Summary of the Model-Building Results for the Northern Ontario Benthic Invertebrate RCA Biomonitoring Initiative: 2003-2006

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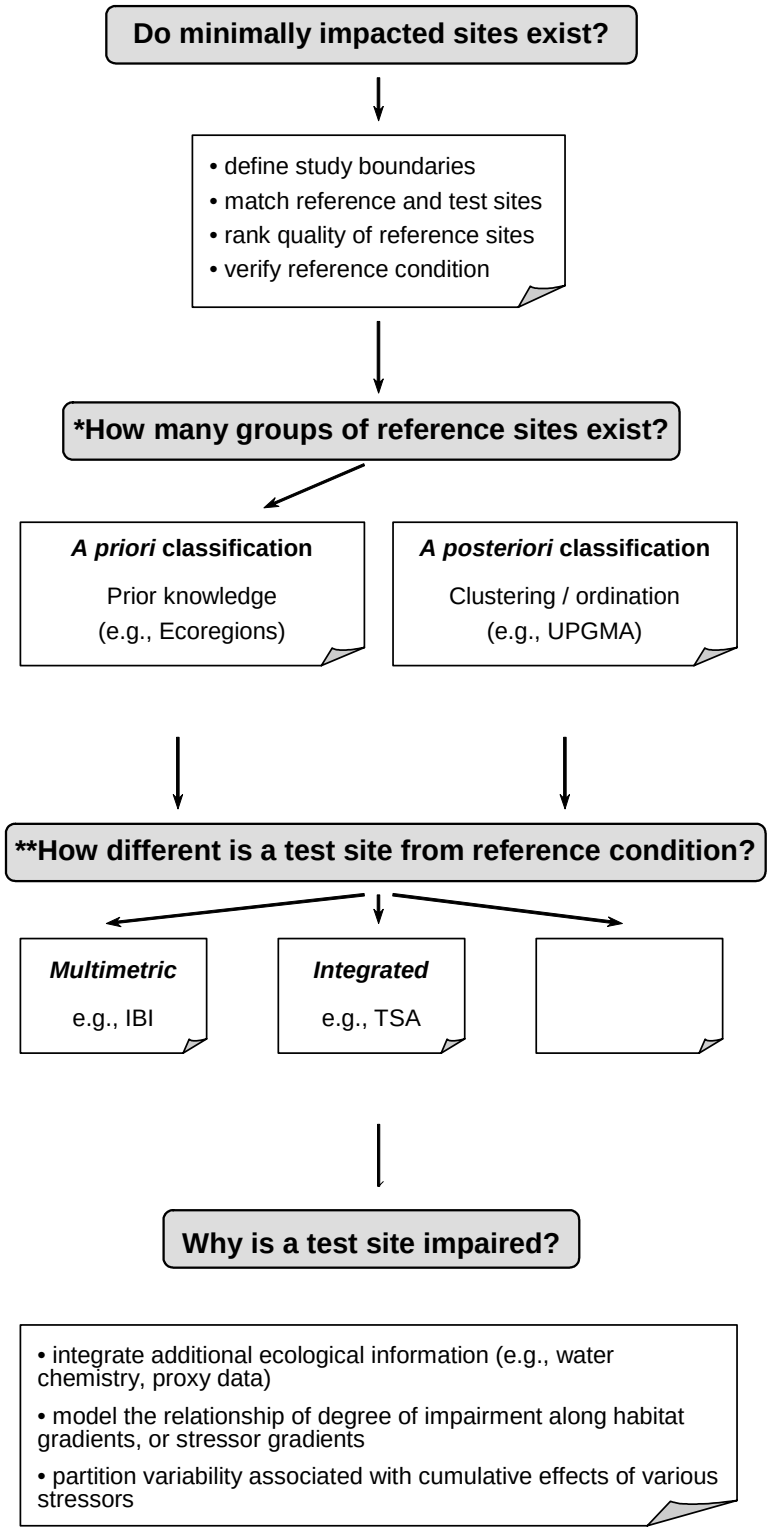
Do minimally impacted sites exist?
• define study boundaries
• match reference and test sites
• rank quality of reference sites
• verify reference condition
*How many groups of reference sites exist?
A priori classification
Prior knowledge
(e.g., Ecoregions)
A posteriori classification
Clustering / ordination
(e.g., UPGMA)
**How different is a test site from reference condition?
Multimetric
e.g., IBI
Integrated
e.g., TSA
Why is a test site impaired?
• integrate additional ecological information (e.g., water chemistry, proxy data)
• model the relationship of degree of impairment along habitat gradients, or stressor gradients
• partition variability associated with cumulative effects of various stressors

2. Methods

2.1 Benthic Invertebrate Sampling

Field sampling was conducted between September and November of 2003 and 2004. Stream invertebrate sampling was conducted according to Environment Canada's CABIN protocols (http://cabin.cciw.ca/cabin/asp/english/cabin_online_resources.asp; Reynoldson et al.1999). Benthic invertebrates were collected using a traveling kick-and-sweep technique. The substrate was kicked to disturb and dislodge the surface sediment which was swept up with a standard D-frame net with 500 µm mesh. The collector zigzagged from bank to bank for 3 minutes. The content of the kick net was emptied into a 1.5L plastic sample jar and preserved with 10% buffered formalin.

Lake sampling methods were similar to procedures outlined in David et al. (1998) with a few modifications to accommodate the needs of the mining industry. At each inflow and outflow site, three 50 m segments of shore were sampled. The transition zone between the actual lake shore and the beginning of the channel was sampled being sure not to sample within the channel; the flow was minimal. Lake substrate was kicked and swept with a standard D-frame net with 500 µm mesh along a transect perpendicular to shore, emptying the net into bucket whenever it became full of debris. Kick and sweep continued along additional transects down the shoreline (2 m apart), filling the same bucket, for 10 minutes. A random portion of the sample was transferred by hand from the bucket into a 1.5L white snow jar and preserved with 10% formalin. The three 50 m segments were labeled as A, B or C and were individually sampled, documented and processed. The resulting data were pooled prior to analysis.

After a minimum of 72 hours, the contents of each of the sample jars was poured into a 500 µm sieve, rinsed with tap water and returned to the same jar with 70% ethanol added.

2.2 Sample Processing

Samples were randomly sub-sampled using a Marchant box; a clear acrylic box (28 cm x 29 cm x16 cm) divided into 100 equal chambers or cells (Marchant, 1989). The sample was poured into the box with a small amount of water, the lid was secured, the box was inverted, gently shaken, and returned to the upright position. This distributed the sample throughout the box which was then sub-sampled. The cell to be sorted was randomly selected using the results of two ten-sided dice. The two numbers were used to select the cell number using a grid system with 1-10 going horizontally and vertically. The contents of the selected cell were extracted using a combination of forceps and manual vacuum extraction using a 50 ml plastic pipette. Water was added to the cell as needed to ensure that the entire cell was emptied. The cell contents were transferred to a 80 ml plastic jar, and small portions were poured into a Petri dish for sorting. The Petri dish was placed under a stereo microscope (16X magnification) and examined in a grid pattern from left to right, from top to bottom then again left to right with a slight swirling of the dish between each pass. Detected animals were extracted using ultra fine forceps and placed in a labeled plastic vial in 70% ethanol. Consecutive cells were sorted until the 300th animal was found and then the remainder of the material from that cell was also sorted. The tallies for each of the cells are recorded on the bench sheets. The orders Nematoda, Platyhelminthes,

2.3 Invertebrate Identification

Invertebrates were identified to the family level with each individual of a family placed in a separate 1.5 ml micro-centrifuge tube (snap-cap). The number of individuals in each of the families was tallied on the bench sheet. Waterproof paper labels were inserted into each snap cap with an inscription with site code, family name, and taxonomist name. All the snap caps belonging to one site were then placed in a labeled 500 ml jar or a 100ml jar. Specimens that were too small or damaged to be identified to family were identified to order.

Benthic invertebrate identification was conducted using appropriate taxonomic keys and by comparing our identifications with the RCA study reference specimens verified by Craig Logan of the taxonomy laboratory of Environment Canada's National Water Research Institute. A reference collection containing up to two individuals from each of the families encountered was created and confirmed by Craig Logan of Environment Canada.

2.4 Habitat Characterization

Habitat variables collected for each site included field-measured and remotely sensed (map based) variables (Table 1). Field measures were collected concurrently with benthic sampling. Upon arrival at the site, variables including latitude, longitude, and altitude were obtained using a GPS. The station number, site name, and date were also recorded on the field sheet. Digital photographs of the location were taken as a record of conditions at the site. First, a photograph of the field sheet, with the site number, was taken to identify the subsequent series of photographs. These included: an upstream, downstream and an across the stream or lake photograph. In addition, a photograph of the wet and dry substrate in the area where the invertebrate sample was collected was taken with a ruler positioned in the photograph for scale. Using Ontario Base Maps (OBM), Craig Logan (EC) delineated the catchment areas and determined stream order for the lakes and streams in our study areas. Ontario Flow Assessment Techniques (OFAT) was used to determine landscape and land-use information (Table 1). OFAT was developed by the Ministry of Natural Resources as interactive Geographic Information System (GIS) software to estimate flow information for watersheds in Ontario (Chang et al., 2002).

Table 2. Values for particle sizes and embeddedness used to calculate substrate score.

Particle Type/Size			Embeddedness	
Size (cm)	Category	Score	Category	Score
organic cover		0		
< 1	Silt	1	Completely embedded	1
0.1 – 0.2	Sand	2	3/4 embedded	2
0.2 – 0.5	Gravel	3	1/2 embedded	3
0.5 – 2.5	Small pebbles	4	1/4 embedded	4
2.5 – 5.0	Large pebbles	5	unembedded	5
5.0 – 10.0	Small cobble	6		
10.0 – 25.0	Large cobble	7		
> 25.0	Boulders	8		
	Bedrock	9		

An estimate of the size of the larger substrate was obtained by measuring a randomly selected sample of the substrate. The sampler walked through the area from which the invertebrate sample was taken, stopping at random and selecting a rock. To avoid bias the rock closest to either the left or right toe was selected. The maximum length width and height were recorded for 10 rocks and the average, maximum and minimum values were determined.

2.4.3 Channel characteristics

Two measures of stream width were made, bankfull and wetted. A representative cross section of the channel was chosen and a transect was established at right angles to the flow. A tape measure was used to measure the present (wetted) bankfull width and depth. Bankfull levels were determined by locating points of vegetation change on the stream banks, where algae or marl have been scoured from boulders, or where sediment texture abruptly changed. Detailed determination of bankfull dimensions is described in Newbury and Gaboury (1993) and Harrelson et al. (1994). At every meter of the transect established for stream width measurements, velocity and depth were measured using a Marsh McBirney Flow-mate flow meter. The average and maximum velocity and depth were then calculated.

2.4.4 Water Chemistry

Field measurements included surface temperature, dissolved oxygen and conductivity using a Dissolved Oxygen Meter and a YSI Model 63 multi-meter for conductivity. Prior to disturbing the site, the probes were placed away from the bank at least 10 cm below the surface. The device output was allowed to stabilize before recording the value. Water samples were also taken for metals, total phosphorus, nutrients and alkalinity. Water was taken directly from the water column by submerging the sampling container below the surface of the water. A 2 L bottle was rinsed three times and was filled with the air removed prior to replacing cap. A second smaller 50 ml bottle was used for cyanide analysis. This bottle was filled with water being careful not to spill the preservative. Each container was marked with proper, legible labels, with the appropriate Site Code using a water- and solvent-proof marker. Samples were kept cool using a cooler with ice packs in the field and during shipping and then refrigerated once back at the lab. All water samples were submitted to the Laurentian University, Elliott Lake Research Station (Standard Council of Canada accreditation 463-ISO17025). Cyanide analysis was conducted by and sent to PSC Analytical Services**.** Examined parameters are outlined in Table 3.

Table 3. Water parameters measured at each site.

Ag (ug/L)	Dissolved Oxygen (mg/L)	Ra(226) (Bq/L)
Al (mg/L)	Dissolved Organic Carbon (mg/L)	S (mg/L)
Alkalinity (mg/L)	Fe (mg/L)	Sb (mg/L)
As (mg/L)	Hardness (mg/L)	Se (ug/L)
B (mg/L)	Hg (ug/L)	Sn (mg/L)
Ba (mg/L)	K (mg/L)	SO4 (mg/L)
Be (mg/L)	Li (mg/L)	Te (mg/L)
Bi (mg/L)	Mg (mg/L)	Temperature (Surface) (ºC)
Ca (mg/L)	Mn (ug/L)	Ti (mg/L)

3. Model Development

Two models were created using reference data from the Northern Ontario RCA database. In the first model, 92 reference stream sites were used to define reference condition and 117 reference lake sites were used in the second model (Appendices 2-4). Biological data for the lake sites is a sum of 3 replicates and the habitat data is an average of the three replicates. Reference sites not used in the model development included those re-visited on more than one occasion (only data from the first 2003 visit was used in the models), sorted by the one sorter with a QA/QC error rate > 15% (i.e., HEM68 stream site and TIM20 & TIM51 lake sites), and one anomalous stream site (Golden Creek).

Replicates could be removed if

Based on the 6-group solution, the density was highest in group 6 and least in groups 2 and 5 (Table 4). Group 1 had the lowest family richness and Group 5 the highest. Diversity was lowest in Groups 1 and 6. The values for the Bray-Curtis index were the highest in Group 2.

Table 4. Number of reference sites (Nref) and the mean and standard deviation (SD) of the density, richness, diversity and Bray-Curtis metrics in the stream reference-site groups

	Nref		Density	Richness	Diversity	Bray-Curtis
Group 1	20	mean	4674	17	0.44	0.40
		SD	2489	4	0.11	0.03
Group 2	11	mean	2084	20	0.82	0.75
		SD	2670	3	0.07	0.07
Group 3	21	mean	3647	23	0.67	0.35
		SD	2221	4	0.09	0.05
Group 4	18	mean	4471	23	0.82	0.52
		SD	3492	4	0.04	0.06
Group 5	17	mean	2330	31	0.84	0.50
		SD	1410	3	0.07	0.12
Group 6	5	mean	16063	22	0.47	0.48
		SD	4076	3	0.15an	4471

The 6-group solution and 20 habitat variables (Table 5) were used in the Discriminant Functions Analysis (DFA). An average of 62% (range 50 – 100%) of reference sites were correctly predicted to the group to which they actually belonged (Table 6). Percent correct classification was highest for Group 6 and lowest for Group 4.

Table 5. The 20 habitat variables used in the Discriminant Functions Analysis for streams

Variable	Discriminant Function
% Coniferous Forest	-0.08
% Deciduous Forest	0.02
% Water	0.27
% Wetland	0.10
2nd Dominant Substrate	0.37
Base Flow Index	0.39
Bankfull Width	**-1.72**
Channel Depth	-0.26
Channel Width	0.76
Constant	-0.87
Distance from Source	**-1.46**
Dominant Substrate	0.06
Drainage Area	**-2.41**
Ecoregion	0.43
Embeddedness	-0.11
Mean Annual Precipitation	-0.52
Perimeter	**4.27**
Slope	0.22
Stream Order	-0.23
Surrounding Material	0.83
Velocity	**-1.23**

Table 6. Total number of sites and the number and proportion of reference sites correctly assigned to each stream group and in the overall model.

Group	1	2	3	4	5	6	Total
No. sites	20	11	21	18	17	5	92
No. correct	11	9	13	9	10	5	57
Proportion	0.55	0.82	0.62	0.50	0.59	1.00	0.62

The habitat variables with large coefficients in the DFA included: bank-full width, distance from source, drainage area, perimeter, and velocity (T

3.2 Lake Model

The same procedures used to develop the stream model were used to

Mean density was highest in Group 1 (Table 7). Group 4 had relatively low richness and diversity. The mean Bray-Curtis metric was highest in Group 2.

Table 7. Number of reference sites (Nref) and the mean and standard deviation (SD) of the density, richness, diversity and Bray-Curtis metrics in the lake reference-site groups

	Nref		Density	Richness	Diversity	Bray-Curtis
Group 1	16	mean	26176	26	0.77	0.37
		SD	7231	5	0.09	0.06
Group 2	26	mean	8167	25	0.81	0.51
		SD	5204	4	0.06	0.10
Group 3	57	mean	8547	24	0.75	0.27
		SD	3760	4	0.07	0.05
Group 4	18	mean	8544	15	0.52	0.36
		SD	4314	3	0.15	0.10

When 17 habitat variables (Table 8) were used to discriminate among the 4 groups, an average of 58% (range 50 – 78%) of reference sites were correctly predicted to the group to which they actually belonged (Table 9). The percent correct classification was highest for Group 4.

Table 8. The 17 habitat variables used in the Discriminant Functions Analysis for lakes

Variable	Discriminant Function
% Coniferous	0.29
% Deciduous	0.14
% Water	0.31
% Wetland	-0.06
2nd Dominant Substrate	-0.43
Base Flow Index	**-1.44**
Constant	-0.70
Distance from Source	**1.92**
Dominant Substrate	0.09
Drainage Area	0.88
Ecoregion	-0.39
Embeddedness	-0.54
Inflow-Outflow	0.46
Mean Annual Precipitation	-0.83
Perimeter	**-2.83**
Slope	-0.34
Stream Order	0.73
Surrounding Material	0.30

Table 9. Total number of sites and the number and proportion of reference sites correctly assigned to each lake group and in the overall model.

Group	1	2	3	4	Total
No. sites	16	26	57	18	117
No. correct	8	13	30	14	65
Proportion	0.50	0.50	0.53	0.78	0.58

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The lake reference sites used in the model were categorized as impaired in 18% of cases (N=117; Table 11; Appendix 6). As in the stream-site analyses, all lake reference sites that were categorized as impaired were assigned to a different group than in the cluster solution. When reference sites were compared to their original group in the model, only 1% was assessed as impaired. The QA/QC replicate reference lake sites were categorized as impaired in 43% of cases. As with the reference sites used in the stream model, the re-sampled lake reference sites that were categorized as impaired were predicted to belong to a different group differewereeye

4. References

Bailey, R. C., R. H. Norris, and T. B. Reynoldson. 2004. Bioassessment of freshwater ecosystems using the reference condition approach. Kluwer Academic Publishers, Boston, Massachusetts.

5. Appendices

Appendix 1 - Sorting and identification QA/QC results.

SORTING QA/QC

Sorter	number sorted	number to be qa/qc (20%)	number qa/qced	average organisms missed (%)
KF	245	49	49	5.3
CSD	146	29	29	6.1
NB	70	14	17	7.6
EL	53	11	14	5.3
PB	50	10	12	8.8
KC	43	9	9	9.2
RG	32	6	7	14.8
DT	18	4	6	29.8
JD	3	1	0	
Total	660	132	143	
Project average w/o DT				8.1

IDENTIFICATION QA/QC

Identifier	number IDed	number to be qa/qc (10%)	number qa/qced	average organisms misIDed (%)	average organisms misIDed & miscounted (%)
LMW	301	30	26	1.2	5.1
CSD	188	19	7	1.2	3.1
KF	87	9			
KC	84	8	10	1.3	5.3
Total	660	66	43		
Project average				1.3	4.5

Appendix 2 - Site information

Site Code	Site Name	Study	Basin	Year	latitude	longitude	altitude (ft)	Inflow/ Outflow
STREAMS								
Mar-31	Blotter Trib	Hemlo Ref Streams	Lk Superior Basin	2003	48.84611	-85.39445	1119	
Mar-32	Kwinkwaga River	Hemlo Ref Streams	Lk Superior Basin	2003	48.86111	-85.30334	1122	
Mar-46	Unnamed Crk	Hemlo Ref Streams	Lk Superior Basin	2003	48.91472	-85.15195	1211	
Mar-47	Davis Crk	Hemlo Ref Streams	Lk Superior Basin	2003	48.87722	-85.10555	1178	
Mar-48	Plate Crk	Hemlo Ref Streams	Lk Superior Basin	2003	48.84472	-85.09250	1201	
Mar-50	Depew River	Hemlo Ref Streams	Lk Superior Basin	2003	48.53722	-85.17167	1329	
Mar-01	Dorothy Crk	Hemlo Ref Streams	Lk Superior Basin	2003	48.94917	-85.93305	899	
Mar-03	Mickey Crk	Hemlo Ref Streams	Lk Superior Basin	2003	48.93667	-85.92500	935	
Mar-05	Mobert Crk	Hemlo Ref Streams	Lk Superior Basin	2003	48.88805	-85.84528	922	
Mar-17	Summers Crk	Hemlo Ref Streams	Lk Superior Basin	2003	48.82444	-85.85778	1046	
Mar-18	Barbara Stream	Hemlo Ref Streams	Lk Superior Basin	2003	48.79500	-85.84917	1007	
Mar-24	Philips Crk	Hemlo Ref Streams	Lk Superior Basin	2003	48.73444	-85.86723	1020	
Mar-28	Lunch Crk	Hemlo Ref Streams	Lk Superior Basin	2003	48.76111	-85.46167	1161	
Abalard Cr.	Abalard Crk	Red Lake Ref Streams	Nelson River Basin	2003	51.11083	-93.72417	1178	
Balmer Trib	Balmer Lake Trib	Red Lake Ref Streams	Nelson River Basin	2003	51.07583	-93.70167	1174	
Chikuni R.	Chikuni River	Red Lake Ref Streams	Nelson River Basin	2003	51.16667	-93.79083	1178	
CMR01	Sawmill Lake Trib	Sudbury Ref Stream	Lk Huron Basin	2003	46.60056	-81.53416	1289	
DIX01	Dixie Crk	Red Lake Ref Streams	Nelson River Basin	2003	50.83972	-93.51806	1106	
Golden Crk	Golden Crk	Red Lake Ref Streams	Nelson River Basin	2003	51.18945	-93.66084	1174	
HEM08	Unnamed Crk - S. Reagan Rd.	Hemlo Ref Streams	Lk Superior Basin	2003	48.66806	-85.58528	1178	
HEM10	Rein Crk	Hemlo Ref Streams	Lk Superior Basin	2003	48.51528	-85.76639	1132	
HEM116	Shabotik River	Hemlo Ref Streams	Lk Superior Basin	2004	48.95222	-85.26195	1102	
HEM117	Strickland River	Hemlo Ref Streams	Lk Superior Basin	2004	48.92611	-85.02556	1145	
HEM12	Binekan Crk	Hemlo Ref Streams	Lk Superior Basin	2003	48.54556	-85.75027	1079	
HEM120	Barehead Crk	Hemlo Ref Streams	Lk Superior Basin	2004	48.93195	-85.93250	932	
HEM121	Nama Crk	Hemlo Ref Streams	Lk Superior Basin	2004	49.13222	-86.01945	951	
HEM122	Rudder Crk	Hemlo Ref Streams	Lk Superior Basin	2004	49.11833	-85.98000	971	
HEM123	Macutagon Crk	Hemlo Ref Streams	Lk Superior Basin	2004	49.16945	-85.60333	1047	
HEM124	Black River	Hemlo Ref Streams	Lk Superior Basin	2004	49.17222	-85.69417	1060	
HEM126	Black River	Hemlo Ref Streams	Lk Superior Basin	2004	48.68806	-86.21222	728	
HEM127	Pic River	Hemlo Ref Streams	Lk Superior Basin	2004	48.70778	-86.28361	617	
HEM128	Tedder River	Hemlo Ref Streams	Lk Superior Basin	2004	48.61167	-85.06695	1352	
HEM129	Tukanee Crk	Hemlo Ref Streams	Lk Superior Basin	2004	48.61417	-85.23055	1299	
HEM130	White River	Hemlo Ref Streams	Lk Superior Basin	2004	48.58778	-85.30666	1214	
HEM14	Triplet Lake Outflow	Hemlo Ref Streams	Lk Superior Basin	2003	48.58306	-85.69417	1148	
HEM16	Oskabukuta River	Hemlo Ref Streams	Lk Superior Basin	2003	48.59444	-85.67083	1096	
HEM22	East Bremner River	Hemlo Ref Streams	Lk Superior Basin	2003	48.52083	-85.40750	1345	
HEM26	Unnamed Trib Oskabukuta	Hemlo Ref Streams	Lk Superior Basin	2003	48.59111	-85.61389	1142	
HEM36	White River	Hemlo Ref Streams	Lk Superior Basin	2003	48.69333	-85.61056	1100	
HEM48	Unnamed Crk	Hemlo Ref Streams	Lk Superior Basin	2003	48.59083	-85.44750	1217	
HEM54	Whitehead's Crk	Hemlo Ref Streams	Lk Superior Basin	2003	48.55750	-85.30278	1253	
HEM68	Wabikoba Crk	Hemlo Ref Streams	Lk Superior Basin	2003	48.71639	-85.79556	1033	
HEM74	Mink Lake Outflow	Hemlo Ref Streams	Lk Superior Basin	2003	48.61028	-85.08750	1450	
ILD01	Island Crk	Sudbury Ref Stream	Lk Huron Basin	2003	46.67667	-81.24555	1043	

Appendix 2 - Site information (contn)

Site Code	Site Name	Study	Basin	Year	latitude	longitude	altitude (ft)	Inflow/ Outflow
ILD02	Sandcherry Crk	Sudbury Ref Stream	Lk Huron Basin	2003	46.66167	-81.21833	938	
LET01	Leano Lake Trib	Red Lake Ref Streams	Nelson River Basin	2003	50.80556	-94.44778	1319	
LSP02	Sable Trib	Sudbury Ref Stream	Lk Huron Basin	2003	46.28250	-82.17416	843	
LSP03	Sable River - Massey	Sudbury Ref Stream	Lk Huron Basin	2003	46.23306	-82.08556	686	
LSR06	Beaudin Crk	Sudbury Ref Stream	Lk Huron Basin	2003	46.29417	-81.75611	692	
LSR07	Ministic Crk Trib	Sudbury Ref Stream	Lk Huron Basin	2003	46.40778	-81.54916	850	
LSR08	Cameron Crk	Sudbury Ref Stream	Lk Huron Basin	2003	46.48361	-81.52444	978	
OPR02	Windy Lake Trib	Sudbury Ref Stream	Lk Huron Basin	2003	46.60778	-81.47389	1188	
RAP01	Rapid River	Sudbury Ref Stream	Lk Huron Basin	2003	46.72445	-81.03555	1079	
RDL15	Red Lake Inflow	Red Lake Ref Streams	Nelson River Basin	2003	51.05583	-94.04278	1184	
RDL16	Unnamed Crk	Red Lake Ref Streams	Nelson River Basin	2003	51.06778	-94.00916	1280	
RED06	Chukuni Trib	Red Lake Ref Streams	Nelson River Basin	2003	50.92250	-93.47972	1220	
RED09	Peisk Crk	Red Lake Ref Streams	Nelson River Basin	2003	51.12861	-94.24611	1286	
RED10	Dixie Cr. Trib	Red Lake Ref Streams	Nelson River Basin	2003	50.80917	-93.79250	1230	
RED12	Dixie Lake Trib	Red Lake Ref Streams	Nelson River Basin	2003	50.83222	-93.73473	1158	
RED22	Stupeck Outflow Trib	Red Lake Ref Streams	Nelson River Basin	2003	50.99111	-94.17361	1201	

Appendix 2 - Site information (contn)

Site Code	Site Name	Study	Basin	Year	latitude	longitude	altitude (ft)	Inflow/ Outflow
SUD23	Onaping River	Sudbury Ref Stream	Lk Huron Basin	2004	46.68250	-81.40528	1106	
SUD24	Bailey Crk	Sudbury Ref Stream	Lk Huron Basin	2004	46.79889	-81.60028	1273	
SUD25	East Spanish River	Sudbury Ref Stream	Lk Huron Basin	2004	47.19695	-81.85944	1214	
USR12	Low Water Crk	Sudbury Ref Stream	Lk Huron Basin	2003	47.11111	-81.67917	1352	
VER01	Vermilion River	Sudbury Ref Stream	Lk Huron Basin	2003	46.81917	-80.95695	1060	
ONP01	Onaping River	Sudbury Urban Streams	Lk Huron Basin	2003	46.66333	-81.39250	1043	
OPR01	High Cliff Crk	Sudbury Urban Streams	Lk Huron Basin	2003	46.62944	-81.40334	1086	
PAN03	Whitefish Lake	Sudbury Urban Streams	Lk Huron Basin	2003	46.42944	-80.94055	761	
PAN04	Unnamed Stream - Hwy 69	Sudbury Urban Streams	Lk Huron Basin	2003	46.43389	-80.96639	850	
RAM01	Lily Crk	Sudbury Urban Streams	Ramsey	2003	46.46861	-81.01250	824	
RMF01	Romford Crk	Sudbury Urban Streams	Lk Huron Basin	2003	46.48472	-80.84834	830	
ROB01	Robinson Lake Trib	Sudbury Urban Streams	Lk Huron Basin	2003	46.45417	-81.03917	820	

Appendix 2 - Site information (contn)

Site Code	Site Name	Study	Basin	Year	latitude	longitude	altitude (ft)	Inflow/ Outflow
HEM44	Unnamed Lake	Hemlo Small Ref Lakes	Lk Superior Basin	2003	48.50945	-85.45778	1299	Inflow
HEM46	Unnamed Lake	Hemlo Small Ref Lakes	Lk Superior Basin	2003	48.50750	-85.46250	1319	Outflow
HEM50	Whitefish Lake	Hemlo Small Ref Lakes	Lk Superior Basin	2003	48.50583	-85.32555	1365	Inflow
HEM52	Whitefish Lake	Hemlo Small Ref Lakes	Lk Superior Basin	2003	48.51361	-85.31528	1388	Outflow

Appendix 2 - Site information (contn)

Site Code	Site Name	Study	Basin	Year	latitude	longitude	altitude (ft)	Inflow/ Outflow
RED02	Red Lake - Pipestone Bay	Red Lake Large Ref Lakes	Nelson River Basin	2003	51.07972	-94.27444	1174	Inflow
RED03	Red Lake - St. Paul Bay	Red Lake Large Ref Lakes	Nelson River Basin	2003	51.01694	-93.92111	1161	Inflow
RED04	Red Lake	Red Lake Large Ref Lakes	Nelson River Basin	2003	50.91278	-93.53555	1142	Outflow
RED05	Lund Lake	Red Lake Large Ref Lakes	Nelson River Basin	2003	51.10111	-94.29694	1247	Outflow
RED07	Unnamed Lake	Red Lake Small Ref Lakes	Nelson River Basin	2003	51.10333	-94.28333	1234	Inflow
RED08	Tote Lake	Red Lake Small Ref Lakes	Nelson River Basin	2003	50.81445	-93.52306	1204	Outflow
RED11	Unnamed Lake	Red Lake Small Ref Lakes	Nelson River Basin	2003	51.14139	-94.19889	1371	Outflow
RED13	Unnamed Lake	Red Lake Small Ref Lakes	Nelson River Basin	2003	51.13750	-94.18945	1332	Inflow
RED14	Unnamed Lake - near Detour	Red Lake Small Ref Lakes	Nelson River Basin	2003	50.90694	-94.24695	1309	Inflow
RED16	Unnamed Lake - near Detour	Red Lake Small Ref Lakes	Nelson River Basin	2003	50.90611	-94.25445	1302	Outflow
RED18	Johnson Lake	Red Lake Small Ref Lakes	Nelson River Basin	2003	50.99222	-94.19444	1243	Outflow
RED19	Unnamed Lake	Red Lake Small Ref Lakes	Nelson River Basin	2003	51.08556	-94.01222	1286	Outflow
RED20	Johnson Lake	Red Lake Small Ref Lakes	Nelson River Basin	2003	50.99000	-94.20750	1240	Inflow
RED21	Unnamed Lake	Red Lake Small Ref Lakes	Nelson River Basin	2003	51.08972	-94.00333	1302	Outflow
RED23	Unnamed Lake	Red Lake Small Ref Lakes	Nelson River Basin	2003	51.10972	-93.96083	1289	Outflow
RED24	Unnamed Lake	Red Lake Small Ref Lakes	Nelson River Basin	2003	50.91528	-94.28500	1299	Outflow
RED25	Unnamed Lake	Red Lake Small Ref Lakes	Nelson River Basin	2003	51.09945	-94.28500	1224	Outflow
RED27	Whiteass Lake	Red Lake Large Ref Lakes	Nelson River Basin	2003	51.18528	-94.06445	1339	Inflow
RED28	Unnamed Lake near Slay's Bay	Red Lake Small Ref Lakes	Nelson River Basin	2003	50.99445	-94.10083	1188	Outflow
RED29	Whiteass Lake	Red Lake Large Ref Lakes	Nelson River Basin	2003	51.20000	-94.04056	1316	Outflow
RED30	Tack Lake	Red Lake Large Ref Lakes	Nelson River Basin	2003	50.93722	-94.04472	1207	Inflow
RED31	Corallen Lake	Red Lake Large Ref Lakes	Nelson River Basin	2003	51.14750	-93.97694	1243	Inflow
RED32	Tack Lake	Red Lake Large Ref Lakes	Nelson River Basin	2003	50.94389	-94.04111	1201	Outflow
RED33	Corallen Lake	Red Lake Large Ref Lakes	Nelson River Basin	2003	51.16667	-93.93056	1207	Outflow
RED40	Flat Lake	Red Lake Large Ref Lakes	Nelson River Basin	2003	50.96972	-93.96194	1204	Inflow
RED41	Sidace Lake	Red Lake Large Ref Lakes	Nelson River Basin	2003	51.29861	-93.52139	1348	Outflow
RED42	Flat Lake	Red Lake Large Ref Lakes	Nelson River Basin	2003	50.96111	-93.93723	1198	Outflow
RED43	Sidace Lake	Red Lake Large Ref Lakes	Nelson River Basin	2003	51.31722	-93.49139	1365	Inflow
RED44	Snib Lake	Red Lake Large Ref Lakes	Nelson River Basin	2003	51.00361	-93.85639	1174	Outflow
RED46	Snib Lake	Red Lake Large Ref Lakes	Nelson River Basin	2003	50.99500	-93.87583	1174	Inflow
RED51	Spiers Lake	Red Lake Small Ref Lakes	Nelson River Basin	2003	50.97944	-93.97305	1227	Outflow
RED52	Upper Medicine Stone	Red Lake Large Ref Lakes	Nelson River Basin	2003	50.90667	-94.00500	1240	Inflow
RED53	Spiers Lake	Red Lake Small Ref Lakes	Nelson River Basin	2003	50.98389	-93.97667	1247	Inflow
RED54	Upper Medicine Stone	Red Lake Large Ref Lakes	Nelson River Basin	2003	50.91306	-94.04583	1227	Outflow
RED56	Russett Lake	Red Lake Large Ref Lakes	Nelson River Basin	2003	50.96778	-93.93056	1198	Inflow
RED58	Russett Lake	Red Lake Large Ref Lakes	Nelson River Basin	2003	50.97334	-93.94000	1191	Outflow
RED69	Dixie Lake	Red Lake Large Ref Lakes	Nelson River Basin	2003	50.81972	-93.72361	1145	Inflow
RED71	Dixie Lake	Red Lake Large Ref Lakes	Nelson River Basin	2003	50.83306	-93.67889	1145	Outflow
STO01	Stone Lake	Red Lake Large Ref Lakes	Nelson River Basin	2003	50.88528	-93.78528	1201	Inflow
STO02	Stone Lake	Red Lake Large Ref Lakes	Nelson River Basin	2003	50.89528	-93.73556	1201	Outflow

Appendix 2 - Site information (contn)

Site Code	Site Name	Study	Basin	Year	latitude	longitude	altitude (ft)	Inflow/ Outflow
TIM10	Clear Lake	Timmins Small Ref Lakes	Moose River Basin	2003	48.30528	-81.28944	1014	Outflow
TIM14	Hillary Lake	Timmins Small Ref Lakes	Moose River Basin	2003	48.23056	-81.78472	1184	Outflow
TIM20	Reid Lake	Timmins Small Ref Lakes	Moose River Basin	2003	48.40667	-81.32889	1014	Outflow
TIM50	Levalley Lake	Timmins Small Ref Lakes	Moose River Basin	2003	48.37917	-81.79111	1092	Inflow
TIM51	Levalley Lake	Timmins Small Ref Lakes	Moose River Basin	2003	48.37194	-81.80556	1083	Outflow
TIM52	Jowsey Lake	Timmins Large Ref Lakes	Moose River Basin	2003	48.36778	-81.73333	1086	Outflow
TIM53	Jowsey Lake	Timmins Large Ref Lakes	Moose River Basin	2003	48.37611	-81.72889	1099	Inflow
TIM54	Kamiskotia Lake	Timmins Large Ref Lakes	Moose River Basin	2003	48.57306	-81.61584	932	Outflow
TIM55	Kamiskotia Lake	Timmins Large Ref Lakes	Moose River Basin	2003	48.55750	-81.62805	938	Inflow
TIM58	Kenogamissi Lake	Timmins Large Ref Lakes	Moose River Basin	2003	48.34000	-81.49111	1017	Outflow
TIM59	Kenogamissi Lake	Timmins Large Ref Lakes	Moose River Basin	2003	48.29639	-81.48333	1020	Inflow
TIM60	Big Water	Timmins Large Ref Lakes	Moose River Basin	2003	48.61666	-81.26833	938	Outflow
TIM61	Big Water	Timmins Large Ref Lakes	Moose River Basin	2003	48.61167	-81.29472	932	Inflow
USR01	Dowes Lake	Sudbury Small Ref Lakes	Upper Spanish River	2003	46.74667	-81.58583	1368	Inflow
USR02	Dowes Lake	Sudbury Small Ref Lakes	Upper Spanish River	2003	46.74500	-81.59889	1368	Outflow
USR10	Upper Marquette Lake	Sudbury Small Ref Lakes	Lk Huron Basin	2003	47.16083	-81.72417	1414	Outflow
USR11	Halfway Lake	Sudbury Large Ref Lakes	Lk Huron Basin	2003	46.88250	-81.64584	1329	Outflow
USR13	Halfway Lake	Sudbury Large Ref Lakes	Lk Huron Basin	2003	46.90333	-81.63250	1335	Inflow
HEM60	Frank Lake	Hemlo Hist Impacted Small Lks	Lk Superior Basin	2003	48.65361	-85.84889	1138	Inflow
HEM62	Frank Lake	Hemlo Hist Impacted Small Lks	Lk Superior Basin	2003	48.65111	-85.83167	1122	Outflow
HEM64	Lim Lake	Hemlo Hist Impacted Small Lks	Lk Superior Basin	2003	48.67028	-85.90195	1112	Inflow
HEM66	Lim Lake	Hemlo Hist Impacted Small Lks	Lk Superior Basin	2003	48.66389	-85.89167	1102	Outflow
RED01	Red Lake - Pipestone Bay	Red Lk Hist Impacted Large Lks	Nelson River Basin	2003	51.06917	-94.23333	1181	
RED35	Rowan Lake	Red Lk Hist Impacted Small Lks	Nelson River Basin	2003	51.06250	-94.11694	1181	Outflow
RED37	Balmer Lake	Red Lk Hist Impacted Large Lks	Nelson River Basin	2003	51.06389	-93.73055	1165	Outflow
RED39	Balmer Lake	Red Lk Hist Impacted Large Lks	Nelson River Basin	2003	51.07555	-93.72111	1178	Inflow
RED47	Florin Lake	Red Lk Hist Impacted Small Lks	Nelson River Basin	2003	51.00528	-93.82166	1194	Inflow
RED49	Florin Lake	Red Lk Hist Impacted Small Lks	Nelson River Basin	2003	51.00917	-93.82056	1207	Outflow
RED55	Derlak Lake	Red Lk Hist Impacted Small Lks	Nelson River Basin	2003	50.98333	-93.89528	1270	Outflow
RED61	Red Lake - Impacted site	Red Lk Hist Impacted Large Lks	Nelson River Basin	2003	51.07833	-93.82250	1174	

Appendix 3 - Water Chemistry

Site Code	Year	Al	Alkalinity	As	CN(t)	Ca	Cd	Conductivity	Cu	DO	DOC	Fe	Hardness	K	Mg
		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(uS/cm)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
STREAMS															
Mar-31	2003	0.011	106	0.001	0.001	39.05	0.0002	251.0	0.0005	12.8	13.14	0.078	128	0.39	7.30
Mar-32	2003	0.013	80	0.001	0.001	25.05	0.0002	185.9	0.0005	11.2	10.08	0.024	84	0.47	5.14
Mar-46	2003	0.027	71	0.003	0.001	22.95	0.0003	162.6	0.0005	6.5	12.72	0.084	81	0.36	5.63
Mar-47	2003	0.028	59	0.001	0.001	20.10	0.0003	146.2	0.0005	10.3	13.90	0.082	70	0.27	4.86
Mar-48	2003	0.013	92	0.001	0.001	29.51	0.0003	218.0	0.0005	9.4	9.11	0.042	100	0.36	6.40
Mar-48	2004	0.018	114	0.001	0.001	37.54	0.0019	160.5	0.0005	10.1	10.56	0.035	122	0.36	6.93
Mar-50	2003	0.008	71	0.001	0.001	23.54	0.0003	182.4	0.0010	10.3	5.72	0.028	78	0.43	4.57
Mar-01	2003	0.118	99	0.002	0.002	34.13	0.0002	302.0	0.0005	10.6	18.32	0.140	114	0.59	7.11
Mar-03	2003	0.121	75	0.001	0.002	22.14	0.0002	168.0	0.0005	8.7	17.29	0.138	77	0.12	5.29
Mar-05	2003	0.071	57	0.001	0.002	19.05	0.0002	141.2	0.0005	8.3	15.28	0.070	62	0.12	3.51
Mar-17	2003	0.046	86	0.001	0.001	32.53	0.0003	295.0	0.0010	10.5	15.63	0.030	102	0.31	5.11
Mar-18	2003	0.088	41	0.001	0.001	13.44	0.0003	112.2	0.0005	9.9	21.05	0.074	47	0.30	3.14
Mar-18	2004	0.098	45	0.002	0.001	16.58	0.0018	76.6	0.0005	10.1	18.86	0.094	56	0.36	3.49
Mar-24	2003	0.092	34	0.001	0.001	12.20	0.0002	174.3	0.0010	6.8	21.00	0.125	43	0.27	2.93
Mar-28	2003	0.035	64	0.001	0.001	19.61	0.0002	149.1	0.0005	5.7	14.02	0.052	67	0.54	4.39
Abalard Crk	2003	0.110	30	0.025	0.001	10.59	0.0002	72.7	0.0005	5.5	38.10	0.509	40	0.74	3.37
Balmer Trib	2003	0.140	41	0.094	0.001	16.20	0.0025	109.1	0.0005	3.9	52.44	1.430	55	1.14	3.56
Chikuni R.	2003	0.058	26	0.014	0.001	7.88	0.0002	64.3	0.0005	9.9	11.98	0.221	28	0.54	1.89
CMR01	2003	0.134	8	0.001	0.001	3.26	0.0002	42.0	0.0020	5.6	10.93	0.796	13	0.39	1.07
DIX01	2003	0.238	44	0.001	0.001	14.98	0.0002	106.8	0.0005	6.4	28.39	0.454	55	1.00	4.33
Golden Crk	2003	0.214	39	0.003	0.001	13.95	0.0002	96.8	0.0005	7.4	28.39	0.670	49	0.80	3.53
HEM08	2003	0.071	33	0.001	0.002	10.13	0.0002	44.1	0.0010	8.3	16.78	0.074	36	0.47	2.53
HEM10	2003	0.222	18	0.001	0.002	7.37	0.0002	54.8	0.0010	8.3	28.53	0.126	25	0.19	1.58
HEM116	2004	0.049	92	0.001	0.001	28.05	0.0019	119.2	0.0005	10.0	13.66	0.229	94	0.33	5.76
HEM117	2004	0.027	78	0.003	0.001	25.38	0.0019	112.3	0.0005	9.1	27.24	0.152	86	0.30	5.42
HEM12	2003	0.131	41	0.001	0.002	14.18	0.0002	103.9	0.0010	6.7	25.63	0.106	48	0.25	3.14
HEM120	2004	0.173	75	0.001	0.001	27.89	0.0019	131.6	0.0005	11.0	17.04	0.215	91	0.32	5.26
HEM121	2004	0.080	72	0.001	0.001	26.23	0.0019	105.6	0.0005	11.1	16.38	0.229	86	0.30	4.98
HEM122	2004	0.052	126	0.001	0.001	50.27	0.0019	222.0	0.0018	8.4	14.67	0.090	158	0.79	7.93
HEM123	2004	0.029	98	0.002	0.001	33.30	0.0018	145.2	0.0005	9.7	13.58	0.090	108	0.27	5.95
HEM124	2004	0.050	76	0.001	0.001	26.64	0.0019	112.6	0.0005	10.1	14.72	0.147	87	0.23	4.94
HEM126	2004	0.241	76	0.001	0.001	28.79	0.0020	124.4	0.0005	9.6	13.10	0.310	94	0.35	5.33
HEM127	2004	0.609	90	0.001	0.001	35.61	0.0019	131.1	0.0022	9.9	13.00	0.784	115	0.58	6.41
HEM128	2004	0.015	70	0.003	0.001	24.16	0.0019	115.1	0.0005	9.6	7.70	0.054	79	0.34	4.48
HEM129	2004	0.003	30	0.001	0.001	9.97	0.0019	49.0	0.0005	10.1	5.20	0.024	34	0.19	2.24
HEM130	2004	0.040	74	0.001	0.001	21.07	0.0019	112.7	0.0005	11.1	6.20	0.095	70	0.31	4.24
HEM14	2003	0.091	28	0.001	0.001	9.31	0.0002	74.4	0.0005	6.3	13.90	0.057	31	0.37	1.98
HEM16	2003	0.058	43	0.001	0.001	13.71	0.0002	104.2	0.0005	8.0	16.28	0.100	46	0.40	2.85

Appendix 3 - Water Chemistry (contn)

Site Code	Mo	NH3	NO3	Na	Ni	Pb	SO4	TP(Wat)	TSS	Temp(Air)	Temp(Surface)	Zn	pH
	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	°C	°C	(mg/L)	(pH)
STREAMS													
Mar-31	0.0004	0.060	0.04	0.771	0.0002	0.0003	1.38	0.012	0.5	8.5	7.1	0.001	7.7
Mar-32	0.0004	0.039	0.02	0.755	0.0002	0.0003	2.15	0.009	0.5	8.7	8.8	0.001	8.0
Mar-46	0.0087	0.025	0.02	0.626	0.0007	0.0080	1.65	0.010	0.5	19.3	9.7	0.003	7.4
Mar-47	0.0004	0.024	0.01	0.896	0.0007	0.0007	1.83	0.013	0.5	15.7	9.7	0.001	7.4
Mar-48	0.0004	0.023	0.02	0.852	0.0002	0.0009	1.96	0.011	0.5	13.0	9.5	0.001	7.9
Mar-48	0.0004	0.019	0.01	0.639	0.0023	0.0003	2.01	0.011	0.5	2.0	7.6	0.003	8.1
Mar-50	0.0004	0.031	0.01	2.590	0.0002	0.0008	2.79	0.012	0.5	13.5	9.3	0.001	7.7
Mar-01	0.0093	0.026	0.06	8.610	0.0043	0.0006	2.59	0.028	10.0	4.7	5.9	0.020	7.7
Mar-03	0.0076	0.023	0.04	0.842	0.0002	0.0042	2.33	0.016	3.0	5.9	5.3	0.001	7.7
Mar-05	0.0008	0.025	0.04	0.597	0.0002	0							

Appendix 3 - Water Chemistry (contn)

Site Code	Year	Al	Alkalinity	As	CN(t)	Ca	Cd	Conductivity	Cu	DO	DOC	Fe	Hardness	K	Mg

Appendix 3 - Water Chemistry (contn)

Site Code	Mo	NH3	NO3	Na	Ni	Pb	SO4	TP(Wat)	TSS	Temp(Air)

Appendix 3 - Water Chemistry (contn)

Site Code	Year	Al	Alkalinity	As	CN(t)	Ca	Cd	Conductivity	Cu	DO	DOC	Fe	Hardness	K	Mg
		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(uS/cm)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
SUD18	2004	0.017	14	0.001	0.001	4.92	0.0002	32.0	0.0005	8.9	3.35	0.097	18	0.31	1.33
SUD19	2004	0.074	15	0.001	0.001	4.58	0.0002	30.2	0.0005	8.5	6.71	0.427	17	0.35	1.26
SUD20	2004	0.031	29	0.001	0.001	8.13	0.0002	53.6	0.0005	8.1	4.96	0.658	31	0.55	2.54
SUD21	2004	0.046	14	0.001	0.001	4.81	0.0002	29.7	0.0005	8.0	3.55	0.423	17	0.36	1.10
SUD22	2004	0.022	10	0.005	0.001	3.66	0.0002	24.1	0.0005	9.2	5.76	0.098	12	0.20	0.80
SUD23	2004	0.029	11	0.004	0.001	4.14	0.0002	28.6	0.0005	8.8	7.34	0.225	15	0.27	1.11
SUD24	2004	0.043	8	0.003	0.001	3.55	0.0002	29.0	0.0005	8.5	13.73	0.116	13	0.23	0.92
SUD25	2004	0.108	19	0.002	0.001	7.49	0.0002	41.3	0.0005	8.1	5.21	0.236	26	0.24	1.72
USR12	2003	0.141	16	0.001	0.001	5.30	0.0004	93.2	0.0005	5.0	9.32	0.475	19	0.36	1.49
VER01	2003	0.045	16	0.002	0.001	6.45	0.0002	66.9	0.0005	9.1	4.08	0.198	23	0.42	1.55
ONP01	2003	0.059	10	0.001	0.001	4.42	0.0002	53.2	0.0010	8.6	5.57	0.200	16	0.29	1.22
OPR01	2003	0.044	7	0.002	0.001	7.41	0.0002	40.7	0.0010	6.7	6.51	0.784	29	0.56	2.66
PAN03	2003	0.037	72	0.001	0.001	28.36	0.0002	739.0	0.0030	3.1	6.60	0.632	103	3.31	7.88
PAN04	2003	0.332	39	0.001	0.001	19.80	0.0002	740.0	0.0330	7.5	7.72	0.968	75	3.98	6.27
RAM01	2003	0.264	64	0.001	0.001	26.62	0.0002	800.0	0.0100	3.3	7.70	0.636	98	3.33	7.55
RMF01	2003	0.027	38	0.001	0.001	11.52	0.0002	313.0	0.0220	7.4	7.54	0.191	49	3.66	4.99
ROB01	2003	0.016	40	0.001	0.002	16.13	0.0002	467.0	0.0130	7.2	11.38	0.038	60	1.81	4.80
TIM12	2003	0.032	82	0.001	0.001	24.92	0.0002	206.0	0.0005	7.8	11.46	0.167	89	0.35	6.51
TIM16	2003	0.036	42	0.001	0.001	14.54	0.0002	123.7	0.0010	7.8	8.64	0.110	50	0.25	3.27
TIM18	2003	0.007	159	0.001	0.023	145.70	0.0003	1524.0	0.0120	6.9	7.45	0.041	628	6.43	64.04
TIM56	2003	0.084	69	0.001	0.002	23.08	0.0002	157.9	0.0005	11.2	25.68	0.338	79	0.46	5.22
TIM57	2003	0.021	166	0.003	0.003	153.20	0.0002	1577.0	0.0020	8.8	3.39	0.025	578	3.43	47.41
UPV01	2003	0.029	25	0.001	0.002	9.55	0.0002	92.7	0.0020	6.9	10.12	0.241	33	0.57	2.25
WHR01	2003	0.041	88	0.003	0.001	41.51	0.0002	411.0	0.0030	6.1	16.10	0.845	136	0.90	7.95
WHR02	2003	0.016	232	0.004	0.001	77.06	0.0002	583.0	0.0020	6.2	27.51	0.157	299	0.88	25.78
WHR03	2003	0.049	65	0.004	0.001	22.61	0.0002	164.1	0.0040	4.0	35.64	0.328	81	0.47	5.95
WHR04	2003	0.136	314	0.001	0.001	125.80	0.0003	2060.0	0.0040	3.3	33.93	1.820	449	3.13	32.67
WHR05	2003	0.145	20	0.001	0.001	15.01	0.0002	414.0	0.0510	5.0	10.28	1.740	57	2.08	4.70
WHR50	2003	0.036	70	0.002	0.001	26.22	0.0002	335.0	0.0070	7.6	6.80	0.477	88	1.06	5.52
FST1	2004	0.162	10	0.001	0.001	64.24	0.0042	945.0	0.1835	12.7	3.20	0.218	256	2.45	23.10
FST1	2003	0.237	11			18.70			0.1960	8.8	4.90	0.160		0.97	9.50
HIS01	2003	0.269	55	0.004	0.001	49.54	0.0004	647.0	0.0005	5.4	15.19	0.714	154	3.30	7.23
JC2	2004	0.092	68	0.001	0.001	46.85	0.0027	793.0	0.0381	11.7	4.80	0.774	165	4.13	11.77
JC2	2003	0.133	42			21.90			0.0620	11.3	5.20	0.580		2.00	9.13
Nolin McNeil	2003	0.121	28			333.00			0.0970	11.6	1.30	0.350		12.40	17.70
RED57	2003									9.0					
RED75	2003	0.039	135	0.219	0.041	55.17	0.0003	540.0	0.0110	4.9	19.45	0.342	210	4.35	17.54
WHR5.0	**0.1830.6.1(3)0.1(0.6.1(3)0.1()8.3(E)1(3)-S)-16(0)-10171.5(7.3231.)-7.7.3231.(8)32 153(0.641)-1720.6(55HE69.6.2(11(0.)-7517(32.0)0(.)-7.9(580)-7242.6(2.)-16.**														

Appendix 3 - Water Chemistry (contn)

Site Code	Mo	NH3	NO3	Na	Ni	Pb	SO4	TP(Wat)	TSS	Temp(Air)	Temp(Surface)	Zn	pH
	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	°C	°C	(mg/L)	(pH)
SUD18	0.0004	0.031	0.04	0.960	0.0008	0.0024	6.09	0.004	0.5	11.7	14.3	0.004	7.3
SUD19	0.0004	0.030	0.04	1.058	0.0016	0.0003	5.04	0.009	0.5	12.6	13.0	0.003	7.0
SUD20	0.0004	0.048	0.02	1.229	0.0002	0.0003	4.96	0.005	0.5	12.6	10.8	0.003	7.1
SUD21	0.0004	0.048	0.01	0.829	0.0002	0.0003	4.98	0.010	0.5	19.8	14.1	0.002	6.9
SUD22	0.0004	0.041	0.02	0.726	0.0002	0.0003	5.65	0.003	0.5	13.0	12.7	0.004	6.9
SUD23	0.0004	0.056	0.03	1.145	0.0034	0.0003	5.79	0.005	0.5	11.1	12.0	0.005	7.1
SUD24	0.0004	0.043	0.02	1.702	0.0042	0.0003	5.75	0.005	1.0	13.9	15.0	0.006	6.8
SUD25	0.0004	0.046	0.07	1.288	0.0026	0.0003	4.19	0.008	0.5	13.5	15.3	0.003	7.1
USR12	0.0004	0.083	0.04	5.040	0.0329	0.0003	4.89	0.015	0.5	12.5	16.6	0.007	6.6
VER01	0.0008	0.025	0.11	1.050	0.0064	0.0003	8.56	0.006	0.5	6.1	5.7	0.002	7.1
ONP01	0.0004	0.031	0.06	1.330	0.0102	0.0003	7.83	0.008	0.5	4.3	4.6	0.003	6.7
OPR01	0.0004	0.027	0.06	1.680	0.0064	0.0003	5.94	0.020	9.0	20.1	17.8	0.002	6.4
PAN03	0.0004	0.025	0.03	62.050	0.0406	0.0007	17.70	0.050	1.0	16.5	14.6	0.009	7.0
PAN04	0.0004	0.023	0.22	66.520	0.1030	0.0003	31.40	0.017	3.0	19.3	15.0	0.037	7.3
RAM01	0.0004	0.102	0.02	88.450	0.0353	0.0003	14.10	0.029	13.0	13.8	15.2	0.005	7.0
RMF01	0.0004	0.039	0.47	22.610	0.1120	0.0003	20.10	0.019	0.5	9.1	5.5	0.005	7.2
ROB01	0.0004	0.035	0.01	37.170	0.0582	0.0003	18.20	0.020	3.0	7.0	7.1	0.003	6.7
TIM12	0.0008	0.017	0.06	2.150	0.0011	0.0003	8.60	0.012	2.0	3.0	5.5	0.001	7.7
TIM16	0.0008	0.026	0.05	1.950	0.0004	0.0003	4.88	0.014	0.5	-1.0	5.7	0.001	7.6
TIM18	0.0008	0.023	2.86	45.000	0.0130	0.0006	470.00	0.014	0.5	-1.0	3.8	0.004	7.6

Appendix 3 - Water Chemistry (contn)

Site Code	Year	Al	Alkalinity	As	CN(t)	Ca	Cd	Conductivity	Cu	DO	DOC	Fe	Hardness	K	Mg
		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(uS/cm)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
HEM32	2003	0.055	66	0.001	0.001	20.51	0.0002	161.9	0.0005	8.6	15.13	0.126		0.34	4.62
HEM32	2004	0.025	74	0.001	0.001	23.31	0.0009	115.4	0.0005	7.1	12.73	0.086		0.32	4.57
HEM34	2003	0.099	40	0.001	0.001	13.04	0.0002	100.2	0.0005	9.0	14.87	0.114		0.34	3.00
HEM34	2004	0.051	54	0.001	0.001	16.36	0.0009	75.9	0.0030	8-6.1(00-.52)-6.1(0)M34			2003	79.5(0.)-6.1(00.)-14.4	

Appendix 3 - Water Chemistry (contn)

Site Code	Mo	NH3	NO3	Na	Ni	Pb	SO4	TP(Wat)	TSS	Temp(Air)	Temp(Surface)	Zn	pH
	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	°C	°C	(mg/L)	(pH)
HEM32	0.0008	0.055	0.04	0.820	0.0002	0.0023	1.93	0.013	2.0	2.0	6.2	0.002	7.6
HEM32	0.0004	0.073	0.02	0.657	0.0002	0.0003	2.04	0.009	0.5	9.0	9.4	0.002	7.9
HEM34	0.0004	0.039	0.01	0.766	0.0002	0.0003	1.83	0.014	0.5	-2.0	4.4	0.002	7.3
HEM34	0.0004	0.033	0.02	0.577	0.0024	0.0006	1.77	0.010	0.5	4.1	7.8	0.003	7.3
HEM38	0.0004	0.022	0.01	3.360	0.0002	0.0003	2.28	0.020	2.0	8.0	9.3	0.004	7.8
HEM40	0.0044	0.024	0.01	3.350	0.0005	0.0003	2.23	0.018	0.5	8.0	9.8	0.004	7.9
HEM44	0.0004	0.041	0.01	0.839	0.0002	0.0003	2.10	0.015	0.5	8.0	6.2	0.003	7.0
HEM46	0.0004	0.039	0.03	0.919	0.0009	0.0014	2.21	0.013	0.5	8.0	6.4	0.006	7.2
HEM50	0.0004	0.040	0.03	0.763	0.0011	0.0011	2.16	0.012	0.5	18.0	8.0	0.001	7.5
HEM50	0.0004	0.031	0.01	0.647	0.0004	0.0003	2.67	0.009	1.0	13.1	10.0	0.004	7.8
HEM52	0.0004	0.040	0.04	0.758	0.0003	0.0003	2.27	0.015	0.5	15.0	7.9	0.003	7.6
HEM52	0.0004	0.033	0.01	0.711	0.0024	0.0011	2.64	0.008	0.5	13.1	10.7	0.006	7.7
HEM56	0.0004	0.064	0.05	3.400	0.0013	0.0011	3.31	0.016	0.5	18.0	9.9	0.001	7.8
HEM58	0.0004	0.071	0.02	2.100	0.0013	0							

Appendix 3 - Water Chemistry (contn)

Site Code	Year	Al	Alkalinity	As	CN(t)	Ca	Cd	Conductivity	Cu	DO	DOC	Fe	Hardness	K	Mg
		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(uS/cm)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
MARA39	2003	0.010	83	0.001	0.002	25.38	0.0002	184.7	0.0005	9.2	8.40	0.027		0.50	5.33
MARA40	2003	0.014	66	0.001	0.001	23.22	0.0002	164.4	0.0005	9.4	13.28	0.044		0.40	4.93
MARA41	2003	0.008	75	0.001	0.001	22.22	0.0002	162.7	0.0005	8.6	13.16	0.056		0.33	5.11
MARA42	2003	0.012	79	0.001	0.001	23.06	0.0002	173.9	0.0005	10.2	10.67	0.065		0.41	5.50
MARA43	2003	0.069	35	0.001	0.001	12.12	0.0002	99.3	0.0005	6.8	10.86	0.023		0.54	3.04
MARA44	2003	0.013	76	0.002	0.001	22.79	0.0002	163.2	0.0005	8.4	13.93	0.060		0.25	5.36
MARA45	2003	0.010	65	0.001	0.001	20.21	0.0003	156.8	0.0005	9.6	10.18	0.041		0.35	4.89
PAN01	2003	0.004	4	0.001	0.001	2.75	0.0002	39.6	0.0050	6.7	3.86	0.017		0.30	1.00
PAN01	2004	0.022	5	0.001	0.001	2.65	0.0010	21.1	0.0094	9.3	4.06	0.046		0.31	0.87
PAN02	2003	0.063	7	0.003	0.001	3.22	0.0002	44.4	0.0060	5.8	5.30	0.568		0.29	1.25
PAN02	2004	0.013	5	0.006	0.001	2.60	0.0010	20.4	0.0046	8.5	4.01	0.029		0.27	0.86
RED02	2003	0.009	33	0.002	0.002	8.39	0.0002	79.0	0.0005	8.0	6.99	0.010		0.59	2.83
RED03	2003	0.135	36	0.007	0.002	13.25	0.0002	106.2	0.0005	6.5	15.28	0.192		0.76	3.27
RED04	2003	0.019	33	0.007	0.002	11.79	0.0002	98.1	0.0005	6.2	10.95	0.034		0.68	2.78
RED05	2003	0.007	13	0.002	0.002	4.07	0.0002	36.9	0.0005	6.7	10.21	0.030		0.44	1.01
RED07	2003	0.144	6	0.001	0.001	4.84	0.0002	37.3	0.0005	5.5	24.92	0.891		0.38	1.26
RED08	2003	0.006	11	0.001	0.002	2.69	0.0002	30.6	0.0005	7.5	13.21	0.014		0.84	0.80
RED08	2003	0.006	11	0.001	0.002	2.69	0.0002	30.6	0.0005	7.5	13.21	0.014		0.84	0.80
RED11	2003	0.069	10	0.002	0.001	2.08	0.0003	24.7	0.0005	7.1	10.42	0.372		0.35	0.77
RED13	2003	0.113	6	0.001	0.001	2.13	0.0003	24.3	0.0005	10.9	10.90	0.449		0.35	0.77
RED14	2003	0.135	11	0.001	0.002	3.50	0.0003	36.6	0.0005	5.5	16.08	0.647		0.66	1.07
RED16	2003	0.199	9	0.006	0.001	3.82	0.0003	38.3	0.0010	5.6	16.62	0.901		0.77	1.14
RED18	2003	0.008	33	0.002	0.001	12.00	0.0002	90.0	0.0010	8.3	8.64	0.013		0.69	1.99
RED19	2003	0.015	14	0.004	0.001	3.92	0.0002	41.0	0.0010	7.2	8.54	0.041		0.39	1.10
RED20	2003	0.018	24	0.001	0.001	7.03	0.0002	62.5	0.0010	7.5	9.86	0.063		0.53	1.48
RED21	2003	0.101	10	0.001	0.001	2.80	0.0002	32.7	0.0010	6.7	10.82	0.825		0.34	1.01
RED23	2003	0.336	5	0.008	0.001	1.93	0.0002	25.8	0.0005	6.6	16.86	1.120		0.47	0.82
RED24	2003	0.239	21	0.013	0.001	7.77	0.0002	60.6	0.0005	5.4	28.66	0.627		1.04	2.08
RED25	2003	0.168	13	0.003	0.001	4.69	0.0002	37.7	0.0005	6.7	22.00	1.150		0.40	1.17
RED25	2003	0.168	13	0.003	0.001	4.69	0.0002	37.7	0.0005	6.7	22.00	1.150		0.40	1.17
RED27	2003	0.502	6	0.004	0.001	3.90	0.0002	32.9	0.0005	7.7	35.65	2.030		0.31	1.07
RED28	2003	0.052	18	0.008	0.002	5.58	0.0002	52.8	0.0005	6.7	14.10	0.085		0.50	1.51
RED29	2003	0.003	10	0.002	0.002	3.05	0.0002	30.8	0.0005	8.6	8.46	0.013		0.38	0.76
RED29	2003	0.003	10	0.002	0.002	3.05	0.0002	30.8	0.0005	8.6	8.46	0.013		0.38	0.76
RED30	2003	0.032	16	0.002	0.002	6.02	0.0002	53.9	0.0005	7.1	9.58	0.043		0.51	1.30
RED31	2003	0.106	17	0.002	0.002	5.15	0.0002	47.3	0.0005	5.3	10.47	0.403		0.58	1.48
RED32	2003	0.050	16	0.006	0.002	6.26	0.0002	54.5	0.0005	7.5	11.61	0.191		0.50	1.44
RED33	2003	0.013	16	0.040	0.002	4.76	0.0002	46.1	0.0005	8.3	11.33	0.061		0.55	1.35
RED40	2003									4.7					
RED41	2003	0.014	15	0.005	0.001	4.25	0.0002	38.8	0.0005	8.6	8.93	0.093		0.34	0.96
RED42	2003									5.1					
RED43	2003	0.032	13	0.004	0.001	4.29	0.0002	37.9	0.0005	10.5	11.01	0.188		0.32	0.95
RED44	2003									6.3					
RED46	2003									6.1					
RED51	2003									7.2					
RED52	2003	0.039	13	0.001	0.001	4.38	0.0002	44.7	0.0005	6.1	10.04	0.026		0.49	1.16
RED53	2003	0.013	21	0.001		5.57	0.0002	57.3	0.0010	7.0	9.12	0.179		0.50	1.83
RED54	2003	0.028	14	0.001	0.001	4.34	0.0002	45.5	0.0010	4.8	8.01	0.017		0.48	1.17

Appendix 3 - Water Chemistry (contn)

Site Code	Mo	NH3	NO3	Na	Ni	Pb	SO4	TP(Wat)	TSS	Temp(Air)	Temp(Surface)	Zn	pH

Appendix 3 - Water Chemistry (contn)

Site Code	Mo	NH3	NO3	Na	Ni	Pb	SO4	TP(Wat)	TSS	Temp(Air)	Temp(Surface)	Zn	pH
	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	°C	°C	(mg/L)	(pH)
RED56	0.0004	0.064	0.08	3.070	0.0033	0.0003	9.32	0.043	1.0	-1.0	10.1	0.001	7.4
RED58	0.0004	0.050	0.02	3.060	0.0037	0.0003	9.39	0.026	0.5	-1.0	9.9	0.001	7.3
RED69	0.0004	0.046	0.05	1.450	0.0007	0.0003	0.85	0.028	0.5	0.8	5.5	0.001	6.7
RED71	0.0004	0.086	0.03	1.480	0.0012	0.0016	1.21	0.043	10.0	2.1	6.2	0.001	7.3
STO01	0.0004	0.018	0.09	1.050	0.0002	0.0003	1.56	0.012	1.0	9.0	12.7	0.001	7.1
STO02	0.0004	0.017	0.08	1.120	0.0002	0.0003	1.78	0.015	1.0	8.7	12.6	0.001	7.2
TIM02	0.0008	0.017	0.02	1.450	0.0003	0.0019	6.25	0.015	1.0	-1.0	8.1	0.001	8.2
TIM04	0.0008	0.014	0.01	1.330	0.0004	0.0008	6.21	0.019	0.5	-1.0	8.5	0.002	8.2
TIM06	0.0008	0.015	0.04	0.797	0.0017	0.0012	4.33	0.010	0.5	0.0	6.4	0.001	7.6
TIM08	0.0008	0.016	0.02	0.871	0.0026	0.0008	3.83	0.008	0.5	-1.0	6.6	0.001	7.4
TIM10	0.0008	0.018	0.02	0.691	0.0009	0.0008	2.03	0.017	0.5	3.0	7.9	0.001	7.4
TIM14	0.0008	0.142	0.03	0.605	0.0006	0.0003	2.05	0.013	1.0	-1.0	5.3	0.001	7.6
TIM20	0.0008	0.023	0.06	1.050	0.0007	0.0006	3.69	0.016	0.5	0.0	6.3	0.001	7.6
TIM50	0.0008	0.021	0.02	0.911	0.0003	0.0006	1.58	0.020	1.0	1.0	3.3	0.001	7.2
TIM51	0.0008	0.022	0.01	0.988	0.0008	0.0006	2.10	0.020	7.0	1.1	3.7	0.001	7.7
TIM52	0.0008	0.021	0.01	0.706	0.0004	0.0006	1.82	0.023	0.5	4.6	6.0	0.001	7.6
TIM53	0.0008	0.018	0.01	0.732	0.0004	0.0003	1.85	0.022	0.5	2.8	6.6	0.001	7.6
TIM54	0.0008	0.017	0.01	3.370	0.0009	0.0003	8.37	0.021	0.5	6.1	5.6	0.023	7.5
TIM55	0.0008	0.016	0.005	2.450	0.0004	0.0003	5.47	0.029	3.0	3.6	5.1	0.012	7.3
TIM58	0.0008	0.045	0.05	1.710	0.0003	0.0003	4.66	0.009	0.5	0.5	5.4	0.001	7.6
TIM59	0.0008	0.043	0.05	0.986	0.0014	0.0003	3.81	0.015	2.0	0.8	3.2	0.001	7.0
TIM60	0.0008	0.036	0.01	7.130	0.0004	0.0003	2.25	0.020	5.0	2.8	4.9	0.001	7.7
TIM61	0.0008	0.035	0.01	12.340	0.0005	0.0003	1.99	0.025	7.0	3.4	4.4	0.001	7.5
USR01	0.0004	0.022	0.01	4.550	0.0060	0.0003	4.91	0.014	0.5	15.9	18.3	0.002	7.1
USR01	0.0004	0.030	0.03	3.295	0.0066	0.0003	5.64	0.006	0.5	17.0	12.3	0.003	7.4
USR02	0.0004	0.023	0.02	4.120	0.0064	0.0003	4.82	0.012	0.5	20.2	19.0	0.002	7.0
USR02	0.0004	0.016	0.03	3.212	0.0075	0.0004	5.50	0.008	1.0	22.2	14.9	0.002	7.2
USR10	0.0008	0.023	0.02	0.669	0.0008	0.0003	4.15	0.010	0.5	13.6	17.6	0.004	5.9
USR11	0.0004	0.027	0.04	4.460	0.0116	0.0003	5.85	0.011	0.5	12.9	16.8	0.001	7.0
USR11	0.0004	0.023	0.005	4.469	0.0002	0.0003	5.70	0.008	1.0	13.0	13.8	0.002	7.0
USR13	0.0004	0.029	0.01	7.480	0.0034	0.0003	5.22	0.013	0.5	12.4	15.7	0.002	6.8
USR13	0.0004	0.041	0.05	4.570	0.0050	0.0003	5.75	0.013	13.0	16.0	16.8	0.004	7.1
HEM60	0.3140	4.660	12	127.700	0.0649	0.0006	932.00	0.009	1.0	8.4	9.5	0.004	7.1
HEM62	0.3140	4.780	12.04	126.800	0.0629	0.0006	946.00	0.009	1.0	8.4	9.4	0.004	7.2
HEM64	0.0713	11.700		132.200	0.1220	0.0006	1185.00	0.013	1.0	10.0	10.4	0.022	7.0
HEM66	0.0762	10.700	9.1	134.500	0.1240	0.0008	1174.00	0.013	1.0	10.0	9.7	0.020	6.9
RED01	0.0004	0.015	0.26	1.140	0.0002	0.0006	2.30	0.005	1.0	7.4	12.7	0.001	7.5
RED35	0.0004	0.551	1.13	1.050	0.0002	0.0011	1.63	0.011	3.0	8.5	9.2	0.001	7.3
RED37	0.0004	0.042	3.87	29.400	0.0459	0.0007	305.00	0.215	11.0	3.8	9.6	0.010	7.8
RED39	0.0008	0.094	0.04	4.760	0.0094	0.0014	33.40	0.151	29.0	4.8	7.3	0.006	7.2
RED47	0.0008	0.043	0.02	11.930	0.0003	0.0003	6.00	0.025	0.5	4.8	10.4	0.001	7.4
RED49	0.0004	0.100	0.02	11.360	0.0004	0.0017	6.52	0.026	2.0	4.8	10.5	0.002	7.4
RED55	0.0004	0.041	0.34	14.550	0.0102	0.0003	96.30	0.101	2.0	2.9	5.4	0.003	7.5
RED61	0.0004	0.031	0.09	1.200	0.0004	0.0003	2.41	0.032	11.0	3.4	10.7	0.002	7.5

Appendix 4A - Stream benthic community data (contn)

site	Sample #	year	Glossosomatidae	Gomphidae	Gyrinidae	Halicaridae	Haliplidae	Helicopsychidae	Heptageniidae	Hyalellidae	Hydraenidae	Hydrobiidae	Hydrodromidae	Hydrophilidae	Hydropsychidae	Hydroptilidae	Hydrozetiidae	Hydryphantidae	Hygrobatidae	Hypogasturidae	Isonychiidae	Isotomidae	Krendowskiidae	Lebertiidae
Mar-31	1	2003	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix 4A - Stream benthic community data (contn)

site	Sample #	year	Lepidostomatidae	Leptoceridae	Leptohyphidae	Leptophlebiidae	Leuctridae	Libellulidae	Limnephilidae	Limnesiidae	Limnocharidae	Lumbriculidae	Lymnaeidae	Macromiidae	Metretopodidae	Molannidae	Muscidae	Naididae	Nemouridae	Neocaridae	Nepidae	Notonectidae	Odontoceridae	Onychiuridae
Mar-31	1	2003	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	31	0	0	0	0	0	0
Mar-32	1	2003	0	1	0	181	0	0	2	0	0	4	3	0	0	0	0	1	0	0	0	0	0	0

Appendix 4A - Stream benthic community data (contn)

site	Sample #	year	Oxidae	Perlidae	Perlodidae	Philopotamidae	Phoridae	Phrygaenidae	Physidae	Pionidae	Planorbidae	Poduridae	Polycentropodidae	Psephenidae	Psychodidae	Psychomyiidae	Pteronarcyidae	Pyralidae	Rhyacophilidae	Sarcophagidae	Sciomysidae	Sericostomatidae	Sialidae	Simuliidae
Mar-31	1	2003	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Mar-32	1	2003	0	0	0	0	0	3	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Mar-46	1	2003	0	0	0	0	0	0	0	0	19	0	1	0	0	0	0	0	0	0	0	0	0	0
Mar-47	1	2003	0	1	0	0	0	1	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	10
Mar-48	1	2003	0	3	1	1	0	0	2	0	1	0	3	0	0	0	0	0	3	0	0	0	0	0
Mar-48	QA/QC1	2004	0	2	1	0	0	0	0	0	1	0	4	0	0	0	0	0	2	0	0	0	0	0
Mar-50	1	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0
Mar-01	1	2003	0	0	0	0	0	0	3	0	3	0	0	0	0	1	0	0	0	0	0	0	2	5
Mar-03	1	2003	0	0	0	0	0	0	1	0	7	0	0	0	4	0	0	0	1	0	0	0	0	1
Mar-05	1	2003	0	0	0	0	0	0	2	0	6	0	2	0	3	0	0	0	0	0	0	0	0	0
Mar-17	1	2003	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mar-18	1	2003	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Mar-18	QA/QC1	2004	0	4	0	5	0	0	0	0	0	0	2	0	0	0	0	0	8	0	0	0	0	0
Mar-24	1	2003	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mar-28	1	2003	0	0	0	0	0	2	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	3
Abalard Cr.	1	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Balmer Trib	1	2003	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Chikuni R.	1	2003	0	3	0	9	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CMR01	1	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
DIX01	1	2003	1	0	0	0	0	1	0	0	22	0	8	0	0	0	0	0	0	0	0	0	1	0
HEM08	1	2003	0	0	0	1	0	0	4	0	2	0	5	0	0	0	0	1	1	0	0	0	0	1
HEM10	1	2003	0	1	0	3	0	0	4	0	4	0	0	0	0	0	0	0	5	0	0	0	0	5
HEM116	1	2004	0	0	0	0	0	1	2	0	3	0	3	0	0	0	0	0	0	0	0	0	2	0
HEM117	1	2004	0	0	2	0	0	0	0	0	1	0	5	0	0	0	1	0	0	0	0	0	0	3
HEM12	1	2003	0	0	3	1	0	0	0	0	0	0	1	0	0	0	0	0	3	0	0	0	0	111
HEM120	1	2004	1	0	0	0	0	1	3	0	0	0	1	0	7	0	0	0	0	0	0	0	0	20
HEM121	1	2004	0	2	3	1	0	0	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	22
HEM122	1	2004	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	23
HEM123	1	2004	0	0	0	0	0	0	0	0	9	0	1	0	0	0	0	1	0	0	0	0	2	4
HEM124	1	2004	0	0	0	0	0	1	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	1
HEM126	1	2004	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	1
HEM127	1	2004	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
HEM128	1	2004	0	0	0	0	0	4	0	0	6	0	11	0	0	0	0	0	0	0	0	0	0	0
HEM129	1	2004	0	6	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
HEM130	1	2004	0	2	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HEM14	1	2003	0	0	0	0	0	0	0	0	2	0	5	0	0	0	0	0	0	0	0	0	0	12
HEM16	1	2003	0	1	1	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55
HEM16	QA/QC1	2004	0	1	1	0	0	0	0	0	0	0	6	0	0	0	0	0	1	0	0	0	0	1
HEM22	1	2003	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	104
HEM26	1	2003	0	0	0	0	0	2	0	0	6	0	1	0	0	1	0	0	0	0	0	0	0	23
HEM36	1	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HEM48	1	2003	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	1
HEM54	1	2003	0	0	0	0	0	1	0	0	5	0	1	0	0	0	0	0	0	0	0	0	0	0
HEM54	QA/QC1	2004	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0

Appendix 4A - Stream benthic community data (contn)

site	Sample #	year	# cells	Total	Aeshnidae	Ancylidae	Anisitsiellidae	Arrenuridae	Asellidae	Athericidae	Aturidae	Baetidae	Baetiscidae	Belostomatidae	Brachycentridae	Caenidae	Calopterygidae	Cambaridae	Capniidae	Ceratopogonidae	Chironomidae	Chloroperlidae	Chrysomelidae	Coenagrionidae
HEM74	1	2003	5	317	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	81	1	0	0
ILD01	1	2003	57	315	2	0	0	0	0	0	0	6	0	0	0	0	0	0	38	7	55	0	0	2
ILD02	1	2003	51	294	0	0	0	0	0	0	0	2	0	0	0	3	3	0	11	7	105	5	0	1
ILD02	QA/QC1	2004	30	304	1	1	0	0	0	0	0	3	0	0	0	1	1	0	3	9	104	0	0	0
LET01	1	2003	13	332	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	238	0	0	0
LSP02	1	2003	12	334	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	176	0	0	0
LSP03	1	2003	36	275	0	0	2	0	0	0	0	3	0	0	0	3	0	0	0	9	77	0	0	27
LSR06	1	2003	17	332	0	1	1	0	0	0	0	0	0	0	0	14	0	0	0	2	121	0	0	2
LSR06	QA/QC1	2004	4	304	0	0	1	0	1	0	0	1	0	0	0	21	0	0	0	1	60	0	0	0
LSR07	1	2003	4	300	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	244	0	0	0
LSR07	QA/QC1	2004	6	324	0	0	0	0	0	0	0	6	0	0	0	0	0	0	3	2	274	0	0	0
LSR08	1	2003	5	357	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	3	211	0	0	0
LSR08	QA/QC1	2004	2	516	0	0	0	0	0	0	0	6	0	0	0	0	0	0	2	8	381	0	0	0

Appendix 4A - Stream benthic community data (contn)

site	Sample #	year	Cordulegastridae	Cordulidae	Corixidae	Corydalidae	Crangonyctidae	Culicidae	Curculionidae	Dixidae	Dolichopodidae	Dryopidae	Dugesiidae	Dytiscidae	Elmidae	Empididae	Enchytraeidae	Entomobryidae	Ephemerellidae	Ephemeridae	Erpobdellidae	Gammaridae	Gerridae	Glossiphoniidae
HEM74	1	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	84	0	0	0	0	0
ILD01	1	2003	3	0	0	0	0	0	0	0	0	0	0	0	13	6	0	0	3	0	0	0	0	0
ILD02	1	2003	5	0	0	0	0	0	0	0	0	0	0	0	5	7	0	0	5	0	0	0	0	0
ILD02	QA/QC1	2004	2	0	0	0	0	0	0	0	0	0	0	0	4	12	1	0	3	0	0	0	0	0

Appendix 4A - Stream benthic community data (contn)

site	Sample #	year	Glossosomatidae	Gomphidae	Gyrinidae	Halicaridae	Haliplidae	Helicopsychidae	Heptageniidae	Hyalellidae	Hydraenidae	Hydrobiidae	Hydrodromidae	Hydrophilidae	Hydropsychidae	Hydroptilidae	Hydrozetiidae	Hydryphantidae	Hygrobatidae	Hypogasturidae	Isonychiidae	Isotomidae	Krendowskiidae	Lebertiidae
HEM74	1	2003	0	14	0	0	0	0	7	0	0	0	0	0	42	0	0	0	0	0	0	0	0	0
ILD01	1	2003	4	25	0	0	0	0	43	0	0	0	0	0	15	0	1	0	0	0	0	0	0	0
ILD02	1	2003	1	22	0	0	0	0	45	2	0	0	0	0	2	3	0	0	1	0	0	0	0	8
ILD02	QA/QC1	2004	1	10	0	0	0	0	55	1	0	0	0	0	2	4	0	0	1	0	0	0	0	5
LET01	1	2003	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0
LSP02	1	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LSP03	1	2003	0	10	0	0	0	0	0	0	0	28	0	0	0	29	0	0	0	0	0	0	0	0
LSR06	1	2003	0	0	0	0	0	0	0	27	0	5	0	0	0	4	1	0	7	0	0	0	0	1
LSR06	QA/QC1	2004	0	0	0	0	0	0	0	53	0	4	0	0	0	12	0	0	7	0	0	0	0	0
LSR07	1	2003	0	0	0	0	0	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
LSR07	QA/QC1	2004	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
LSR08	1	2003	0	7	0	0	0	0	0	0	0	0	0	0	0	66	0	0	6	0	0	0	0	1
LSR08	QA/QC1	2004	1	2	0	0	0	0	0	0	0	0	0	0	0	32	0	0	1	0	0	0	0	1
OPR02	1	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
RAP01	1	2003	0	5	0	0	0	0	7	0	0	0	0	0	29	0	0	0	0	0	8	0	0	1
RDL15	1	2003	5	7	0	0	0	0	2	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0
RDL16	1	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0	0	0	0	0	1
RED06	1	2003	0	0	0	0	0	0	2	20	0	0	0	0	0	0	0	0	0	0	0	1	0	0
RED09	1	2003	0	0	0	0	2	0	0	0	0	0	0	0	0	9	0	0	1	0	0	0	0	2
RED10	1	2003	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	5	1	0	0	0	2
RED12	1	2003	0	0	0	0	0	0	10	2	0	0	0	0	3	0	0	0	0	0	0	0	0	0
RED22	1	2003	0	1	0	0	0	0	1	0	0	0	0	0	14	2	0	0	1	0	0	0	0	2
RED26	1	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0
RED45	1	2003	0	0	0	0	0	0	20	2	0	0	1	0	32	1	0	0	1	0	0	0	0	0
RED48	1	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RED50	1	2003	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	1
RED59	1	2003	0	0	0	0	0	0	0	36	0	10	0	0	0	0	0	0	0	0	0	0	0	0
RED73	1	2003	0	0	0	0	0	0	0	79	0	1	0	0	0	1	0	0	1	0	0	0	0	0
RLT01	1	2003	0	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
RLT02	1	2003	0	0	0	0	0	0	0	10	1													

RED732003

RED73 12003 0 0 0 0 0 00 00 520 00 00 10 02 J 0

RED50 12003 0 0 0 0 0 0 0 52

OPR022003

Appendix 4A - Stream benthic community data (contn)

site	Sample #	year	Lepidostomatidae	Leptoceridae	Leptohyphidae	Leptophlebiidae	Leuctridae	Libellulidae	Limnephilidae	Limnesiidae	Limnocharidae	Lumbriculidae	Lymnaeidae	Macromiidae	Metretopodidae	Molannidae	Muscidae	Naididae	Nemouridae	Neocaridae	Nepidae	Notonectidae	Odontoceridae	Onychiuridae
HEM74	1	2003	0	2	0	5	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
ILD01	1	2003	3	0	0	5	21	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
ILD02	1	2003	2	4	0	2	2	0	1	0	0	7	0	0	0	0	0	5	0	0	0	0	0	0
ILD02	QA/QC1	2004	2	2	0	0	2	0	1	0	0	7	0	0	0	0	0	3	0	0	0	0	0	0
LET01	1	2003	0	0	0	0	0	0	3	0	0	6	0	0	0	0	0	9	1	0	0	0	0	0
LSP02	1	2003	4	1	0	0	0	0	4	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
LSP03	1	2003	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	22	0	0	3	0	0	0
LSR06	1	2003	0	1	0	1	0	0	0	3	0	0	0	0	0	0	0	57	0	0	0	0	0	0
LSR06	QA/QC1	2004	0	3	0	3	0	0	0	3	0	0	0	0	1	0	0	88	0	0	0	0	0	0
LSR07	1	2003	0	0	0	8	0	0	0	0	0	1	0	0	0	1	0	3	0	0	0	0	0	0
LSR07	QA/QC1	2004	0	0	0	11	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
LSR08	1	2003	0	4	0	5	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
LSR08	QA/QC1	2004	0	5	0	2	0	0	1	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0
OPR02	1	2003	1	0	0	0	0	3	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0
RAP01	1	2003	3	0	0	0	20	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
RDL15	1	2003	13	0	0	7	5	0	0	0	0	5	0	0	0	0	0	4	0	0	0	0	0	0
RDL16	1	2003	0	0	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	0	0	0
RED06	1	2003	0	0	0	91	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0
RED09	1	2003	0	0	0	5	0	0	3	0	0	4	0	0	0	0	0	43	0	0	0	0	0	0
RED10	1	2003	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0
RED12	1	2003	0	0	0	3	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0
RED22	1	2003	0	4	0	4	0	1	1	0	1	0	0	0	0	0	0	12	0	0	0	0	0	0
RED26	1	2003	0	0	0	0	0	1	0	0	0	7	0	0	0	0	0	19	0	0	0	0	0	0
RED45	1	2003	12	0	0	35	6	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	0	1
RED48	1	2003	0	0	0	15	0	0	0	1	0	0	0	0	0	0	0	3	0	0	0	0	0	0
RED50	1	2003	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	16	0	0	0	0	0	0
RED59	1	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0
RED73	1	2003	0	0	0	3	0	0	0	0	0	2	0	0	0	0	0	4	0	0	0	0	0	0
RLT01	1	2003	0	0	0	8	0	0	2	0	0	5	1	0	0	0	2	0	0	0	0	0	0	0
RLT02	1	2003	0	0	0	12	0	0	1	1	0	2	1	0	0	0	0	3	0	0	0	0	0	0
SUD01	1	2004	0	0	0	24	0	0	1	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0
SUD02	1	2004	0	0	0	11	0	0	0	0	0	2	0	0	0	0	0	5	0	0	0	0	1	0
SUD03	1	2004	0	5	0	3	0	0	1	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
SUD05	1	2004	24	0	0	25	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
SUD06	1	2004	0	13	0	11	0	0	4	0	0	10	0	2	0	0	0	14	0	0	0	0	0	0
SUD07	1	2004	0	17	1	29	1	0	0	0	0	1	0	0	0	0	0	5	0	0	0	0	0	0
SUD08	1	2004	0	5	0	0	0	0	0	1	0	0	0	0	0	0	0	16	0	0	0	0	0	0
SUD09	1	2004	0	21	0	3	0	0	0	0	0	1	0	0	0	0	0	8	0	0	0	0	0	0
SUD10	1	2004	0	5	0	1	1	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0
SUD11	1	2004	0	17	0	3	1	0	0	0	0	3	0	0	0	0	0	1	0	0	0	0	0	0
SUD12	1	2004	0	23	0	5	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
SUD13	1	2004	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0
SUD14	1	2004	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
SUD15	1	2004	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0
SUD16	1	2004	0	4	0	1	1	0	0	0	0	1	0	0	0	0	0	6	0	0	0	0	0	0
SUD17	1	2004	0	13	0	4	0	0	0	0	0	1	0	0	0	0	0	8	0	0	0	0	0	0

Appendix 4A - Stream benthic community data (contn)

site	Sample #	year	Sisyridae	Siphlonuridae	Sminthuridae	Sperchontidae	Sphaeriidae	Staphylinidae	Stratiomyidae	Tabanidae	Taeniopterygidae	Tanyderidae	Tetrastemmatidae	Tipulidae	Torrenticolidae	Trhypachthoniidae	Tubificidae	Unionicolidae	Unionidae	Valvatidae
HEM74	1	2003	0	0	0	0	57	0	0	0	0	0	0	0	0	0	0	0	0	0
ILD01	1	2003	0	0	0	7	7	0	0	0	8	0	0	4	0	0	0	0	0	0
ILD02	1	2003	0	0	0	2	0	0	0	0	7	6	0	1	1	0	0	0	0	0
ILD02	QA/QC1	2004	0	0	0	6	0	0	0	0	33	0	0	2	0	0	1	0	0	0
LET01	1	2003	0	0	0	0	45	0	0	2	0	0	0	1	0	1	8	0	0	0
LSP02	1	2003	0	0	0	0	89	0	0	1	0	0	0	0	0	0	23	0	0	0
LSP03	1	2003	0	0	1	0	15	0	0	0	1	0	0	0	0	0	12	0	0	2
LSR06	1	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	9	0	12
LSR06	QA/QC1	2004	0	0	0	0	1	0	0	0	0	0	0	0	0	0	26	1	0	0
LSR07	1	2003	0	0	0	0	7	0	1	2	0	0	0	0	0	0	0	1	0	0
LSR07	QA/QC1	2004	0	0	0	0	3	0	0	0	0	0	0	2	0	0	0	0	0	0
LSR08	1	2003	0	0	0	1	1	0	0	1	5	0	0	1	0	0	6	0	0	0
LSR08	QA/QC1	2004	0	0	0	0	1	0	0	0	3	0	0	3	0	0	6	0	0	0
OPR02	1	2003	0	0	0	0	219	0	0	0	0	0	0	0	0	0	3	0	0	0
RAP01	1	2003	0	0	0	1	2	0	0	0	20	0	0	0	0	0	0	0	0	0
RDL15	1	2003	0	0	0	0	7	0	0	0	0	0	0	0	1	0	0	0	0	0
RDL16	1	2003	0	0	0	0	6	0	0	0	0	0	0	52	0	8	19	0	0	1
RED06	1	2003	0	0	0	0	4	0	0	0	0	0	0	2	0	0	4	0	0	0
RED09	1	2003	0	0	0	0	71	0	0	1	1	0	0	0	0	0	2	0	0	0
RED10	1	2003	0	0	0	0	16	0	0	0	0	0	0	0	0	0	2	0	0	0
RED12	1	2003	0	0	0	0	2	0	0	0	0	0	0	2	0	0	2	0	0	0
RED22	1	2003	0	0	0	0	3	0	0	0	5	0	0	0	0	0	0	0	0	0
RED26	1	2003	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3	0	0	0
RED45	1	2003	0	0	0	0	19	0	0	0	0	0	0	4	0	0	1	0	0	0
RED48	1	2003	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0
RED50	1	2003	0	0	0	0	8	0	0	0	0	0	0	0	0	0	8	0	0	0
RED59	1	2003	0	0	0	0	23	0	0	0	0	0	0	0	0	0	1	2	0	7
RED73	1	2003	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3	7	0	1
RLT01	1	2003	0	0	0	0	8	0	0	1	0	0	0	1	0	0	1	0	0	0
RLT02	1	2003	0	0	0	0	5	0	2	0	0	0	0	0	0	0	5	0	0	0
SUD01	1	2004	0	0	0	0	0	0	0	0	4	0	0	2	0	0	1	0	0	0
SUD02	1	2004	0	0	0	4	23	0	0	0	1	0	0	7	1	0	0	0	0	0
SUD03	1	2004	0	0	0	13	0	0	0	0	12	0	0	2	9	0	0	0	0	0
SUD05	1	2004	0	0	0	10	3	0	0	0	0	0	0	4	0	0	0	0	0	0
SUD06	1	2004	0	0	0	0	32	0	0	0	0	0	0	1	0	0	4	0	0	0
SUD07	1	2004	0	0	0	0	3	0	0	0	0	0	0	1	0	0	2	0	0	0
SUD08	1	2004	0	0	0	0	3	0	0	0	0	0	0	0	2	0	0	0	0	0
SUD09	1	2004	0	0	0	0	12	0	0	0	0	0	0	0	1	0	2	0	0	0
SUD10	1	2004	0	0	0	0	4	0	0	0	0	0	0	0	0	0	3	0	0	0
SUD11	1	2004	0	0	0	1	1	0	0	0	4	0	0	3	2	0	4	0	0	0
SUD12	1	2004	0	0	0	1	0	0	0	0	6	0	0	0	0	0	0	0	0	0
SUD13	1	2004	0	0	0	0	4	0	0	0	3	1	0	1	0	0	0	0	0	0
SUD14	1	2004	0	0	0	0	1	0	0	0	21	5	0	0	0	0	0	0	0	0
SUD15	1	2004	0	0	0	0	12	0	0	0	1	0	0	0	1	0	0	0	0	0
SUD16	1	2004	0	0	0	1	4	0	0	0	4	0	0	0	0	0	4	0	0	0
SUD17	1	2004	0	0	0	0	12	0	0	0	0	0	0	0	1	0	0	0	0	0

Appendix 4A - Stream benthic community data (contn)

site	Sample #	year	Glossosomatidae	Gomphidae	Gyrinidae	Halicaridae	Haliplidae	Helicopsychidae	Heptageniidae	Hyalellidae	Hydraenidae	Hydrobiidae	Hydrodromidae	Hydrophilidae	Hydropsychidae	Hydroptilidae	Hydrozetiidae	Hydryphantidae	Hygrobatidae	Hypogasturidae	Isonychiidae	Isotomidae	Krendowskiidae	Lebertiidae
SUD18	1	2004	13	15	0	0	0	0	34	0	0	0	0	0	8	0	0	0	0	0	5	0	0	0
SUD19	1	2004	0	5	0	0	0	0	38	0	0	0	0	0	8	2	0	0	0	0	0	0	0	1
SUD20	1	2004	0	1	0	0	0	0	0	0	0	0	0	0	1	10	0	0	0	0	0	0	0	0
SUD21	1	2004	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0
SUD22	1	2004	0	7	0	0	0	0	33	0	0	0	0	0	0	2	0	0	3	0	2	0	0	1
SUD23	1	2004	0	4	0	0	0	0	15	0	0	0	0	0	1	6	0	0	0	0	0	0	0	1
SUD24	1	2004	0	1	0	0	0	0	1	0	0	5	0	0	0	23	0	0	0	0	0	0	0	0
SUD25	1	2004	2	13	0	1	0	0	14	0	0	0	0	0	42	0	0	0	0	0	0	0	0	0
USR12	1	2003	0	6	0	0	0	0	11	48	0	0	0	0	1	2	0	0	1	0	0	0	0	0
VER01	1	2003	0	6	0	0	0	0	28	0	0	0	0	0	18	14	0	0	0	0	6	0	0	1
Test19	1	2003	0	0	0	0	0	0	6	0	0	0	0	0	0	24	0	0	0	0	3	0	0	0
Test20	1	2003	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	5	0	0
Test21	1	2003	0	0	0	0	1	0	0	23	0	0	0	0	0	0	0	0	6	0	0	0	0	0
Test22	1	2003	0	0	0	0	0	0	0	0	0	0	0	0	209	0	0	0	0	0	0	0	0	0
Test23	1	2003	0	0	0	0	4	0	0	8	0	0	3	0	0	0	0	0	24	0	0	0	0	0
Test24	1	2003	0	0	0	0	2	0	0	3	0	0	0	0	0	11	0	0	7	0	0	0	0	0
Test25	1	2003	0	2	0	1	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Test33	1	2003	0	0	2	0	0	0	0	96	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Test34	1	2003	0	0	0	0	3	0	0	62	0	4	0	0	0	0	0	0	0	0	0	0	0	0
Test35	1	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	45	0	0	4	0	0	0	0	0
Test36	1	2003	0	0	0	0	1	0	0	44	0	3	0	0	0	4	0	0	0	0	0	0	0	0
Test37	1	2003	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Test26	1	2003	0	4	0	0	0	0	33	0	0	0	0	0	71	3	0	0	0	0	34	0	0	0
Test27	1	2003	0	0	0	0	0	0	1	4	0	0	0	0	0	0	1	0	8	0	0	0	0	4
Test28	1	2003	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Test29	1	2003	0	0	0	0	1	0	0	20	0	0	0	0	0	6	0	0	5	0	0	0	0	12
Test30	1	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0
Test31	1	2003	0	0	0	0	0	0	0	0	0	0	0	0	3	52	0	0	0	0	0	0	0	0
Test32	1	2003	0	0	0	0	0	0	1	0	0	0	0	0	5	2	0	0	6	0	0	0	0	1
Test16-03	1	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Test16-04	1	2004	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	15	0	0
Test13-1	1	2003	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Test13-2	1	2003	0	0	0	1	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0
Test13-3	1	2003	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Test17-03	1	2003	0	0	0	0	0	0	0	0	0	0	0	0	17	0	0	0	0	0	0	0	0	1
Test17-04	1	2004	0	0	0	0	0	0	0	0	0	0	0	0	27	0	0	0	0	0	0	0	0	4
Test18	1	2003	0	2	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	0	2	0	0
Test14	1	2003	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Test15	1	2003	0	0	0	0	0	0	0	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix 4A - Stream benthic community data (contn)

site	Sample #	year	Lepidostomatidae	Leptoceridae	Leptohyphidae	Leptophlebiidae	Leuctridae	Libellulidae	Limnephilidae	Limnesiidae	Limnocharidae

Appendix 4A - Stream benthic community data (contn)

site	Sample #	year	Oxidae	Perlidae

Appendix 4A - Stream benthic community data (contn)

site	Sample #	year	Sisyridae	Siphlonuridae	Sminthuridae	Sperchontidae	Sphaeriidae	Staphylinidae	Stratiomyidae	Tabanidae	Taeniopterygidae	Tanyderidae	Tetrastemmatidae	Tipulidae	Torrenticolidae	Trhypachthoniida	Tubificidae	Unionicolidae	Unionidae	Valvatidae
SUD18	1	2004	0	0	0	3	0	0	0	0	1	1	0	1	0	0	1	0	0	0
SUD19	1	2004	0	0	0	5	5	0	0	0	6	0	0	7	1	0	2	0	0	0
SUD20	1	2004	0	0	0	0	6	0	0	0	0	3	0	5	1	0	1	0	0	0
SUD21	1	2004	0	0	0	0	5	0	0	0	0	0	0	0	0	0	13	4	0	0
SUD22	1	2004	0	0	0	2	76	0	0	0	15	0	0	0	0	0	0	0	0	0
SUD23	1	2004	0	0	0	1	18	0	0	0	7	0	1	1	2	0	0	0	0	0
SUD24	1	2004	0	0	0	0	35	0	0	0	2	0	0	0	0	0	0	0	0	0
SUD25	1	2004	0	0	0	0	13	0	0	0	2	0	0	1	1	0	0	0	0	0
USR12	1	2003	0	0	0	0	8	0	0	1	0	0	0	0	1	0	6	0	0	1
VER01	1	2003	0	0	0	2	2	0	0	0	27	0	0	4	0	0	3	0	0	0
Test19	1	2003	0	0	0	0	0	0	0	0	31	0	0	0	0	0	0	0	0	0
Test20	1	2003	0	0	0	0	69	1	1	0	0	0	0	6	0	0	44	0	0	0
Test21	1	2003	0	0	0	0	21	0	0	2	0	0	0	0	0	0	37	0	0	0
Test22	1	2003	0	0	0	5	0	0	0	0	0	0	0	3	0	0	0	0	0	0
Test23	1	2003	0	0	0	0	3	0	0	0	0	0	0	1	0	0	55	0	0	0
Test24	1	2003	0	0	0	0	1	0	0	0	0	0	0	0	0	0	33	4	0	0
Test25	1	2003	0	0	0	0	35	0	0	0	0	0	0	0	0	0	13	0	0	0
Test33	1	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	2	0	2
Test34	1	2003	0	0	0	0	1	0	0	0	0	0	0	0	0	0	8	7	0	1
Test35	1	2003	0	0	0	0	5	0	0	0	0	0	0	1	0	0	32	0	0	1
Test36	1	2003	0	0	0	0	10	0	0	0	0	0	0	0	0	0	21	4	0	0
Test37	1	2003	0	0	0	0	2	0	0	0	0	0	0	0	0	0	121	0	0	0
Test26	1	2003	0	0	0	0	62	0	0	0	1	0	0	1	0	0	0	0	0	0
Test27	1	2003	0	0	0	1	2	0	0	0	0	0	0	0	1	0	7	0	0	0
Test28	1	2003	0	0	0	0	3	0	0	0	0	0	0	0	0	0	45	5	0	0
Test29	1	2003	1	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0
Test30	1	2003	0	0	0	0	0	0	0	0	0	0	0	4	0	0	123	0	0	0
Test31	1	2003	0	0	0	1	0	0	0	0	0	0	0	0	0	0	8	0	0	0
Test32	1	2003	0	0	0	0	0	0	0	0	9	0	0	0	0	0	1	0	0	0
Test16-03	1	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Test16-04	1	2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0
Test13-1	1	2003	0	0	0	0	21	0	0	0	0	0	0	1	0	0	16	0	0	0
Test13-2	1	2003	0	0	0	0	13	0	0	0	0	0	0	1	0	0	7	0	0	0
Test13-3	1	2003	0	0	0	0	15	0	0	0	0	0	0	0	0	0	18	0	0	0
Test17-03	1	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Test17-04	1	2004	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Test18	1	2003	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
Test14	1	2003	0	0	0	0	42	0	0	1	0	0	0	1	0	0	52	0	0	1
Test15	1	2003	0	0	0	1	1	0	0	0	0	0	0	0	0	0	46	0	0	0

Appendix 4B - Lake benthic community data.

Appendix 4B - Lake benthic community data (contn)

Site	Year	Helicopsychidae	Heptageniidae	Hyalellidae	Hydrobiidae	Hydrodromidae	Hydrophilidae	Hydropsychidae	Hydroptilidae	Hydrozetiidae	Hydryphantidae	Hygrobatidae	Hypogasturidae	Isotomidae	Krendowskiidae	Lebertiidae	Lepidostomatidae	Leptoceridae	Leptohyphidae	Leptophlebiidae	Leuctridae	Libellulidae
Reference lakes																						
HEM02	2003	0	0	10	0	0	0	0	0	1	0	0	0	0	0	0	0	4	0	10	0	0
HEM04	2003	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	86	0	3
HEM06	2003	0	0	28	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	45	0	0
HEM18	2003	0	0	49	1	0	0	0	0	0	0	0	0	0	0	0	0	4	0	14	0	0
HEM20	2003	0	0	26	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0	17	0	0
HEM24	2003	0	0	13	0	0	0	0	1	0	0	0	0	0	0	0	0	4	0	11	0	3
HEM28	2003	0	2	44	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	47	0	0
HEM30	2003	0	4	50	0	0	0	0	0	0	0	1	0	1	0	0	0	9	0	27	0	1
HEM32	2003	0	0	34	0	0	0	0	5	0	0	1	0	0	0	0	0	1	0	18	0	1
HEM34	2003	0	1	20	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	10	0	0
HEM38	2003	0	4	56	3	0	0	0	0	0	0	0	0	0	0	0	0	5	0	14	0	0
HEM40	2003	0	10	66	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	16	0	0
HEM44	2003	0	0	12	0	0	0	0	0	0	0	2	0	0	0	0	0	3	0	4	0	0
HEM46	2003	0	0	21	0	0	0	0	0	1	1	0	0	0	0	0	0	7	0	0	0	0
HEM50	2003	0	0	48	0	0	0	0	0	1	0	0	0	0	0	0	0	11	0	24	0	2
HEM52	2003	0	0	110	8	0	0	0	0	1	0	0	0	0	0	0	0	20	0	62	0	0
HEM52QA/QC1	2003	0	1	81	1	0	0	0	0	0	0	0	0	0	0	0	0	9	0	54	0	0
HEM56	2003	0	3	40	0	0	0	0	0	0	0	19	0	0	0	0	0	1	0	10	3	0
HEM58	2003	1	26	14	0	0	0	0	0	0	0	18	0	0	0	0	0	2	0	23	3	0
HEM70	2003	2	3	46	0	0	0	0	0	1	0	1	1	0	0	4	0	2	0	6	0	0
HEM72	2003	0	7	48	2	0	0	0	0	0	0	0	0	0	0	0	4	12	0	16	0	0
HEM80	2003	0	0	115	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	16	0	0
HEM82	2003	0	3	74	0	0	0	0	2	1	0	2	0	0	0	0	0	2	0	55	0	0
HEM84	2003	0	1	32	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	18	0	0
LEA01	2003	0	6	17	0	1	0	0	2	0	0	2	0	0	0	1	0	0	0	9	0	0
LEA02	2003	0	2	27	0	1	0	0	1	0	0	4	0	0	0	1	0	3	0	12	0	0
LEA03	2003	0	0	68	6	0	0	0	13	0	0	11	0	0	0	0	0	4	0	5	0	0
LSP01	2003	0	0	28	2	0	0	0	0	0	0	0	0	0	0	0	0	10	0	13	0	0
LSP01QA/QC1	2003	0	0	42	1	1	0	0	0	0	0	0	0	0	0	0	0	14	0	5	0	0
MARA07	2003	0	1	59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
MARA09	2003	0	0	40	0	0	0	0	0	0	1	0	0	5	0	0	0	0	0	11	0	0
MARA11	2003	0	0	56	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2	0	1
MARA13	2003	0	14	18	0	0	0	0	0	0	0	1	0	0	0	2	0	1	0	67	0	0
MARA14	2003	0	0	4	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	1	0	0
MARA15	2003	0	0	24	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	7	0	0
MARA16	2003	0	0	102	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29	0	0
MARA20	2003	0	0	27	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	25	0	1
MARA21	2003	0	0	115	0	0	0	0	1	0	0	1	0	0	0	2	0	9	0	5	1	0
MARA21QA/QC1	2003	0	1	101	3	1	0	0	0	0	0	0	0	1	0	0	0	2	0	6	0	0
MARA22	2003	0	0	100	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	36	0	0

0 0 0 1 MARA112003 0 0 0 1 0 3 0 0 0 0 0 0 0 0 0 2 0 MARA14 1 0 0 5 0 0 0 0 0 0

Appendix 4B - Lake benthic community data (contn)

Site	Year	Limnephilidae	Limnesiidae	Limnocharidae	Lumbriculidae	Lymnaeidae	Metretopodidae	Molannidae	Muscidae	Naididae	Neoacaridae	Nepidae	Notonectidae	Odontoceridae	Onychiuridae	Oxidae	Perlidae	Philopotamidae	Phoridae	Phrygaenidae	Physidae	Pionidae	Planorbidae
Reference lakes																							
HEM02	2003	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	1	21
HEM04	2003	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	4	0	0	10
HEM06	2003	3	0	0	2	0	0	0	0	16	0	0	1	0	0	0	0	0	0	1	0	1	0
HEM18	2003	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	1	0	0	0
HEM20	2003	0	1	0	0	0	0	0	0	26	0	0	0	0	0	0	0	0	0	0	1	0	2
HEM24	2003	0	0	0	1	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0
HEM28	2003	1	0	0	4	0	0	1	0	8	0	0	0	0	0	0	0	0	0	2	0	0	2
HEM30	2003	0	0	0	0	1	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0	1	5
HEM32	2003	0	0	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	2	0	0	10
HEM34	2003	1	0	0	2	2	0	0	0	13	0	0	0	0	0	0	0	0	0	2	0	0	5
HEM38	2003	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	2	0	0	3
HEM40	2003	0	0	0	1	3	0	0	0	33	0	0	0	0	0	0	0	0	0	2	0	0	3
HEM44	2003	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0
HEM46	2003	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	3
HEM50	2003	0	0	0	1	0	0	0	0	6	0	0	4	0	0	0	0	0	0	1	0	0	1
HEM52	2003	0	0	0	3	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	9
HEM52QA/QC1	2003	0	0	0	3	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	12
HEM56	2003	0	0	0	6	1	0	0	0	15	0	0	0	0	0	0	0	0	0	3	0	0	1
HEM58	2003	0	0	0	12	1	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	15
HEM70	2003	0	0	0	2	2	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	2
HEM72	2003	0	0	0	4	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	0	0	1
HEM80	2003	0	0	0	0	0	1	0	0	4	0	0	0	0	0	0	0	0	0	2	3	0	8
HEM82	2003	3	1	0	0	1	1	0	0	29	0	0	0	0	0	0	0	0	0	3	0	0	4
HEM84	2003	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	2	0	0	3
LEA01	2003	0	0	0	1	0	0	0	0	21	0	0	0	0	0	1	0	0	0	0	0	1	5
LEA02	2003	0	0	0	0	0	0	0	0	31	0	0	0	0	0	1	0	0	0	2	0	0	0
LEA03	2003	0	0	0	0	0	0	1	0	11	0	0	0	0	0	0	0	0	0	1	0	0	0
LSP01	2003	0	0	0	1	0	0	0	0	5	0	0	0	1	0	2	0	0	0	0	2	0	6
LSP01QA/QC1	2003	0	0	0	0	0	0	0	0	3	0	0	0	1	0	1	0	0	0	0	1	1	4
MARA07	2003	0	1	0	2	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	2
MARA09	2003	1	0	0	0	0	0	0	0	7	0	0	4	0	0	0	0	0	0	0	0	0	6
MARA11	2003	2	0	0	4	0	0	0	0	8	0	0	1	0	0	0	0	0	0	1	0	0	0
MARA13	2003	3	0	0	10	0	0	0	0	15	0	1	0	0	0	0	0	0	0	0	0	0	4
MARA14	2003	0	0	0	0	0	0	0	0	5	0	0	0	0	0	1	0	0	0	0	0	0	0
MARA15	2003	1	0	0	1	26	0	0	1	66	0	0	1	0	0	0	0	0	0	1	1	0	6
MARA16	2003	2	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
MARA20	2003	0	0	0	4	0	0	0	0	13	0	0	0	0	0	0	0	0	0	2	0	1	0
MARA21	2003	0	0	0	5	0	0	0	0	13	0	0	0	0	1	0	0	0	0	0	0	0	1
MARA21QA/QC1	2003	4	0	0	1	0	0	0	0	22	0	0	0	0	0	0	0	0	0	0	0	0	2
MARA22	2003	2	0	0	1	0	0	0	0	14	0	0	0	0	0	0	0	2	0	1	0	1	1
MARA23	2003	0	0	0	1	1	1	0	0	63	0	0	0	0	0	0	0	0	0	1	0	0	0
MARA26	2003	0	0	0	1	10	6	0	1	4	0	0	0	0	0	0	0	0	2	4	0	0	1
MARA29	2003	0	0	0	3	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	5
MARA30	2003	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	8
MARA33	2003	6	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	2
MARA34	2003	5	0	0	2	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	9
MARA35	2003	0	0	0	2	2	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0
MARA36	2003	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	1	0	0	0	0	0
MARA37	2003	4	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	1
MARA38	2003	0	0	0	0	2	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	2
MARA39	2003	10	0	0	1	11	0	0	0	7	0	0	2	0	0	0	0	0	0	0	0	0	5
MARA40	2003	2	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	4	0	0	5
MARA41	2003	3	0	0	1	2	0	0	0	142	0	0	0	0	0	0	0	0	0	1	0	0	2
MARA42	2003	0	1	0	7	1	0	0	0	8	0	0	0	0	0	0	0	0	0	3	0	0	5
MARA43	2003	0	0	0	1	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0
MARA44	2003	4	0	0	1	0	0	0	0	5	0	0	0	0	0	0	0	0	0	3	0	2	0
MARA45	2003	0	0	0	0	1	4	1	0	9	0	0	0	0	0	0	0	0	0	2	0	0	7
PAN01	2003	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0

Appendix 4B - Lake benthic community data (contn)

Site	Year	Poduridae	Polycentropodidae	Psephenidae	Psychodidae	Psychomyiidae	Pyralidae	Rhyacophilidae	Sciomyzidae	Sericostomatidae	Sialidae	Simuliidae	Sisyridae	Sperchontidae	Sphaeriidae	Stratiomyidae	Tabanidae	Tetrastemmatidae	Tipulidae	Torrenticolidae	Trhypachthoniidae	Tubificidae	Unionicolidae	Unionidae	Valvatidae		
Reference lakes																											
HEM02	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	4		
HEM04	2003	0	13	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0		
HEM06	2003	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0		
HEM18	2003	0	5	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0		
HEM20	2003	0	4	0	0	0	0	0	0	0	0	1	0	0	10	0	0	0	0	0	0	2	0	0	0		
HEM24	2003	0	5	0	0	0	0	0	0	0	0	0	0	0	21	0	0	0	0	0	0	0	0	0	0		
HEM28	2003	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0		
HEM30	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	0	0		
HEM32	2003	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0		
HEM34	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	1	2	0	0	0		
HEM38	2003	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	4	2	0	0		
HEM40	2003	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	1	0	0	2	0	0	1		
HEM44	2003	0	2	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0	0	0	0	5	0	0		
HEM46	2003	0	2	0	0	0	0	0	0	0	0	0	0	0	29	0	2	0	0	0	0	0	2	0	1		
HEM50	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	3	0	0	1		
HEM52	2003	0	3	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	2		
HEM52QA/QC1	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	1	0	0	0	0	2	0	0	8		
HEM56	2003	0	0	0	0	0	1	1	0	0	0	0	0	0	6	0	0	0	0	0	0	13	1	0	0		
HEM58	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	36	0	0	0	0	0	0	8	0	0	0		
HEM70	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	10	1	0	0	6	0	2	17	0	0	0		
HEM72	2003	0	3	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	1	0	0	3	0	0	0		
HEM80	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	1	0	5	1	0	0		
HEM82	2003	0	1	0	0	0	0	0	0	0	0	0	0	0	21	0	0	1	3	0	1	5	2	0	0		
HEM84	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0	1	0	0	0	0	2	0	0	0		
LEA01	2003	0	2	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	1	1	14	0	0		
LEA02	2003	0	1	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	4	4	0	2		
LEA03	2003	0	1	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	4	5	0	9		
LSP01	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0	0	0	0	0	0	1	0	0	5		
LSP01QA/QC1	2003	0	1	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	1	0	1	0	2		
MARA07	2003	0	0	0	0	0	0	0	0	0	0	1	0	0	64	0	1	0	0	0	0	31	1	0	0		
MARA09	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	59	0	1	0	1	0	0	11	0	0	0		
MARA11	2003	0	0	0	3	0	0	0	0	0	0	0	0	0	15	0	0	0	3	0	0	5	0	0	0		
MARA13	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	1	0	0	1	0	0	0		
MARA14	2003	0	1	0	0	0	1	0	0	0	0	0	0	0	4	0	1	0	0	0	0	1	2	0	0		
MARA15	2003	0	0	0	1	0	0	0	0	0	0	0	0	0	3	1	0	0	1	0	0	5	0	0	0		
MARA16	2003	0	2	0	0	0	0	0	0	0	0	0	0	0	9	3	5	0	0	0	0	6	0	2	5		
MARA20	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	1	0	0	3	7	0	0		
MARA21	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	1	0	0	0	0	2	0	0	1		
MARA21QA/QC1	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	1	0	0	5	0	0	0		
MARA22	2003	0	1	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	1	0	0	3	0	0	0		
MARA23	2003	0	1	0	0	0	0	0	0	0	0	0	0	1	4	0	0	0	0	1	1	9	0	0	0		
MARA26	2003	0	1	0	0	0	2	0	1	0	0	1	0	0	1	0	0	0	1	0	1	0	0	0	0		
MARA29	2003	0	3	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0	0	1		
MARA30	2003	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0		
MARA33	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	6	0	0	3	0	0	1		
MARA34	2003	0	0	0	0	0	1	0	0	0	0	0	0	1	7	0	0	0	2	0	0	3	0	0	3		
MARA35	2003	0	0	0	33	0	0	0	0	0	0	0	0	0	3	0	3	0	1	0	0	0	0	0	0		
MARA36	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	0	0	0	0	6	0	0	0		
MARA37	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0	0	9	1	0	0	0	0	0

Appendix 4B - Lake benthic community data.

Site	Year	# cells sorted	Total # benthos	Aeolosomatidae	Aeshnidae	Ancylidae	Anisitsiellidae	Arrenuridae	Athericidae	Aturidae	Baetidae	Baetiscidae	Belostomatidae	Caenidae	Caloperygidae	Cambaridae	Capniidae	Ceratopogonidae	Chironomidae	Chloroperlidae	Chrysomelidae	Coenagrionidae	Cordulegastridae
PAN02	2003	11	377	0	0	0	0	0	0	0	0	0	0	5	0	0	0	7	338	0	0	0	0
RED02	2003	20	322	0	0	0	0	0	0	0	0	0	0	25	0	0	0	5	61	0	0	0	0
RED03	2003	9	490	0	3	0	0	0	1	0	0	0	0	16	0	0	0	13	143	0	0	0	0
RED04	2003	28	470	0	0	2	0	1	0	0	3	0	0	15	0	0	0	6	182	0	0	2	0
RED05	2003	48	384	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	144	0	0	0	0
RED07	2003	27	347	0	1	5	0	0	0	0	1	0	0	29	0	0	0	2	157	0	0	1	0
RED08	2003	16	372	0	0	0	0	0	0	0	2	0	0	13	0	0	0	9	268	0	1	0	0
RED08QA/QC1	2003	15	306	0	0	0	0	0	0	0	3	0	0	11	0	0	0	4	186	0	2	0	0
RED11	2003	15	226	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	124	0	0	0	0
RED13	2003	19	312	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	156	0	0	0	0
RED14	2003	10	402	0	0	1	0	0	0	0	1	0	0	74	0	0	0	2	193	0	0	0	0
RED16	2003	5	449	0	0	0	0	0	0	0	0	0	0	83	0	0	0	4	229	0	0	0	0
RED18	2003	8	332	0	0	0	1	1	0	0	0	0	0	2	0	0	0	68	85	0	0	0	0
RED19	2003	11	335	0	0	0	0	0	0	0	1	0	0	23	0	0	0	4	194	0	1	6	0
RED20	2003	16	333	0	0	0	0	0	0	0	2	0	0	11	0	0	0	22	181	0	0	1	0
RED21	2003	17	351	0	0	0	0	2	0	0	1	0	0	44	0	0	0	4	180	0	0	2	0
RED23	2003	12	242	0	0	0	0	3	0	0	0	0	0	6	0	0	0	12	249	0	0	1	0
RED24	2003	43	303	0	1	0	3	0	0	0	4	0	0	41	0	0	0	16	122	0	0	2	0
RED25	2003	17	338	0	0	0	0	0	0	0	0	0	0	26	0	0	0	8	171	0	0	0	0
RED25QA/QC1	2003	21	319	0	0	0	0	0	0	0	0	0	0	19	0	0	0	23	135	0	0	2	0
RED27	2003	75	330	0	0	0	0	0	0	0	3	0	0	12	0	0	0	3	63	0	0	0	0
RED28	2003	20	348	0	0	0	0	0	0	0	1	0	0	70	0	0	0	9	199	0	0	0	0
RED29	2003	18	362	0	0	0	0	0	0	1	0	0	0	1	0	0	0	6	60	0	0	0	0
RED29QA/QC1	2003	9	448	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	62	0	0	0	0
RED30	2003	7	225	0	0	0	0	1	0	0	1	0	0	8	0	0	0	4	89	0	0	2	0
RED31	2003	8	377	0	0	0	0	1	0	0	2	0	0	87	0	0	0	8	167	0	0	2	0
RED32	2003	29	338	0	2	0	1	2	0	0	0	0	0	11	0	0	0	8	85	0	0	0	0
RED33	2003	7	389	0	0	0	0	3	0	0	1	0	0	1	0	0	0	11	101	0	0	0	0
RED40	2003	15	350	0	0	0	0	0	0	0	3	0	0	3	0	0	0	10	132	0	0	0	0
RED41	2003	13	425	0	0	0	0	0	0	0	0	0	0	20	0	0	0	9	216	0	0	0	0
RED42	2003	10	435	0	0	6	1	0	0	0	2	0	0	9	0	0	0	9	271	0	0	2	0
RED43	2003	10	346	0	0	0	0	0	0	0	0	0	0	3	0	0	0	7	165	0	0	0	0
RED44	2003	4	253	0	0	1	0	0	0	0	16	0	0	26	0	0	0	7	123	0	0	1	0
RED46	2003	11	330	0	0	0	0	0	0	0	46	0	0	36	0	0	0	3	132	0	0	3	0
RED51	2003	9	325	0	0	0	0	0	0	0	1	0	0	8	0	0	0	5	139	0	0	0	0
RED52	2003	22	323	0	0	0	0	0	0	0	0	0	0	11	0	0	0	15	181	0	0	0	0
RED53	2003	11	486	0	0	0	0	0	0	0	2	0	0	14	0	0	0	21	250	0	0	0	0
RED54	2003	10	387	0	0	0	1	0	0	0	0	0	0	1	0	0	0	72	105	1	0	0	0
RED56	2003	22	366	1	0	0	0	0	0	0	2	0	0	16	0	0	0	3	197	0	0	0	0
RED58	2003	25	324	0	0	2	0	0	0	0	1	0	0	59	0	0	0	6	107	0	0	0	0
RED69	2003	11	251	0	0	0	0	0	0	0	15	0	0	4	0	0	0	5	97	0	0	6	0
RED71	2003	6	437	0	0	0	0	0	0	0	68	0	0	55	0	0	0	17	87	0	0	4	0
STO01	2003	8	344	0	0	0	0	2	0	0	2	0	0	51	0	0	0	5	164	0	0	1	0

Appendix 4B - Lake benthic community data (contn)

Site	Year	Cordulidae	Corixidae	Corydalidae	Crangonyctidae	Curculionidae	Dixidae	Dolichopodidae	Dytiscidae	Elmidae	Empididae	Enchytraeidae	Entomobryidae	Ephemerellidae	Ephemeridae	Erpobdellidae	Gammaridae	Glossiphoniidae	Gomphidae	Gyrinidae	Halicaridae	Haliplidae
PAN02	2003	1	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0
RED02	2003	0	0	0	0	0	0	0	0	3	2	2	0	88	5	0	0	0	5	0	0	0
RED03	2003	0	0	0	0	0	0	0	0	6	2	4	0	32	2	0	0	0	2	0	1	0
RED04	2003	0	2	0	0	0	0	0	0	1	1	0	0	11	0	0	3	0	0	0	2	0
RED05	2003	0	0	0	0	0	0	0	0	2	1	6	0	17	0	0	0	1	0	0	0	0
RED07	2003	0	0	0	0	0	0	0	0	0	0	5	0	3	0	0	0	0	0	0	0	0
RED08	2003	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0
RED08QA/QC1	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RED11	2003	0	0	0	0	0	0	0	0	0	0	35	0	1	0	0	1	2	0	3	0	0
RED13	2003	0	0	0	0	0	0	0	0	0	0	19	0	3	0	0	0	0	0	0	0	0
RED14	2003	0	0	0	1	0	0	0	0	0	0	0	0	4	0	0	0	1	0	0	0	0
RED16	2003	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	2	1	0	0	0	0
RED18	2003	0	0	0	0	0	0	0	5	9	1	20	0	4	0	0	0	0	2	0	0	0
RED19	2003	0	0	0	0	0	0	0	1	0	0	0	0	17	0	0	0	0	0	1	0	0
RED20	2003	0	0	0	0	0	0	0	1	0	0	5	0	2	0	0	1	0	0	0	0	2
RED21	2003	0	0	0	0	0	0	0	0	0	0	2	0	3	0	0	4	0	0	0	0	0
RED23	2003	0	2	0	0	0	0	0	1	0	0	0	0	1	0	0	3	5	0	0	0	0
RED24	2003	0	1	0	0	0	0	0	0	2	0	0	0	1	0	0	0	3	0	0	0	1
RED25	2003	0	0	0	0	0	0	0	0	0	0	1	0	7	1	1	1	0	0	0	0	0
RED25QA/QC1	2003	0	0	0	5	0	0	0	0	0	1	0	0	3	0	0	0	1	0	0	0	0
RED27	2003	0	0	0	0	0	0	0	0	15	0	0	0	3	2	0	0	2	0	0	0	19
RED28	2003	0	0	0	2	0	0	0	0	0	0	3	0	1	0	0	0	0	0	0	4	0
RED29	2003	0	0	0	0	0	0	0	0	5	1	14	0	8	0	0	0	0	0	0	3	0
RED29QA/QC1	2003	0	0	0	0	0	0	0	0	1	1	16	0	4	1	0	0	0	0	0	1	0
RED30	2003	0	0	0	0	0	0	0	0	22	0	4	0	21	0	0	0	1	3	0	0	0
RED31	2003	1	0	0	1	0	0	0	0	0	0	4	0	0	0	0	0	1	0	0	1	1
RED32	2003	0	0	0	0	0	0	0	5	6	1	1	0	41	0	0	1	0	0	0	0	0
RED33	2003	0	0	0	0	0	0	0	0	36	1	3	0	5	6	0	0	0	0	0	0	0
RED40	2003	0	0	0	1	0	0	0	0	7	0	1	0	8	0	0	1	0	0	1	0	0
RED41	2003	0	1	0	3	0	0	0	0	0	0	0	0	11	10	0	0	0	0	1	0	0
RED42	2003	0	0	0	2	0	0	0	1	0	0	6	0	3	0	0	2	0	0	0	1	0
RED43	2003	1	3	0	0	0	0	0	0	15	0	1	0	2	0	0	0	0	1	0	1	0
RED44	2003	0	0	0	0	0	0	0	0	20	0	1	0	47	1	0	0	0	1	0	0	0
RED46	2003	0	0	0	0	0	0	0	1	0	0	2	0	10	0	0	0	0	0	0	1	1
RED51	2003	0	0	0	0	0	0	0	0	0	0	5	0	21	0	1	0	3	0	0	2	0
RED52	2003	0	0	0	0	0	0	0	0	0	0	8	0	4	0	0	1	0	1	0	1	0
RED53	2003	0	0	0	0	0	0	0	1	0	0	10	0	4	1	0	0	0	0	0	1	1
RED54	2003	0	0	0	0	0	0	0	1	5	3	2	0	31	0	0	0	0	0	0	0	0
RED56	2003	0	0	0	0	0	0	0	0	0	0	0	0	13	0	0	4	0	0	0	2	0
RED58	2003	0	0	0	0	0	0	0	0	0	0	2	0	11	0	0	4	0	0	0	4	0
RED69	2003	0	0	0	0	0	1	0	2	0	0	17	0	0	0	0	6	1	0	1	0	6
RED71	2003	0	2	0	1	0	0	0	0	1	0	2	0	37	1	0	0	0	0	0	0	2
STO01	2003	0	0	0	1	0	0	0	0	4	0	0	0	17	1	0	0	0	0	0	0	0
STO02	2003	0	0	0	0	0	0	0	0	1	0	0	0	27	2	0	0	0	0	2	0	1
TIM02	2003	0	2	0	0	0	0	0	1	3	0	1	0	9	18	0	0	0	0	0	0	1
TIM04	2003	0	8	0	0	0	0	0	0	14	0	1	0	14	4	0	0	0	1	0	0	0
TIM06	2003	0	0	0	0	0	0	0	0	6	0	0	0	2	0	0	0	0	0	0	0	0
TIM08	2003	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1
TIM10	2003	0	0	0	0	0	0	0	0	0	1	3	0	2	0	0	0	0	0	0	1	0
TIM14	2003	0	0	0	0	0	0	0	0	0	0	1	0	3	0	0	0	0	0	3	0	0
TIM50	2003	0	2	0	0	0	0	0	1	0	0	1	0	0	0	1	1	2	0	0	0	0
TIM52	2003	0	1	0	0	0	0	0	0	21	1	6	0	13	1	0	0	1	0	1	0	1
TIM52QA/QC1	2003	0	1	0	0	0	0	0	2	9	0	3	0	7	1	0	0	0	0	2	1	0
TIM53	2003	0	2	0	0	0	0	0	0	23	0	11	0	11	1	0	0	0	1	0	0	0
TIM54	2003	0	6	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	3
TIM55	2003	0	0	0	0	0	0	0	1	3	1	16	0	0	1	0	0	0	0	1	1	1
TIM58	2003	0	0	0	0	0	0	0	2	0	1	18	0	51	9	0	0	0	6	0	0	0
TIM59	2003	0	2	0	0	0	0	0	1	0	0	2	0	4	1	1	0	1	0	0	0	1
TIM60	2003	0	0	0	5	0	0	0	2	3	0	3	1	13	0	0	13	0	0	1	0	0
TIM61	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	2	1	0	0

Appendix 4B - Lake benthic community data (contn)

Site	Year	Helicopsychidae	Heptageniidae	Hyalellidae	Hydrobiidae	Hydrodromidae	Hydrophilidae	Hydropsychidae	Hydroptilidae	Hydrozetiidae	Hydryphantidae	Hygrobatidae	Hypogasturidae	Isotomidae	Krendowskiidae	Lebertiidae	Lepidostomatida	Leptoceridae	Leptohyphidae	Leptophlebiidae	Leuctridae	Libellulidae
PAN02	2003	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0	4	0	2
RED02	2003	1	29	13	1	1	0	0	1	0	0	3	0	0	0	1	1	3	0	13	0	0

Appendix 4B - Lake benthic community data (contn)

Site	Year	Limnephilidae	Limnesiidae	Limnocharidae	Lumbriculidae	Lymnaeidae	Metretopodidae	Molannidae	Muscidae	Naididae	Neoacaridae	Nepidae	Notonectidae	Odontoceridae	Onychiuridae	Oxidae	Perlidae	Philopotamidae	Phoridae	Phrygaenidae	Physidae	Pionidae	Planorbidae
PAN02	2003	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
RED02	2003	0	0	0	1	1	0	0	0	34	0	0	0	0	0	0	0	0	0	0	0	0	2
RED03	2003	0	0	0	2	6	0	0	0	42	0	0	0	0	0	0	0	0	0	1	0	0	9
RED04	2003	0	0	0	3	0	0	0	0	105	0	0	0	0	0	0	0	0	0	0	0	0	2
RED05	2003	1	0	0	6	0	0	1	0	43	0	0	0	0	0	0	0	0	0	1	0	0	7
RED07	2003	0	0	0	1	0	0	0	0	29	0	1	0	0	0	0	0	0	0	3	0	0	3
RED08	2003	0	0	0	2	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	3
RED08QA/QC1	2003	0	0	0	0	0	0	1	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0
RED11	2003	4	0	0	6	0	0	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0	5
RED13	2003	0	17	0	7	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	3
RED14	2003	0	0	0	0	0	0	0	0	20	0	0	1	0	0	0	0	0	0	1	0	2	6
RED16	2003	0	0	0	1	0	0	0	0	47	0	0	0	0	0	0	0	0	0	0	0	0	1
RED18	2003	0	23	0	26	0	0	0	0	21	0	0	0	0	0	0	0	0	0	0	0	0	9
RED19	2003	0	0	0	1	1	0	0	0	15	0	0	0	0	0	0	0	0	0	2	0	0	10
RED20	2003	2	0	0	0	0	0	0	0	32	0	0	0	0	0	0	0	0	0	2	0	1	4
RED21	2003	0	0	0	3	0	0	0	0	18	0	0	0	0	0	0	0	0	0	2	0	1	2
RED23	2003	0	0	0	7	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0
RED24	2003	2	0	0	0	0	0	2	0	5	0	0	0	0	0	0	0	0	0	4	0	0	6
RED25	2003	0	0	0	2	0	0	0	0	19	0	0	0	0	0	0	0	0	0	1	0	0	1
RED25QA/QC1	2003	2	0	0	6	0	0	0	0	12	0	0	0	0	1	0	0	0	0	2	0	0	1
RED27	2003	0	2	0	0	0	0	0	0	139	0	0	0	0	0	0	0	0	0	1	0	1	3
RED28	2003	2	0	0	0	0	0	0	0	19	0	0	0	0	0	2	0	0	0	1	0	1	0
RED29	2003	0	1	0	0	0	0	0	0	187	0	0	0	0	0	0	0	0	0	0	0	1	11
RED29QA/QC1	2003	1	0	0	0	0	0	0	0	283	0	0	0	0	0	0	0	0	0	0	0	2	12
RED30	2003	0	0	0	2	0	0	0	0	69	0	0	0	0	0	0	0	0	0	1	0	0	3
RED31	2003	2	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	2

Appendix 4B - Lake benthic community data (contn)

Site	Year	Poduridae	Polycentropodidae	Psephenidae	Psychodidae	Psychomyiidae	Pyralidae	Rhyacophilidae	Sciomyzidae	Sericostomatidae	Sialidae	Simuliidae	Sisyridae	Sperchontidae	Sphaeriidae	Stratiomyidae	Tabanidae	Tetrastemmatidae	Tipulidae	Torrenticolidae	Trhypachthoniidae	Tubificidae	Unionicolidae	Unionidae	Valvatidae
PAN02	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	1	0	0
RED02	2003	0	2	0	0	0	0	0	0	0	0	0	0	3	8	0	0	0	2	1	0	0	0	0	5
RED03	2003	0	0	0	0	1	0	0	0	0	0	0	0	1	21	0	0	0	0	0	1	3	0	0	2
RED04	2003	0	0	0	0	0	0	0	0	0	0	0	0	1	9	0	0	0	0	0	0	2	1	0	0
RED05	2003	0	4	4	0	0	0	0	0	0	0	0	0	2	34	0	0	0	1	0	2	5	0	0	0
RED07	2003	0	7	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	1	0	0	3
RED08	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	41	0	0	0	0	0	0	3	0	0	0
RED08QA/QC1	2003	0	1	0	0	0	0	0	0	0	0	0	0	0	65	0	0	0	0	0	0	3	0	0	0
RED11	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	52	0	0	0	0	0	0	0	0	0	3
RED13	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0	0	0	0	0	0	0	0	0
RED14	2003	0	2	0	0	0	0	0	0	0	0	0	2	0	18	0	0	0	0	0	0	1	3	0	3
RED16	2003	0	2	0	0	0	0	0	0	0	0	0	1	0	19	0	1	0	0	0	0	0	1	0	0
RED18	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	31	0	0	0	0	0	0	0	0	0	6
RED19	2003	0	6	0	0	0	1	0	0	0	1	0	0	1	2	0	0	0	1	0	0	0	1	0	0
RED20	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0	0	0	0	0	0	5	0	0	1
RED21	2003	0	4	0	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	5	0	0	0
RED23	2003	0	4	0	0	0	0	0	0	0	0	0	0	0	31	0	0	0	0	0	0	5	1	0	0

T J T RE RE [(R) 1 9 9 6 . 6 (E) 1 9 9 9 . 7 (D) 1 9 9 6 . 6 (
(3) 2 RE 6 6 . 2 (0 0 0 0 0 0 5 0 0 0)] T J 0 - 1 . 3 6 4 7 T
R D19 203 0 0 5 . 4 (9) 1 1 . 3 5 6 3 1 9 9 7 (3) 3 3 2 . 8
2 (0 7 RE (D 0 3 0 5 . 4 (9) 1 1 . 3 5 6 3 1 9 2 7 4 2 . 9 ( ) 2 0
RE 3 4 (0) 1 9 9 7 (3) 3 3 2 . 8 (0 2 0 0 0) - 8 . 4 (0
0 0 0 0 RED1 01 0 0 0 0 0 RED29 9 . 7 (D) 1 9 9 6 . 6 (1) 2 0 9 . 6 (0
R D111 2 0 0 5 . 4 (0) 1 9 9 7 (3) 3 3 2 . S 1 . 3 6 1 1 9

Appendix 4B - Lake benthic community data.

Site	Year	# cells sorted	Total # benthos	Aeolosomatidae	Aeshnidae	Ancylidae	Anisitsiellidae	Arrenuridae	Athericidae	Aturidae	Baetidae	Baetiscidae	Belostomatidae	Caenidae	Calopterygidae	Cambaridae	Capniidae	Ceratopogonidae	Chiro	A

Appendix 4B - Lake benthic community data (contn)

Site	Year	Cordulliidae	Corixidae	Corydalidae	Crangonyctidae	Curculionidae	Dixidae	Dolichopodidae	Dytiscidae	Elmidae	Empididae	Enchytraeidae	Entomobryidae	Ephemerellidae	Ephemeridae	Erpobdellidae	Gammaridae	Glossiphoniidae	Gomphidae	Gyrinidae	Halicaridae	Haliplidae
USR01	2003	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0
USR02	2003	2	0	0	0	0	0	0	0	0	0	2	0	7	0	0	0	1	3	0	0	0
USR10	2003	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0
USR11	2003	0	0	0	0	0	0	0	3	0	1	1	0	18	1	1	0	0	2	0	0	1
USR13	2003	0	0	0	0	0	0	0	1	0	0	16	0	6	0	0	1	0	0	0	0	2
Historically impacted sites																						
Test01		0	0	0	0	0	0	0	0	0	0	26	0	0	0	0	0	0	0	0	3	0
Test02		0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	1	2	0	0
Test03		0	0	0	0	0	0	0	0	0	2	8	0	0	0	0	0	0	0	0	0	0
Test04		0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	3	0	0	0
Test05		0	0	0	0	0	0	0	0	10	3	1	8	(	e	)	(	0	0	)	-	8

Appendix 4B - Lake benthic community data (contn)

Site	Year	Helicopsychidae	Heptageniidae	Hyalellidae	Hydrobiidae	Hydrodromidae	Hydrophilidae	Hydropsychidae	Hydroptilidae	Hydrozetiidae	Hydryphantidae	Hygrobatidae	Hypogasturidae	Isotomidae	Krendowskiidae	Lebertiidae	Lepidostomatidae	Leptoceridae	Leptohyphidae	Leptophlebiidae	Leuctridae	Libellulidae
USR01	2003	0	0	98	7	0	0	0	4	0	0	1	0	0	0	0	0	2	0	1	0	0
USR02	2003	0	1	133	1	0	0	0	1	0	0	0	0	0	0	1	0	1	0	19	0	1
USR10	2003	0	0	158	0	0	0	0	1	0	0	0	0	0	0	0	2	3	0	29	0	0
USR11	2003	0	10	103	0	1	0	0	1	1	0	2	0	0	0	1	1	4	0	11	0	3
USR13	2003	0	0	37	30	0	0	0	2	1	0	1	0	0	0	3	0	1	0	11	0	5
Historically impacted sites																						
Test01		0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Test02		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Test03		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Test04		0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3	0	0	0	0
Test05		1	24	36	0	0	0	0	17	1	0	2	0	0	0	3	2	0	0	6	0	0
Test06		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Test07		0	0	14	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Test08		0	0	1	5	0	0	0	0	0	0	1	0	0	0	0	0	8	0	0	0	0
Test09		0	2	51	8	0	0	0	0	0	0	1	0	0	0	0	0	5	0	3	0	0
Test11		0	0	64	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29	0	0
Test38		0	0	12	6	0	0	0	4	0	0	0	0	0	0	0	0	2	0	16	0	0
Test12		0	0	50	0	1	0	0	0	2	0	0	0	0	0	1	0	2	0	0	0	2

Appendix 4B - Lake benthic community data (contn)

Site	Year	Limnephilidae	Limnesiidae	Limnocharidae	Lumbriculidae	Lymnaeidae	Metretopodidae	Molannidae	Muscidae	Naididae	Neoacaridae	Nepidae	Notonectidae	Odontoceridae	Onychiuridae	Oxidae	Perlidae	Philopotamidae	Phoridae	Phrygaenidae	Physidae	Pionidae	Planorbidae
USR01	2003	0	1	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	6	0	0	4
USR02	2003	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	2	0	1	4
USR10	2003	0	0	1	0	0	0	1	0	5	0	0	0	0	0	1	0	0	0	0	0	0	0
USR11	2003	1	0	0	1	0	0	0	0	11	0	0	0	0	0	1	0	0	0	3	0	1	0
USR13	2003	0	2	0	2	0	0	0	0	82	0	0	0	0	0	0	0	0	0	3	0	0	3
Historically impacted sites																							
Test01		0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
Test02		0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	1	0	0	1
Test03		0	0	0	2	1	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	5
Test04		0	0	0	1	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0
Test05		0	1	0	4	0	0	0	0	42	0	0	0	0	0	0	1	0	0	1	0	0	10
Test06		0	0	0	0	0	0	0	0	29	0	0	0	0	0	0	0	0	0	0	0	0	1
Test07		0	0	0	1	0	0	0	0	34	0	0	0	0	0	0	0	0	0	0	0	0	0
Test08		0	0	0	0	1	0	0	0	60	0	0	0	0	0	0	0	0	0	0	0	0	2
Test09		0	0	0	0	0	0	0	0	43	0	0	1	0	0	0	0	0	0	0	0	0	7
Test11		0	0	0	2	1	0	0	0	30	0	0	1	0	0	0	0	0	0	1	0	0	3
Test38		2	0	0	1	0	0	0	0	14	0	0	0	0	0	0	0	0	0	2	0	0	4
Test12		0	0	0	0	0	0	0	0	59	0	0	0	0	0	0	0	0	0	0	0	5	20

Appendix 5 - Reference Group Habitat Characteristics

Site	Group	Inflow/ Outflow	Ecoregion	Stream order	MAP	Slope	Distance from Source	Drainage Area	Perimeter	BaseFlow Index	%Water	%Wetland
STREAMS												
Abalard Cr.	1		1	2	591.19	3.86	7.37	12.02	23.32	0.90	0.70	3.25
CMR01	1		5	1	**703.13**	7.49	0.77	0.43	3.96	0.00	**7.24**	0.00
HEM124	1		4	3	692.95	2.12	16.90	59.12	54.60	0.74	9.31	6.98
LET01	1		1	1	595.33	5.61	5.49	4.30	15.00	0.86	6.53	10.89
LSP02	1		5	1	**703.13**	12.21	0.56	0.38	4.00	0.00	**7.24**	0.00
LSR07	1		6	2	761.81	9.71	4.99	7.67	18.48	0.64	1.16	0.09
OPR02	1		5	2	755.22	20.334	2.436	2.81	13.12	0.603	2.89	0
RED10	1		1	2	595.06	7.28	7.56	12.34	30.92	0.88	15.95	2.17
RED26	1		1	1	586.23	23.77	1.12	0.73	4.84	0.88	1.62	0.00
RED48	1		1	1	593.33	6.31	6.18	7.92	22.44	0.89	18.90	4.33
RED50	1		1	2	593.20	5.52	4.74	6.84	17.48	0.89	4.50	9.52
SUD03	1		5	3	744.28	6.52	10.19	15.73	26.88	0.54	4.78	0.32
SUD06	1		5	6	727.50	0.88	216.61	4426.06	830.80	0.61	11.55	1.91
SUD08	1		5	3	**703.13**	**5.29**	**34.00**	**315.43**	**115.14**	**0.70**	**7.24**	0.00
SUD10	1		6	3	744.30	6.45	17.52	22.28	62.92	0.54	3.61	0.22
SUD15	1		5	4	745.82	1.46	59.24	358.65	226.40	0.66	13.43	0.70
SUD16	1		5	3	781.68	6.62	17.68	47.40	60.76	0.68	5.43	0.50
SUD17	1		5	4	780.60	3.35	47.45	161.34	166.00	0.68	6.28	0.36
SUD20	1		5	3	781.68	4.64	24.11	80.32	78.12	0.72	8.41	0.00
SUD21	1		5	5	783.13	1.86	61.69	305.08	169.60	0.69	6.49	0.86
	mean		**5**	**3**	**695.13**	**6.36**	**28.64**	**307.58**	**101.67**	**0.66**	**7.39**	**2.22**
	stdev		**2**	**1**	**76.92**	**5.08**	**49.37**	**1004.24**	**187.83**	**0.26**	**4.81**	**3.37**
	count		**19**	**19**	**19.00**	**19.00**	**19.00**	**19.00**	**19.00**	**19.00**	**19.00**	**19.00**
Mar-32	2		4	3	718.90	1.96	52.81	421.05	201.12	0.74	9.24	0.89
Chikuni R.	2		1	4	591.46	0.64	92.75	1479.04	279.80	0.87	16.79	6.34
HEM10	2		4	4	744.30	2.46	20.38	98.38	95.80	0.72	5.76	1.51
HEM126	2		4	5	703.01	1.08	136.48	2163.34	397.00	0.73	5.44	2.19
HEM127	2		4	6	689.87	0.86	199.87	3993.84	743.20	0.72	5.09	1.15
HEM22	2		4	3	750.76	3.57	22.11	70.32	82.68	0.74	5.16	0.31
HEM36	2		4	6	744.86	1.00	122.87	2011.88	474.60	0.74	7.75	1.09
RAP01	2		5	3	740.94	3.66	29.65	70.65	100.32	0.55	6.82	0.36
RED06	2		1	4	603.99	1.94	24.88	174.54	85.80	0.89	0.25	2.75
RED12	2		1	2	594.14	2.84	12.66	24.03	38.52	0.88	4.24	4.09
SUD01	2		6	3	733.82	2.80	17.03	57.41	55.60	0.58	4.14	1.10
	mean		**4**	**4**	**692.37**	**2.07**	**66.50**	**960.41**	**232.22**	**0.74**	**6.43**	**1.98**
	stdev		**2**	**1**	**64.35**	**1.08**	**62.67**	**1301.96**	**223.33**	**0.11**	**4.13**	**1.82**
	count		**11**	**11**	**11.00**	**11.00**	**11.00**	**11.00**	**11.00**	**11.00**	**11.00**	**11.00**
Mar-31	3		4	3	717.37	5.71	6.38	10.95	25.60	0.75	7.11	1.42
Mar-46	3		4	1	717.55	3.39	6.11	9.04	22.00	0.74	2.71	1.06
Mar-05	3		4	4	703.48	19.46	6.66	7.93	19.72	0.72	6.61	3.80
Mar-24	3		4	2	729.99	5.59	8.69	19.08	31.88	0.73	**7.24**	0.00
HEM08	3		4	1	734.35	15.36	1.64	1.48	7.40	0.75	7.78	0.93
HEM26	3		4	1	737.43	12.94	4.52	5.73	17.36	0.75	1.70	3.61
HEM48	3		4	1	743.18	10.69	1.72	2.11	8.68	0.75	4.05	0.00
LSR08	3		6	3	757.54	4.91	13.60	51.91	63.20	0.61	6.81	1.26
RDL15	3		1	2	584.41	3.59	12.63	35.06	47.04	0.89	26.55	1.95
RED22	3		1	2	586.01	3.01	7.39	11.69	22.24	0.88	27.03	1.18
RED59	3		1	1	592.20	0.15	1.27	1.84	8.80	0.89	20.65	4.82
RED73	3		1	3	594.38	1.93	21.31	90.56	63.00	0.88	18.94	2.76
RLT01	3		1	2	602.52	16.36	0.91	0.56	4.84	0.90	**7.24**	0.00
RLT02	3		1	1	605.08	4.45	3.89	5.71	17.12	0.89	0.25	1.79
SUD07	3		5	3	**703.13**	**5.29**	**34.00**	**315.43**	**115.14**	**0.70**	**7.24**	0.00
SUD11	3		6	4	740.59	2.89	39.69	168.54	156.40	0.05	6.68	0.46
SUD12	3		6	3	741.28	4.17	35.38	80.10	106.40	0.55	6.59	0.32
SUD22	3		5	5	773.00	2.19	69.47	652.90	235.40	0.65	9.91	0.73
SUD23	3		5	5	736.89	0.84	121.39	1473.19	398.40	0.59	12.48	0.87
SUD24	3		5	4	738.20	3.02	33.65	149.44	147.24	0.60	9.88	0.34
USR12	3		5	3	727.58	1.22	26.51	113.44	82.24	0.60	10.93	0.72
	mean		**4**	**3**	**693.63**	**6.05**	**21.75**	**152.70**	**76.20**	**0.71**	**9.92**	**1.33**
	stdev		**2**	**1**	**66.46**	**5.52**	**28.76**	**338.33**	**95.85**	**0.19**	**7.41**	**1.36**
	count		**21**	**21**	**21.00**	**21.00**	**21.00**	**21.00**	**21.00**	**21.00**	**21.00**	**21.00**

Appendix 5 - Reference Group

Appendix 5 - Reference Group Habitat Characteristics (contn)

Site	Group	Inflow/ Outflow	Ecoregion	Stream order	MAP	Slope	Distance from Source	Drainage Area	Perimeter	BaseFlow Index	%Water	%Wetland
STREAMS												
Mar-47	4		4	3	712.00	5.51	16.96	88.32	77.36	0.74	4.63	2.63
Mar-01	4		4	2	688.12	7.16	10.82	15.81	30.80	0.72	3.29	0.63
Mar-17	4		4	1	715.05	22.80	4.39	3.92	14.04	0.72	2.93	0.00
Mar-18	4		4	2	722.81	13.16	12.50	24.11	38.00	0.73	1.96	4.91
Mar-28	4		4	2	730.41	4.86	5.14	10.81	25.56	0.75	5.73	1.46
Balmer Trib	4		1	2	591.20	5.43	7.95	16.29	27.04	0.90	1.14	3.48
DIX01	4		1	4	595.14	1.56	40.28	353.77	157.80	0.88	5.69	4.82
HEM116	4		4	5	717.90	1.51	89.81	835.11	278.28	0.75	8.98	5.94
HEM128	4		4	3	735.01	1.47	35.41	10.44	91.44	0.75	10.86	1.38
HEM129	4		4	3	726.18	6.49	45.52	52.11	54.60	0.75	11.83	0.52
HEM130	4		4	5	746.14	1.24	70.88	1013.13	292.60	0.74	9.65	1.10
HEM74	4		4	3	731.18	9.82	11.90	34.35	39.88	0.75	10.95	0.55
LSP03	4		6	6	777.72	2.30	122.01	1335.28	382.00	0.68	7.30	0.58
LSR06	4		6	3	765.36	5.89	11.12	33.63	46.20	0.69	1.74	1.71
RDL16	4		1	1	**703.13**	10.68	0.64	0.42	3.92	0.00	**7.24**	2.65
RED09	4		1	1	585.11	4.00	6.33	6.00	21.12	0.89	5.04	2.61
SUD05	4		5	3	774.23	7.93	9.85	19.65	30.36	0.68	1.23	0.37
SUD25	4		5	5	717.19	0.97	80.67	593.29	263.24	0.62	6.58	2.85
	mean		**4**	**3**	**707.44**	**6.27**	**32.34**	**247.02**	**104.12**	**0.71**	**5.93**	**2.12**
	stdev		**2**	**1**	**58.64**	**5.43**	**35.71**	**413.04**	**117.43**	**0.19**	**3.50**	**1.75**
	count		**18**	**18**	**18.00**	**18.00**	**18.00**	**18.00**	**18.00**	**18.00**	**18.00**	**18.00**
Mar-48	5		4	3	712.25	3.51	15.00	43.00	46.20	0.74	7.39	0.86
Mar-03	5		4	2	687.38	4.84	10.00	9.00	30.40	0.72	5.69	0.82
HEM117	5		4	4	723.77	2.52	48.83	366.43	144.12	0.75	9.58	9.81
HEM12	5		4	3	740.75	4.12	20.13	43.35	54.32	0.74	2.57	1.69
HEM120	5		4	3	688.59	2.12	27.55	124.69	100.56	0.72	3.90	1.10
HEM121	5		4	3	686.51	1.59	55.70	286.05	168.24	0.73	3.68	2.09
HEM123	5		4	3	695.98	1.34	38.93	190.80	117.64	0.74	4.79	4.45
HEM14	5		4	1	737.89	8.31	2.99	4.53	12.32	0.74	12.30	0.28
HEM16	5		4	3	737.64	6.00	11.58	53.09	52.24	0.74	8.23	2.55
HEM54	5		4	3	748.47	4.55	18.84	52.30	59.88	0.74	5.11	0.35
ILD01	5		5	4	748.92	6.56	12.50	40.38	56.44	0.56	5.84	0.20
ILD02	5		5	5	745.81	6.37	26.36	143.79	118.44	0.55	4.83	0.46
RED45	5		1	2	597.88	8.27	13.76	28.96	46.12	0.90	**7.24**	4.89
SUD02	5		6	4	728.94	1.67	60.72	355.14	208.80	0.58	7.86	1.56
SUD18	5		5	5	766.07	1.98	85.38	752.96	281.20	0.66	6.45	0.56
SUD19	5		5	5	787.83	4.20	41.35	175.11	126.84	0.70	5.23	0.54
VER01	5		5	4	731.38	1.65	62.94	545.52	262.20	0.58	7.78	1.28
	mean		**4**	**3**	**721.53**	**4.09**	**32.50**	**189.12**	**110.94**	**0.70**	**6.38**	**1.97**
	stdev		**1**	**1**	**42.58**	**2.34**	**23.34**	**211.22**	**80.28**	**0.09**	**2.39**	**2.44**
	count		**17**	**17**	**17.00**	**17.00**	**17.00**	**17.00**	**17.00**	**17.00**	**17.00**	**17.00**
Mar-50	6		4	4	735.16	1.16	50.45	235.74	128.36	0.75	10.78	1.02
HEM122	6		4	3	690.50	8.56	12.00	25.00	44.68	0.72	3.08	1.19
SUD09	6		5	3	755.57	2.59	9.88	12.64	24.88	0.62	1.23	1.07
SUD13	6		6	5	734.46	1.59	90.09	679.18	272.00	0.58	7.08	1.25
SUD14	6		6	5	736.76	1.46	105.99	1012.09	321.20	0.56	6.48	1.01
	mean		**5**	**4**	**730.49**	**3.07**	**53.68**	**392.93**	**158.22**	**0.64**	**5.73**	**1.11**
	stdev		**1**	**1**	**24.00**	**3.12**	**43.96**	**438.75**	**133.30**	**0.08**	**3.71**	**0.11**
	count		**5**	**5**	**5.00**	**5.00**	**5.00**	**5.00**	**5.00**	**5.00**	**5.00**	**5.00**
LAKES												
HEM02	1	1	4.0	1.0	716.15	2.51	3.17	2.38	10.96	0.72	6.88	0.53
HEM04	1	2	4.0	1.0	715.84	2.63	4.43	3.28	14.40	0.72	9.40	0.38
HEM52	1	2	4.0	3.0	748.07	4.22	12.81	38.68	48.88	0.73	6.40	0.32
HEM82	1	2	4.0	2.0	762.76	1.61	37.72	254.31	139.60	0.73	13.12	0.49
RED03	1	1	1.0	5.0	592.94	5.15	15.78	37.01	48.12	0.88	16.70	3.62
RED04	1	2	1.0	5.0	591.69	0.49	144.10	3575.08	490.60	0.88	19.95	4.76
RED16	1	2	1.0	1.0	597.35	4.46	2.97	4.18	14.36	0.87	20.63	6.09
RED33	1	2	1.0	3.0	586.02	1.93	25.07	87.96	72.00	0.89	21.60	1.65

Appendix 5 - Reference Group Habitat Characteristics (contn)

Site	Group	%Deciduous Forest	%Coniferous Forest	Dominant Substrate	2ndDominant Substrate	Surrounding Material	Embedded-ness	Bankfull Width	Channel Width	Channel Depth	Velocity
STREAMS											
Mar-47	4	20.54	57.03	8	7	0	1	20	17	30	0.222
Mar-01	4	7.22	44.91	10	1	2	1	3.9	3.1	67.7	0.14
Mar-17	4	27.27	67.83	2	10	3	1	4.8	2.6	27.3	0.18
Mar-18	4	5.40	82.33	5	6	4	1	12.2	9.5	44	0.34
Mar-28	4	10.04	82.24	2	1	0	1	7.5	2.8	63.6	0.196
Balmer Trib	4	52.29	36.75	10	0	1	1	1.9	1.8	38.4	0.03
DIX01	4	27.37	45.78	10	1	0	1	31	25	**42.84**	**0.22**
HEM116	4	18.34	56.46	1	10	2	1	27	26	72.2	0
HEM128	4	26.31	41.91	6	5	3	4	20.1	12	46	0.35
HEM129	4	32.78	54.35	8	7	5	5	9.5	7.8	25.7	0.52
HEM130	4	34.42	42.29	8	7	6	5	50	25	58.8	0.38
HEM74	4	52.60	32.87	8	7	6	4	9.8	7	31.8	0.419
LSP03	4	24.67	55.07	2	10	0	1	15	13	64	0.023
LSR06	4	61.47	8.17	10	0	2	1	7.8	7.6	70.2	0.03
RDL16	4	10.46	86.90	7	0	2	1	1.8	1.7	23.4	0.066
RED09	4	38.68	0.00	1	2	0	1	3.4	2.6	45.6	0.22
SUD05	4	52.45	45.95	8	6	5	4	5.45	1.8	12.8	0.24
SUD25	4	30.22	48.41	5	4	3	4	27.7	21.2	28	0.27
	mean	**29.59**	**49.40**	**6**	**5**	**2**	**2**	**14.38**	**10.42**	**44.02**	**0.21**
	stdev	**16.78**	**22.75**	**3**	**4**	**2**	**2**	**12.84**	**8.82**	**18.31**	**0.15**
	count	**18.00**	**18.00**	**18**	**18**	**18**	**18**	**18**	**18**	**18**	**18**
Mar-48	5	16.73	46.04	6	5	3	4	4.1	2.8	34	0.297
Mar-03	5	5.72	34.83	4	5	3	1	6.8	3	31	0.23
HEM117	5	21.24	51.33	1	2	10	1	14.5	11.8	79.6	0.22
HEM12	5	12.94	57.80	2	1	3	1	12	12.9	80.2	0.202
HEM120	5	7.41	55.33	10	1	2	1	11.5	8	76	0.1
HEM121	5	16.39	55.51	8	7	3	3	17.1	13.8	60	0.42
HEM123	5	14.42	56.65	1	2	0	1	16	14	70.17	0.11
HEM14	5	2.16	64.63	8	2	1	4	4.5	3.8	43.1	0.0975
HEM16	5	21.37	54.58	6	7	3	5	7.7	7.7	41.5	1.06
HEM54	5	18.30	46.27	2	3	0	1	9.8	9.8	67.7	0.27
ILD01	5	48.19	43.62	7	6	3	5	8.7	4.6	9.5	0.24
ILD02	5	34.35	58.01	7	6	4	4	12.82	12.12	22.3	0.172
RED45	5	29.53	58.25	10	1	0	1	5.1	5	49.6	0.111
SUD02	5	40.98	48.81	8	7	4	3	34	17.2	20.5	0.33
SUD18	5	18.15	62.76	7	6	5	5	30.8	29	20.4	0.33
SUD19	5	28.25	54.83	6	5	2	4	15.2	9.3	14.1	0.21
VER01	5	37.47	45.99	7	6	4	4	35	30	27.33	0.705
	mean	**21.98**	**52.66**	**6**	**4**	**3**	**3**	**14.45**	**11.46**	**43.94**	**0.30**
	stdev	**12.83**	**7.57**	**3**	**2**	**2**	**2**	**9.85**	**8.01**	**24.18**	**0.25**
	count	**17.00**	**17.00**	**17**	**17**	**17**	**17**	**17**	**17**	**17**	**17**
Mar-50	6	37.70	38.76	3	2	4	1	27.4	21.3	57.3	0.29
HEM122	6	21.14	36.71	4	3	2	4	8.2	5.8	26.4	0.37
SUD09	6	15.03	68.95	4	0	2	5	9.75	9.75	52	0.02
SUD13	6	41.52	42.24	2	3	1	1	22.55	19.35	64.7	0.19
SUD14	6	38.32	42.97	2	3	1	1	35.5	15.2	54.5	0.3
	mean	**30.74**	**45.93**	**3**	**2**	**2**	**2**	**20.68**	**14.28**	**50.98**	**0.23**
	stdev	**11.84**	**13.12**	**1**	**1**	**1**	**2**	**11.66**	**6.49**	**14.54**	**0.14**
	count	**5.00**	**5.00**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**
LAKES											
HEM02	1	19.51	58.55	0.0	0.0	1.0	1.0				
HEM04	1	25.76	51.24	4.0	1.0	5.0	1.0				
HEM52	1	12.37	46.80	2.0	1.0	0.0	1.0				
HEM82	1	25.53	49.37	2.0	1.0	10.0	1.0				
RED03	1	44.19	33.50	2.0	3.3	2.3	2.0				
RED04	1	23.03	41.83	3.3	0.3	3.0	1.0				

Appendix 5 - Reference Group Habitat Characteristics (contn)

Site	Group	Inflow/ Outflow	Ecoregion	Stream order	MAP	Slope	Distance from Source	Drainage Area	Perimeter	BaseFlow Index	%Water	%Wetland
LAKES												
RED42	1	2	1.0	2.0	592.03	12.04	6.16	21.31	35.04	0.88	19.86	2.41
RED53	1	1	1.0	1.0	**679.40**	4.63	0.18	0.17	2.00	**0.80**	**13.50**	0.00
RED71	1	2	1.0	4.0	594.79	2.18	26.21	182.64	110.20	0.88	8.62	3.70
TIM04	1	2	5.0	1.0	728.10	5.03	3.99	5.50	17.04	0.67	18.04	0.41
TIM10	1	2	5.0	1.0	719.11	6.86	1.62	0.46	3.60	0.64	30.51	3.51
TIM52	1	2	4.0	2.0	703.98	2.89	4.55	9.13	18.08	0.64	20.35	1.16
USR01	1	1	5.0	4.0	753.31	0.23	10.15	42.35	44.60	0.60	14.21	0.34
USR13	1	1	5.0	4.0	735.44	5.32	15.46	53.53	59.76	0.60	8.19	0.29
	mean	**2**	**3**	**3**	**676.06**	**3.89**	**19.65**	**269.87**	**70.58**	**0.76**	**15.50**	**1.85**
	stdev	**0**	**2**	**2**	**69.63**	**2.86**	**34.83**	**884.30**	**118.45**	**0.11**	**6.66**	**1.91**
	count	**16**	**16**	**16**	**16.00**	**16.00**	**16.00**	**16.00**	**16.00**	**16.00**	**16.00**	**16.00**
HEM58	2	2	4.0	3.0	735.59	2.69	12.52	34.52	45.44	0.74	9.00	0.24
HEM70	2	1	4.0	3.0	726.23	16.44	5.67	6.16	16.52	0.74	6.35	0.41
HEM80	2	1	4.0	2.0	763.30	2.10	47.68	249.62	156.84	0.73	13.09	0.49
MARA07	2	1	4.0	1.0	715.05	27.96	3.29	3.08	11.44	0.72	2.11	0.00
MARA13	2	2	4.0	1.0	717.10	7.10	7.21	12.88	23.12	0.73	12.63	0.52
MARA15	2	1	4.0	2.0	718.45	14.08	9.88	20.12	28.20	0.72	2.98	1.94
MARA16	2	2	4.0	2.0	718.38	12.30	11.53	24.32	46.00	0.72	5.01	1.62
MARA21	2	2	4.0	1.0	724.16	1.80	3.15	4.97	14.64	0.73	13.25	4.35
MARA23	2	1	4.0	2.0	721.94	4.89	14.69	46.83	64.20	0.74	11.32	1.88
MARA26	2	2	4.0	3.0	732.65	10.43	9.81	2286(9.)-84	..5	13.25	.0.9(19)-3	0/04(88)TJT*[M)12.7(A)-4.7
MA	2	2	4.0	2.0	2286(9.8(14)-147728(1.)-5.9(69)-3269.5(1)803(4)0.1(.)-.2(3)001(9)-3740.9(10.)-5.8(43)-3087528(1.)-558(12)-3674.1(0.)-5							

Appendix 5 - Reference Group Habitat Characteristics (contn)

Site	Group	%Deciduous	%Coniferous	Dominant	2ndDominant	Surrounding	Embedded-	Bankfull	Channel	Channel

Appendix 6 - Test Site Analysis results (contn)

Site Code	group in model Original	group Predicted	of belonging to group Prob	Density	Richness	Diversity Simpson's	Index Bray-Curtis	D	P NCF	Band Metrics
SUD07	3	3	0.43	4828	28	0.68	0.36	1.59	1.00	**1**
SUD11	3	1	0.60	4338	25	0.46	0.41	2.07	1.00	**1**
SUD12	3	3	0.30	4122	26	0.71	0.43	2.23	0.99	**1**
SUD22	3	5	0.58	8075	26	0.75	0.35	4.28	0.20	**2**
SUD23	3	1	0.37	1938	26	0.55	0.33	3.63	0.42	**2**
SUD24	3	3	0.90	3190	17	0.70	0.36	1.61	1.00	**1**
USR12	3	3	0.60	6180	23	0.73	0.33	1.75	1.00	**1**
MAR47	4	2	0.46	1931	19	0.87	0.73	5.28	0.17	**2**
MAR01	4	5	0.41	1277	0	0.00	0.00	3.51	0.52	**2**
MAR17										

Appendix 6 - Test Site Analysis results (contn)

Site Code	group in model Original	group Predicted	of belonging to group Prob	Density	Richness	Diversity Simpson's	Index Bray-Curtis	D	P NCF	Band Metrics
Reference sites compared to original model group										
Abalard Cr.	1	1	0.87	2654	13	0.62	0.40	2.05	1.00	**1**
CMR01	1	1	0.79	3080	17	0.53	0.36	1.44	1.00	**1**
HEM124	1	4	0.41	4871	23	0.44	0.39	1.54	1.00	**1**
LET01	1	4	0.36	2554	15	0.47	0.40	1.05	1.00	**1**
LSP02	1	1	0.95	2783	11	0.64	0.41	2.53	0.96	**1**
LSR07	1	1	0.74	7500	16	0.34	0.34	2.18	1.00	**1**
OPR02	1	3	0.58	1285	13	0.51	0.62	8.44	0.00	**3**
RED10	1	1	0.49	3956	16	0.33	0.41	1.58	1.00	**1**
RED26	1	1	0.62	927	12	0.33	0.35	2.23	0.99	**1**
RED48	1	1	0.93	5883	9	0.30	0.40	2.25	0.99	**1**
RED50	1	1	0.60	5157	13	0.37	0.41	1.38	1.00	**1**
SUD03	1	1	0.33	9075	21	0.48	0.41	1.97	1.00	**1**
SUD06	1	2	0.91	4444	21	0.48	0.45	2.30	0.99	**1**
SUD08	1	1	0.45	10300	13	0.27	0.39	2.63	0.93	**2**
SUD10	1	1	0.80	3100	16	0.30	0.36	1.77	1.00	**1**
SUD15	1	5	0.44	6533	22	0.50	0.43	1.70	1.00	**1**
SUD16	1	4	0.35	3911	24	0.44	0.41	1.93	1.00	**1**
SUD17	1	4	0.41	3589	19	0.48	0.35	1.57	1.00	**1**
SUD987D91							**1**			
							SUD11SUD1			**1-503GT52y TD-0.0049 Tc[S)-13.4(UD1)-7.5**

Appendix 6 - Test Site Analysis results (contn)

Site Code	group in model Original	group Predicted	of belonging to group Prob	Density	Richness	Diversity Simpson's	Index Bray-Curtis	D	P NCF	Band Metrics
QA/QC Repeat Reference sites compared to predicted group										
LSR07 QA/QC1	1	1	0.65	5400	18	0.28	0.39	1.57	1.00	**1**
LSR08 QA/QC1	3	3	0.43	25800	21	0.45	0.54	10.06	0.00	**3**
LSR06 QA/QC1	4	1	0.87	7600	19	0.83	0.69	10.20	0.00	**3**
MAR18 QA/QC1	4	5	0.70	8250	29	0.84	0.41	4.92	0.08	**2**
HEM16 QA/QC1	5	5	0.56	8850	18	0.40	0.43	12.97	0.00	**3**
HEM54 QA/QC1	5	5	0.41	7020	24	0.57	0.39	7.14	0.00	**3**
ILD02 QA/QC1	5	5	0.60	1013	36	0.83	0.46	1.84	1.00	**1**
MAR48 QA/QC1	5	5	0.61	5900	27	0.81	0.39	2.59	0.94	**2**
Urban Sites										
Test19		6	0.91	2006	16	0.63	0.39	38.29	0.13	**2**
Test20		3	0.59	1188	18	0.77	0.44	3.21	0.64	**2**
Test21		3	0.92	4828	18	0.68	0.42	1.81	1.00	**1**
Test22		1	0.43	1683	11	0.50	0.89	17.71	0.00	**3**
Test23		3	0.77	4011	28	0.80	0.43	2.81	0.87	**2**
Test24		1	0.83	1622	20	0.79	0.46	3.77	0.35	**2**
Test25		3	0.99	1510	17	0.65	0.35	1.93	1.00	**1**
Test27		3	0.39	1888	21	0.41	0.40	3.66	0.37	**2**
Test28		6	0.69	4436	12	0.47	0.56	52.73	0.10	**2**
Test29		3	0.90	4786	24	0.80	0.40	1.97	1.00	**1**
Test30		3	0.77	1684	21	0.73	0.52	4.80	0.05	**3**
Test31		4	0.35	4200	16	0.65	0.44	4.35	0.16	**2**
Test32		6	0.93	2617	23	0.45	0.37	5.16	0.78	**2**
Test33		4	0.54	4867	27	0.78	0.65	3.73	0.38	**2**
Test34		1	0.98	3750	21	0.78	0.39	3.17	0.68	**2**
Test35		4	0.45	4425	17	0.67	0.42	3.83	0.34	**2**
Test36		4	0.65	5700	20	0.73	0.40	2.59	0.94	**2**
Test37		4	0.57	7225	11	0.62	0.40	5.23	0.04	**3**
Historically Impacted Sites										
Test13-1		1	0.62	1853	15	0.59	0.30	3.71	0.38	**2**
Test13-2		4	0.40	2950	15	0.37	0.33	11.66	0.00	**3**
Test13-3		1	0.71	1663	13	0.42	0.36	1.69	1.00	**1**
Test14		3	0.74	2718	15	0.71	0.34	2.21	1.00	**1**
Test15		6	0.44	2654	14	0.65	0.37	44.98	0.11	**2**
Test16-03		1	0.95	228	7	0.32	0.52	6.16	0.01	**3**
Test16-04		1	0.70	562	13	0.45	0.39	1.94	1.00	**1**
Test17-03		1	0.73	228	5	0.68	0.77	13.96	0.00	**3**
Test17-04		1	0.62	1571	7	0.34	0.46	4.17	0.19	**2**
Test18		3	0.93	753	16	0.71	0.39	2.78	0.88	**2**

Appendix 6 - Test Site Analysis results (contn)

Site Code	group in model Original	group Predicted	of belonging to group Prob	Density	Richness	Diversity Simpson's	Index Bray-Curtis	D	P NCF	Band Metrics	
LAKES											
Reference sites											
HEM02	1	3	0.404	33733	15	0.69	0.45	7.77	0.00	**3**	
HEM04	1	4	0.499	41950	21	0.68	0.45	9.09	0.00	**3**	
HEM06	3	3	0.419	8700	23	0.78	0.30	0.81	1.00	**1**	
HEM18	4	4	0.426	8678	15	0.46	0.30	0.85	1.00	**1**	
HEM20	4	4	0.589	6160	18	0.59	0.22	1.49	1.00	**1**	
HEM24	4	4	0.833	832(4)7.6(h)-2.9(n)-11.2(ess)-f01E0.60			18		0.59	4	0.2-11.7(2)-86c[(0)-3250.29

Appendix 6 - Test Site Analysis results (contn)

Site Code	group in model Original	group Predicted	of belonging to group Prob	Density	Richness	Diversity Simpson's	Index Bray-Curtis	D	P NCF	Band Metrics
MARA38	3	2	0.278	6158	18	0.69	0.22	4.05	0.14	**2**
MARA39	2	2	0.908	5020	27	0.87	0.60	1.57	1.00	**1**
MARA40	2	2	0.961	4687	27	0.88	0.50	1.26	1.00	**1**
MARA41	4	2	0.352	12333	17	0.68	0.45	2.85	0.85	**2**
MARA42	3	4	0.545	11667	24	0.73	0.30	3.97	0.28	**2**
MARA43	4	4	0.623	4206	18	0.65	0.36	1.86	1.00	**1**
MARA44	3	3	0.500	7835	28	0.75	0.29	1.31	1.00	**1**
MARA45	3	4	0.637	6763	27	0.80	0.33	5.47	0.03	**3**
PAN01	4	4	0.769	4921	13	0.47	0.43	1.55	1.00	**1**
PAN02	4	4	0.621	11895	15	0.20	0.45	2.32	0.99	**1**
RED02	2	2	0.585	5958	30	0.86	0.52	1.41	1.00	**1**
RED03	1	1	0.489	32933	31	0.84	0.33	2.59	0.94	**2**
RED04	1	1	0.999	26845	28	0.76	0.33	0.95	1.00	**1**
RED05	3	3	0.543	4768	27	0.82	0.27	1.73	1.00	**1**
RED07	3	3	0.590	3912	21	0.73	0.22	1.67	1.00	**1**
RED08	4	3	0.612	7725	14	0.47	0.35	5.56	0.00	**3**
RED11	3	3	0.422	6633	17	0.80	0.30	2.19	1.00	**1**
RED13	3	3	0.667	5139	15	0.72	0.26	2.50	0.99	**1**
RED14	3	3	0.795	13350	26	0.72	0.29	1.57	1.00	**1**
RED16	1	3	0.539	6160	18	0.59	0.22	5.48	0.00	**3**
RED18	2	3	0.411	13000	20	0.86	0.52	5.28	0.00	**3**
RED19	3	3	0.567	9275	26	0.65	0.25	1.70	1.00	**1**
RED20	3	3	0.447	8666	24	0.68	0.24	1.09	1.00	**1**
RED21	3	3	0.434	6571	23	0.70	0.19	1.64	1.00	**1**
RED23	4	4	0.609	11988	18	0.57	0.40	1.60	1.00	**1**
RED24	3	3	0.489	5388	29	0.80	0.23	1.98	1.00	**1**
RED25	3	4	0.462	6790	23	0.71	0.18	3.30	0.62	**2**
RED27	2	3	0.689	1971	22	0.77	0.61	7.90	0.00	**3**
RED28	3	3	0.433	7044	22	0.63	0.34	2.85	0.86	**2**
RED29	2	3	0.525	10338	25	0.70	0.59	7.22	0.00	**3**
RED30	3	2	0.949	11540	24	0.84	0.37	1.70	1.00	**1**
RED31	3	2	0.372	16000	23	0.73	0.24	4.03	0.14	**2**
RED32	2	2	0.945	3807	25	0.85	0.41	1.28	1.00	**1**
RED33	1	1	0.636	17133	25	0.85	0.41	1.87	1.00	**1**
RED40	3	3	0.609	8146	28	0.80	0.26	1.43	1.00	**1**
RED41	3	1	0.809	11425	23	0.71	0.27	3.39	0.60	**2**
RED42	1	4	0.363	26833	29	0.60	0.30	6.94	0.00	**3**
RED43	3	3	0.602	13143	23	0.73	0.23	1.56	1.00	**1**
RED44	3	1	0.496	16183	24	0.83	0.30	2.96	0.81	**2**
RED46	3	3	2.416	0.499						

RED46

93(2.)-19.093(7)-867.8t()-8.3(4)-50311.4(83)-5045.4(0.)-11.4(3)-8.3(0)-867.3(2.)-19.8(96)-152/TT67952/T1

Appendix 6 - Test Site Analysis results (contn)

Site Code	group in model Original	group Predicted	of belonging to group Prob	Density	Richness	Diversity Simpson's	Index Bray-Curtis	D	P NCF	Band Metrics
STO02	2	3	0.333	18500	22	0.68	0.60	7.67	0.00	**3**
TIM02	3	4	0.649	14400	28	0.79	0.22	5.67	0.02	**3**
TIM04	1	4	0.644	21390	31	0.82	0.30	7.61	0.00	**3**
TIM06	4	4	0.438	15775	12	0.52	0.33	2.80	0.87	**2**
TIM08	4	4	0.701	15617	16	0.25	0.41	2.10	1.00	**1**
TIM10	1	4	0.478	27667	23	0.62	0.32	5.76	0.02	**3**
TIM14	4	4	0.502	6075	16	0.54	0.27	0.97	1.00	**1**
TIM50	2	4	0.356	5395	22	0.75	0.46	4.18	0.21	**2**
TIM52	1	1	0.610	22050	29	0.84	0.32	1.39	1.00	**1**
TIM53	3	3	0.480	8261	22	0.87	0.30	1.91	1.00	**1**
TIM54	4	4	0.599	4039	18	0.61	0.29	1.57	1.00	**1**
TIM55	3	1	0.349	5041	28	0.72	0.20	4.06	0.29	**2**
TIM58	2	2	0.995	13700	21	0.82	0.65	2.30	0.99	**1**
TIM59	3	1	0.601	3843	29	0.70	0.14	4.89	0.10	**2**
TIM60	2	1	0.650	757	23	0.80	0.40	4.77	0.11	**2**
TIM61	3	1	0.372	4098	22	0.65	0.22	4.94	0.09	**2**
USR01	1	1	0.672	34500	25	0.83	0.50	2.59	0.94	**2**
USR02	3	1	0.424	4582	28	0.74	0.30	3.43	0.57	**2**
USR10	3	4	0.646	11580	19	0.66	0.30	2.03	1.00	**1**
USR11	3	1	0.406	6118	36	0.76	0.27	3.31	0.64	**2**
USR13	1	1	0.726	14980	34	0.84	0.33	2.02	1.00	**1**
Reference sites compared to original model group										
HEM02	1	3	0.404	33733	15	0.69	0.45	2.16	0.99	**1**
HEM04	1	4	0.499	41950	21	0.68	0.45	2.31	0.98	**1**
HEM06	3	3	0.419	8700	23	0.78	0.30	0.81	1.00	**1**
HEM18	4	4	0.426	8678	15	0.46	0.30	0.85	1.00	**1**
HEM20	4	4	0.589	6160	18	0.59	0.22	1.49	1.00	**1**
HEM24	4	4	0.833	8361	13	0.56	0.28	1.59	1.00	**1**
HEM28	3	3	0.469	10783	23	0.81	0.27	1.17	1.00	**1**
HEM30	3	3	0.319	11612	23	0.83	0.30	1.46	1.00	**1**
HEM32	3	3	0.557	11300	23	0.70	0.25	1.15	1.00	**1**
HEM34	3	3	0.306	5975	22	0.58	0.26	2.71	0.95	**2**
HEM38	3	4	0.478	7500	21	0.76	0.19	1.95	1.00	**1**
HEM40	3	4	0.634	13050	24	0.83	0.34	1.94	1.00	**1**
HEM44	4	4	0.489	5012	14	0.66	0.32	1.19	1.00	**1**
HEM46	3	4	0.722	5001	18	0.72	0.35	2.61	0.98	**1**
HEM50	3	3	0.501	14080	23	0.80	0.31	1.71	1.00	**1**
HEM52	1	3	0.323	23450	21	0.71	0.1(T-61.0875 -1.6262 TD-0		1.005 Tc[	(HE)-13.5(M)-22.6(5)-7.6(
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Appendix 6 - Test Site Analysis results (contn)

Site Code	group in model Original	group Predicted	of belonging to group Prob	Density	Richness	Diversity Simpson's	Index Bray-Curtis	D	P NCF	Band Metrics
LSP01	3	2	0.655	5887	21	0.72	0.34	2.12	1.00	**1**
MARA07	2	4	0.429	1199	22	0.83	0.40	1.78	1.00	**1**
MARA09	3	4	0.367	1968	22	0.81	0.29	2.13	1.00	**1**
MARA11	3	4	0.453	3677	24	0.75	0.28	1.35	1.00	**1**
MARA13	2	2	0.489	11610	24	0.88	0.63	2.20	1.00	**1**
MARA14	4	4	0.797	8842	18	0.28	0.38	2.13	1.00	**1**
MARA15	2	4	0.515	18825	30	0.83	0.56	2.47	0.98	**1**
MARA16	2	2	0.435	4025	22	0.84	0.43	1.38	1.00	**1**
MARA20	3	3	0.618	8467	24	0.83	0.34	1.82	1.00	**1**
MARA21	2	1	0.267	5726	26	0.81	0.46	0.83	1.00	**1**
MARA22	3	2	0.677	13750	25	0.76	0.29	1.44	1.00	**1**
MARA23	2	2	0.747	4005	27	0.84	0.44	1.19	1.00	**1**
MARA25	4	3	0.513	4850	9	0.67	0.64	3.44	0.53	**2**
MARA26	2	1	0.348	2433	36	0.82	0.79	3.95	0.17	**2**
MARA29	3	3	0.516	6147	24	0.75	0.26	0.67	1.00	**1**
MARA30	4	3	0.289	15208	18	0.61	0.34	2.20	0.99	**1**
MARA33	2	3	0.449	4707	22	0.79	0.52	1.14	1.00	**1**
MARA34	2	2	0.439	11666	28	0.74	0.56	1.78	1.00	**1**
MARA35	2	3	0.389	8788	20	0.67	0.59	2.45	0.98	**1**
MARA36	4	4	0.431	2115	15	0.63	0.18	2.16	1.00	**1**
MARA37	3	3	0.485	8026	16	0.79	0.26	2.30	1.00	**1**
MARA38	3	2	0.278	6158	18	0.69	0.22	1.95	1.00	**1**
MARA39	2	2	0.908	5020	27	0.87	0.60	1.57	1.00	**1**
MARA40	2	2	0.961	4687	27	0.88	0.50	1.26	1.00	**1**
MARA41	4	2	0.352	12333	17	0.68	0.45	2.25	0.99	**1**
MARA42	3	4	0.545	11667	24	0.73	0.30	1.10	1.00	**1**
MARA43	4	4	0.623	4206	18	0.65	0.36	1.86	1.00	**1**
MARA44	3	3	0.500	7835	28	0.75	0.29	1.31	1.00	**1**
MARA45	3	4	0.637	6763	27	0.80	0.33	1.76	1.00	**1**
PAN01	4	4	0.769	4921	13	0.47	0.43	1.55	1.00	**1**
PAN02	4	4	0.621	11895	15	0.20	0.45	2.32	0.99	**1**
RED02	2	2	0.585	5958	30	0.86	0.52	1.41	1.00	**1**
RED03	1	1	0.489	32933	31	0.84	0.33	2.59	0.94	**2**
RED04	1	1	0.999	26845	28	0.76	0.33	0.95	1.00	**1**
RED05	3	3	0.543	4768	27	0.82	0.27	1.73	1.00	**1**
RED07	3	3	0.590	3912	21	0.73	0.22	1.67	1.00	**1**
RED08	4	3	0.612	7725	14	0.47	0.35	0.83	1.00	**1**
RED11	3	3	0.422	6633	17	0.80	0.30	2.19	1.00	**1**
RED13	3	3	0.667	5139	15	0.72	0.26	2.50	0.99	**1**
RED14	3	3	0.795	13350	26	0.72	0.29	1.57	1.00	**1**
RED16	1	3	0.539	6160	18	0.59	0.22	1.57	1.00	**1**
RED18	2	3	0.411	13000	20	0.86	0.52	2.16	1.00	**1**
RED19	3	3	0.567	9275	26	0.65	0.25	1.70	1.00	**1**
RED20	3	3	0.447	8666	24	0.68	0.24	1.09	1.00	**1**
RED21	3	3	0.434	6571	23	0.70	0.19	1.64	1.00	**1**
RED23	4	4	0.609	11988	18	0.57	0.40	1.60	1.00	**1**
RED24	3	3	0.489	5388	29	0.80	0.23	1.98	1.00	**1**
RED25	3	4	0.462	6790	23	0.71	0.18	1.85	1.00	**1**
RED27	2	3	0.689	1971	22	0.77	0.61	2.04	1.00	**1**

Appendix 6 - Test Site Analysis results (contn)

Site Code	group in model Original	group Predicted	of belonging to group Prob	Density	Richness	Diversity Simpson's	Index Bray-Curtis	D	P NCF	Band Metrics
LSP01	3	2	0.655	5887	21	0.72	0.34	2.12	1.00	**1**
MARA07	2	4	0.429	1199	22	0.83	0.40	1.78	1.00	**1**
MARA09	3	4	0.367	1968	22	0.81	0.29	2.13	1.00	**1**
MARA11	3	4	0.453	3677	24	0.75	0.28	1.35	1.00	**1**
MARA13	2	2	0.489	11610	24	0.88	0.63	2.20	1.00	**1**
MARA14	4	4	0.797	8842	18	0.28	0.38	2.13	1.00	**1**
MARA15	2	4	0.515	18825	30	0.83	0.56	2.47	0.98	**1**
MARA16	2	2	0.435	4025	22	0.84	0.43	1.38	1.00	**1**
MARA20	3	3	0.618	8467	24	0.83	0.34	1.82	1.00	**1**
MARA21	2	1	0.267	5726	26	0.81	0.46	0.83	1.00	**1**
MARA22	3	2	0.677	13750	25	0.76	0.29	1.44	1.00	**1**
MARA23	2	2	0.747	4005	27	0.84	0.44	1.19	1.00	**1**
MARA25	4	3	0.513	4850	9	0.67	0.64	3.44	0.53	**2**
MARA26	2	1	0.348	2433	36	0.82	0.79	3.95	0.17	**2**
MARA29	3	3	0.516	6147	24	0.75	0.26	0.67	1.00	**1**
MARA30	4	3	0.289	15208	18	0.61	0.34	2.20	0.99	**1**
MARA33	2	3	0.449	4707	22	0.79	0.52	1.14	1.00	**1**
MARA34	2	2	0.439	11666	28	0.74	0.56	1.78	1.00	**1**
MARA35	2	3	0.389	8788	20	0.67	0.59	2.45	0.98	**1**
MARA36	4	4	0.431	2115	15	0.63	0.18	2.16	1.00	**1**
MARA37	3	3	0.485	8026	16	0.79	0.26	2.30	1.00	**1**
MARA38	3	2	0.278	6158	18	0.69	0.22	1.95	1.00	**1**
MARA39	2	2	0.908	5020	27	0.87	0.60	1.57	1.00	**1**
MARA40	2	2	0.961	4687	27	0.88	0.50	1.26	1.00	**1**
MARA41	4	2	0.352	12333	17	0.68	0.45	2.25	0.99	**1**
MARA42	3	4	0.545	11667	24	0.73	0.30	1.10	1.00	**1**
MARA43	4	4	0.623	4206	18	0.65	0.36	1.86	1.00	**1**
MARA44	3	3	0.500	7835	28	0.75	0.29	1.31	1.00	**1**
MARA45	3	4	0.637	6763	27	0.80	0.33	1.76	1.00	**1**
PAN01	4	4	0.769	4921	13	0.47	0.43	1.55	1.00	**1**
PAN02	4	4	0.621	11895	15	0.20	0.45	2.32	0.99	**1**
RED02	2	2	0.585	5958	30	0.86	0.52	1.41	1.00	**1**
RED03	1	1	0.489	32933	31	0.84	0.33	2.59	0.94	**2**
RED04	1	1	0.999	26845	28	0.76	0.33	0.95	1.00	**1**
RED05	3	3	0.543	4768	27	0.82	0.27	1.73	1.00	**1**
RED07	3	3	0.590	3912	21	0.73	0.22	1.67	1.00	**1**
RED08	4	3	0.612	7725	14	0.47	0.35	0.83	1.00	**1**
RED11	3	3	0.422	6633	17	0.80	0.30	2.19	1.00	**1**
RED13	3	3	0.667	5139	15	0.72	0.26	2.50	0.99	**1**
RED14	3	3	0.795	13350	26	0.72	0.29	1.57	1.00	**1**
RED16	1	3	0.539	6160	18	0.59	0.22	1.57	1.00	**1**
RED18	2	3	0.411	13000	20	0.86	0.52	2.16	1.00	**1**
RED19	3	3	0.567	9275	26	0.65	0.25	1.70	1.00	**1**
RED20	3	3	0.447	8666	24	0.68	0.24	1.09	1.00	**1**
RED21	3	3	0.434	6571	23	0.70	0.19	1.64	1.00	**1**
RED23	4	4	0.609	11988	18	0.57	0.40	1.60	1.00	**1**
RED24	3	3	0.489	5388	29	0.80	0.23	1.98	1.00	**1**
RED25	3	4	0.462	6790	23	0.71	0.18	1.85	1.00	**1**
RED27	2	3	0.689	1971	22	0.77	0.61	2.04	1.00	**1**

Appendix 6 - Test Site Analysis results (contn)

Site Code	group in model Original	group Predicted	of belonging to group Prob	Density	Richness	Diversity Simpson's	Index Bray-Curtis	D	P NCF	Band Metrics
QA/QC Repeated reference sites compared to predicted group										
TIM52 QA/QC1	1	1	0.426	8689	30	0.80	0.22	3.36	0.61	**2**
MARA21 QA/QC1	2	1	0.589	7956	25	0.80	0.43	3.89	0.35	**2**
LSP01 QA/QC1	3	2	0.426	11825	26	0.74	0.31	3.21	0.61	**2**
RED08 QA/QC1	4	2	0.589	6861	13	0.60	0.30	4.78	0.02	**3**
RED29 QA/QC1	2	3	0.426	16950	24	0.60	0.65	9.25	0.00	**3**
HEM52 QA/QC1	1	3	0.589	31400	21	0.79	0.27	6.21	0.00	**3**
RED25 QA/QC1	3	4	0.636	5770	22	0.75	0.18	3.09	0.73	**2**
QA/QC Repeated reference sites compared to original model group										
HEM52 QA/QC1		1	0.589	31400	21	0.79	0.27	4.44	0.18	**2**
MARA21 QA/QC1		2	0.426	7956	25	0.80	0.43	0.98	1.00	**1**
RED29 QA/QC1		2	0.589	16950	24	0.60	0.65	3.76	0.25	**2**
LSP01 QA/QC1		3	0.426	11825	26	0.74	0.31	1.31	1.00	**1**
RED25 QA/QC1		3	0.589	5770	22	0.75	0.18	2.02	1.00	**1**
RED08 QA/QC1		4	0.636	6861	13	0.60	0.30	1.37	1.00	**1**
Historically Impacted sites compared to predicted group										
Test08		1	0.833	16550	18	0.57	0.48	5.29	0.06	**2**
Test09		1	0.489	5670	23	0.81	0.42	4.09	0.28	**2**
Test01		3	0.833	9338	11	0.52	0.44	6.53	0.00	**3**
Test02		3	0.489	5886	12	0.42	0.34	6.31	0.00	**3**
Test05		3	0.797	9950	32	0.87	0.47	4.74	0.00	**3**
Test06		3	0.431	20250	7	0.29	0.50	10.81	0.00	**3**
Test07		3	0.623	4797	9	0.47	0.38	6.66	0.00	**3**
Test11		3	0.769	10569	25	0.81	0.38	2.35	1.00	**1**
Test12		3	0.621	5438	19	0.83	0.38	3.01	0.71	**2**
Test03		4	0.591	4102	14	0.57	0.35	1.12	1.00	**1**
Test04		4	0.610	2336	11	0.53	0.39	2.19	0.99	**1**
Test38		4	0.672	14716	25	0.76	0.41	5.04	0.05	**2**