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DEPARTMENT OF ECOLOGY
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August 31, 1992

TO: The Tenant Committee

THROUGH: Will Kendra
Watershed Assessments Section

FROM: Betsy Dickes and Barbara Reed

SUBJECT: Woodland Creek Baseline Data Summary, January 1991 - March 1992.

As part of the Ecology Building Project, the Watershed Assessments Section of EILS collected baseline data on Woodland Creek prior to building construction. This report summarizes pre-construction data for the 15-month period, January 1991 - March 1992.

We found very little difference among sites located upstream and downstream of the new building construction site. Continued monitoring during the construction phase will help identify impacts from construction activities.

If you have any questions regarding the water quality assessment or the information presented in this report, please call Betsy Dickes at 586-8168 or Barbara Reed at 586-2668.

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WOODLAND CREEK INTERIM REPORT
PRE-CONSTRUCTION MONITORING RESULTS

ABSTRACT

Monitoring of Woodland Creek prior to construction of the new Ecology building showed that turbidity and TSS concentrations were not significantly different between upstream and downstream sites. However, dissolved oxygen and pH concentrations were found to be significantly lower at the upstream site. High metals concentrations in sediment were seen at all sites and elevated organics in sediment were seen at the upstream site. Fecal coliform and dissolved oxygen concentrations at all sites occasionally failed to meet Washington State Class AA water quality standards.

INTRODUCTION

Woodland Creek originates in the Long-Hicks-Pattison Lakes basin, flows north through residential, commercial, and agricultural areas, and eventually feeds into Henderson Inlet. The Department of Ecology has classified the stream as Class AA (Appendix A). Additionally, the city of Lacey has zoned the Woodland Creek drainage as an Environmentally Sensitive Area in recognition of the value and sensitivity of the resource (city of Lacey Zoning Ordinance, Chapter 16.54).

The new Department of Ecology Headquarters building site is located in Saint Martins Park, Lacey. The eastern property line is located within 200 feet of Woodland Creek's centerline. Ecology's concern about protecting the creek during construction of the new building led the Watershed Assessments Section to begin a study to monitor water quality.

Ecology's water quality assessment focuses on the portion of Woodland Creek adjacent to the new building site. The study design includes two parts: 1) pre-construction baseline monitoring; and 2) impact monitoring during the construction activity. Runoff resulting from construction activities is of principal interest. Instream turbidity and total suspended solids were the primary parameters chosen to measure construction impacts.

Pre-construction baseline data were collected from January 1991 through March 1992. Impact monitoring began in April, with the commencement of ground breaking, and is anticipated to continue until September 1993.

This interim report summarizes data collected during preconstruction baseline monitoring (January 1991 - March 1992). These data form the background data set by which construction impacts will be measured.

METHODS

Site Description

Four water quality monitoring sites were established on Woodland Creek (Figure 1). River Mile 4.2 (RM 4.2) and RM 3.8 bracket the construction site. RM 4.2 is the upstream reference site. RM 3.8 is downstream of the construction area but upstream of Martin Way. Site RM 3.7, located just downstream of Martin Way, will help determine impacts from the construction of Desmond Drive, the road being constructed to intersect with Martin Way. Site RM 3.1 is downstream from a large Lacey stormwater discharge. The site was originally chosen in the event that construction site runoff water was diverted into this stormwater drainage system. After monitoring began, it was determined that stormwater from the new building would be managed on-site. Despite this change, monitoring has continued at this site.

Sampling Methods

Routine Water Quality Sampling

Mid-stream grab samples were collected monthly at each site. Samples were collected from downstream to upstream to prevent sample contamination. Temperature (Temp), pH, conductivity (Cond), and discharge (Q) were measured at each site. Samples for dissolved oxygen (D.O.) and turbidity (Turb) were collected, preserved, and analyzed at Ecology's field laboratory in Tumwater. Samples for turbidity, total suspended solids (TSS), total phosphorus (TP), and fecal coliform (FC) were preserved and shipped within 24 hours to the EPA/Ecology Laboratory in Manchester. Sample containers, processing, and analysis conformed to procedures described by EPA (1983), Huntamer (1986), and APHA *et al.* (1989).

Storm Event Water Quality Sampling

Three storm events were monitored over the 15-month period to obtain baseline information on runoff effects on sediment transport. Storm events were loosely defined as approximately 1 inch of rain in 24 hours. At each site, automated sequential samplers collected one sample every hour for a 24-hour period. Samples were analyzed for TSS, turbidity, and conductivity. Additionally, grab sample sets, following similar methods to those for the routine monthly events, were collected before and after each storm.

Sediment Sampling

Sediment samples were collected in August 1991 from depositional areas near each site. Sampling methods followed Cusimano (1992). Base-neutral-acid extractable compounds and metals were parameters of concern. Grain size, total organic carbon, and percent solids were measured and used in data interpretation.

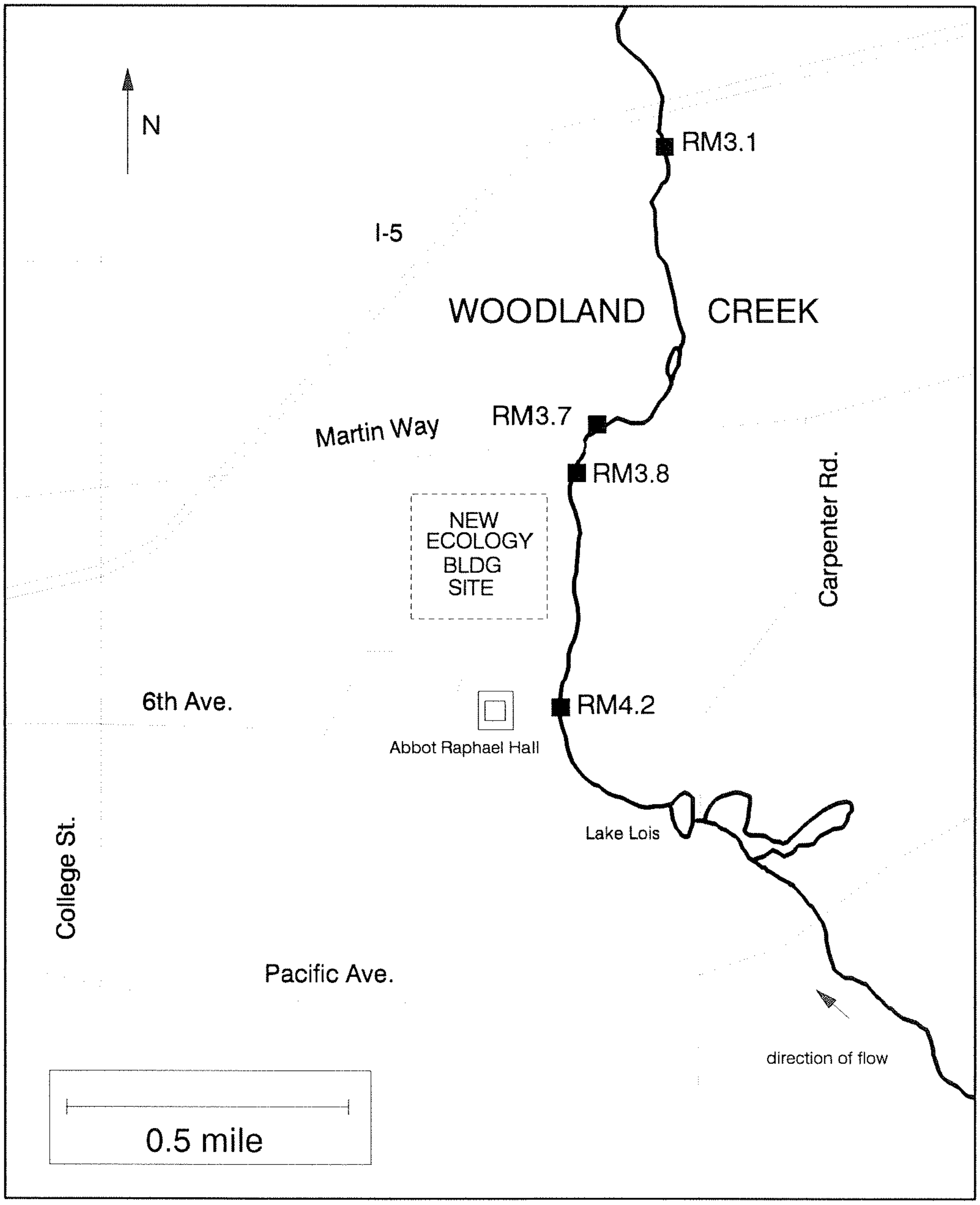


Figure 1. Woodland Creek water quality sampling sites for the Ecology Building Project.

Macroinvertebrate Sampling

Macroinvertebrates were collected quarterly and preserved. Methods were based on rapid bioassessment techniques (Plafkin, *et al.*, 1989). Identification of these samples is scheduled for autumn 1992.

Considerations in Data Analysis

Routine data are defined as data collected monthly during baseline monitoring. Routine data were separated for wet and dry seasonal comparisons. Months with cumulative precipitation greater than three inches were considered wet (January - April 1991 and November 1991 - February 1992).

Loads were calculated for conductivity, TSS, and TP as the product of discharge and concentration (corrected for units). This calculation reduces the concentration/dilution effect of discharge and is representative of the total mass passing a given point.

Notched box plots were used to determine if sites differed significantly from one another. We tested for significant differences among the sites over all months, within wet months, and within dry months. As illustrated in Figure 2, the notches on each box represent the 95% confidence interval about the median. If the notches on different boxes do not overlap, the sites values for the given parameter are deemed significantly different.

QA/QC

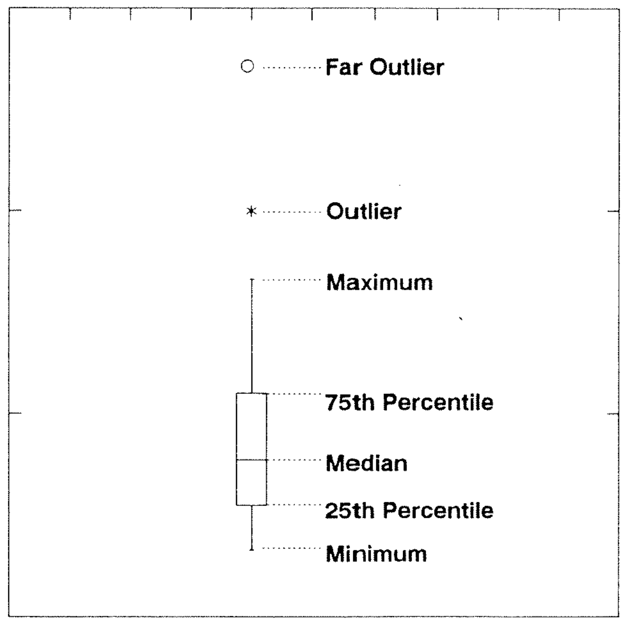
Routine Water Quality Sampling

Randomly selected replicate samples were taken at one of the four sites to assess field and analytical variability during routine monitoring. The average of the replicate samples was used in subsequent calculations. Replicate pairs were compared by determining the relative percent difference (RPD), the difference between two replicates expressed as a percentage of their mean. The results are illustrated in Figure 3 using box plots. All values were acceptable. The variability in FC most likely resulted from the natural patchiness of bacteria. The RPD for TSS was determined to be insignificant because as replicates approach the detection limit the RPD becomes artificially high (e.g., replicate values of 1 and 2 mg/L yield a RPD of 67%).

Both field and lab conductivity were measured from March-June 1991 and September-October 1991. Little variability was observed between the values, and it was determined that field conductivity measurements were acceptable.

Replicate turbidity samples were taken at each site to compare data from a field turbidimeter to those analyzed at the lab. Due to inconsistent comparisons at higher turbidity levels, we decided to only analyze laboratory results for routine data.

EXAMPLE



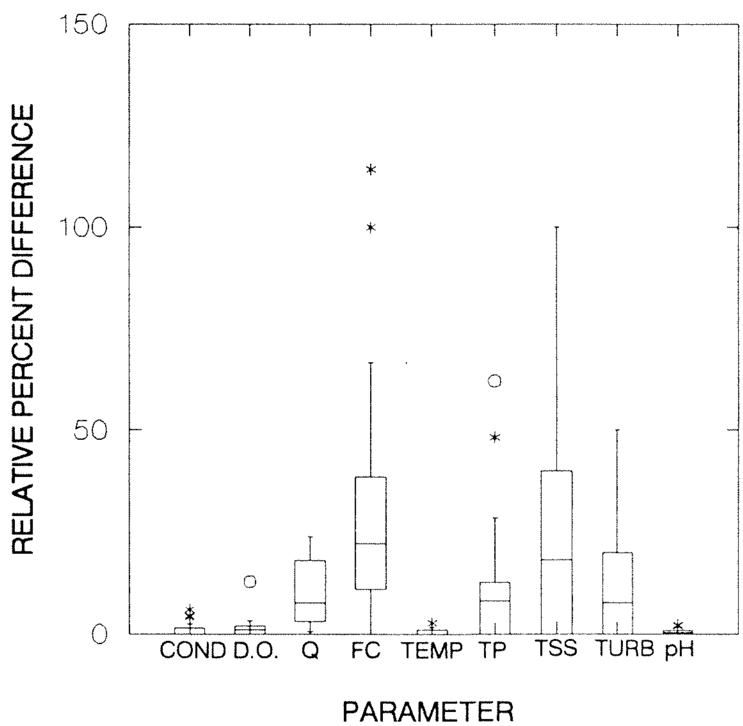


Figure 2. Relative percent difference of replicates for each parameter sampled monthly on Woodland Creek, January 1991 - March 1992.

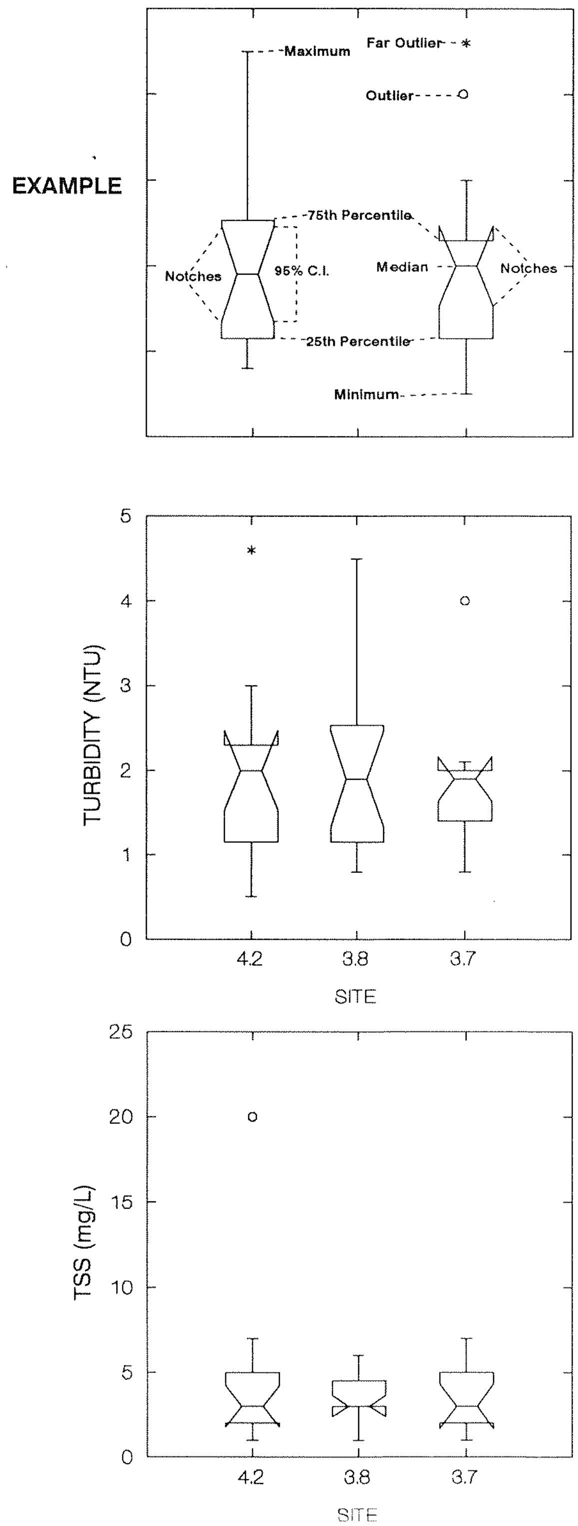


Figure 3. Notched box plots for turbidity and TSS at three sites on Woodland Creek, January 1991 - March 1992.

Due to intermittent and low flows in October, it was not possible to sample RM 3.7 and RM 3.8 at the routine sampling locations. The nearby alternate sites were considered representative of the creek, and therefore the data were included in subsequent analyses.

Flow was measured using a Swoffer® current meter the first 12 months of monitoring. In January, flow was measured with both Swoffer and Marsh McBirney® meters to determine if there were any differences between the two. Differences ranged from 0.05 to 1.39 CFS, which was comparable to the field variability observed between replicate measurements using only the Swoffer. The Marsh McBirney meter was used for the remainder of the study.

Storm Event Water Quality Sampling

Grab samples taken before and after storm events followed the same QA/QC methods as those for routine monitoring.

Sequential sample bottles were washed three times with a non-phosphate detergent, rinsed three times each with tap water then deionized water, and then air dried. One split sample (duplicate) was taken randomly from each sampler to help assess lab variability.

Sediment Sampling

Equipment for sediment sampling was cleaned according to procedures in Cusimano (1992). A replicate sample was taken at RM 3.7 to assess field and lab variability.

Macroinvertebrate Sampling

Replicate samples were collected at each site.

RESULTS AND DISCUSSION

All data collected during the baseline period (January 1991 - March 1992) are compiled in Appendices B through E. Routine monthly baseline data are summarized in Table 1. Data from RM 3.1 were excluded from this analysis but are described briefly later in this report.

Routine Monitoring

Turbidity

All three Woodland Creek sites had a median turbidity of 2 NTU. The Class AA criterion states that turbidity should not exceed 5 NTU over background turbidity. All sites met this criterion. There were no significant differences among the three sites (Figure 3). Turbidity tended to be lower during the dry months.

Table 1. Summary of Woodland Creek baseline monthly data, January 1991 - March 1992.

PARAMETER	RM 4.2			RM 3.8			RM 3.7		
	M	W	D	M	W	D	M	W	D
TURBIDITY (NTU)									
min	<1	2	<1	<1	2	<1	<1	1	<1
max	5	5	3	5	5	2	4	4	2
mean	2	2	1	2	3	1	2	2	2
median	2	2	1	2	2	1	2	2	2
TOTAL SUSPENDED SOLIDS (mg/L)									
min	1	2	1	1	1	1	1	2	1
max	20	7	20	6	6	5	7	7	7
mean	5	4	5	3	4	3	4	4	4
median	3	4	2	3	3	3	3	3	4
TOTAL PHOSPHOROUS (mg/L)									
min	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02
max	0.15	0.05	0.15	0.16	0.04	0.16	0.15	0.04	0.15
mean	0.04	0.03	0.05	0.05	0.03	0.06	0.05	0.03	0.06
median	0.03	0.03	0.03	0.03	0.02	0.04	0.04	0.03	0.04
FECAL COLIFORM (CFU/100mL)									
min	4	4	8	7	7	12	5	5	17
max	628	110	628	260	104	260	160	67	160
mean (geometric)	24	17	37	28	21	39	32	19	51
median	24	17	26	27	20	27	27	21	45
DISSOLVED OXYGEN (mg/L)									
min	7.2	9.5	7.2	8.6	10.0	8.6	8.7	10.0	8.7
max	11.7	11.7	10.7	12.8	12.8	11.1	12.3	12.3	11.0
mean	9.7	10.7	8.5	10.6	11.4	9.5	10.4	11.3	9.7
median	9.5	10.9	8.5	10.6	11.4	9.3	10.3	11.4	9.6
DISSOLVED OXYGEN (%sat)									
min	78	84	78	91	92	91	90	92	90
max	96	95	96	104	104	103	108	97	108
mean	88	89	87	95	95	96	95	94	96
median	88	89	87	94	94	95	94	94	95
pH (S.U.)									
min	7.2	7.2	7.2	7.3	7.3	7.4	7.3	7.3	7.5
max	7.8	7.8	7.8	8.0	7.8	8.0	8.0	8.0	7.8
mean	7.5	7.5	7.5	7.6	7.5	7.7	7.6	7.5	7.7
median	7.5	7.5	7.5	7.6	7.6	7.7	7.7	7.5	7.7
CONDUCTIVITY (uhmos/cm)									
min	88	88	100	95	95	98	81	81	100
max	135	112	135	130	112	130	132	110	132
mean	110	102	120	109	103	118	108	95	120
median	110	101	121	110	103	119	108	95	124
TEMPERATURE (°C)									
min	4.8	4.8	10.7	4.4	4.4	10.3	4.3	4.3	10.1
max	22.1	12.1	22.1	21.1	11.9	21.1	20.4	12.0	20.4
mean	11.7	7.7	17.0	11.3	7.6	16.4	11.9	7.7	16.1
median	10.4	7.4	17.5	10.1	7.3	16.8	11.1	7.3	16.4
DISCHARGE (CFS)									
min	0.1	1.0	0.1	0.1	1.0	0.1	<0.1	0.8	<0.1
max	27.2	27.2	13.6	20.2	20.2	13.6	24.1	24.1	15.6
mean	8.5	11.8	4.7	8.3	11.1	5.1	7.6	10.6	5.5
median	5.5	12.3	3.0	8.1	13.2	3.1	6.4	11.5	3.1

M = Monthly data, January 1991 - March 1992.
W = Wet weather data, January 1991 - April 1991, November 1991 - February 1992.
D = Dry weather data, May 1991 - October 1991, March 1992.

Total Suspended Solids

The median TSS concentration at each site was 3 mg/L. Again, there were no significant differences among the three sites (Figure 2). TSS did not show a clear seasonal trend. On September 18, 1991, TSS increased to 20 mg/L at RM 4.2. This elevated concentration was most likely due to a temporary disturbance upstream (*i.e.*, animal or person crossing the creek upstream).

Total Phosphorus

TP was measured in this study due to its characteristic of adsorbing to sediment. It was thought that an increase in sediment might also cause an increase in TP concentration. However, no correlation was seen between TP and TSS (r=0.002) during the pre-construction phase of the study.

Median TP concentrations in Woodland Creek were between 0.03 and 0.04 mg/L. There were no significant differences among the sites.

Figure 4 shows that there was an increase in TP concentration in July 1991. To identify possible reasons for the elevation in TP, the mass load of TP was calculated (Appendix C). We found that the increase was most likely due to an increase in TP rather than a decrease in discharge. One possible explanation for the load increase is the release of phosphorus from decaying plants or other natural processes. The increase could also have been due to the initial application of the herbicide Fluridone (SONAR) to Long Lake on July 2 and 17. The increase in decaying plant material may have resulted in the release of phosphorus.

The spikes in TP concentration seen in September 1991 at RM 3.8 and RM 3.7 are likely a result of decreasing discharge, as seen from the loading calculations in Appendix C. A corresponding increase was probably not seen at RM 4.2 due to the dilution effect from slightly higher discharge at this site.

Fecal Coliform

Monthly fecal coliform bacteria concentrations tended to be variable in Woodland Creek (Appendix B). No significant differences in concentrations were found among the sites. The Class AA criteria for fecal coliform consists of two parts: 1) the geometric mean should not exceed 50 coliform forming units (CFU) per 100 mL; and 2) not more than 10% of samples should exceed 100 CFU\100 mL. With the exception of RM 3.7 dry month data, all sites met the first part of the criterion. Elevated levels in February, June, July, and October 1991 resulted in violations of the second part of the criterion at all three sites. Possible sources of bacteria include septic failures, animals, bacteria in resuspended sediments, or from the storm drain discharge below Lake Lois.

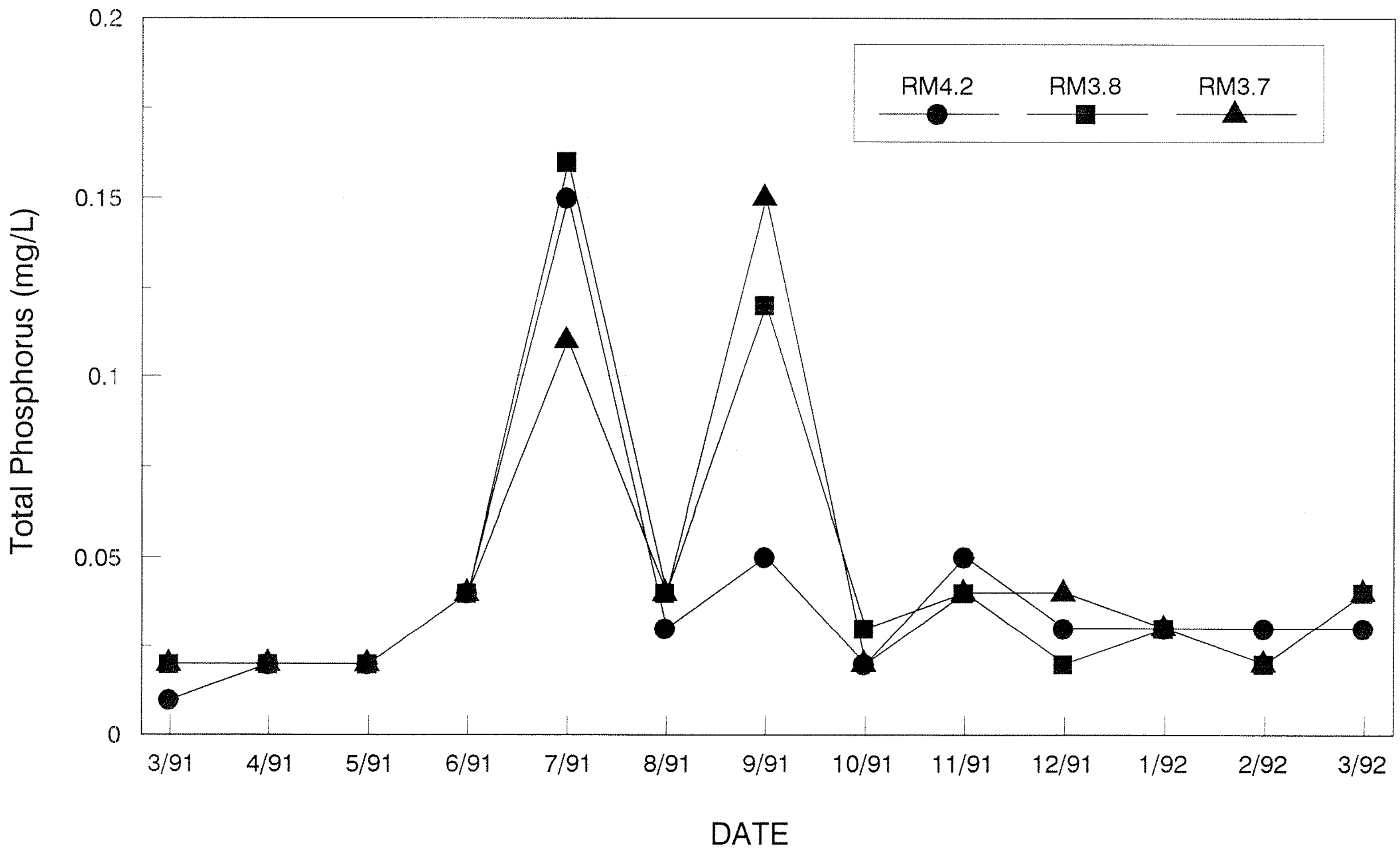


Figure 4. Total Phosphorus concentrations at three Woodland Creek stations during pre-construction monitoring, March 1991 - March 1992.

Dissolved Oxygen

Dissolved oxygen (D.O.) concentrations and saturations were consistently lower at RM 4.2 than at RM 3.8 and RM 3.7. During dry months, D.O. median concentrations at RM 4.2 were significantly lower than at RM 3.8 and RM 3.7. During both wet and dry months, D.O. saturation was significantly lower at RM 4.2. Some possible explanations for increased oxygen demand at RM 4.2 include: 1) low D.O. water from Lake Lois; 2) resuspended organic matter; 3) sediment oxygen demand; and 4) oxygen consuming materials in water entering from the storm drain. Reaeration then likely occurs as the water moves downstream through riffle areas.

All sites were below the Class AA standard of 9.5 mg/L during much of the dry season (Figure 5). These low values probably result from low D.O. water feeding the creek from Lake Lois, further compounded by low flow and warm water temperature.

pH

All sites were within the Class AA pH criterion range of 6.5 to 8.5 standard units (S.U). For dry months, pH at RM 4.2 was significantly lower than at RM 3.8 and RM 3.7. Low oxygen levels at RM 4.2 during dry months may explain the lower pH levels at this site. When low oxygen water shifts toward equilibrium, in order to balance oxygen and carbon dioxide levels, it releases hydrogen ions, lowering pH (Goldman and Horne, 1983)

Conductivity

Conductivity did not differ significantly among the sites. Loading calculations indicate that conductivity is directly influenced by discharge (*i.e.*, dilution of ions). Conductivity increased as discharge decreased in dry months, and the reverse was true during wet months.

Temperature

Monthly temperatures did not differ significantly among the sites. The Class AA criterion states that temperature should not exceed 16°C due to human activities. Although all sites exceeded 16°C from June - September 1991, it is likely these high values were caused by natural warming in Lake Lois and low flow conditions.

Discharge

Discharge at RM 4.2 did not differ significantly from discharge at the downstream sites. Discharge was highest at all sites in April 1991, and decreased steadily until October 1991, when the creek ran intermittently. In October 1991, there was no water flowing at RM 3.7.

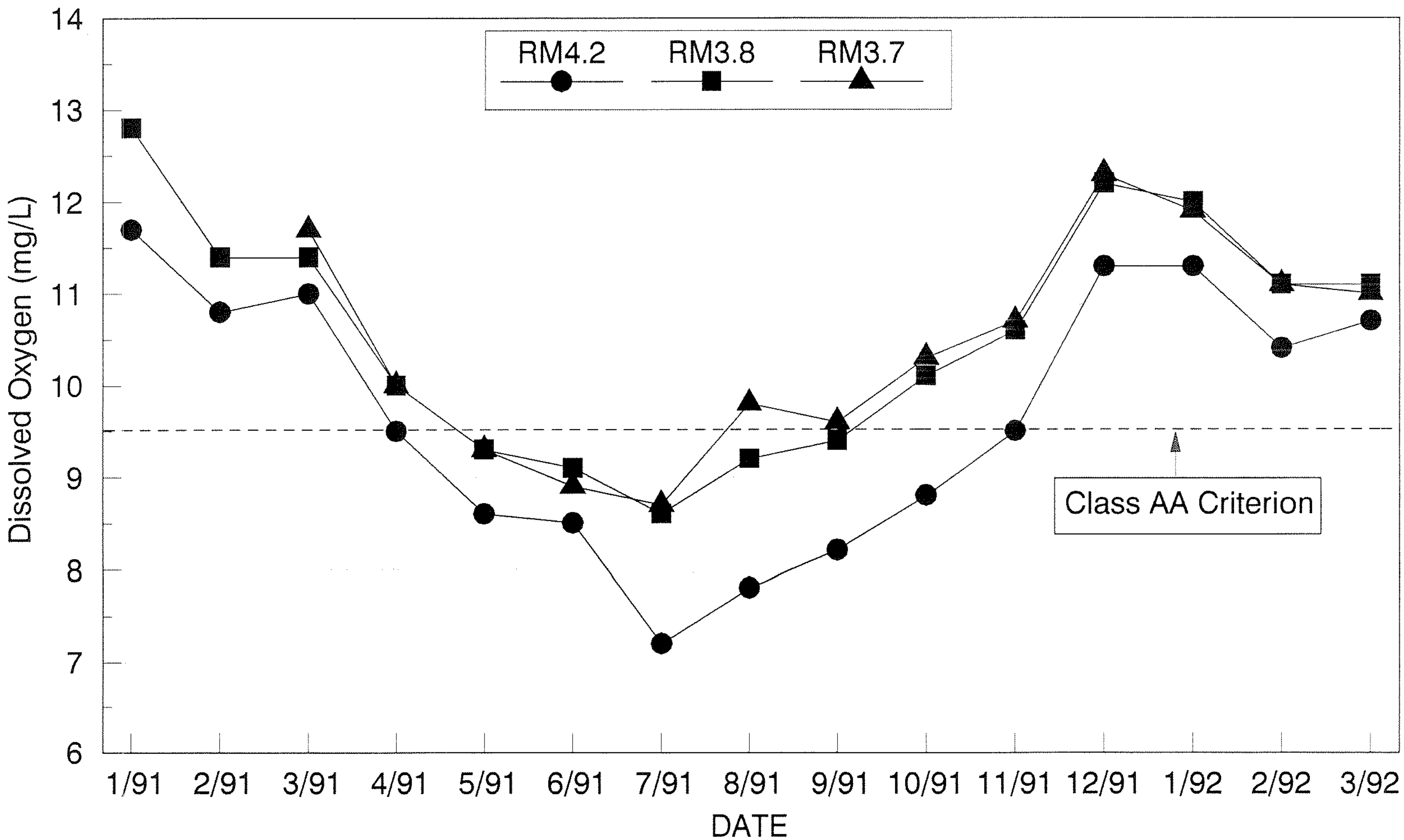


Figure 5. Woodland Creek dissolved oxygen, January 1991 - March 1992.

Loading Analysis

Loading calculations for TDS, TSS, TP, and FC show that there were no significant difference among the three sites (Appendix C). Concentrations of these parameters tended to reflect changes in discharge rather than pollutant sources entering the system.

Storm Event Monitoring

Storm event data are contained in Appendices D and E. Data were evaluated by comparison to routine wet weather data.

During storm events, both turbidity and TSS tended to increase. Increases were likely caused by bank erosion and resuspension of bottom sediments. No consistent pattern was seen for these parameters when comparing upstream to downstream sites.

Dissolved oxygen saturation was significantly lower at RM 4.2 than at RM 3.8 and RM 3.7. With increased discharge and turbulence, we would have expected to see higher D.O. concentrations and saturations. The low values may result from the resuspension of decaying organic matter or from oxygen consuming materials in water entering from the storm drain.

Fecal coliform levels also increased during storm events. Concentrations were highest at RM 4.2 (2,300 CFU/100 mL), RM 3.8 (1,950 CFU/100 mL), and RM 3.7 (260 CFU/100 mL) in November 1991. Sources of bacteria may include septic failures, animals, or bacteria in resuspended sediments. The storm drain that discharges into Woodland Creek just below Lake Lois was also found to be a primary loading source (Appendix D). On January 29, 1992, during a storm event, additional samples were taken above and below the storm drain. Results were 140 CFU/100 mL just above the drain and 15,000 CFU/100 mL just below the drain. These data were provided to the City of Lacey and the Thurston County Department of Health.

Analysis of sequential sampling data will be completed this fall after 1992 storm event data are collected.

Sediment Analysis

Sediment at all sites was primarily gravel/sand (Figure 6). Grain size among the sites showed little variability with the exception of RM 3.7 which had a slightly higher percent fines (*i.e.*, silt + clay).

Sediment data were analyzed for priority pollutant organic compounds. Table 2 shows that sediment at RM 4.2 had more types and higher levels of organic compounds than the other sites. The data were also compared to the two part toxicity criterion of Persaud (1991), which defines lowest and severe effect levels based on total polycyclic aromatic hydrocarbons (PAH). The lowest-effect level of contamination is that which can be tolerated by a majority of (95%) benthic organisms. The severe-effect level is that which would be detrimental to a majority of

Table 2. Summary of sediment sampling results on Woodland Creek, August 22, 1991.

	LOCATION							
	RM 4.2		RM 3.8		RM 3.7		REP 3.7	
CONVENTIONALS								
Grain Size (%)								
Gravel (2 mm)	1		0		1		12	
Sand (2mm-62um)	87		91		74		84	
Silt (62um-4um)	10		9		21		4	
Clay (<4 um)	2		0		4		0	
Total Organic Carbon (%)	4		1.2		3.9		3.5	
Solids (%)	36.7		55.6		30.1		66.0	
METALS (mg/kg dry)								
Cadmium	0.83	*P	0.65	*P	0.75	*P	0.95	*
Chromium	86.5	*	53.7	*	52.1	*	116	**
Copper	26.6	*	25.3	*	20.6	*	20.1	*
Lead	94.5	*	25.1		29.5		17.3	
Nickel	72.2	*J	55.3	*J	56.9	*J	149	**
Zinc	120	*	69.6		71.8		60.1	*
POLYCYCLIC AROMATIC HYDROCARBONS (PAH) (ug/kg)								
LOW MOLECULAR WEIGHT PAH								
Acenaphthene	85	J	-		-		-	
Phenanthrene	1,200		63	J	150	J	38	J
Flourene	97	J	-		-		-	
Naphthalene	56	J	-		-		-	
Anthracene	150	J	-		25	J	7	J
TOTAL LPAH	1,600		63		175		45	
HIGH MOLECULAR WEIGHT PAH								
Benzo (a) pyrene	560	J	-		-		-	
Benzo (a) anthracene	740	J	-		-		-	
Pyrene	2,500		78	J	270	J	65	J
Benzo (ghi) perylene	570	J	-		100	J	-	
Benzo (b) fluoranthene	1,200		-		180	J	-	
Fluoranthene	2,000		74	J	260	J	51	J
Chrysene	890		-		-		-	
TOTAL HPAH	8,500		152		810		116	
TOTAL PAH DECTECTED:	10,000	*	215		985		161	
NORMALIZED TO %TOC	250,000		18,000		25,000		4,600	
OTHER PAH								
1-Methylnaphthalene	35	J	-		-		-	
2-Methylnaphthalene	38	J	-		-		-	
Carbazole	190	J	-		-		-	

- = Below detection.
P = Concentration above instrument detection limit but below established minimum quantitation limit
J = Estimated concentration
* = Exceeds lowest effect for freshwater sediment criteria (Persaud, 1991)
** = *Exceeds severe effect for freshwater sediment criteria* (Persaud, 1991)

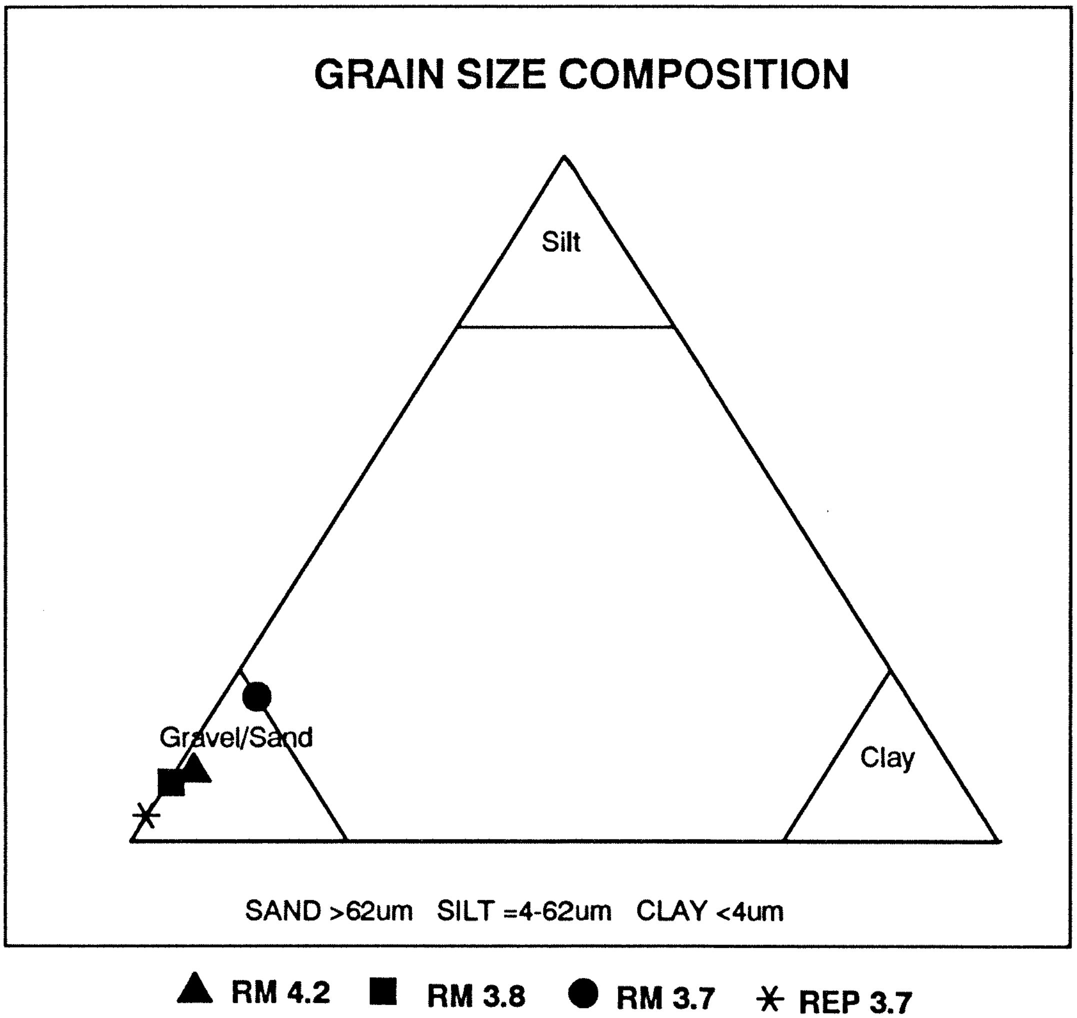


Figure 6. Grain size composition of sediment collected at three Woodland Creek sites on August 22, 1991.

benthic species. RM 4.2 with 10 mg/kg total PAH was the only site which exceeded the lowest effect criterion of 2 mg/kg.

Table 2 also summarizes metals data. RM 4.2 exceeded the lowest effect criteria for all metals. Both downstream sites exceeded the lowest effect criteria for cadmium, chromium, copper, and nickel. Metals concentrations were generally higher in the RM 3.7 replicate sample, and exceeded the severe effect criteria for chromium and nickel. The higher levels of metals in the replicate sample may be due to variable distribution of metals in the depositional area at RM 3.7. The source of these metals is most likely runoff from Martin Way.

The elevated levels of organics and metals seen in sediments at RM 4.2 can be attributed to the storm drain which discharges just below Lake Lois. In June 1991, approximately 85% of this discharge was diverted into a constructed wetland. It is unclear whether these concentrations reflect new material coming into the creek or if the levels reflect discharges prior to the diversion.

Data from RM 3.1

RM 3.1 is located just upstream of the culverts that pass Woodland Creek under I-5 (Figure 1). This site is influenced by loading sources from the Nisqually Trout Farm, a large stormwater discharge from the City of Lacey, and a wetland area to the southwest. As a result, water quality at this site was much different than the three sites monitored upstream. In comparison, temperatures were cooler during the summer and warmer during the winter months, and discharge was consistently higher. Generally, conductivity, TSS, turbidity, and TP levels were higher at RM 3.1, and D.O. levels were lower than those found further upstream. During storm events, grab samples were taken at this site. In November 1991, extremely turbid water was found at RM 3.1 and reported to Ecology's spill team and the City of Lacey. Follow-up investigations led to the identification and remediation of failing sediment retention facilities at the Martin Village construction site located near the creek between RM 3.7 and RM 3.1.

CONCLUSIONS

- Baseline monitoring data have shown that there are no significant differences in water quality between RM 4.2 (upstream of the new building site) and RM 3.8 (the downstream site) except for D.O. and pH, which were found to be significantly lower at RM 4.2.

- No water quality differences were evident between RM 3.8 and RM 3.7 (downstream of Martin Way), which indicates road runoff impacts on surface water are likely minimal. However, increased metals in sediment at RM 3.7 may be due to runoff from Martin Way.

- Discharge from the storm drain above RM 4.2 is most likely the primary source of high fecal coliform levels in the water and increased organics and metals in sediment at that site.

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APPENDICES

Appendix A. Class AA (extraordinary) freshwater quality standards and characteristic uses (WAC 173-201-045).

General Characteristics:	Shall markedly and uniformly exceed the requirements for all, or substantially all uses.
Characteristic uses:	Shall include, but not be limited to, the following: domestic, industrial, and agricultural water supply; stock watering; salmonid and other fish migration, rearing, spawning, and harvesting; wildlife habitat; primary contact recreation, sport fishing, boating, and aesthetic enjoyment; and commerce and navigation.
<u>Water Quality Criteria</u>	
Fecal Coliform:	Shall not exceed a geometric mean value of 50 organisms/100 mL, with not more than 10% of samples exceeding 100 organisms/100 mL.
Dissolved Oxygen:	Shall exceed 9.5 mg/L.
Total Dissolved Gas:	Shall not exceed 110% saturation.
Temperature:	Shall not exceed 16.0°C due to human activities. When natural conditions exceed 16°C, no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3°C. Increases from nonpoint sources shall not exceed 2.8°C with a maximum of 16.3°C.
pH:	Shall be within the range of 6.5 to 8.5 with a man-caused variation within a range of less than 0.2 units.
Turbidity:	Shall not exceed 5 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10% increase in turbidity when the background turbidity is more than 50 NTU.
Toxic, Radioactive, or Deleterious material:	Shall be below concentrations which may adversely affect characteristic water uses, cause acute or chronic conditions to aquatic biota, or adversely affect public health.
Aesthetic Values:	Shall not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste.

Appendix B. Woodland Creek monthly baseline data, January 1991 – March 1992.

Date	Site	Rep.	Lab#	Time	Temp. (°C)	pH (S.U.)	Field Cond. (uhmos/cm)	Lab Cond. (uhmos/cm)	D.O. (mg/L)	D.O. (%sat)	Field Turb. (NTU)	Lab Turb. (NTU)		TSS (mg/L)	FC (CFU/100mL)		TP (mg/L)		Q (CFS)
16-Jan-91	4.2		38040	1550	6.4	7.8	105	–	11.7	95	–	5	J	6	11		–		15.0
	4.2	R	38044	1550	6.4	7.7	105	–	11.7	95	–	5		5	40		–		16.4
	3.8		38042	1205	6.4	7.8	110	–	12.8	104	–	5	J	6	37		–		13.8
	3.8	R	38046	1205	6.4	7.7	110	–	12.8	104	–	4	J	6	51		–		21.0
	3.1		38043	1040	7.9	7.4	80	–	10.2	86	–	3	J	4	14		–		32.0
13-Feb-91	4.2		78075	1240	7.9	7.4	110	–	10.8	91	–	3		5	100		–		15.6
	4.2	R	78074	1300	7.8	7.6	112	–	11.0	92	–	2		5	120		–		16.7
	3.8		78072	1020	7.7	7.6	112	–	11.5	96	–	3		5	84		–		16.0
	3.8	R	78076	1100	7.7	7.6	112	–	11.3	94	–	3		5	130		–		12.6
	3.1		78073	900	8.9	7.3	125	–	9.0	77	–	4		6	130		–		27.7
13-Mar-91	4.2		118040	1300	7.4	7.7	110	109	10.9	90	–	2		1	5		0.01		–
	4.2	R	118041	1330	7.5	7.7	110	108	11.0	91	–	2		2	5		0.01		10.8
	3.8		118042	1200	7.2	7.7	110	105	–	–	–	3		3	7		0.02		15.1
	3.8	R	118043	1230	7.2	7.7	110	108	11.4	94	–	4		2	8		0.02		12.6
	3.7		118044	1100	7.4	8.0	110	108	11.8	98	–	2		3	4		0.02		12.2
	3.7	R	118045	1130	7.2	7.9	110	108	11.5	95	–	2		2	6		0.02		10.8
	3.1		118046	1000	8.2	7.5	130	124	9.8	83	–	3		3	3		0.04		22.4
17-Apr-91	4.2		168025	1430	12.1	7.4	95	109	9.4	87	2	2		3	9		0.02	J	26.7
	4.2	R	168026	1440	12.1	7.5	96	109	9.6	89	2	2		4	3		0.02	J	27.6
	3.8		168023	1300	11.9	7.6	97	108	10.0	92	3	2		6	3		0.02	J	22.1
	3.8	R	168024	1315	11.9	7.6	98	108	9.9	91	3	2		5	11		0.02	J	18.4
	3.7		168022	1200	12.0	7.6	96	109	10.0	92	3	2		7	26		0.02	J	24.1
	3.1		168020	1030	11.4	7.2	110	124	8.6	79	3	1		5	6		0.04	J	43.9
	3.1	R	168021	1045	11.3	7.1	110	123	8.6	78	2	2		5	6		0.04	J	–
15-May-91	4.2		208033	1115	15.0	7.5	112	112	8.5	84	2	3		3	26	J	0.02		14.2
	4.2	R	208036	1130	15.0	7.5	112	–	8.7	86	2	–		–	–		–		13.1
	3.8		208032	1020	14.4	7.7	112	112	9.3	91	3	2		4	9	J	0.03		12.1
	3.8	R	208035	1030	14.4	7.7	110	112	–	–	3	2		3	17	J	0.02		15.0
	3.7		208031	940	14.0	7.7	115	111	–	–	2	2		3	14	J	0.02		15.7
	3.7	R	208034	950	14.1	7.7	110	112	9.3	90	3	2		5	20	J	0.02		15.6
	3.1		208030	900	12.0	7.1	132	132	7.9	73	2	1		3	14	J	0.04		28.0
12-Jun-91	4.2		248045	1500	17.1	7.5	120	113	8.4	87	2	1		2	20		0.04	U	8.8
	4.2	R	248046	1505	16.9	7.6	115	113	8.6	88	2	1		2	21		0.04	U	–
	3.8		248043	1340	16.8	7.8	115	113	9.1	93	3	1		3	38		0.04	U	8.4
	3.8	R	248044	1345	16.9	7.8	115	113	9.1	94	3	1		3	28		0.04	U	7.9
	3.7		248041	1230	16.6	7.7	125	114	8.9	91	4	2		3	120		0.04	U	8.9
	3.7	R	248042	1235	16.6	7.7	125	116	8.9	91	4	2		4	110		0.04	U	8.7
	3.1		248040	1100	13.1	7.0	138	136	8.1	77	-	1		2	32		0.04	U	20.0
17-Jul-91	4.2		298043	1313	19.3	7.2	125	–	7.2	78	0.9	0.6		1	25		0.16		3.2
	4.2	R	298044	1328	19.3	7.2	122	–	7.2	78	0.6	0.4		1	24		0.14		2.8
	3.8		298042	1236	19.0	7.7	122	–	8.6	92	1	1		3	150		0.16		3.1
	3.7		298041	1211	19.0	7.8	122	–	8.7	93	2	2		7	120		0.11		3.1
	3.1		298040	1100	13.3	7.1	145	–	7.4	71	1	1		2	71		0.13		12.5
21-Aug-91	4.2		348050	1240	22.1	7.4	130	–	7.8	89	-	1		2	39	X	0.03		1.4
	3.8		348051	1145	21.0	7.7	129	–	9.2	103	-	0.7		2	37	X	0.04		1.2
	3.8	R	348052	1200	21.1	7.8	130	–	9.1	102	-	0.9		3	19	X	0.04		1.1
	3.7		348053	1100	20.4	7.8	132	–	9.8	108	-	0.8		2	45	X	0.04		1.2
	3.1		348054	1000	12.3	6.9	150	–	7.0	65	-	0.9		1	26		0.07		11.0

R = Replicate sample.

J = The analyte was positively identified. The associated numerical result is an estimate.

U = The analyte was not detected at or above the reported result

X = High background count.

S = Spreader (colonies possibly masked by other bacteria).

Appendix B. Continued.

Date	Site	Rep.	Lab#	Time	Temp. (°C)	pH (S.U.)	Field Cond. (uhmos/cm)	Lab Cond. (uhmos/cm)	D.O. (mg/L)	D.O. (%sat)	Field Turb. (NTU)	Lab Turb. (NTU)		TSS (mg/L)		FC (CFU/100mL)		TP (mg/L)	Q (CFS)
18-Sep-91	4.2		388030	1320	17.9	7.8	135	129	8.2	86	0.8	1	U	20		37		0.05	0.5
	3.8		388031	1230	16.6	8.0	130	128	9.4	96	0.9	1	U	1	U	24		0.12	0.3
	3.7		388032	1150	16.1	7.7	130	129	9.6	97	0.9	1	U	2		27		0.10	0.3
	3.7	R	388033	1150	16.1	7.7	130	129	9.5	96	0.7	1	U	1		27		0.19	0.3
	3.1		388034	1050	11.4	7.0	150	146	7.1	65	1	1	U	3		11		0.09	9.1
15-Oct-91	4.2		428030	1245	–	–	–	–	8.8	–	2	1	U	1		680		0.02	0.1
	4.2	R	428031	1245	–	–	–	–	8.8	–	1	1	U	2		580		0.02	0.1
	3.8		428032	1145	–	–	–	–	10.1	–	2	1	U	1		260		0.03	0.1
	3.7		428033	1115	–	–	–	–	10.3	–	2	1		1		160		0.02	0.0
	3.1		428034	1031	–	–	–	–	7.1	–	2	1	U	2		9		0.05	8.3
13-Nov-91	4.2		468030	1200	10.0	7.3	110	–	9.5	84	–	2		4		34		0.05	1.0
	3.8		468031	1120	9.9	7.4	108	–	10.6	93	–	2		3		46		0.04	1.0
	3.7		468032	1050	9.8	7.3	105	–	10.7	94	–	2		3		31		0.04	0.8
	3.1		468033	1000	10.2	7.2	125	–	6.9	61	–	3		2		29		0.08	4.7
	3.1	R	468034	1000	10.1	7.2	125	–	7.0	62	–	3		3		24		0.08	5.9
18-Dec-91	4.2		518020	1215	4.8	7.2	88	–	11.3	88	–	2		2		13		0.03	5.5
	3.8		518021	1110	4.4	7.3	95	–	12.2	94	–	3		3		29	S	0.02	5.3
	3.7		518022	1015	4.3	7.2	81	–	12.3	94	–	4		3		57	S	0.03	–
	3.7	R	518023	1015	4.3	7.3	80	–	12.3	94	–	4		6		79	S	0.04	–
	3.1		518024	930	7.6	7.1	105	–	8.2	68	–	5		10		80		0.07	–
15-Jan-92	4.2		38020	1241	5.7	7.3	97	–	11.3	90	4	2		3		67		0.03	4.1
	3.8		38021	1130	5.7	7.3	95	–	12.0	95	2	2		1	U	11		0.03	4.3
	3.7		38022	1025	5.7	7.3	80	–	12.0	95	3	2		3		9		0.03	4.1
	3.7	R	38023	1025	5.6	7.3	85	–	11.8	94	3	2		1		11		0.03	4.0
	3.1		38024	918	8.4	7.0	114	–	7.9	67	3	2		4		2		0.08	12.7
12-Feb-92	4.2		78020	1145	7.4	7.6	96	–	10.4	86	3	2		7		4		0.03	13.9
	3.8		78021	1050	7.3	7.6	94	–	11.1	92	2	2		3		8		0.02	12.6
	3.8	R	78022	1050	7.3	7.6	96	–	11.2	92	2	1		3		11		0.02	12.4
	3.7		78023	1005	7.3	7.7	93	–	11.1	91	3	1		3		16		0.02	12.5
	3.1		78024	925	8.3	7.5	107	–	9.6	82	2	2		5		5		0.05	23.3
18-Mar-92	4.2		128050	1100	10.7	7.4	100	–	10.7	96	4	2		5		8		0.03	5.2
	3.8		128051	1015	10.3	7.4	98	–	11.0	98	2	2		5		15		0.04	9.0
	3.8	R	128052	1020	10.3	7.4	98	–	11.1	98	5	2		5		12		0.04	9.2
	3.7		128053	940	10.1	7.5	100	–	11.0	98	3	2		6		21		0.04	9.3
	3.1		128054	855	9.5	7.5	121	–	8.7	76	3	2		6		6		0.06	18.2

R = Replicate sample.

J = The analyte was positively identified. The associated numerical result is an estimate.

U = The analyte was not detected at or above the reported result.

X = High background count.

S = Spreader (colonies possibly masked by other bacteria).

Appendix C. Woodland Creek routine monthly data with loading calculations, January 1991 – March 1992.

Date	Site	Q (CFS)	Load TDS (lb/day)	Load TSS (lb/day)		Load FC (#FC/sec)		Load TP (lb/day)	
16-Jan-91	4.2	15.7	1150	500		93000		–	
	3.8	17.4	1340	600		210000		–	
	3.1	32.0	1800	700		130000		–	
13-Feb-91	4.2	16.2	1270	400		505000		–	
	3.8	14.3	1120	400		421000		–	
	3.1	27.7	2430	900		1020000		–	
13-Mar-91	4.2	10.8	832	100		20000		0.8	
	3.8	13.9	1070	200		30000		1.3	
	3.7	11.5	886	200		20000		1.1	
	3.1	22.4	2040	400		20000		4.3	
17-Apr-91	4.2	27.2	1800	600		40000		2.9	J
	3.8	20.2	1400	700		50000		2.2	J
	3.7	24.1	1600	900		180000		2.6	J
	3.1	43.9	3380	1000		70000		4.7	J
15-May-91	4.2	13.6	1060	200		100000	J	1.5	
	3.8	13.6	1060	300		46000	J	1.8	
	3.7	15.6	1240	300		75000	J	1.9	
	3.1	28.0	2580	500		110000	J	6.6	
12-Jun-91	4.2	8.8	730	100		50000		1.9	U
	3.8	8.1	650	100		76000		1.7	U
	3.7	8.8	770	200		287000		1.9	U
	3.1	20.0	1930	200		180000		4.3	U
17-Jul-91	4.2	3.0	260	20		20000		2.4	
	3.8	3.1	260	50		131000		2.7	
	3.7	3.1	260	100		105000		1.8	
	3.1	12.5	1270	100		250000		8.8	
21-Aug-91	4.2	1.4	130	20		16000	X	0.2	
	3.8	1.1	100	20		8400	X	0.2	
	3.7	1.2	110	10		15000	X	0.3	
	3.1	11.0	1160	60		81000		4.2	
18-Sep-91	4.2	0.5	47	50		5200		0.1	
	3.8	0.3	31	2	U	2300		0.2	
	3.7	0.3	25	3		2100		0.2	
	3.1	9.1	960	100		28000		4.4	
15-Oct-91	4.2	0.1	8	1		21300		0.01	
	3.8	0.1	4	0		4420		0.0	
	3.7	0.01	1	0		453		0.0	
	3.1	8.3	550	90		20000		2.2	
13-Nov-91	4.2	1.0	79	20		9800		0.2	
	3.8	1.0	74	20		13000		0.2	
	3.7	0.8	57	10		6800		0.1	
	3.1	4.3	380	70		32000		1.9	
18-Dec-91	4.2	5.5	340	60		20000		0.8	
	3.8	5.3	350	90		43000	S	0.7	
	3.7	4.9	280	100		92000	S	0.9	
	3.1	17.1	1260	900		390000		6.6	
15-Jan-92	4.2	4.1	280	70		77000		0.6	
	3.8	4.3	290	20	U	13000		0.6	
	3.7	4.0	230	40		11000		0.6	
	3.1	12.7	1010	300		7200		5.1	
12-Feb-92	4.2	13.9	930	500		16000		2.5	
	3.8	12.5	830	200		32000		1.6	
	3.7	12.5	820	200		57000		1.6	
	3.1	23.3	1740	600		30000		6.6	
18-Mar-92	4.2	5.2	370	100		10000		0.9	
	3.8	9.1	620	200		33000		1.7	
	3.7	9.3	650	300		55000		1.8	
	3.1	18.2	1540	600		30000		5.9	

TDS = Total dissolved solids (conductivity x 0.7).

J = The analyte was positively identified. The associated numerical result is an estimate.

U = The analyte was not detected at or above the reported result.

X = High background count.

S = Spreader (colonies possibly masked by other bacteria).

Appendix D. Woodland Creek storm event data from grab samples, January 1991 – March 1992.

Date	Site	Lab #	Time	Temp. (°C)	pH (S.U.)	Field Cond. (uhmos/cm)	Lab Cond. (uhmos/cm)	D.O. (mg/L)	D.O. (%sat)	Field Turb. (NTU)	Lab Turb. (NTU)	TSS (mg/L)	FC (CFU/100mL)	TP (mg/L)	Q (CFS)
24-Apr-91	4.2	178595	1230	12.6	7.6	110	–	9.4	89	2	3	–	–	–	20.3
	4.2	178594	646	–	–	–	–	–	–	2	3	–	–	–	–
	4.2		847	12.1	7.4	–	–	9.0	83	–	–	–	–	–	–
	3.8	178596	706	–	–	–	–	–	–	2	3	–	–	–	–
	3.8		815	11.9	7.4	117	–	10.0	93	–	–	–	–	–	–
	3.8	178597	1340	12.8	7.7	110	–	10.0	94	3	5	–	–	–	22.5
	3.7		755	11.8	7.6	115	–	10.0	92	–	–	–	–	–	–
	3.7	178598	715	–	–	–	–	–	–	2	3	–	–	–	–
	3.7	178599	1315	12.7	7.8	110	–	10.2	96	4	3	–	–	–	21.5
25-Apr-91	4.2		905	11.8	8.0	112	–	9.2	85	2	–	–	–	–	20.0
	3.8		820	11.4	8.1	112	–	10.1	92	2	–	–	–	–	23.7
	3.7		735	11.5	7.9	100	–	10.1	92	2	–	–	–	–	21.1
19-Nov-91	4.2	478180	950	8.5	7.8	80	–	10.0	85	20	10	8	400	0.07	–
	3.8	478181	912	8.5	7.8	79	–	10.9	93	12	6	8	190	0.05	2.2
	3.7	478182	840	8.5	7.7	71	–	11.0	94	10	6	6	260	0.05	1.4
	3.1	478184	806	9.8	7.8	110	–	7.0	62	6	3	2	47	0.07	5.1
20-Nov-91	4.2	478185	1350	8.5	7.8	76	–	10.1	86	39	17	26	2300	0.09	
	4.2		1700	8.2	7.8	100	–	–	–	–	–	–	–	–	–
	3.8		1630	8.7	7.8	100	–	–	–	–	–	–	–	–	–
	3.8	478186	1315	8.3	7.8	90	–	11.2	95	15	7	8	1950	0.05	2.9
	3.7		1545	8.7	7.5	96	–	–	–	–	–	–	–	–	–
	3.7	478187	1245	8.2	7.8	95	–	11.2	95	9	5	8	98	0.05	–
	3.1	478188	1150	8.9	7.6	68	–	7.9	68	122	66	41	550	0.21	23.7
28-Jan-92	4.2	58400	1440	8.0	7.4	69	–	10.9	91	18	9	19	230	0.06	13.3
	3.8	58402	1345	7.8	7.6	79	–	11.3	95	18	8	25	210	0.07	–
	3.7	58403	1330	8.0	7.4	72	–	11.3	95	22	9	33	260	0.09	11.4
	3.1	58404	1105	9.3	7.3	60	–	9.0	78	38	15	41	1400 J	0.12	–
29-Jan-92	4.2	58406	1458	8.0	7.1	75	–	10.7	90	3	16	2 J	220	0.04	15.0
	3.8	58407	1530	8.0	7.1	84	–	11.3	95		21	5 J	190	0.04	16.0
	3.7	58408	1455	8.0	7.4	85	–	11.3	95	5	25	5 J	260	0.04	–
	3.1	58410	1425	9.4	7.6	83	–	8.7	76	9	37	5 J	195	0.07	–
	AD	58411	–	–	–	–	–	–	–	–	–	–	140	–	–
	BD	58412	–	–	–	–	–	–	–	–	–	–	15000	–	–

J = The analyte was positively identified. The associated numerical result is an estimate.

AD = Above the storm drain, upstream from RM4.2.

BD = Below the storm drain, upstream from RM4.2.

Appendix E. Woodland Creek baseline storm event data collected by automated sequential samplers, January – March 1992.

Date	Time	Site	Lab #	Cond. (uhmos/cm)	Field Turb. (NTU)	TSS (mg/L)
04/24/91	800	4.2	–	109	2	–
	900	4.2	–	109	2	–
	1000	4.2	–	109	2	–
	1100	4.2	–	109	2	–
	1200	4.2	–	109	2	–
	1300	4.2	–	109	6	–
	1400	4.2	–	109	3	–
	1500	4.2	–	109	2	–
	1600	4.2	–	109	2	–
	1700	4.2	–	109	2	–
	1800	4.2	–	109	2	–
	1900	4.2	–	109	2	–
	2000	4.2	–	109	2	–
	2100	4.2	–	109	2	–
	2200	4.2	–	109	2	–
	2300	4.2	–	109	2	–
	2400	4.2	–	109	2	–
04/25/91	100	4.2	–	109	2	–
	200	4.2	–	109	2	–
	300	4.2	–	109	2	–
	400	4.2	–	109	2	–
	500	4.2	–	109	2	–
	600	4.2	–	109	2	–
	700	4.2	–	109	2	–
04/24/91	800	3.8	–	109	2	–
	900	3.8	–	108	3	–
	1000	3.8	–	109	3	–
	1100	3.8	–	109	2	–
	1200	3.8	–	109	3	–
	1300	3.8	–	108	3	–
	1400	3.8	–	108	3	–
	1500	3.8	–	109	3	–
	1600	3.8	–	109	3	–
	1700	3.8	–	109	3	–
	1800	3.8	–	109	2	–
	1900	3.8	–	109	2	–
	2000	3.8	–	109	2	–
	2100	3.8	–	109	2	–
	2200	3.8	–	109	2	–
	2300	3.8	–	109	2	–
	2400	3.8	–	109	2	–
04/25/91	100	3.8	–	109	2	–
	200	3.8	–	104	2	–
	300	3.8	–	109	2	–
	400	3.8	–	109	2	–
	500	3.8	–	109	2	–
	600	3.8	–	109	2	–
	700	3.8	–	109	2	–
04/24/91	800	3.7	–	110	2	–
	900	3.7	–	109	2	–
	1000	3.7	–	109	2	–
	1100	3.7	–	109	2	–
	1200	3.7	–	109	3	–
	1300	3.7	–	–	3	–
	1400	3.7	–	–	3	–
	1500	3.7	–	–	3	–
	1600	3.7	–	–	3	–
	1700	3.7	–	109	3	–
	1800	3.7	–	–	2	–
	1900	3.7	–	–	2	–
	2000	3.7	–	–	2	–
	2100	3.7	–	–	2	–
	2200	3.7	–	108	2	–
	2300	3.7	–	–	2	–
	2400	3.7	–	–	2	–
04/25/91	100	3.7	–	–	2	–
	200	3.7	–	–	2	–
	300	3.7	–	109	2	–
	400	3.7	–	–	2	–
	500	3.7	–	–	2	–
	600	3.7	–	–	2	–
	700	3.7	–	109	3	–

Appendix E. Continued.

Date	Time	Site	Lab #	Cond. (uhmos/cm)	Field Turb. (NTU)	TSS (mg/L)
11/19/91	1500	4.2	478190	44	52	59
	1600	4.2	478191	51	24	20
	1700	4.2	478192	54	38	53
	1800	4.2	478193	44	26	23
	1900	4.2	478194	61	23	13
	2000	4.2	478195	82	16	10
	2100	4.2	478196	60	21	26
	2200	4.2	478197	69	10	9
	2300	4.2	478198	90	12	7
11/20/91	0	4.2	478199	92	12	7
	100	4.2	478200	92	10	5
	200	4.2	478201	101	9	6
	300	4.2	478202	99	9	5
	400	4.2	478203	102	8	5
	500	4.2	478204	102	7	5
	600	4.2	478205	102	5	4
	700	4.2	478206	96	55	97
	800	4.2	478207	58	60	78
	900	4.2	478208	47	28	26
	1000	4.2	478209	77	10	8
	1100	4.2	478210	92	10	7
	1200	4.2	478211	95	15	8
	1300	4.2	478212	91	15	8
	1400	4.2	478213	71	13	17
11/19/91	1500	3.8	478215	66	9	77
	1600	3.8	478216	46	20	30
	1700	3.8	478217	57	19	18
	1800	3.8	478218	42	37	46
	1900	3.8	478219	47	16	20
	2000	3.8	478220	66	11	11
	2100	3.8	478221	64	15	13
	2200	3.8	478222	51	13	12
	2300	3.8	478223	72	9	9
11/20/91	0	3.8	478224	87	13	6
	100	3.8	478225	90	9	6
	200	3.8	478226	95	8	5
	300	3.8	478227	99	7	4
	400	3.8	478228	99	9	4
	500	3.8	478229	101	7	6
	600	3.8	478230	101	7	5
	700	3.8	478231	97	8	8
	800	3.8	478232	56	44	75
	900	3.8	478233	46	35	45
	1000	3.8	478234	54	18	16
	1100	3.8	478235	79	11	9
	1200	3.8	478236	91	11	7
	1300	3.8	478237	90	11	8
	1400	3.8	478238	89	20	16
11/19/91	1500	3.7	478240	80	56	61
	1600	3.7	478241	47	33	37
	1700	3.7	478242	52	22	15
	1800	3.7	478243	43	44	54
	1900	3.7	478244	47	21	22
	2000	3.7	478245	62	13	12
	2100	3.7	478246	77	16	17
	2200	3.7	478247	54	16	15
	2300	3.7	478248	67	10	10
11/20/91	0	3.7	478249	88	10	6
	100	3.7	478250	89	10	7
	200	3.7	478251	95	10	6
	300	3.7	478252	97	7	6
	400	3.7	478253	98	8	6
	500	3.7	478254	97	6	6
	600	3.7	478255	99	8	7
	700	3.7	478256	97	9	8
	800	3.7	478257	60	34	39
	900	3.7	478258	47	40	50
	1000	3.7	478259	51	21	20
	1100	3.7	478260	75	13	9
	1200	3.7	478261	88	11	8
	1300	3.7	478262	88	9	9
	1400	3.7	478263	90	17	16

Appendix E. Continued.

Date	Time	Site	Lab #	Cond. (uhmos/cm)	Field Turb. (NTU)	TSS (mg/L)
01/28/92	1700	4.2	58455	70	10	12
	1800	4.2	58456	82	8	9
	1900	4.2	58457	75	7	9
	2000	4.2	58458	83	4	7
	2100	4.2	58459	84	4	4
	2200	4.2	58460	82	4	5
	2300	4.2	58461	80	5	3
	0	4.2	58462	72	6	9
01/29/92	100	4.2	58463	75	5	4
	200	4.2	58464	79	5	2
	300	4.2	58465	70	6	10
	400	4.2	58466	73	4	6
	500	4.2	58467	82	4	3
	600	4.2	58468	73	3	2
	700	4.2	58469	79	4	3
	800	4.2	58470	68	8	8
	900	4.2	58471	73	7	9
	1000	4.2	58472	80	5	6
	1100	4.2	58473	83	3	4
01/28/92	1700	3.8	58435	75	9	19
	1800	3.8	58436	70	9	16
	1900	3.8	58437	70	11	12
	2000	3.8	58438	80	6	22
	2100	3.8	58439	84	4	6
	2200	3.8	58440	83	5	8
	2300	3.8	58441	83	5	6
	0	3.8	58442	80	6	12
	100	3.8	58443	76	5	8
01/29/92	200	3.8	58444	83	5	8
	300	3.8	58445	60	9	14
	400	3.8	58446	72	6	10
	500	3.8	58447	77	4	8
	600	3.8	58448	80	4	6
	700	3.8	58449	84	4	8
	800	3.8	58450	70	11	20
	900	3.8	58451	77	7	12
	1000	3.8	58452	75	7	9
	1100	3.8	58453	80	4	6
	1200	3.8	58454	85	4	6
01/28/92	1700	3.7	58413	80	10	15
	1800	3.7	58414	70	9	22
	1900	3.7	58415	81	6	15
	2000	3.7	58416	85	5	14
	2100	3.7	58417	85	6	10
	2200	3.7	58418	82	7	7
	2300	3.7	58419	80	7	12
	0	3.7	58420	75	7	10
01/29/92	100	3.7	58421	80	6	8
	200	3.7	58422	73	11	14
	300	3.7	58423	70	5	9
	400	3.7	58424	80	5	7
	500	3.7	58425	85	5	6
	600	3.7	58426	83	4	8
	700	3.7	58427	75	10	24
	800	3.7	58428	70	7	10
	900	3.7	58429	77	6	9
	1000	3.7	58430	81	5	7
	1100	3.7	58431	83	4	8
	1200	3.7	58432	95	5	6
	1300	3.7	58433	86	3	5
	1400	3.7	58434	85	3	5