7. Appendix A

Results of 2011 QC as reported by an independent taxonomist are presented below in full. Note that only the format of the QC report was modified, to allow clarity and confidentiality within the report.

Quality Control exercise: Examination of stream invertebrate samples from Northland for Pohe Environmental. I have re-examined vials of voucher specimens from 5 stream samples, scanned the 5 bulk samples to looked for any missed taxa and checked the coded-abundances indicated on the list provided by Pohe Environmental.

Results

1. Opouteke (102258)

Taxonomic accuracy: I agree with all identifications made: **QC - Pass**.
Abundance coding 1: Three 'new taxa' were recorded from the sample, being *Oxyethira*, Oligochaeta and Hirudinea. All three missed taxa were 'Rare': **QC - Pass**.
Abundance coding 2: I only recorded two taxa with abundance codes that differed from those provided by Pohe Environmental. In both cases the codes only differed by one abundance class: **QC – Pass**.

2. Meatmorks ds (100010)

Taxonomic accuracy: I disagree with identification of one larvae only, being *Zephlebia* instead of *Mauiulus*. The larvae is badly damaged and needs very close examination: **QC - Pass**.
Abundance coding 1: Three 'new taxa' was recorded from the sample, being *Zephlebia*, Eriopterini and Dolichopodidae. All three missed taxa 'Rare': **QC - Pass**.
Abundance coding 2: I only recorded two taxa with abundance codes that differed from those provided by Pohe Environmental. In both cases the codes only differed by one abundance class: **QC – Pass**.

3. Pukenui (110370)

Taxonomic accuracy: I agree with all identifications made: **QC - Pass**.
Abundance coding 1: Two 'new taxa' were recorded from the sample, being *Zephlebia* and Elmidae. They were 'Rare'. Other taxa not included in the list, but found in the vial with identified animals, were already recorded by principal investigator in the notes at the beginning of the list: **QC - Pass**.
Abundance coding 2: I only recorded two taxa with abundance codes that differed from those provided by Pohe Environmental. In both cases the codes only differed by one abundance class: **QC – Pass**.

4. Mangamuka (108978)

Taxonomic accuracy: I agree with all identifications made: **QC - Pass**.
Abundance coding 1: One 'new taxa' was recorded from the sample, being *Neurochorema*. It was 'Rare': **QC - Pass**.
Abundance coding 2: I recorded five taxa with abundance codes that differed from those provided by Pohe Environmental. In all cases the codes only differed by one abundance class: **QC – Pass**.

5. Waiotu (102248)

Taxonomic accuracy: I agree with all identifications made: **QC - Pass**.
Abundance coding 1: One 'new taxa' was recorded from the sample, being *Pycnocentria*. It was 'Rare': **QC - Pass**.
Abundance coding 2: I agree with all coded abundances: **QC – Pass**.

Conclusion

Both species identification and coded abundances provided by Pohe Environmental were accurate. The only disagreement in identification given above is due to badly damaged specimen. I recommend the Council to have a full confident in the results provided by the principal investigator.

Dr Milen Marinov
University of Canterbury
18 May 2011

7. Appendix B

Table 3. Summary of peripyhton results from the 16 collection sites. Average Chlorophyll a (mg/sample) and standard errors were derived from four replicate samples (samples analysed by Hill Laboratories). Periphyton taxa were recorded from one sample (samples analysed by NIWA). For full periphyton datasets (including taxon abundances, ash free dry weights, Pheophytin a and detection limits) contact Northland Regional Council Monitoring Department. * Some replicate results were below detection limits.

Site name (Site code)	Avg. Chlorophyll a (SE)	Taxa present
Hakaru River @ Topuni Creek Farm	0.275 (0.043)	**Cyanobacteria**: *Phormidium* large sp., *Phormidium* small sp.; **Chlorophyta**: *Scenedesmus* sp.; **Diatoms**: *Cocconeis* sp., *Cymbella* sp., *Encyonema* sp., *Gomphoneis* sp., *Melosira varians*, *Navicula* sp., *Pinnularia* sp., unidentified pennate diatoms; **Desmids**: *Cosmarium* sp.; **Flagellates/Unicells <5um**.
Hatea River u/s Mair Park Bridge	0.018* (0.012)	**Chlorophyta**: *Scenedesmus* sp., *Stigeoclonium* sp.; **Diatoms**: *Cymbella* sp., *Diatoma* sp., *Gomphonema* sp., *Synedra* sp.; **Rhodophyta**: *Audouinella* sp.
Pukenui Stream u/s of Ridge Track crossing	0.005* (<0.001)	**Diatoms**: *Navicula* sp., *Rhoicosphenia* sp., unidentified pennate diatoms; **Rhodophyta**: *Audouinella* sp.; **Flagellates/Unicells <5um**.
Waiarohia Stream @ Kamo tributary culvert	0.008* (0.001)	**Chlorophyta**: *Ulothrix* sp.; **Diatoms**: *Gomphoneis* sp., *Gomphonema* sp., *Melosira varians*, *Navicula* sp., *Pinnularia* sp.; **Rhodophyta**: *Audouinella* sp.
Kerikeri River @ stone store bridge	0.097 (0.022)	**Cyanobacteria**: *Anabaena* sp., *Phormidium* sp.; **Chlorophyta**: *Geminella* sp., *Oedogonium* sp.; **Diatoms**: *Cocconeis* sp., *Cymbella* sp., *Gomphonema* sp., *Melosira varians*, *Navicula* sp., *Synedra* sp., unidentified pennate diatoms; **Desmids**: *Closterium* sp., *Spirogyra* sp.
Waipapa River @ Waipapa Landing Bridge	0.063 (0.025)	**Cyanobacteria**: *Anabaena* sp.; **Chlorophyta**: *Ankistrodesmus falcatus*, *Coelastrum cambricum*, *Kirchneriella* sp., *Monoraphidium* sp., *Scenedesmus* sp., *Sphaerocystis* sp., *Ulothrix* sp., *Westella botryoides*; **Diatoms**: *Cocconeis* sp., *Cymbella* sp., *Diatoma* sp., *Gomphonema* sp., *Navicula* sp., *Synedra* sp., *Tabellaria* sp., unidentified pennate diatoms; **Desmids**: *Gonatozygon* sp., *Mougeotia* sp., *Zygnema* sp.
Waiharakeke Stream @ Stringers Road Bridge	0.024 (0.011)	**Diatoms**: *Cymbella* sp., *Gomphoneis* sp., *Melosira varians*, *Navicula* sp., *Nitzschia* sp., *Synedra* sp., unidentified pennate diatoms.
Mangakahia River d/s of Twin Bridges	0.070 (0.025)	**Cyanobacteria**: *Dolichospermum* sp.; **Chlorophyta**: *Cladophora* sp., *Monoraphidium* sp.; **Diatoms**: *Amphora* sp., *Cocconeis* sp., *Cymbella* sp., *Diatoma* sp., *Epithemia* sp., *Gomphoneis* sp., *Gomphonema* sp., *Melosira varians*, unidentified pennate diatoms; **Desmids**: *Spirogyra* sp.
Opouteke River @ suspension bridge	0.006* (0.002)	**Chlorophyta**: *Cladophora* sp., *Monoraphidium* sp.; **Diatoms**:, *Cocconeis* sp., *Cymbella* sp., *Diatoma* sp., *Fragilaria* sp., *Melosira varians*, *Synedra* sp., unidentified pennate diatoms; **Desmids**: *Spirogyra* sp.
Victoria River @ Thompsons Bridge	0.044 (0.013)	**Chlorophyta**: *Oedogonium* sp., *Stigeoclonium* sp. ; **Diatoms**: *Cocconeis* sp., *Cymbella* sp., *Epithemia* sp., *Gomphonema* sp., *Melosira varians*, *Navicula* sp., *Pinnularia* sp., *Rhopalodia* sp., *Synedra* sp., unidentified pennate diatoms; **Desmids**: *Spirogyra* sp.
Awanui River @ FNDC watertake	0.044 (0.009)	**Cyanobacteria**: *Anabaena* sp., *Lyngbya* sp.; **Chlorophyta**: *Cladophora* sp., *Oedogonium* sp., *Stigeoclonium* sp.; **Diatoms**: *Cymbella* sp., *Diatoma* sp., *Encyonema* sp., *Fragilaria* sp., *Gomphoneis* sp., *Melosira varians*, *Navicula* sp., *Nitzschia* sp., *Rhopalodia* sp., *Synedra* sp., unidentified pennate diatoms.
Mangamuka River @ Iwiatua Road Bridge	0.011* (0.002)	**Cyanobacteria**: *Anabaena* sp.; **Chlorophyta**: *Stigeoclonium* sp.; **Diatoms**: *Cymbella* sp., *Diatoma* sp., *Epithemia* sp., *Gomphonema* sp., *Melosira varians*, *Navicula* sp., *Pinnularia* sp., *Rhopalodia* sp., *Synedra* sp., unidentified pennate diatoms; **Desmids**: *Cosmarium* sp., *Spirogyra* sp.
Waipoua River @ SH12 Rest Area	0.004* (<0.001)	**Cyanobacteria**: *Phormidium* sp.; **Diatoms**: *Cocconeis* sp., *Gomphonema* sp., *Melosira varians*, *Synedra* sp., unidentified pennate diatoms; **Desmids**: *Spirogyra* sp.
Kaihu River @ gorge	0.019 (0.007)	**Cyanobacteria**: *Phormidium* sp.; **Diatoms**: *Gomphonema* sp., *Melosira varians*, *Navicula* sp., *Synedra* sp., unidentified pennate diatoms.
Waipapa River @ Forest Ranger	0.039 (0.004)	**Diatoms**: *Cocconeis* sp., *Cymbella* sp., *Diatoma* sp., *Gomphonema* sp., *Melosira varians*, *Navicula* sp., *Nitzschia* sp., *Synedra* sp., unidentified pennate diatoms; **Desmids**: *Closterium* sp., *Zygnema* sp.
Waimamaku River @ SH12	0.044 (0.029)	**Cyanobacteria**: *Dolichospermum* sp.; **Chlorophyta**: *Cladophora* sp., *Monoraphidium* sp., *Stigeoclonium* sp.; **Diatoms**: *Cocconeis* sp., *Cymbella* sp., *Epithemia* sp., *Melosira varians*, *Synedra* sp., unidentified pennate diatoms; **Desmids**: *Spirogyra* sp.

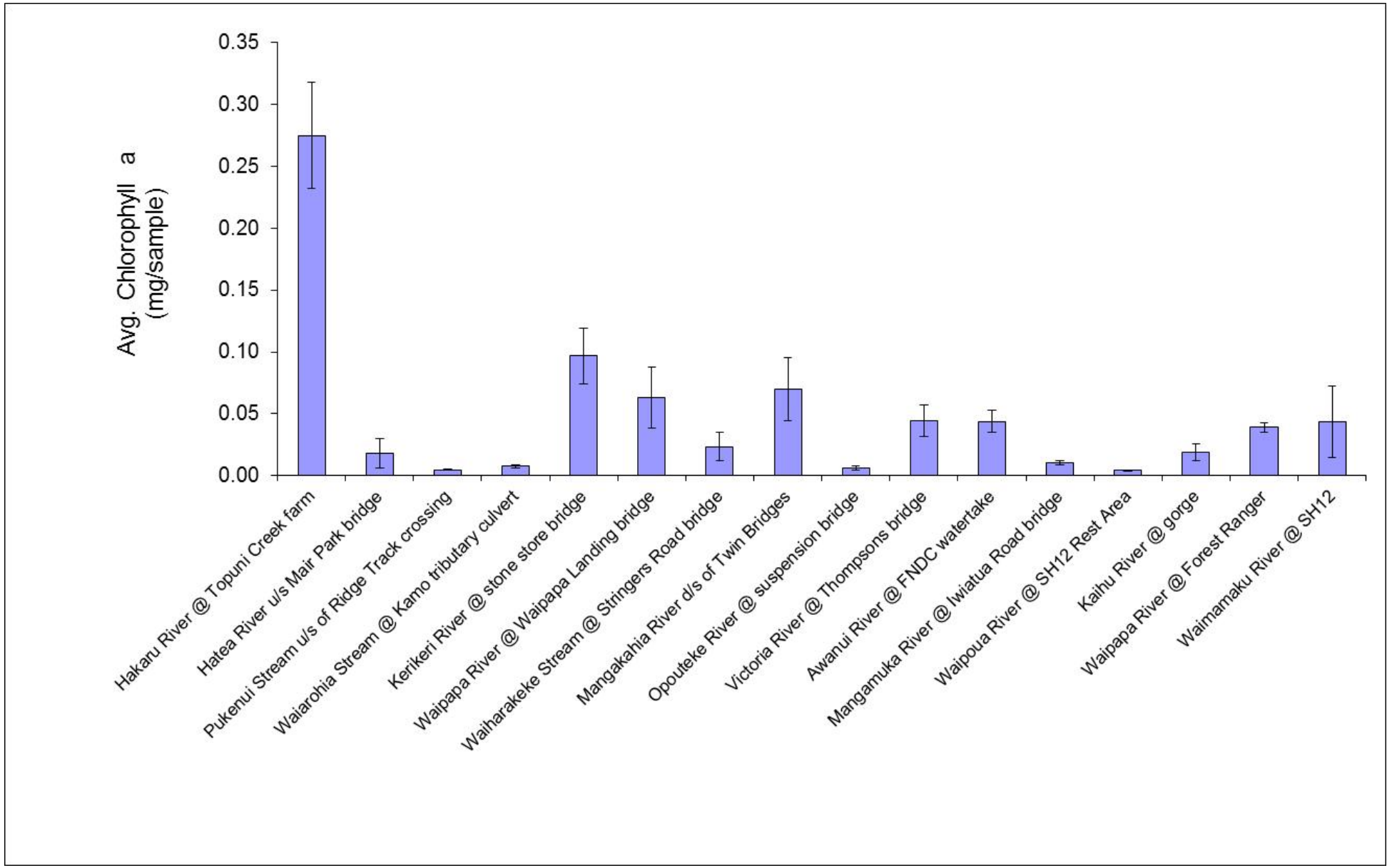

Figure 18. Summary of average Chlorophyll a results (SE, n=4) from the 16 collection sites. For full periphyton datasets (including taxon abundances, ash free dry weights, Pheophytin a and detection limits) contact Northland Regional Council Monitoring Department.

7. Appendix C

Table 4. Physico-chemical data (water temperature, dissolved oxygen, air saturated dissolved oxygen, temperature compensated conductivity, and salinity) recorded at the 37 State of the Environment sites throughout Northland (u/s = upstream, d/s = downstream) during 2011 invertebrate sampling.

Site name	Temp. (°C)	D.O. (%)	D.O. (mg/L)	Cond. 25°C‡ (µS/cm)	Sal. (ppt)
Awanui River @ FNDC watertake	18.0	86.6	8.22	188.6	0.1
Awanui River u/s of Waihue Channel	18.8	86.6	8.06	211.2	0.1
Hakaru River @ Topuni Creek Farm	20.4	105.1	9.48	177.2	0.1
Hatea River u/s Mair Park Bridge	18.1	86.7	8.19	223.7	0.1
Kaeo River @ Dip Road	15.9	86.0	8.51	130.4	0.1
Kaihu River @ gorge	15.6	93.4	9.29	117.5	0.1
Kerikeri River @ stone store bridge	18.5	92.4	8.66	81.5	0.0
Mangahahuru Stream @ Apotu Rd Bridge	19.3	72.6	6.69	118.1	0.1
Mangahahuru Stream @ end of Main Rd	18.8	83.7	7.80	97.7	0.0
Mangakahia River @ Titoki Bridge	20.5	84.1	7.56	167.8	0.1
Mangakahia River d/s of Twin Bridges	19.8	104.7	9.56	113.8	0.1
Mangamuka River @ Iwiatua Road Bridge	18.2	93.0	8.77	167.7	0.1
Manganui River @ Mitaitai Road	22.5	89.1	7.71	205.2	0.1
Mangere Stream @ Knight Road	20.1	68.4	6.21	159.3	0.1
Opouteke River @ suspension bridge	19.1	97.3	9.00	108.2	0.1
Oruru River @ Oruru Road	17.5	82.3	7.88	160.0	0.1
Paparoa Stream @ walking bridge	22.1	115.9	9.90	6,430	3.5
Pukenui Stream u/s of Ridge Track crossing	16.3	86.6	8.49	115.6	0.1
Punakitere River @ Taheke Recorder	18.3	93.3	8.78	134.7	0.1
Ruakaka River @ Flyger Road	17.7	68.6	6.53	233.9	0.1
Utakura River @ Okaka Road Bridge	17.5	71.1	6.79	122.0	0.1
Victoria River @ Thompsons Bridge	17.6	74.6	7.12	165.6	0.1
Waiarohia Stream @ Kamo tributary culvert	17.9	91.9	8.72	183.1	0.1
Waiarohia Stream @ Russell Rd Bridge Nth	17.7	79.1	7.53	265.9	0.1
Waiarohia Stream @ Rust Ave Bridge	19.0	96.0	8.89	260.1	0.1
Waiarohia Stream @ Whau Valley Road	17.7	77.9	7.41	265.7	0.1
Waiharakeke Stream @ Stringers Rd Bridge	17.0	83.8	8.09	175.3	0.1
Waimamaku River @ SH12	15.8	97.2	9.62	100.4	0.1
Waiotu River @ SH1	16.9	69.9	6.78	102.1	0.1
Waipao River @ Draffin Road	18.8	102.5	9.54	201.9	0.1
Waipapa River @ Forest Ranger	18.2	84.3	7.95	112.5	0.1
Waipapa River @ Waipapa Landing Bridge	19.2	85.7	7.91	77.0	0.0
Waipoua River @ SH12 Rest Area	14.2	93.0	9.54	82.3	0.0
Wairua River @ Purua	22.5	76.8	6.64	131.5	0.1
Waitangi River @ Watea	18.1	82.3	7.77	127.4	0.1
Waitangi River @ Waimate Road	18.3	98.0	9.22	111.9	0.1
Whakapara River @ cableway	17.4	74.2	7.11	94.4	0.0

‡ Conductivity temperature compensated to 25°C.

Table 5. Physico-chemical data (water temperature, dissolved oxygen, air saturated dissolved oxygen, temperature compensated conductivity, and salinity) recorded at the 4 Resource Consent locations throughout Northland (u/s = upstream, d/s = downstream) during 2011 invertebrate sampling.

Site name (site number)	Temp (°C)	D.O. (%)	D.O. (mg/L)	Cond. 25°C[§] (µS/cm)	Sal. (ppt)
Dam d/s (106508)	16.8	69.4	6.73	127.5	0.1
Dam u/s (106509)	14.9	94.2	9.51	146.9	0.1
Meatworks d/s (100010)	17.2	85.2	8.19	180.7	0.1
Meatworks u/s (100007)	17.0	83.8	8.09	175.3	0.1
Oxidation Pond A d/s (100280)	19.1	50.9	4.71	136.2	0.1
Oxidation Pond A u/s (100279)	19.1	70.5	6.53	107.4	0.1
Quarry d/s (103824)	16.4	82.7	8.09	92.8	0.0
Quarry u/s (103823)	16.7	83.3	8.10	89.4	0.0

[§] Conductivity temperature compensated to 25°C.

7. Appendix D

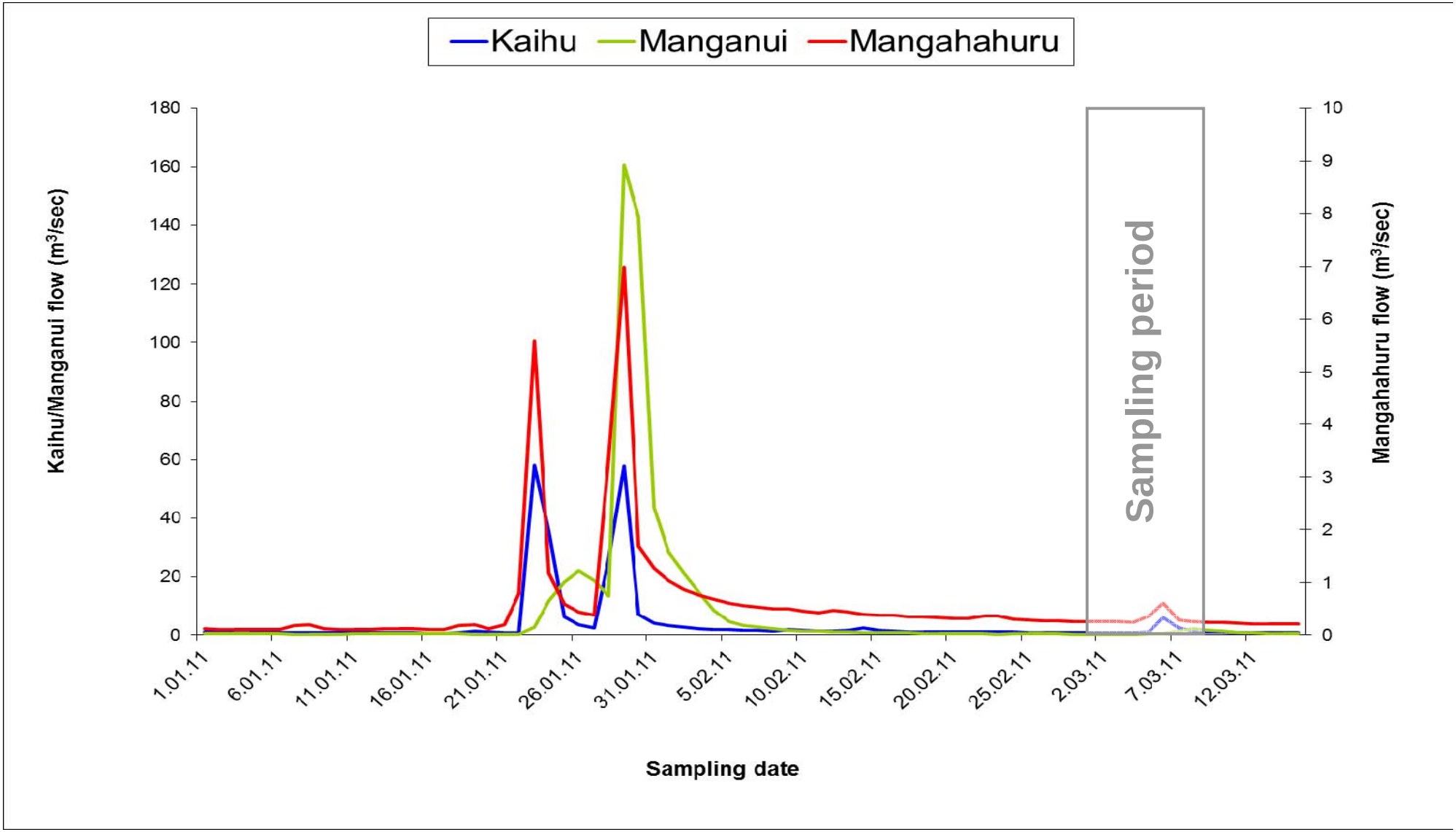

Figure 19. Select river flows (m^3/sec) across Northland prior to commencement of sampling. For Kaihu and Manganui refer to the primary axis and for Mangahahuru refer to the secondary axis.

7. Appendix E

Table 6. Raw macroinvertebrate data for the State of Environment sites, March 2011. Sites in red have been reprocessed by an independent taxonomist as a measure of Quality Control.

Site name			Waiarohia @ Rust Ave Bridge	Waiarohia @ Russell Rd Bridge (Nth)	Waiarohia @ Kamo Tributary Culvert	Waiarohia @ Whau Valley Rd Bridge	Awanui u/s Waihue Channel	Awanui @ FNDC watertake	Victoria @ Thompsons Bridge	Utakura @ Okaka Rd Bridge	Mangamuka @ Iwiatua Rd Bridge	Oruru @ Oruru Rd	Waipapa @ Forest Ranger	Pukenui Stream u/s Ridge Track crossing	Waitangi @ Waimate Rd	Waitangi @ Watea	Kaeo River @ Dip Rd Bridge	Waipapa @ Waipapa Landing	Kerikeri @ stone store bridge	Whakapara @ cableway
Site number			**105672**	**105674**	**105677**	**107773**	**100370**	**100363**	**105532**	**109020**	**108978**	**108979**	**101751**	**110370**	**103178**	**101752**	**102674**	**101524**	**101530**	**102249**
Collection date			**01.03.11**	**01.03.11**	**01.03.11**	**01.03.11**	**09.03.11**	**09.03.11**	**09.03.11**	**08.03.11**	**09.03.11**	**09.03.11**	**08.03.11**	**06.03.11**	**08.03.11**	**08.03.11**	**09.03.11**	**08.03.11**	**08.03.11**	**09.03.11**
TAXA	Tolerance Values																			
	HB	SB [1]																		
INSECTA																				
Ephemeroptera																				
Acanthophlebia	7	9.6												1						
Ameletopsis	10	10.0												1						
Atalophlebioides	9	4.4																		
Austroclima	9	6.5												20						
Austronella [1]	7	4.7																		
Coloburiscus	9	8.1	1	5		1			20		5		20	100	1					
Deleatidium	8	5.6	20	100		20			20		100	1	100	20			1			
Ichthybotus	8	9.2												1						
Mauiulus	5	4.1						5	1			5	5							
Neozephlebia	7	7.6		1		1			1				1	20	1					
Nesameletus	9	8.6		1		1								5						
Oniscigaster	10	5.1											1							
Rallidens	9	3.9							1				5							
Siphlaenigma	9	**9.0**												1						
Tepakia [1]	8	7.6																		
Zephlebia	7	8.8		1		5	1	20	5	1		20	1	1	20					20
Plecoptera																				
Austroperla	9	8.4							1				1	5						
Megaleptoperla	9	7.3																		
Spaniocerca	8	8.8												1						
Stenoperla	10	9.1												1						
Zelandobius	5	7.4									1			1						
Zelandoperla	10	8.9																		
Megaloptera																				
Archichauliodes	7	7.3	1	5		1			5		5		5	5						
Odonata																				
Antipodochlora	6	6.3																		
Austrolestes	6	0.7								1										
Hemicordulia	5	0.4													1	1		1		
Xanthocnemis	5	1.2			1	1	1			5		5			20	5		5		5
Hemiptera																				
Diaprepocoris	5	4.7																		
Sigara	5	2.4													5	1				
Coleoptera																				
Antiporus	5	3.5								1										
Elmidae	6	7.2	5	20		1		5	20		100		100	1	1		20			
Hydraenidae	8	6.7									1			5						
Hydrophilidae	5	8.0					1			1						1			1	
Ptilodactylidae	8	7.1																		
Staphylinidae	5	6.2																		
Diptera																				
Aphrophila	5	5.6	1	1	1				1		1		5						1	
Austrosimulium	3	3.9	1		1	1		1	20	1	5	5	1	5	5	1	1		1	1
Ceratopogonidae	3	6.2																		
Chironominae [2]	**2.5**	**4.7**	1		1		1	1	5		5	1	5	5		5		1	20	
Empididae	3	5.4																		
Ephydridae	4	1.4	1																	
Eriopterini	9	7.5							1		5	1					1			
Harrisius	6	4.7																		
Hexatomini	5	6.7												1						
Mischoderus	4	5.9		1							1									
Muscidae	3	1.6	1					1	1						1				1	
Orthocladiinae	2	3.2	20	1	5	20	1	20	20		20	1	5	5	20	100	5	5	100	20

Paradixa	4	8.5												1					
Psychodidae	1	6.1	1													1			
Tanypodinae	5	6.5	1	1			1	1	5		5		5	5	20	1	1		
Trichoptera																			
Aoteapsyche	4	6.0	1	20					20		5		20					1	
Beraeoptera	8	7.0							1		1		1						
Helicopsyche	10	8.6											1	1					
Hudsonema	6	6.5		1									1		1			1	
Hydrobiosella	9	7.6												20					
Hydrobiosis	5	6.7	1	1		1					1	1	1	1				1	
Hydrochorema	9	**9.0**																	
Neurochorema	6	6.0									1								
Oecetis [1]	6	6.8																	
Olinga	9	7.9									1		5						
Orthopsyche	9	7.5									1			5					
Oxyethira	2	1.2	1	5	1	5			1	1	1	5	1		100	1	1	1		5
Paroxyethira	2	3.7													1	1		5		
Psilochorema	8	7.8		1		1			1				5	1						
Pycnocentria	7	6.8					1	20	20		5			1	20					1
Pycnocentrodes	5	3.8	5	100		1		5	20		100		100				1		1	1
Triplectides	5	5.7		1			1			1	1	1	5		20	1				20
Lepidoptera																				
Hygraula	4	1.3										5								
Acarina	5	5.2												1						
CRUSTACEA																				
Amarinus [1]	**3**	5.1		1			1	1				5								1
Amphipoda	5	5.5	1	1		1				1				5		1				
Cladocera	5	0.7														1		5		
Copepoda	5	2.4				1										5				
Isopoda	5	4.5											1							
Mysidae [1]	**5**	6.4																		
OSTRACODA	3	1.9	5			1									100			1		
Paranephrops	5	8.4												1	1					
Paratya	5	3.6					20	5		5		20	5				1	5	5	
MOLLUSCA																				
Ferrissia	3	2.4				1	1					1								
Gyraulus	3	1.7			1	5						1								
Latia	3	6.1																		
Lymnaeidae	3	1.2					1			1										
Melanopsis	3	1.9										5						5	1	
Physa	3	0.1		1						1		20			5	5		1		1
Potamopyrgus	4	2.1	5	20		5	500	20	20	100	5	500	5	1	20	20	1	5	5	500
Sphaeriidae	3	2.9													1			1		1
HIRUDINEA	3	1.2																		1
NEMERTEA	3	1.8	1			1													1	
OLIGOCHAETA	1	3.8	100	5	20	100	5	5	5	5	100	1	1	5	20	1	1		5	1
POLYCHAETA [1]	**3**	6.7																		
PLATYHELMINTHES	3	0.9	1	1		1	5			1		1			20	1	1			5
Total (Minimum) coded abundances (c_i)			175	295	31	176	541	110	215	126	476	605	412	253	404	153	35	41	145	583
Taxonomic richness			22	24	8	23	15	14	24	15	25	21	29	34	23	19	12	13	15	15
MCI value			82.3	102.5	58.8	98.3	80.7	83.6	112.9	82.7	110.8	81.4	118.3	132.6	87.8	72.1	88.3	68.5	75.3	74.7
MCI-sb value			86.3	108.0	63.3	90.0	85.3	93.1	110.4	66.9	115.3	71.9	113.9	142.0	82.5	65.8	82.2	42.5	84.3	67.6
SQMCI value			2.58	5.94	1.63	2.65	4.01	4.79	5.29	3.98	4.95	4.08	6.23	7.85	3.42	2.64	5.00	3.62	2.36	4.04
SQMCI-sb value			3.99	4.86	3.56	3.99	2.22	5.02	5.32	2.32	5.12	2.37	5.65	7.22	2.89	2.96	5.68	2.27	3.50	2.48
EPT* count			5	11	0	8	3	4	12	2	12	5	17	20	6	1	2	0	4	4
%EPT*			22.7	45.8	0.0	34.8	20.0	28.6	50.0	13.3	48.0	23.8	58.6	58.8	26.1	5.3	16.7	0.0	26.7	26.7

* Excludes *Oxyethira* & *Paroxyethira* (Hydroptilidae) [1] Addition from Stark & Maxted (2007). [2] Further additions to list. Bold tolerance values are additional values assigned based on professional judgement or hard-bottomed tolerances.

Table 6 continued.

Site name			Manga-hahuru @ Apotu Rd Bridge	Manga-hahuru @ end of Main Rd	Wairua @ Purua	Waipao @ Draffin Rd	Mangere @ Knight Rd Bridge	Manga-kahia @ Titoki Bridge	Opouteke @ suspension bridge	Manga-kahia ds of Twin Bridges	Puna-kitere @ Taheke Recorder	Waiotu @ SH1 Bridge	Kaihu @ gorge	Waipoua @ SH12 Rest Area	Waima-maku @ SH12	Manganui @ Mitaitai Rd	Ruakaka @ Flyger Road	Hakaru @ Topuni Creek Farm	Paparoa @ walking bridge	Hatea River u/s Mair Park Bridge	Waihara-keke Stream @ Stringers Rd Bridge
Site number			**100281**	**100237**	**101753**	**108941**	**101625**	**101038**	**102258**	**109096**	**105231**	**102248**	**102256**	**103304**	**109098**	**102257**	**105008**	**109021**	**108977**	**100194**	**100007**
Collection date			**06.03.11**	**04.03.11**	**05.03.11**	**01.03.11**	**05.03.11**	**01.03.11**	**07.03.11**	**07.03.11**	**07.03.11**	**09.03.11**	**07.03.11**	**07.03.11**	**07.03.11**	**02.03.11**	**02.03.11**	**02.03.11**	**02.03.11**	**02.03.11**	**08.03.11**
TAXA	Tolerance Values																				
	HB	SB [1]																			
INSECTA																					
Ephemeroptera																					
Acanthophlebia	7	9.6												1							
Ameletopsis	10	10.0												1							
Atalophlebioides	9	4.4												1							
Austroclima	9	6.5		5							1										
Austronella [1]	7	4.7		1														1			1
Coloburiscus	9	8.1		100		5			1					5	5		1	1		1	
Deleatidium	8	5.6		20					5	1	5		1	100	5						1
Ichthybotus	8	9.2																			
Mauiulus	5	4.1		5		100		5		1	5				1						
Neozephlebia	7	7.6								1			1		1		5	5			
Nesameletus	9	8.6												100							
Oniscigaster	10	5.1											1								
Rallidens	9	3.9								1				5							
Siphlaenigma	9	**9.0**												1							
Tepakia [1]	8	7.6																1			
Zephlebia	7	8.8	5	20		20	20			1	5	1	1	5	1		100	20		1	5
Plecoptera																					
Austroperla	9	8.4																			
Megaleptoperla	9	7.3												1							
Spaniocerca	8	8.8																			
Stenoperla	10	9.1												1							
Zelandobius	5	7.4																			
Zelandoperla	10	8.9												1							
Megaloptera																					
Archichauliodes	7	7.3		5					1	1	1		5	5	5		1				
Odonata																					
Antipodochlora	6	6.3		1																	
Austrolestes	6	0.7																			
Hemicordulia	5	0.4														1					
Xanthocnemis	5	1.2					5	1				5				1		1			
Hemiptera																					
Diaprepocoris	5	4.7	1																		
Sigara	5	2.4	1									1									
Coleoptera																					
Antiporus	5	3.5																			
Elmidae	6	7.2		100					20	5	20	1	20	5	20					1	1
Hydraenidae	8	6.7										1				1					
Hydrophilidae	5	8.0																			
Ptilodactylidae	8	7.1		1																	
Staphylinidae	5	6.2													1						
Diptera																					
Aphrophila	5	5.6		1					1		1		1	5	1						
Austrosimulium	3	3.9	5	20		20	1				1		5								5
Ceratopogonidae	3	6.2												1							
Chironominae [2]	**2.5**	**4.7**	5	1	5	5	1		5	5	20		20	1	20		20	100		1	5
Empididae	3	5.4												1							
Ephydridae	4	1.4																			
Eriopterini	9	7.5		5										1							
Harrisius	6	4.7																			1
Hexatomini	5	6.7												1							
Mischoderus	4	5.9		1																	
Muscidae	3	1.6							1				5		1						

Orthocladiinae	2	3.2	5		1	5	5	1	5	20	20	5	5	1	20			20		5	20
Paradixa	4	8.5																			
Psychodidae	1	6.1	1																		
Tanypodinae	5	6.5	1	1	1		1	1	1	5	5			1	5			20		1	5
Trichoptera																					
Aoteapsyche	4	6.0		1		1			20	5	1		5	5	20		5	5			1
Beraeoptera	8	7.0							1				1	5	1						
Helicopsyche	10	8.6												1						5	
Hudsonema	6	6.5				1		1		1				1							
Hydrobiosella	9	7.6																			
Hydrobiosis	5	6.7		1		1					1		5	5				1			
Hydrochorema	9	**9.0**											1								
Neurochorema	6	6.0							1	1											
Oecetis [1]	6	6.8									1										
Olinga	9	7.9				1								20	1						
Orthopsyche	9	7.5																			
Oxyethira	2	1.2	5	1	1		5	5	1		1	1	5		5			20			1
Paroxyethira	2	3.7	1				1					1						1			
Psilochorema	8	7.8															1	1			
Pycnocentria	7	6.8		1		20					1	1					5				1
Pycnocentrodes	5	3.8		5		5			20	20	20		20	1	5		1			20	1
Triplectides	5	5.7	1	5		5	5	5			1	5	1	1	1		1				
Lepidoptera																					
Hygraula	4	1.3																			
Acarina	5	5.2							1												
CRUSTACEA																					
Amarinus [1]	**3**	5.1	5			1	5					5									
Amphipoda	5	5.5				100	100	20					1			5	1	5	20	5	
Cladocera	5	0.7			100																
Copepoda	5	2.4														20		1	500	1	
Isopoda	5	4.5																		1	
Mysidae [1]	**5**	6.4																	20		
OSTRACODA	3	1.9								1								1			
Paranephrops	5	8.4					1														
Paratya	5	3.6						5		5				1			20	5	5	20	
MOLLUSCA																					
Ferrissia	3	2.4	1								5					1					
Gyraulus	3	1.7																			
Latia	3	6.1		5		5				1	5		1	1	1					1	
Lymnaeidae	3	1.2														1					
Melanopsis	3	1.9																		1	
Physa	3	0.1	1				1		1			1				5					
Potamopyrgus	4	2.1	100	5	5	500	500	500	5	20	20	500	100	5	20	500	20	20	100	20	5
Sphaeriidae	3	2.9		1			5						1					1			
HIRUDINEA	3	1.2		1					1	1											
NEMERTEA	3	1.8		1						1											
OLIGOCHAETA	1	3.8		5					1	1	1		1	5	5			100		1	1
POLYCHAETA [1]	**3**	6.7																		1	
PLATYHELMINTHES	3	0.9		1			1											1			
Total (Minimum) coded abundances (c_i)			138	320	113	795	657	544	92	98	141	528	207	295	145	535	181	331	645	86	54
Taxonomic richness			15	29	6	17	16	10	19	21	22	13	23	34	22	9	13	22	5	17	15
MCI value			70.0	102.4	68.3	99.4	74.4	88.0	93.2	96.7	95.0	90.8	99.6	128.5	102.3	91.1	116.2	93.2	96.0	94.7	92.7
MCI-sb value			80.8	102.6	61.3	111.8	79.9	79.2	90.7	96.9	104.4	83.4	104.7	130.2	109.2	48.9	119.7	91.7	80.0	102.9	97.3
SQMCI value			3.82	6.77	4.79	4.40	4.21	4.05	4.78	4.09	4.25	4.01	4.21	7.91	4.22	4.04	5.85	2.76	4.84	4.82	3.58
SQMCI-sb value			2.73	6.87	1.02	3.26	2.89	2.30	5.13	3.94	4.59	2.20	3.60	6.93	4.87	2.13	6.79	4.37	2.58	3.92	4.40
EPT* count			2	11	0	10	2	3	6	9	10	3	10	20	10	0	8	8	0	4	6
%EPT*			13.3	37.9	0.0	58.8	12.5	30.0	31.6	42.9	45.5	23.1	43.5	58.8	45.5	0.0	61.5	36.4	0.0	23.5	40.0

* Excludes *Oxyethira* & *Paroxyethira* (Hydroptilidae) [1] Addition from Stark & Maxted (2007). [2] Further additions to list. **Bold** tolerance values are additional values assigned based on professional judgement or hard-bottomed tolerances.

7. Appendix F

Table 7. Raw macroinvertebrate data for the Resource Consent sites, March 2011. Sites in red have been reprocessed by an independent taxonomist as a measure of Quality Control.

Site name			Dam d/s	Dam u/s	Oxidation Pond A d/s	Oxidation Pond A u/s	Meatworks d/s	Meatworks u/s	Quarry d/s	Quarry u/s
Site number			**106508**	**106509**	**100280**	**100279**	**100010**	**100007**	**103824**	**103823**
Collection date			**07.03.11**	**07.03.11**	**06.03.11**	**06.03.11**	**08.03.11**	**08.03.11**	**09.03.11**	**09.03.11**
TAXA	Tolerance Values									
INSECTA	HB	SB [1]								
Ephemeroptera										
Acanthophlebia	7	9.6		1						
Austroclima	9	6.5	1	1						1
Austronella [1]	7	4.7						1		
Coloburiscus	9	8.1	1	5					1	
Deleatidium	8	5.6		20				1	1	1
Mauiulus	5	4.1					1			1
Neozephlebia	7	7.6		5					1	1
Zephlebia	7	8.8		5	1	1	1	5	1	1
Plecoptera										
Acroperla	5	5.1							1	
Austroperla	9	8.4							1	
Megaloptera										
Archichauliodes	7	7.3		1					1	5
Odonata										
Adversaeshna	5	1.4			1					
Hemicordulia	5	0.4					1			
Xanthocnemis	5	1.2			1	1	5		1	
Hemiptera										
Anisops	5	2.2	1							
Sigara	5	2.4			1					
Coleoptera										
Elmidae	6	7.2		5				1	5	5
Hydraenidae	8	6.7		1						
Hydrophilidae	5	8.0	1						1	
Staphylinidae	5	6.2					1		1	1
Diptera										
Aphrophila	5	5.6		1					1	
Austrosimulium	3	3.9	20	20	1	20		5	1	5
Chironominae [2]	**2.5**	**4.7**	1	1	5	5	1	5		
Eriopterini	9	7.5		1					1	
Harrisius	6	4.7						1		
Hexatomini	5	6.7	1				1			
Limonia	6	6.3								1
Muscidae	3	1.6			1					
Orthocladiinae	2	3.2	1	1	1	5		20		5
Tanypodinae	5	6.5	1	5				5		
Trichoptera										
Aoteapsyche	4	6.0	1					1	5	1
Ecnomina / Zelandoptila	8	**8.3**	1							
Hydrobiosis	5	6.7	5	1					1	1
Hydroptilidae [2]	2	**2.5**								1
Orthopsyche	9	7.5							20	20
Oxyethira	2	1.2	5	1	1	20		1		
Paroxyethira	2	3.7				1				
Polyplectropus	8	8.1	1				1			
Psilochorema	8	7.8	1	1						
Pycnocentria	7	6.8						1	5	1
Pycnocentrodes	5	3.8		5				1		
Triplectides	5	5.7	1		1	1	1		1	5
CRUSTACEA										
Amarinus [1]	**3**	5.1			5	5	1			
Amphipoda	5	5.5	1				20			
Cladocera	5	0.7					5			
OSTRACODA	3	1.9					5			
Paratya	5	3.6					100			
MOLLUSCA										
Ferrissia	3	2.4			5	1				
Lymnaeidae	3	1.2	1		1					
Physa	3	0.1	1		5		1			
Potamopyrgus	4	2.1	20	1	100	100	100	5	5	20
Sphaeriidae	3	2.9	1				1			
NEMERTEA	3	1.8	1		1					
OLIGOCHAETA	1	3.8	20	1	1			1		5
PLATYHELMINTHES	3	0.9			1		1			
Total (Minimum) coded abundances (c_i)			88	83	133	160	247	54	55	81
Taxonomic richness			23	21	18	11	18	15	20	19
MCI value			93.5	113.8	69.4	70.0	90.6	92.7	124.0	107.4
MCI-sb value			96.5	118.3	57.2	76.4	76.3	97.3	125.3	113.5
SQMCI value			3.27	5.84	3.79	3.50	4.53	3.58	6.89	5.49
SQMCI-sb value			3.74	5.70	2.32	2.49	3.05	4.40	6.48	5.12
EPT* count			8	9	2	2	4	6	11	10
%EPT*			34.8	42.9	11.1	18.2	22.2	40.0	55.0	52.6

* Excludes *Oxyethira* & *Paroxyethira* (Hydroptilidae) [1] Addition from Stark & Maxted (2007). [2] Further additions to list. **Bold** tolerance values are additional values assigned based on professional judgement or hard-bottomed tolerances.