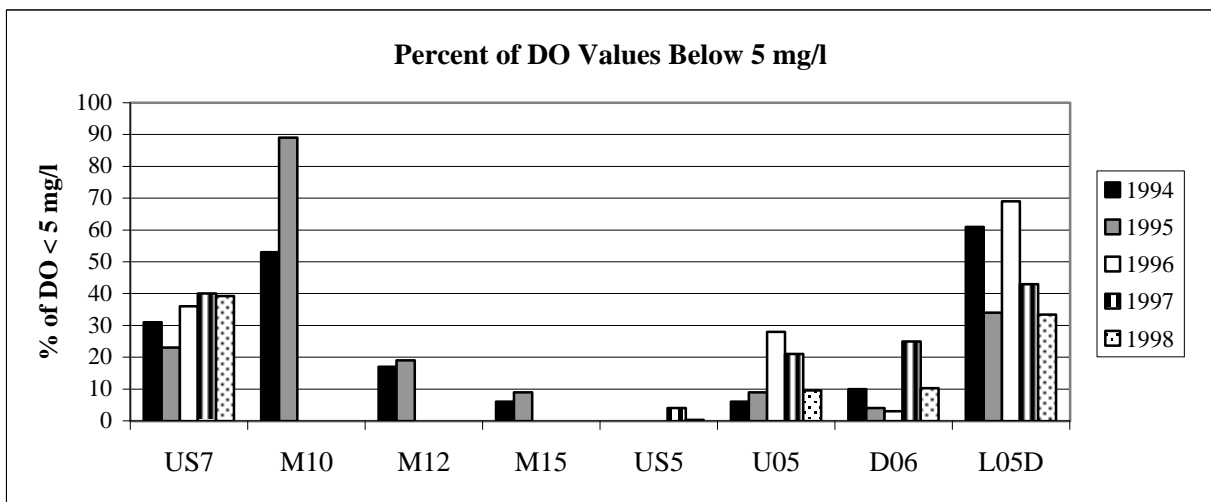
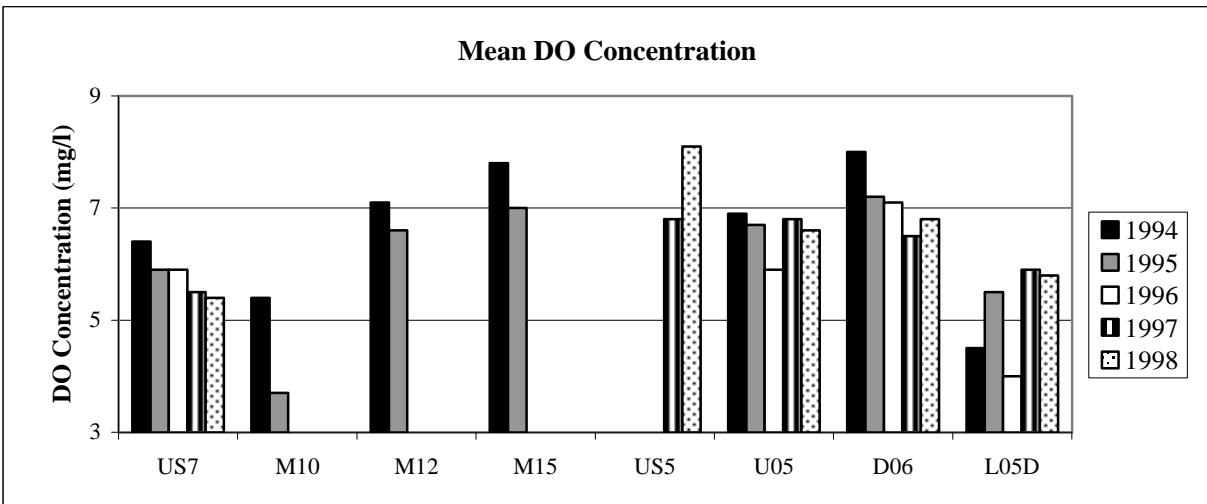


Figure 3
Main Rouge River @ US7: 5/15/99-5/23/99

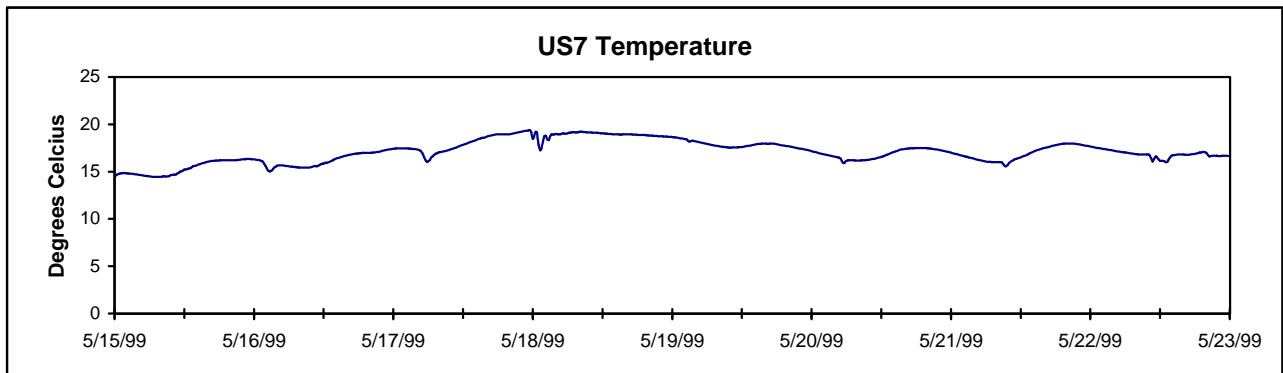
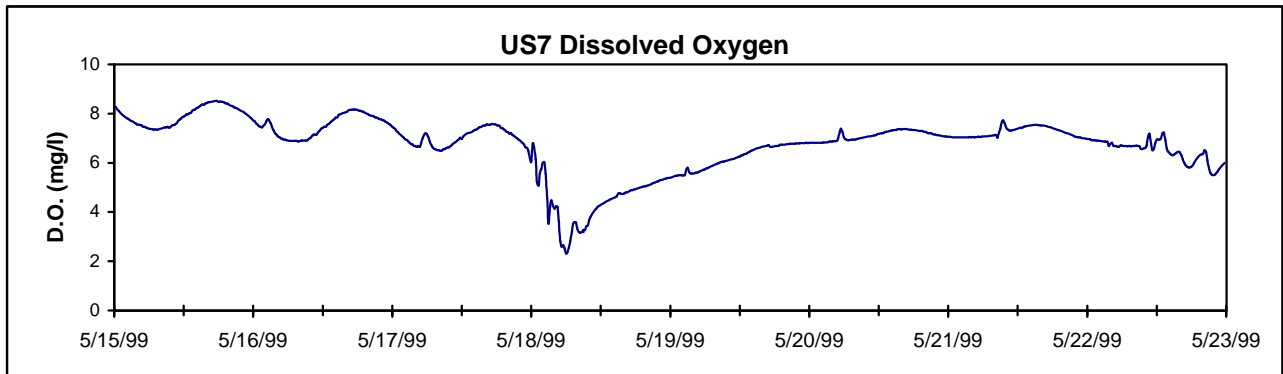
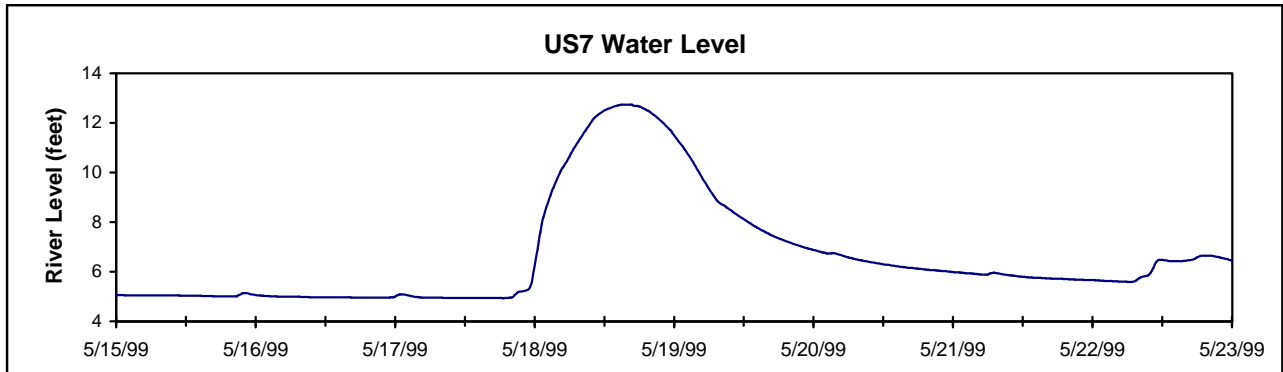
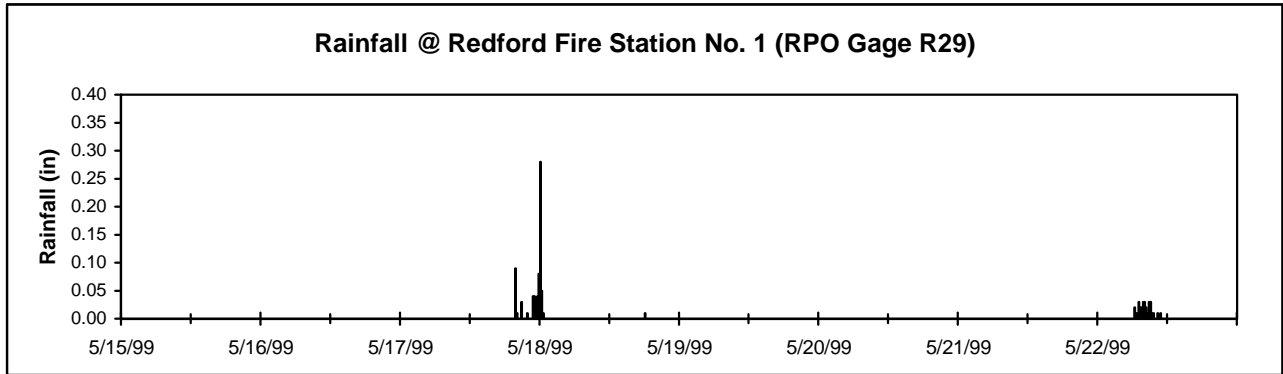


Figure 4
Lower Rouge River @ L05D: 5/15/99-5/23/99
 Preliminary Level, DO and Temperature

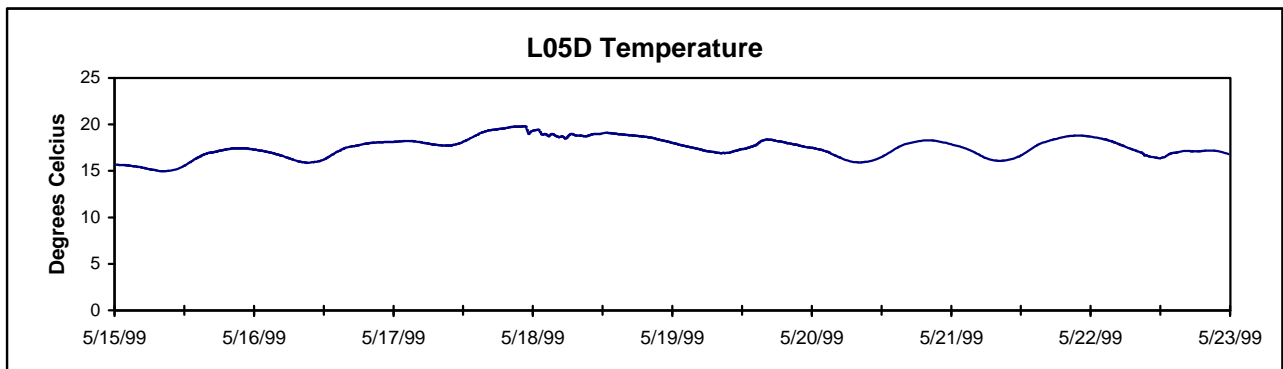
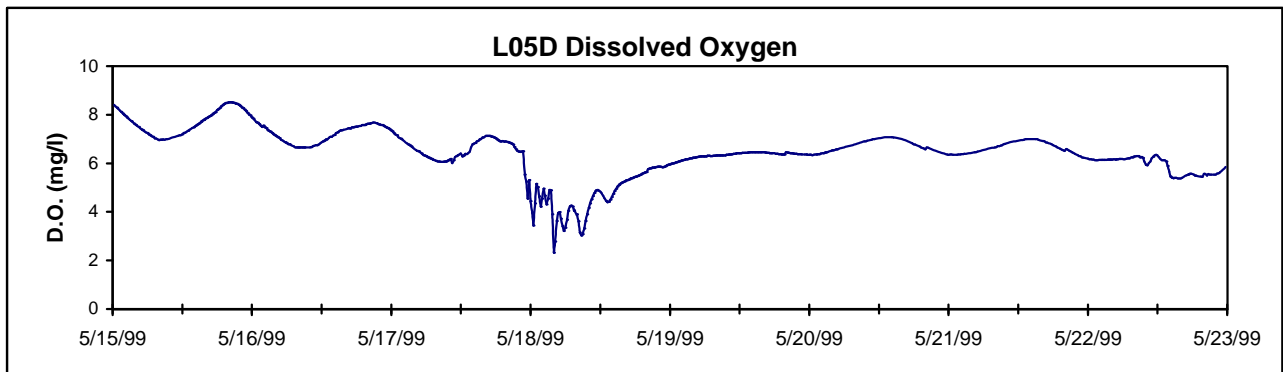
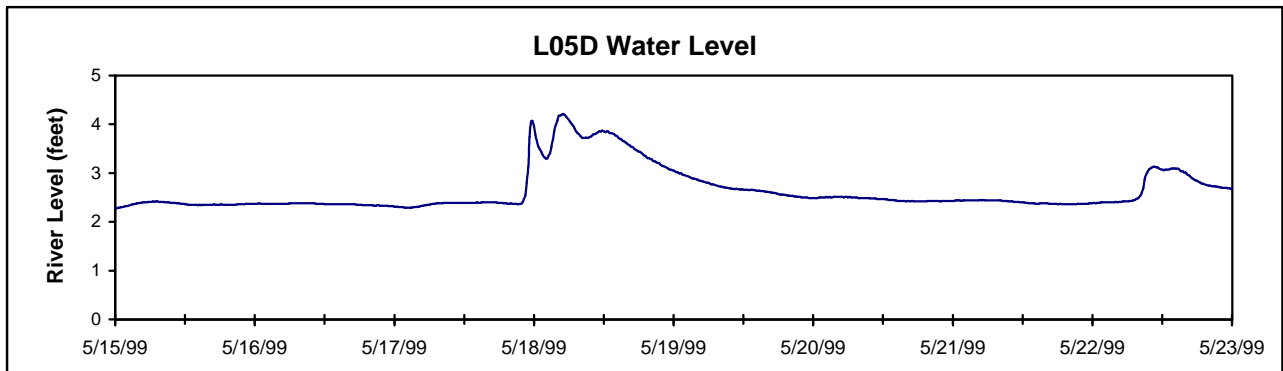
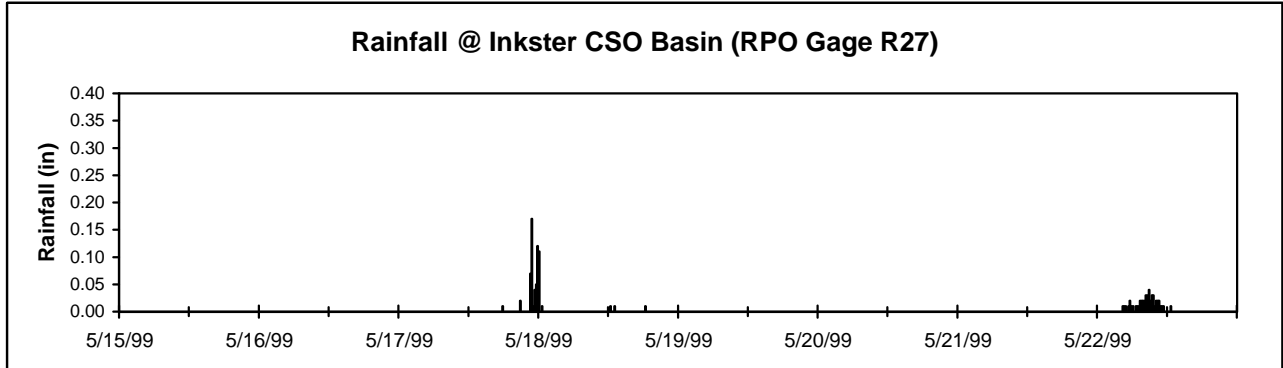


Figure 5
Middle Rouge River @ D06: 5/15/99-5/23/99
Preliminary Level, DO and Temperature

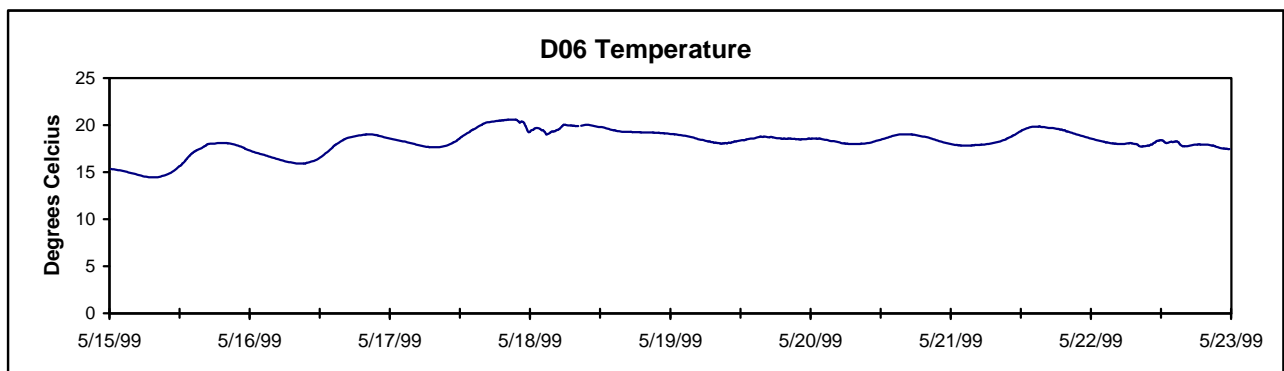
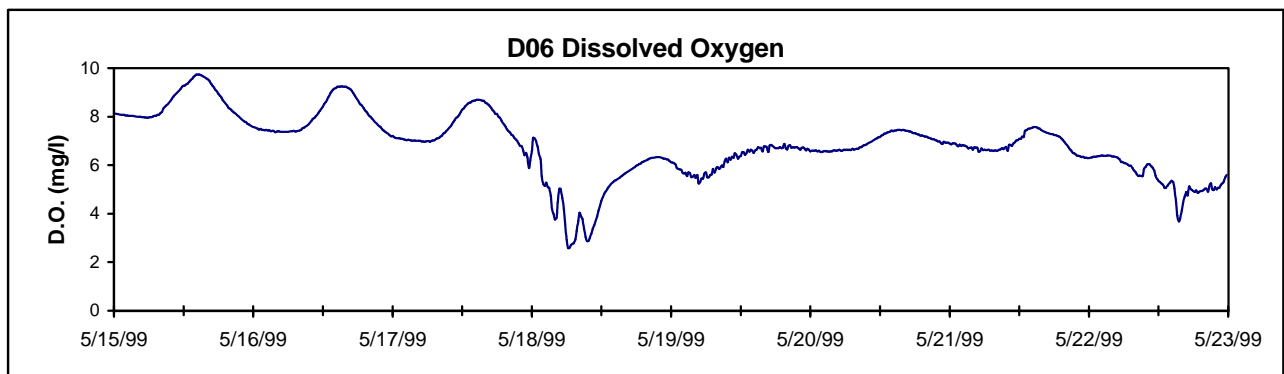
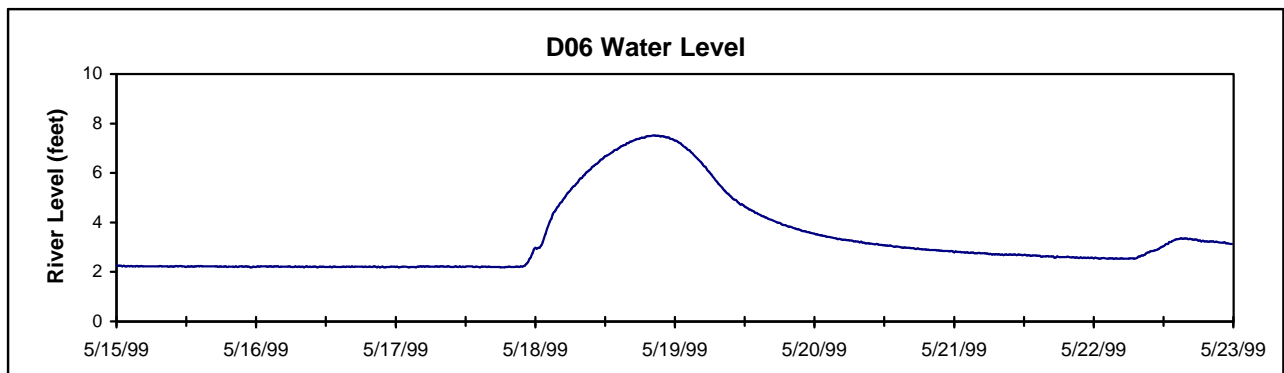
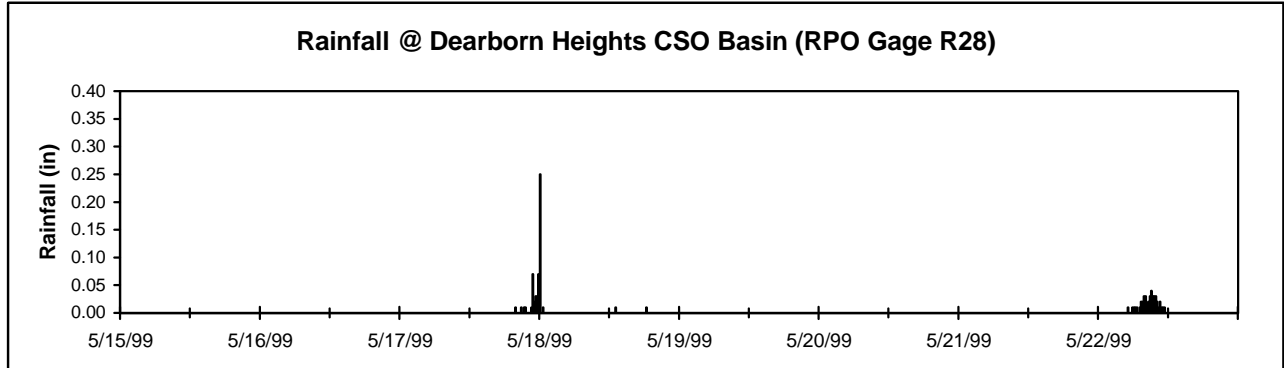


Table 1
Main 3 & 4 Storm Water Management Areas
Summary of Dissolved Oxygen and Temperature River Monitoring Performed by RPO

Type of River Monitoring	Year	Number of Events	Event Dates	Monitoring Locations														
				Main 3 & 4										Other				
				G41	G42	G43	M05	M10	M12	M14	M15	M19	US5	US7	D06	L05	U05	
Dry Weather Monitoring																		
River Profile Survey	1995	3	Aug 24, Sep 5 and 15															
Bi-Weekly Surveys	1997	varies	May-Oct															
	1998	varies	May-Oct															
	1999	varies	May-Oct															
Watershed-Wide Surveys	1996	1	Jul 11															
	1997	2	Jul 25, Sep 8															
	1998	2	Jun 4, Sep 24															
	1999	2	Jun 23, Aug 30															
				Site locations for 1999 not yet verified.														
Wet Weather Monitoring																		
Inkster CSO Basin Evaluation	1997	2	Jul 2-4, Sep 9-11															
Redford CSO Basin Evaluation	1997	2	Jul 2-4, Sep 9-11															
	1998	3	Aug 6-7, Aug 24-25, Oct 7-8															
Oakland County CSO Basin Eval.	1998	3	Aug 6-7, Aug 24-25, Oct 7-8															
Dry/Wet Weather Monitoring																		
Vertical Profiling	1997	varies	May-Oct															
	1998	varies	May-Oct															
	1999	varies	May-Oct															
Continuous Monitoring																		
Baseline Survey	1994	N/A	April-November															
	1995	N/A	May-October															
	1996	N/A	May 1-September 25															
	1997	N/A	April 1-October 31															
	1998	N/A	April 1-October 31															
	1999	N/A	May 10-November 1															

Table 2
Main 3 & 4 Rouge Dry Weather Grab DO Summary

Site	Parameter	DO			Temperature		
		1997	1998	1999	1997	1998	1999
M12	MEAN	6.5	5.5	6.9	20.4	23.9	19.3
	N	23	19	14	22	15	14
	MAX	9.8	7.8	8.5	29.1	31.2	24.6
	MIN	3.9	3.4	5.5	6.9	14.3	10.2
	% < 5 mg/L	9	26	0			
M19	MEAN	5.9	5.9	6.8	16.2	17.4	17.6
	N	15	14	14	16	13	14
	MAX	9.1	8.8	8.7	23.0	23.3	22.8
	MIN	2.7	2.5	5.3	9.9	8.3	9.4
	% < 5 mg/L	27	29	0			
G43	MEAN	6.3	5.9	7.1	16.7	18.3	17.6
	N	21	31	13	20	25	13
	MAX	10.2	10.4	11.4	23.0	23.9	22.6
	MIN	2.8	2.3	5.4	6.5	8.4	9.0
	% < 5 mg/L	24	23	0			
M05	MEAN	7.1	5.7	5.5	16.0	18.1	18.5
	N	24	40	13	23	27	13
	MAX	12.0	9.8	9.1	23.4	23.4	23.2
	MIN	4.3	1.6	3.2	6.7	7.4	9.3
	% < 5 mg/L	4	33	23			
US5	MEAN	8.2	7.8	7.8	15.7	18.5	17.9
	N	24	36	13	23	31	13
	MAX	10.6	10.8	9.5	22.8	24.2	22.5
	MIN	6.4	6.3	6.3	6.1	8.2	9.3
	% < 5 mg/L	0	0	0			
L05D	MEAN	7.1	5.9	6.2	17.0	19.4	18.2
	N	24	31	15	23	22	15
	MAX	8.9	8.5	8.9	23.1	23.9	22.6
	MIN	5.4	3.4	4.7	9.9	10.7	11.3
	% < 5 mg/L	0	36	13			
D06	MEAN	7.6	6.1	6.9	17.7	19.2	18.5
	N	17	26	14	17	20	14
	MAX	9.9	8.9	8.9	23.8	24.5	24.1
	MIN	5.7	4.0	5.6	7.1	8.6	10.0
	% < 5 mg/L	0	19	0			

Table 3
Main 3 & 4 Rouge Continuous DO and Temperature Summary

Site	Parameter	DO					Temperature				
		1994	1995	1996	1997	1998	1994	1995	1996	1997	1998
US7	MEAN	6.4	5.9	5.9	5.5	5.4	15.2	19.1	18.5	16.9	18.3
	N	18612	10544	12718	16362	15616	18628	13376	13281	16447	17603
	MAX	14.6	14.9	12.9	11.3	14.7	25.0	26.3	24.5	24.7	29.9
	MIN	0.0	0.4	0.0	0.0	0.7	3.1	10.4	8.5	5.10	6.9
	STD	2.4	1.3	2.2	2.0	1.9	4.5	3.6	3.2	4.1	4.0
	% < 5 mg/L	31	23	36	40	39.2					
M10	MEAN	5.4	3.7				16.3	20.0			
	N	18600	13335				19280	21639			
	MAX	14.3	7.1				27.4	26.0			
	MIN	0.0	0.4				4.1	11.1			
	STD	2.7	1.0				4.8	3.0			
	% < 5 mg/L	53	89								
M12	MEAN	7.1	6.6				18.8	22.0			
	N	14500	13560				19554	13599			
	MAX	18.9	17.0				32.7	32.2			
	MIN	0.0	0.0				3.5	11.9			
	STD	2.4	2.1				6.2	4.2			
	% < 5 mg/L	17	19								
M15	MEAN	7.8	7.0				15.9	17.4			
	N	11727	5193				12080	6795			
	MAX	14.7	10.0				24.8	24.3			
	MIN	0.1	3.6				6.6	9.6			
	STD	1.9	1.4				3.9	4.0			
	% < 5 mg/L	6	9								
US5	MEAN				6.8	8.1				17.4	17.6
	N				14269	15454				14269	16812
	MAX				12.4	11.5				24.6	25.6
	MIN				2.7	3.1				4.3	7.5
	STD				1.5	1.1				4.2	4.0
	% < 5 mg/L				4	0.3					
U05	MEAN	6.9	6.7	5.9	6.8	6.6	16.5	18.4	18.2	17.0	17.9
	N	15886	10072	13220	13650	12832	16371	11672	13321	14897	14278
	MAX	12.7	10.7	12.9	12.2	10.9	25.3	27.0	25.6	25.0	26.3
	MIN	3.0	0.0	1.9	1.2	1.6	6.9	10.0	9.0	4.8	5.8
	STD	1.4	1.6	1.5	1.9	1.3	4.0	3.6	3.2	4.4	4.1
	% < 5 mg/L	6	9	28	21	9.6					
L05D	MEAN	4.5	5.5	4.0	5.9	5.8	15.9	19.8	18.6	17.2	19.2
	N	15989	10387	10083	16085	13260	18869	11742	13487	16950	14143
	MAX	15.7	11.5	29.7	14.3	10.9	26.7	25.9	24.3	25.1	28.0
	MIN	0.0	0.0	0.0	0.0	0.6	2.5	11.8	8.1	7.2	10.6
	STD	3.1	1.7	3.4	2.3	1.6	4.4	3.3	3.1	3.8	3.4
	% < 5 mg/L	61	34	69	43	33.4					
D06	MEAN	8.0	7.2	7.1	6.5	6.8	15.8	19.9	19.4	17.5	19.6
	N	12558	12058	12151	15148	12037	15611	13500	13830	17080	14343
	MAX	15.1	10.6	11.5	12.3	10.5	26.7	27.9	26.3	26.1	26.3
	MIN	0.5	0.3	0.2	0.0	0.3	4.1	11.3	9.1	5.0	11.4
	STD	2.2	1.2	1.3	2.3	1.4	5.1	3.7	3.4	4.5	3.3
	% < 5 mg/L	10	4	3	25.0	10.3					

Dissolved Oxygen & Temperature Data Summary for Middle Rouge Subwatershed

3/12/00

Introduction

Beginning in 1993, the RPO and its grantees have measured dissolved oxygen (DO) and temperature at various sites throughout the Middle Rouge Subwatershed, including:

- Numerous river locations
- Four storm water outfalls
- The inlet and outlet of several nonpoint source evaluation projects.
- The effluent of the newly constructed Dearborn Heights CSO Basin.

This packet addresses DO and temperature results from river monitoring only, and the data summarized are only from some of the river monitoring surveys performed. A complete list of DO and temperature river monitoring performed by the RPO is presented in Table 1. A map and table identifying all river monitoring locations in the Middle Rouge Subwatershed have been provided separately.

Data results should be viewed in light of several significant changes which have occurred in the subwatershed in recent years.

- Approximately half of the Dearborn Heights CSO areas tributary in the Lower Rouge have been controlled by a CSO basin which became operational in the Fall of 1997. The treated effluent enters the Middle Rouge River just east of Telegraph Road.
- All CSO areas in Plymouth Township, Livonia, Westland, and Garden City which are tributary to the Middle Rouge River were controlled by sewer separation projects. However, due to problems with some of these projects, untreated sanitary sewer overflows are still occurring during some precipitation events.
- The Newburgh Lake remediation project took place in 1997-98, which included completely emptying the lake.

Dry Weather Grab DO Observations (Figure 1 and Table 2)

Note: Grab sampling results depend greatly on the time of day when sampling occurred.

- At both sites monitored, mean dry weather water temperature is highest in 1998 and lowest in 1997.
- At both sites monitored, mean dry weather DO is highest in 1997 and lowest in 1998.

- At both sites the mean dry weather DO in 1999 is about 1 mg/l higher than in 1997. This does not necessarily mean that conditions are worsening. Sampling results depend on the time of day and the water temperature at the time the sample was taken.
- Excursions below the water quality standard of 5 mg/l occurred at both sites (D06 and D05) but only occurred during 1998.

Middle-1 Dry and Wet Weather Grab DO Survey

A special grab survey at seven Middle-1 sampling locations was conducted in 1997. The results are described in the 1997 Baseline Data Summary Report. Several key findings are summarized below.

- The DO measurements were always above the standard of 5.0 mg/l.
- The DO measurements were not significantly different between dry and wet weather.
- The dry and wet weather mean DO concentrations at all sites were between 7 and 9 mg/l.

Continuous DO Data Observations (Figure 2 and Table 3)

Note: Continuous data obviously include dry and wet weather influences, but mean values are dominated by the dry weather influence due simply because there are far more dry weather days than wet.

- The coolest year to date at each site was 1994. The coolest temperatures were recorded at Johnson Creek at Seven Mile (D03) while the warmest temperatures were recorded on the Middle Rouge at Merriman Road (D07).
- The highest mean DO concentrations have occurred at Johnson Creek at Seven Mile Rd. (D03).
- Some excursions below the water quality standard of 5 mg/l have occurred at all sites with the exception of D03. The most significant excursions have occurred at Hines Dr. near Ford Rd. (D06).

Wet Weather DO Data Observations (Figure 3)

Note: Wet weather DO impacts are best understood by looking at individual wet weather events. PRELIMINARY DATA from 1999 are used in this discussion.

- Figure 3 shows the river's response to a rain event as measured at Hines Dr. near Ford Rd. (D06) which is downstream of several uncontrolled CSOs in Dearborn Heights, several sewer separation projects resulting in SSOs, and the Dearborn Heights CSO basin. The rain event shown caused a significant DO depression which lasted about 1 day and was below the water quality standard of 5 mg/l for at least 12 hours. To date, such depressions have only been observed in sewage-impacted river reaches.

Figure 1
Middle Rouge River Dry Weather Grab DO Summary

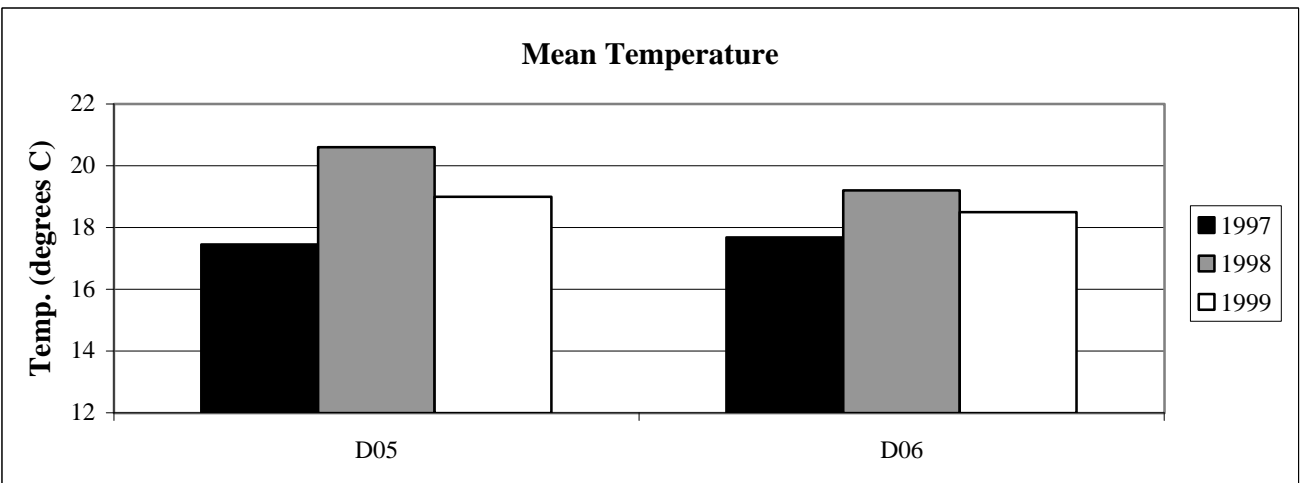
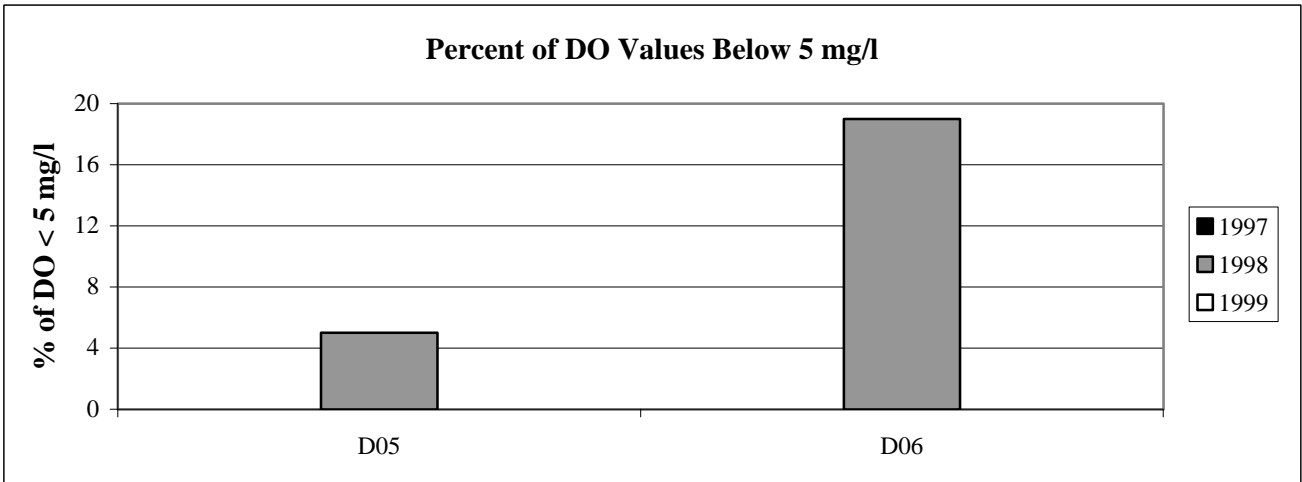
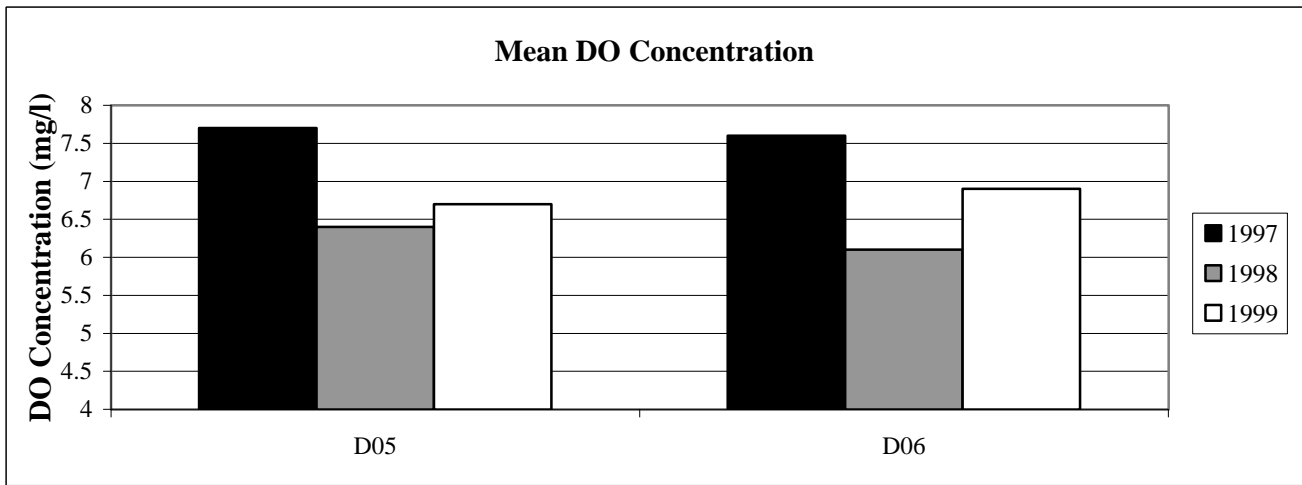


Figure 2
Middle Rouge River Continuous DO and Temperature Summary

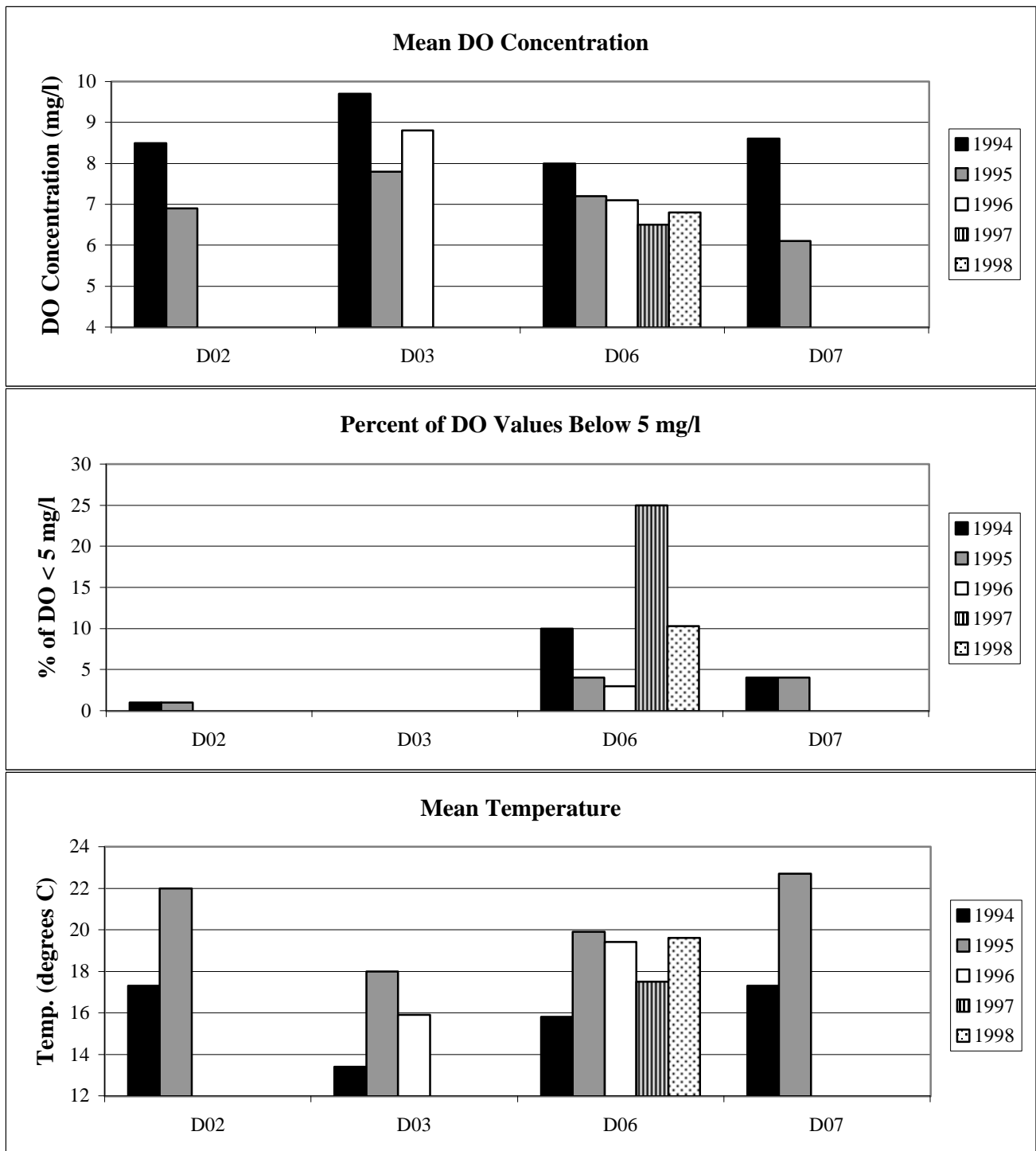


Figure 3
Middle Rouge River @ D06: 5/15/99-5/23/99
Preliminary Level, DO and Temperature

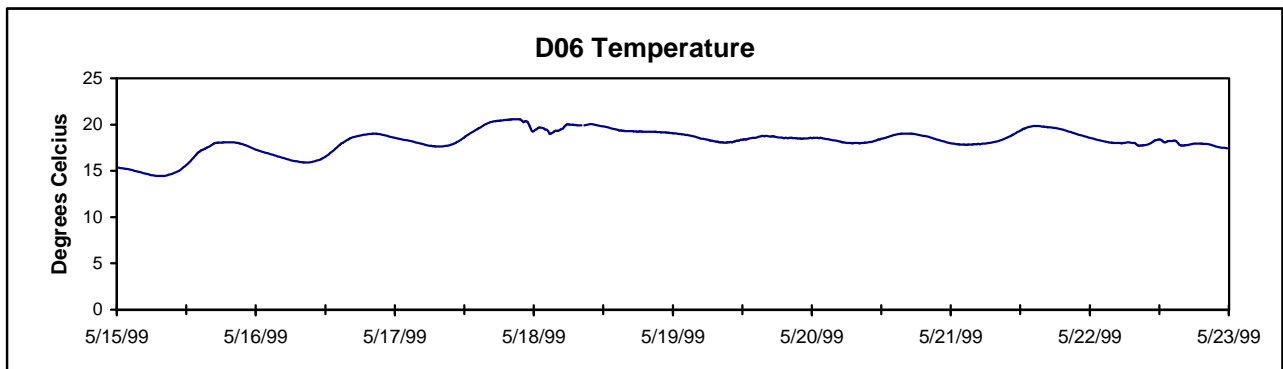
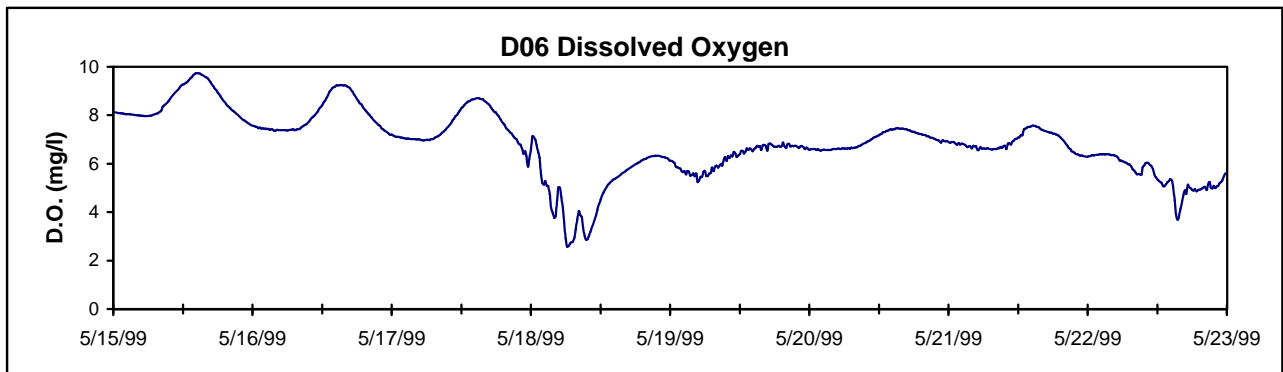
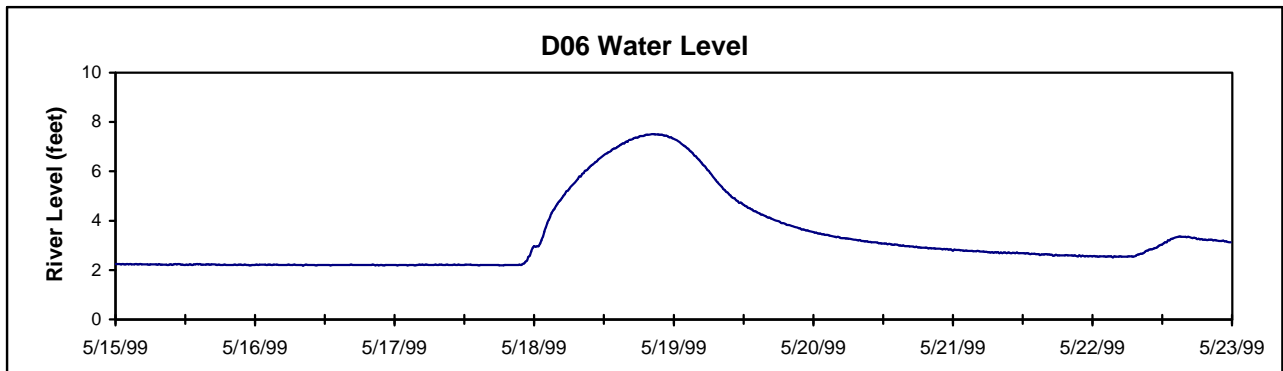
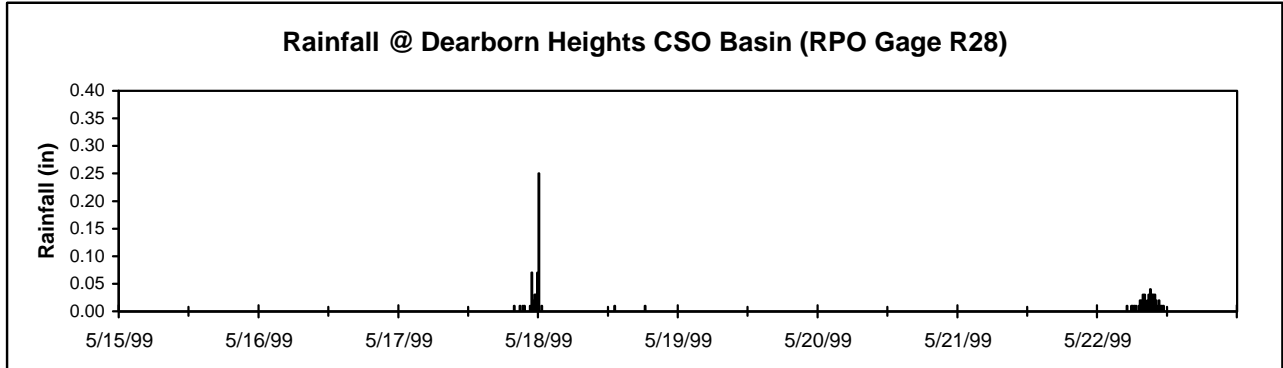


Table 1
Middle Rouse Storm Water Management Areas
Summary of Dissolved Oxygen and Temperature River Monitoring Performed by RPO

Type of River Monitoring	Year	Number of Events	Event Dates	Monitoring Locations																					
				D02	D03	D05	D06	D07	D08	D09	D23	D24	D26	D28	G01	G02	G50	G51	G52	G53	G54	G55	G81	G82	G83
Dry Weather Monitoring																									
River Profile Survey	1995	2	Aug 24, Sept 15																						
Middle-1 Survey	1997	5	June-September																						
Bi-Weekly Surveys	1997	varies	May-Oct																						
	1998	varies	May-Oct																						
	1999	varies	May-Oct																						
Watershed-Wide Surveys	1996	1	Jul 11																						
	1997	2	Jul 25, Sep 8																						
	1998	2	Jun 4, Sep 24																						
	1999	2	Jun 23, Aug 30																						
				Site locations for 1999 not yet verified.																					
Wet Weather Monitoring																									
Middle-1 Survey	1997	2	June-September																						
Continuous Monitoring																									
Baseline Survey	1994	N/A	April-November																						
	1995	N/A	May-October																						
	1996	N/A	May 1-September 25																						
	1997	N/A	April 1-October 31																						
	1998	N/A	April 1-October 31																						
	1999	N/A	May 10-November 1																						

Table 2
Middle Rouge Grab DO and Temperature Summary

Site	Parameter	DO			Temperature		
		1997	1998	1999	1997	1998	1999
D05	MEAN	7.7	6.4	6.7	17.5	20.6	19.0
	N	23	19	15	22	10	15
	MAX	10.1	9.2	8.6	24.2	24.6	24.9
	MIN	5.7	3.8	5.2	7.1	15.7	9.8
	% < 5 mg/L	0	5	0			
D06	MEAN	7.6	6.1	6.9	17.7	19.2	18.5
	N	17	26	14	17	20	14
	MAX	9.9	8.9	8.9	23.8	24.5	24.1
	MIN	5.7	4.0	5.6	7.1	8.6	10.0
	% < 5 mg/L	0	19	0			

Table 3
Middle Rouge Continuous DO and Temperature Summary

Site	Parameter	DO					Temperature				
		1994	1995	1996	1997	1998	1994	1995	1996	1997	1998
D02	MEAN	8.5	6.9				17.3	22.0			
	N	13130	17352				13283	17501			
	MAX	11.9	9.8				28.3	30.6			
	MIN	2.8	4.2				7.1	16.4			
	STD	1.3	0.6				4.9	2.3			
	% < 5 mg/L	1	1								
D03	MEAN	9.7	7.8	8.8			13.4	18.0	15.9		
	N	19592	10518	13675			19585	10519	13788		
	MAX	17.8	9.4	16.7			22.8	24.7	22.7		
	MIN	6.8	6.0	2.4			2.3	11.5	6.1		
	STD	1.6	0.6	1.3			3.8	2.3	2.7		
	% < 5 mg/L	0	0	0							
D06	MEAN	8.0	7.2	7.1	6.5	6.8	15.8	19.9	19.4	17.5	19.6
	N	12558	12058	12151	15148	12037	15611	13500	13830	17080	14343
	MAX	15.1	10.6	11.5	12.3	10.5	26.7	27.9	26.3	26.1	26.3
	MIN	0.5	0.3	0.2	0.0	0.3	4.1	11.3	9.1	5.0	11.4
	STD	2.2	1.2	1.3	2.3	1.4	5.1	3.7	3.4	4.5	3.3
	% < 5 mg/L	10	4	3	25	10					
D07	MEAN	8.6	6.1				17.3	22.7			
	N	13451	13571				17952	13589			
	MAX	15.2	8.3				29.3	28.8			
	MIN	2.1	1.3				3.9	15.3			
	STD	2.1	0.7				5.3	2.3			
	% < 5 mg/L	4	4								

Dissolved Oxygen & Temperature Data Summary for Upper Rouge Subwatershed

3/12/00

Introduction

Beginning in 1993, the RPO and its grantees have measured dissolved oxygen (DO) and temperature at various sites throughout the Upper Rouge Subwatershed, including:

- Numerous river locations
- Two storm water outfalls
- The inlet and outlet of several nonpoint source evaluation projects
- The influent and effluent of the newly constructed Redford Township CSO Basin

This packet addresses DO and temperature results from river monitoring only, and the data summarized are only from some of the river monitoring surveys performed. A complete list of DO and temperature river monitoring performed by the RPO is presented in Table 1. A map and table identifying all river monitoring locations in the Upper Rouge Subwatershed have been provided separately.

Data results should be viewed in light of the fact that all Redford Township CSOs tributary to the main branch of the Upper Rouge River have been controlled by a CSO basin which became operational in the summer of 1997. The treated effluent from this basin enters the Upper Rouge River just east of Beech Daly Road (between monitoring locations U20 and U22).

Dry Weather Grab DO Observations (Figure 1 and Table 2)

Note: All dry weather data were collected on the Upper Rouge River; i.e. not on Bell Branch. Also, grab sampling results depend greatly on the time of day when sampling occurred.

- Dry weather water temperatures for each year monitored, are coolest at Powers Road (U01).
- The highest mean dry weather DO concentrations each year occurred at Powers Road (U01) while the lowest occurred at Inkster Road (G71).
- At the three sites monitored in 1997, the mean dry weather DO in 1999 is about 1 mg/l lower than in 1997. This does not necessarily mean conditions are worsening given that river temperature was higher in 1997. Sampling results depend on the time of day and the water temperature at the time the sample was taken.
- Excursions below the water quality standard of 5 mg/l occurred at two sites (Inkster Road - G71 and Graham Road - U02) but only occurred during 1998.

Special Dry Weather Grab DO Survey Observations

A special dry weather DO survey was conducted in the summer of 1996 to determine the ambient DO levels in Bell Branch and Tarabusi Creek. Sites U13 through U17 were monitored over three two-day periods. The results are described in detail in the 1996 Baseline Data Summary report. Several of the findings are summarized below.

- During the low flow periods of summer and early fall the DO concentrations in Tarabusi Creek (sites U13 and U17) and site U15 on Bell Branch are likely to be greater than the 5 mg/l standard. However, at sites U14 and U16 on Bell Branch, DO routinely drops below the 5 mg/l standard at night, during periods of low flow.
- At sites U14 and U16, the DO concentrations dropped as low as 3 and 4 mg/l, respectively. These sites also exhibit high levels of bacteria, so it is believed sources of human or animal waste may be entering the stream and causing both the DO and bacteria problem.
- All sites exhibited a diurnal fluctuation in DO. The difference between the maximum and minimum DO in a given day was 1 to 2 mg/l at most sites. However, site U13 consistently exhibited a much larger fluctuation than the other sites – sometimes as large as 4.5 mg/l.

Continuous DO Data Observations (Figure 2 and Table 3)

Note: Continuous data obviously include dry and wet weather influences, but mean values are dominated by the dry weather influence due simply because there are far more dry weather days than wet.

- There are not sufficient data for a meaningful comparison of mean water temperature between sites, but it is clear that 1994 was the coolest year to date.
- The highest mean DO concentrations have occurred at Powers Road (U01) and Bell Branch at Beech-Daly (U04), although low temperatures in 1994 may be part of the explanation.
- Some excursions below the water quality standard of 5 mg/l have occurred at each site for almost every year monitored. The most significant excursions have occurred on the Bell Branch at Inkster Road (U03), Bell Branch at Beech Daly (U04) and the Upper Rouge at Telegraph Road. Sites U04 and U05 are still impacted by Redford Township CSOs. SSOs have been observed upstream of Site U03.
- Comparison of the sites upstream and downstream of the Redford Township CSO basin, U20 and U22 respectively, in the second year of its operation show no degradation downstream.

Wet Weather DO Data Observations (Figures 3 and 4)

Note: Wet weather DO impacts are best understood by looking at individual wet weather events. PRELIMINARY DATA from 1999 are used in this discussion.

- Figure 3 shows the river's response to several wet weather events at sites upstream and downstream of the Redford Township CSO basin. The first rain event shown causes a significant DO depression upstream and downstream of the basin. To date, such depressions have only been observed in sewage-impacted areas, so a sewage source is likely. The minimum DO at Site U20 occurred about 18 hours after the rain event. Since the DO depression at Site U22 occurs 6 hours later than at U20, which is 1 to 1.5 miles upstream, a best guess would say the sewage source is entering the river 3 to 5 miles upstream of Site U20.
- Figure 3 also shows a significant DO depression at Site U22 on 6/28 in response to another rain event. The abrupt nature of the drop and the absence of a similar drop at Site U20 implicate a sewage source between Sites U20 and U22. At least one SSO has been observed in this reach. The Redford CSO basin also discharges in this reach but it is not known if it was even discharging at this time.
- Figure 4 shows a typical response to a wet weather event at Telegraph Road (U05). Significant DO depressions still occur at this site due to uncontrolled CSOs on Bell Branch and due to the other unknown sources on the Upper Rouge discussed above.

Figure 1
Upper Rouge River Dry Weather Grab DO Summary

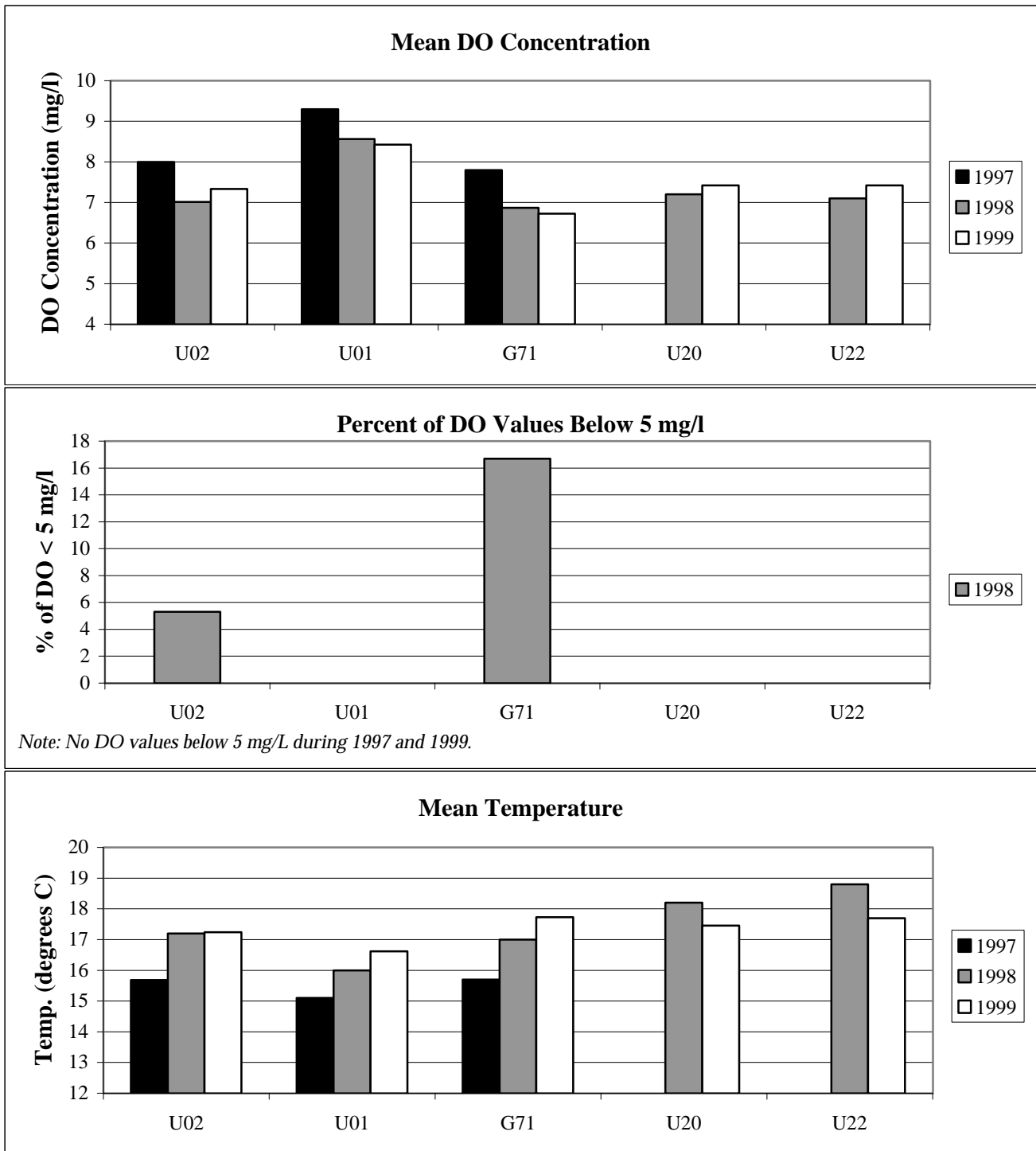


Figure 2
Upper Rouge River Continuous DO and Temperature Summary

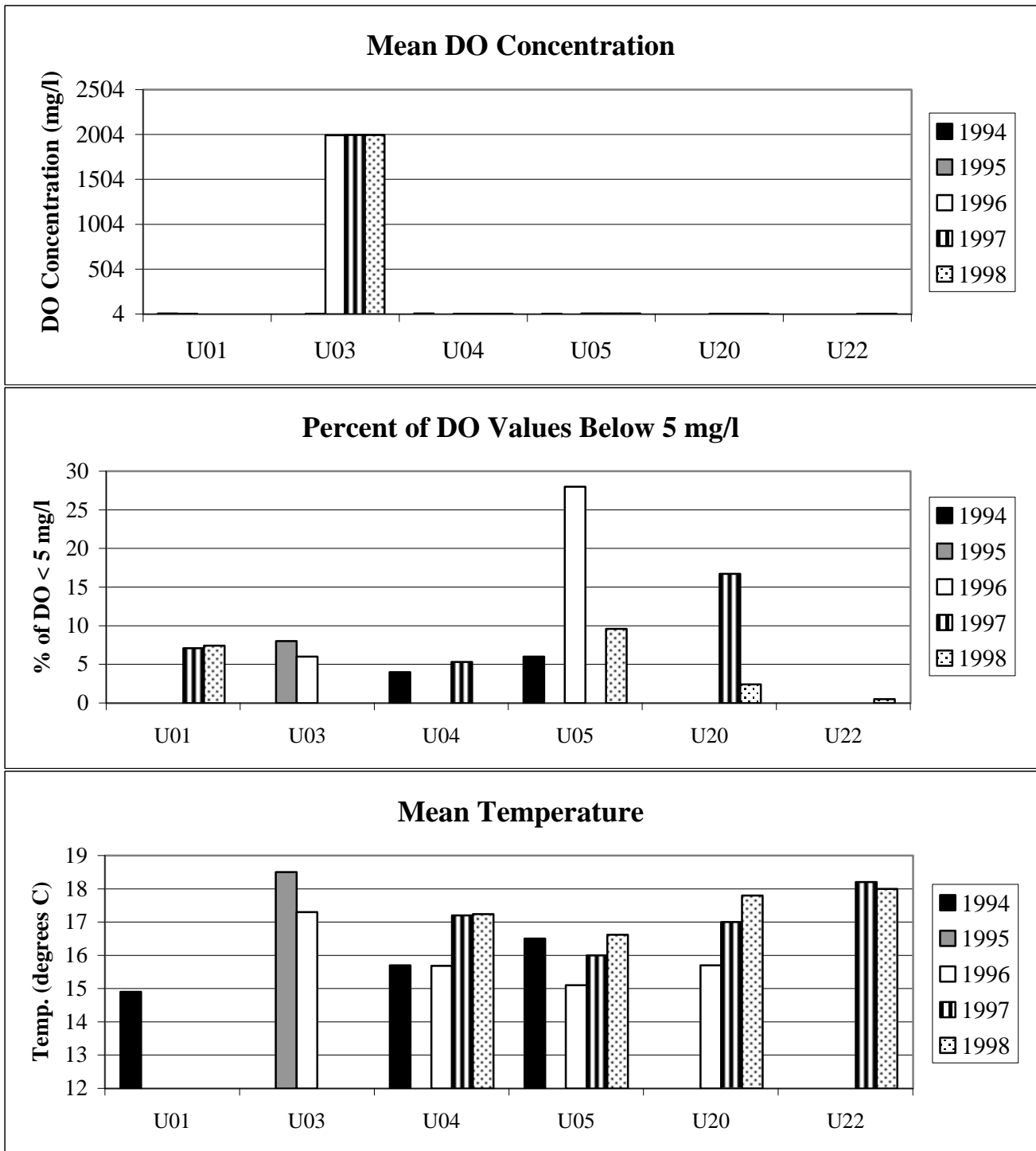


Figure 3
Upper Rouge River @ U20 & U22 – 6/23/99-6/29/99
Preliminary Level, DO and Temperature

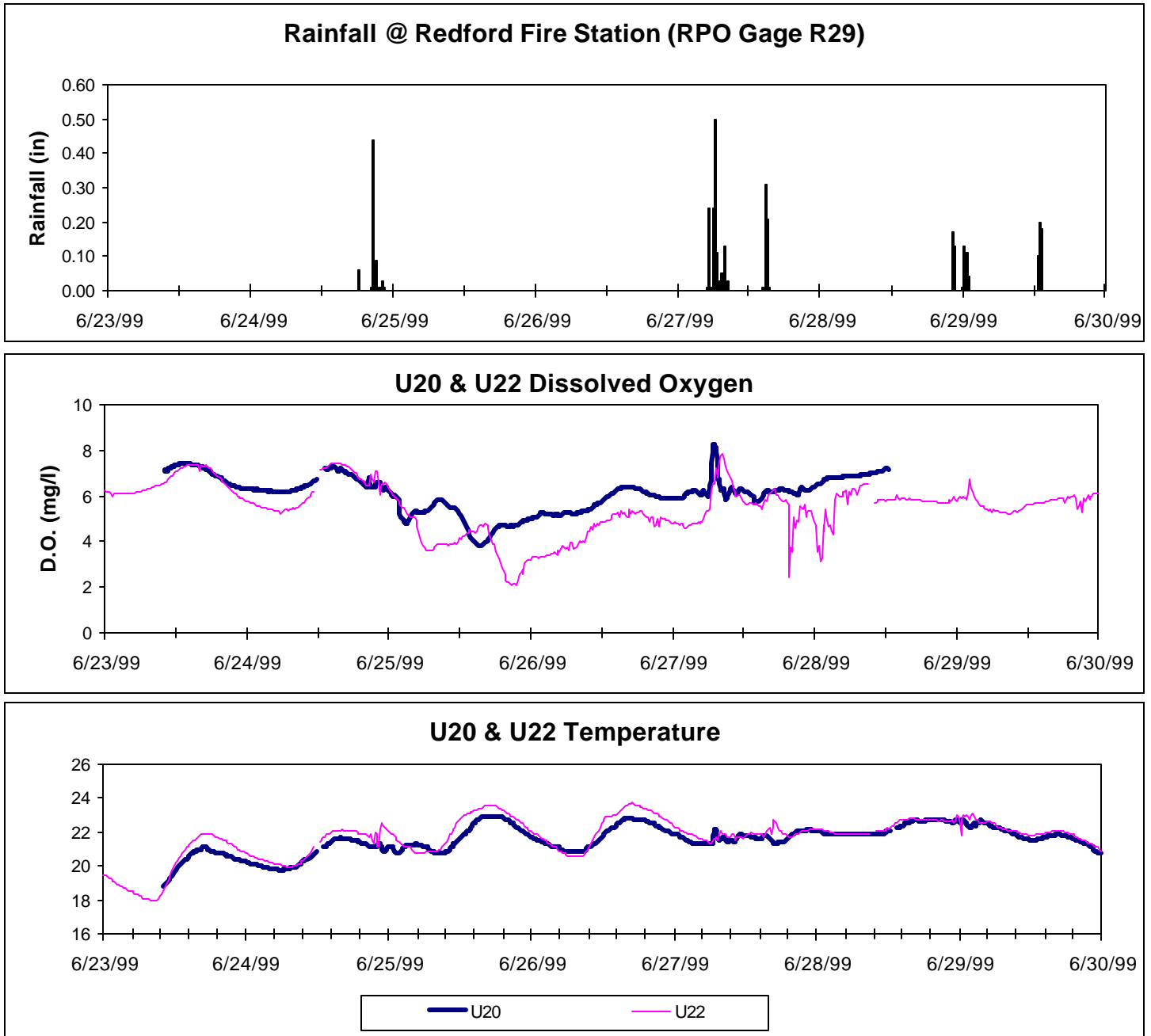


Figure 4
Upper Rouge River @ U05: 5/15/99-5/23/99
Preliminary Level, DO and Temperature

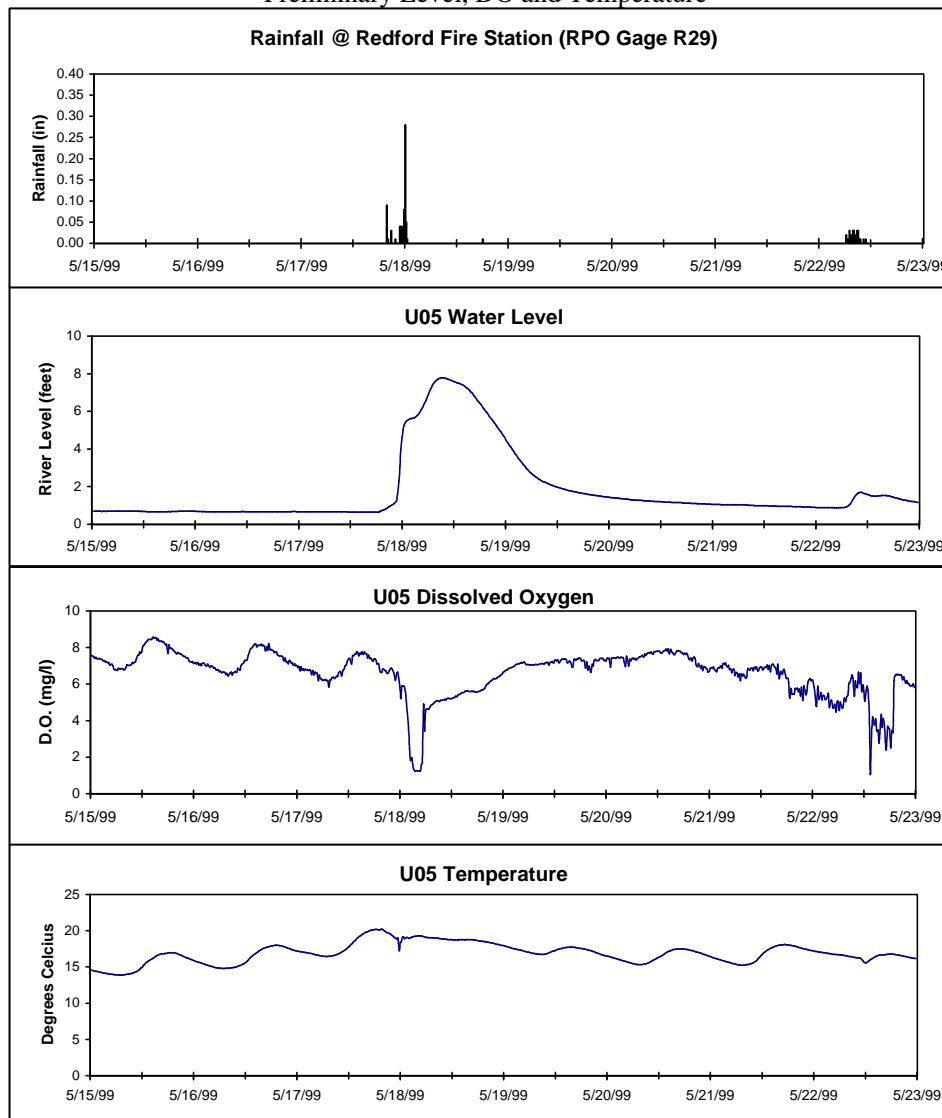


Table 1
Upper Storm Water Management Area
Summary of Dissolved Oxygen and Temperature River Monitoring Performed by RPO

Type of River Monitoring	Year	Number of Events	Event Dates	Monitoring Locations																		
				G71	G76	U01	U02	U03	U04	U05	U12	U13	U14	U15	U16	U17	U18	U19	U20	U21	U22	
Dry Weather Monitoring																						
River Profile Survey	1995	3	Aug 24, Sep 5 and 15																			
Upper-2 Surveys	1996	3	Aug 7-8, Aug 14-15, Aug 19-20																			
Bi-Weekly Surveys	1997	13	May-Oct																			
	1998	16	May-Oct																			
	1999	15	May-Oct																			
Watershed-Wide Surveys	1996	1	Jul 11																			
	1997	2	Jul 25, Sep 8																			
	1998	2	Jun 4, Sep 24																			
	1999	2	Jun 23, Aug 30	Site locations for 1999 not yet verified.																		
Continuous Monitoring																						
Baseline Survey	1994	N/A	April-November																			
	1995	N/A	May-October																			
	1996	N/A	May 1-September 25																			
	1997	N/A	April 1-October 31																			
	1998	N/A	April 1-October 31																			
	1999	N/A	May 10-November 1																			

Table 2
Upper Rouge River Dry Weather Grab DO Summary

Site	Parameter	DO			Temperature		
		1997	1998	1999	1997	1998	1999
U02	MEAN	8.0	7.0	7.3	15.7	17.2	17.2
	N	24	19	15	22	14	15
	MAX	11.2	10.5	9.3	22.2	23.0	22.5
	MIN	5.4	3.6	5.9	6.1	7.8	8.7
	% < 5 mg/l	0.0	5.3	0.0			
U01	MEAN	9.3	8.6	8.4	15.1	16.0	16.6
	N	24	27	13	23	15	13
	MAX	11.3	10.8	9.8	22.0	21.7	21.6
	MIN	7.4	7.1	5.2	5.8	6.9	9.1
	% < 5 mg/l	0.0	0.0	0.0			
G71	MEAN	7.8	6.9	6.7	15.7	17.0	17.7
	N	23	18	14	21	16	14
	MAX	12.0	9.7	8.6	22.4	22.6	22.5
	MIN	4.7	4.3	5.2	6.3	8.8	9.4
	% < 5 mg/l	0.0	16.7	0.0			
U20	MEAN		7.2	7.4		18.2	17.5
	N		41	15		29	15
	MAX		10.3	9.1		23.6	23.0
	MIN		5.0	5.7		8.0	9.2
	% < 5 mg/l		0.0	0.0			
U22	MEAN		7.1	7.4		18.8	17.7
	N		30	15		23	15
	MAX		11.0	9.8		24.5	23.5
	MIN		5.0	5.5		7.9	9.3
	% < 5 mg/l		0.0	0.0			

Table 3
Upper Rouge Continuous DO and Temperature Summary

Site	Parameter	DO					Temperature				
		1994	1995	1996	1997	1998	1994	1995	1996	1997	1998
U01	MEAN	9.0	8.2				14.9	18.0			
	N	17343	7164				18331	8635			
	MAX	18.0	14.0				24.0	25.3			
	MIN	5.8	4.6				2.0	9.0			
	STD	1.4	1.9				4.2	3.9			
	% < 5 mg/L	0	1								
U03	MEAN		6.5	7.2			18.5	17.3			
	N		8939	13287			9317	13287			
	MAX		10.6	12.6			27.1	24.3			
	MIN		3.6	0.6			9.3	7.8			
	STD		1.2	1.3			4.0	3.1			
	% < 5 mg/L		8	6							
U04	MEAN	8.6					15.7				
	N	11534					17948				
	MAX	16.3					25.2				
	MIN	3.2					5.3				
	STD	2.2					4.4				
	% < 5 mg/L	4									
U05	MEAN	6.9	6.7	5.9	6.8	6.6	16.5	18.4	18.2	17.0	17.9
	N	15886	10072	13220	13650	12832	16371	11672	13321	14897	14278
	MAX	12.7	10.7	12.9	12.2	10.9	25.3	27.0	25.6	25.0	26.3
	MIN	3.0	0.0	1.9	1.2	1.6	6.9	10.0	9.0	4.8	5.8
	STD	1.4	1.6	1.5	1.9	1.3	4.0	3.6	3.2	4.4	4.1
	% < 5 mg/L	6	9	28	21	9.6					
U20	MEAN					7.1					17.8
	N					11816					12084
	MAX					11.4					26.2
	MIN					3.7					7.7
	STD					1.2					4.0
	% < 5 mg/L					2.4					
U22	MEAN					7.4					18
	N					10907					11202
	MAX					17.0					25.5
	MIN					4.3					7.4
	STD					1.4					4.2
	% < 5 mg/L					0.5					