3. Results

3.1 State of the Environment (SoE) sites

Raw macroinvertebrate SoE data is presented in Appendix D (Table 3). Taxonomic richness at the 37 sites ranged from 5 at the Kaeo River @ Dip Rd Bridge site (tidal influence) to 45 at Waipoua @ SH12 Rest Area site (Fig. 6). The mean number of taxa was 20.4 ± 1.4 (SE, n=37).

Two SoE sites (Kaeo River @ Dip Rd Bridge and Manganui @ Mititai Rd) recorded no insect taxa from the orders Ephemeroptera, Plecoptera and Trichoptera (EPT*) this year. These insect orders are considered the most sensitive to organic pollution and habitat modification. In addition, fourteen **other** sites recorded less than five EPT* taxa. Of the 37 sites, the range of %EPT* taxa was 0.0–67.9% (Fig. 7). Sixteen sites (43.2%) scored at least 40% EPT* however 21 sites (56.8%) scored <40% EPT* taxa, which represents an approximate lower limit of 'healthy' Northland stream communities (Pohe unpublished data). Mean %EPT* for all SoE sites was 35.3% ± 2.8 (SE, n=37).

Macroinvertebrate Community Index (MCI) scores for the 37 sites ranged from 57.1 (Awanui u/s Waihue Channel) to 141.8 (Pukenui Stream u/s Ridge Track crossing) (Fig. 8), with a mean of 93.1 ± 3.0 (SE, n=37). Seven (18.9%) sites recorded MCI scores less than 80, which can be interpreted as water of probable severe organic pollution (Boothroyd & Stark 2000). Two sites (5.4%) scored above 120 (Waipoua River @ SH12 Rest Area and Pukenui Stream u/s Ridge Track crossing), which is accepted as the 'clean water' lower limit. Waipapa River @ Forest Ranger and Mangahahuru Stream @ end of Main Rd are also likely to fall into this category if the ± 5 unit buffer, and species present, are considered.

Semi-Quantitative Macroinvertebrate Community Index (SQMCI) results ranged from 2.10 (Awanui u/s Waihue Channel) to 7.93 (Waipoua River @ SH12 Rest Area) (Fig. 9). Eighteen sites (48.6%) recorded SQMCI scores of less than 4.00, which is interpreted as water of probable 'severe pollution' (worst six listed below). However, a further seven sites (18.9%) were recorded in the 'moderate pollution' category (**a total of 67.5% of sites in poorly polluted categories**), which is indicated by a low-scoring mean of 4.26 ± 0.26 (SE, n=37). Four sites (10.8%) scored above 6.00 (see below), which is interpreted as the SQMCI 'clean water' lower limit. Six other sites potentially fall into this category if the ± 1 unit buffer is considered.

The worst six streams/rivers this year, based on MCI and SQMCI scores, were:

Stream/River	SQMCI value	MCI value
Awanui River u/s Waihue Channel	2.10	57.1
Manganui River @ Mititai Rd	2.11	62.3
Oruru River @ Oruru Rd	2.17	71.5
Waiotu River @ SH1 Bridge	2.24	80.9
Utakura River @ Okaka Rd Bridge	2.41	81.7
Waiarohia Stream @ Kamo Tributary Culvert	3.10	79.2

The top six streams/rivers this year, based on MCI and SQMCI scores, were:

Stream/River	SQMCI value	MCI value
Waipoua River @ SH12 Rest Area	7.93	130.4
Pukenui Stream u/s Ridge Track crossing	7.31	141.8
Mangahahuru Stream @ end of Main Rd	7.00	117.4
Otaika Stream @ Otaika Valley Rd	5.97	110.3
Ruakaka River @ Flyger Rd	5.84	101.4
Waipapa River @ Forest Ranger	5.80	116.2

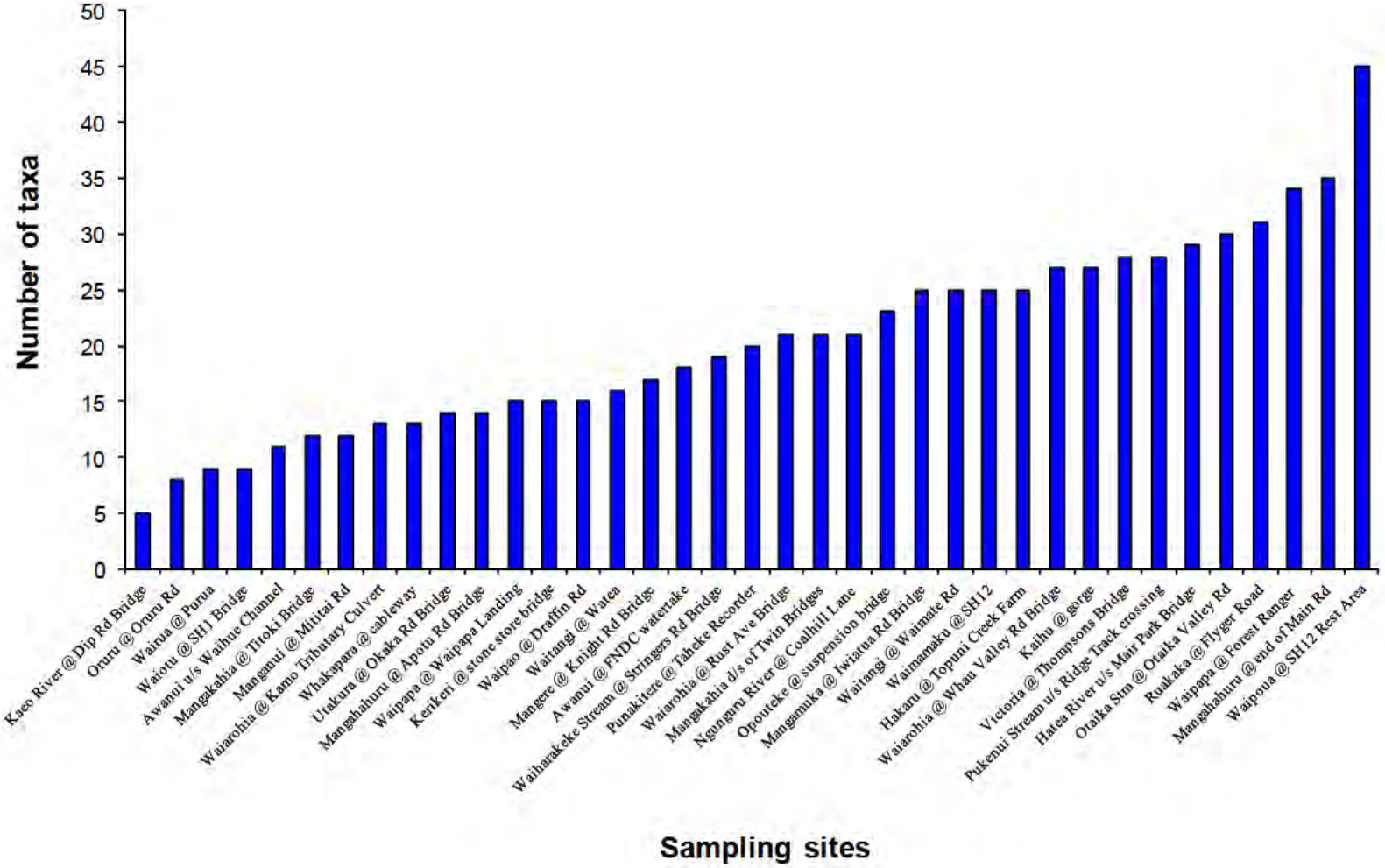

Figure 6. Number of macroinvertebrate taxa recorded from the 37 State of Environment sites for 2013.

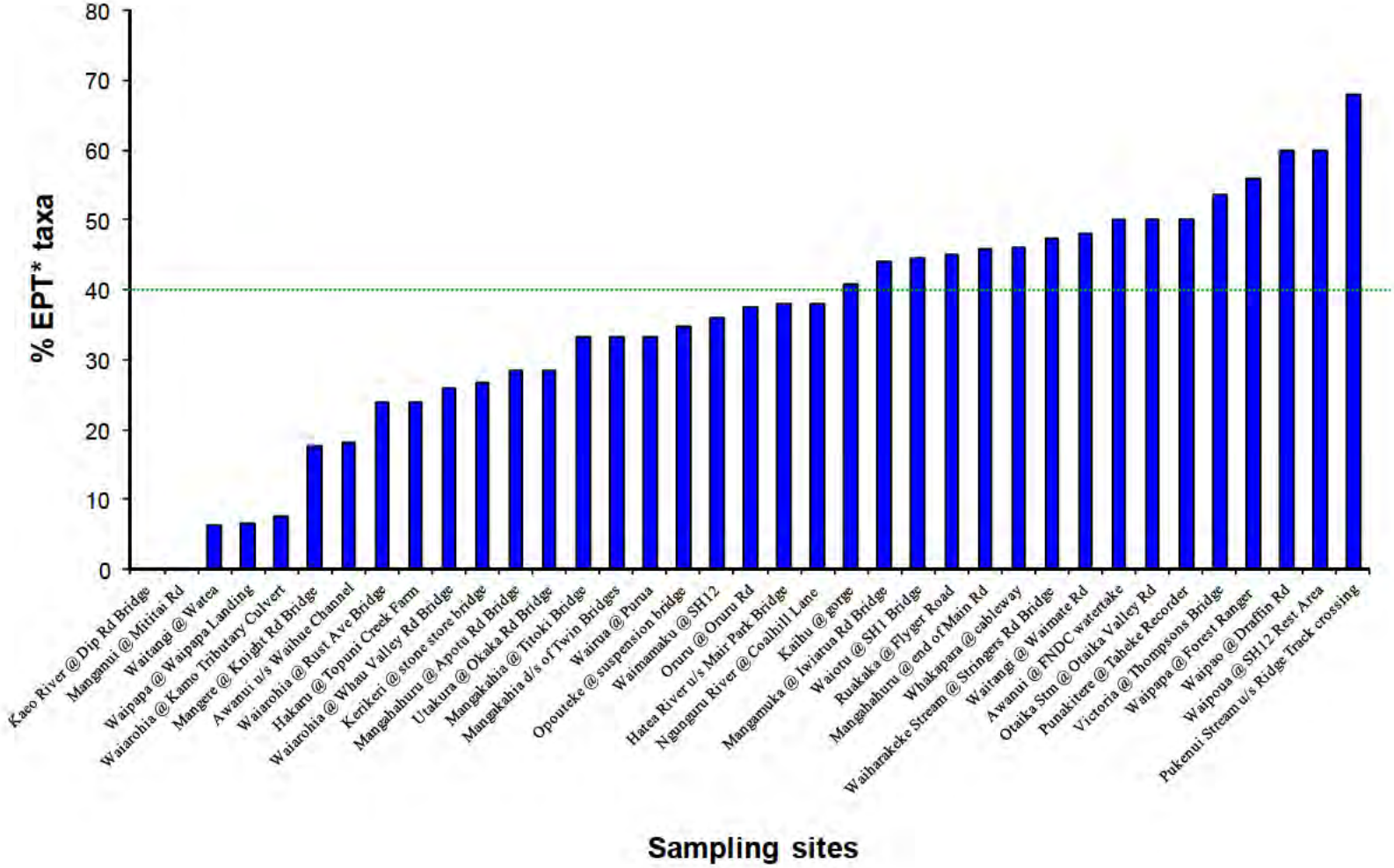

Figure 7. Percentage of Ephemeroptera, Plecoptera and Trichoptera (excluding Hydroptilidae) taxa from the 37 State of Environment sites for 2013. Green dashed line represents approximate lower limit of 'healthy' Northland stream communities.

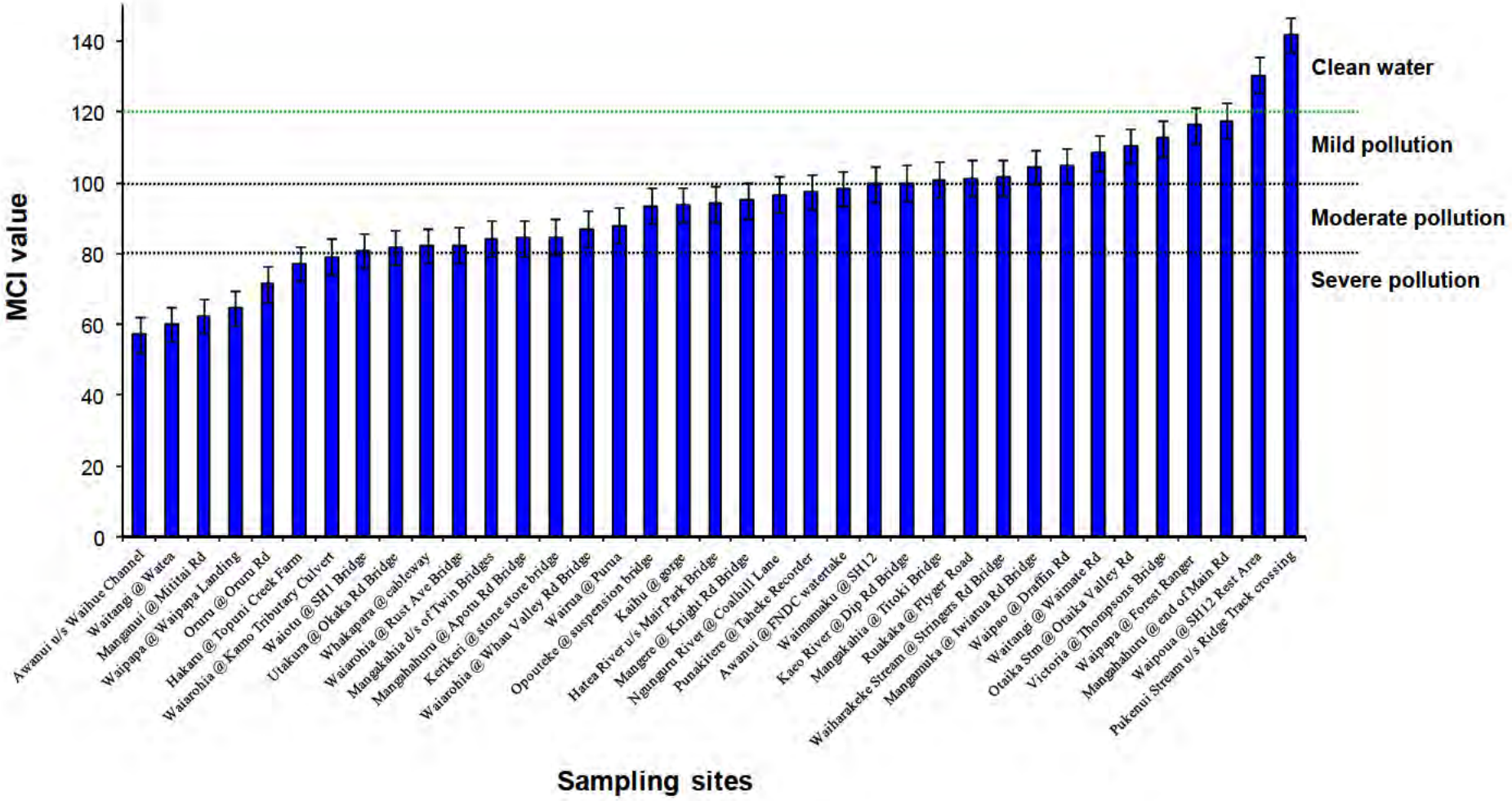

Figure 8. MCI scores for the 37 State of Environment sites for 2013. Error bars represent ± 5 MCI units. Green dashed line indicates lower limit of 'healthy' stream communities.

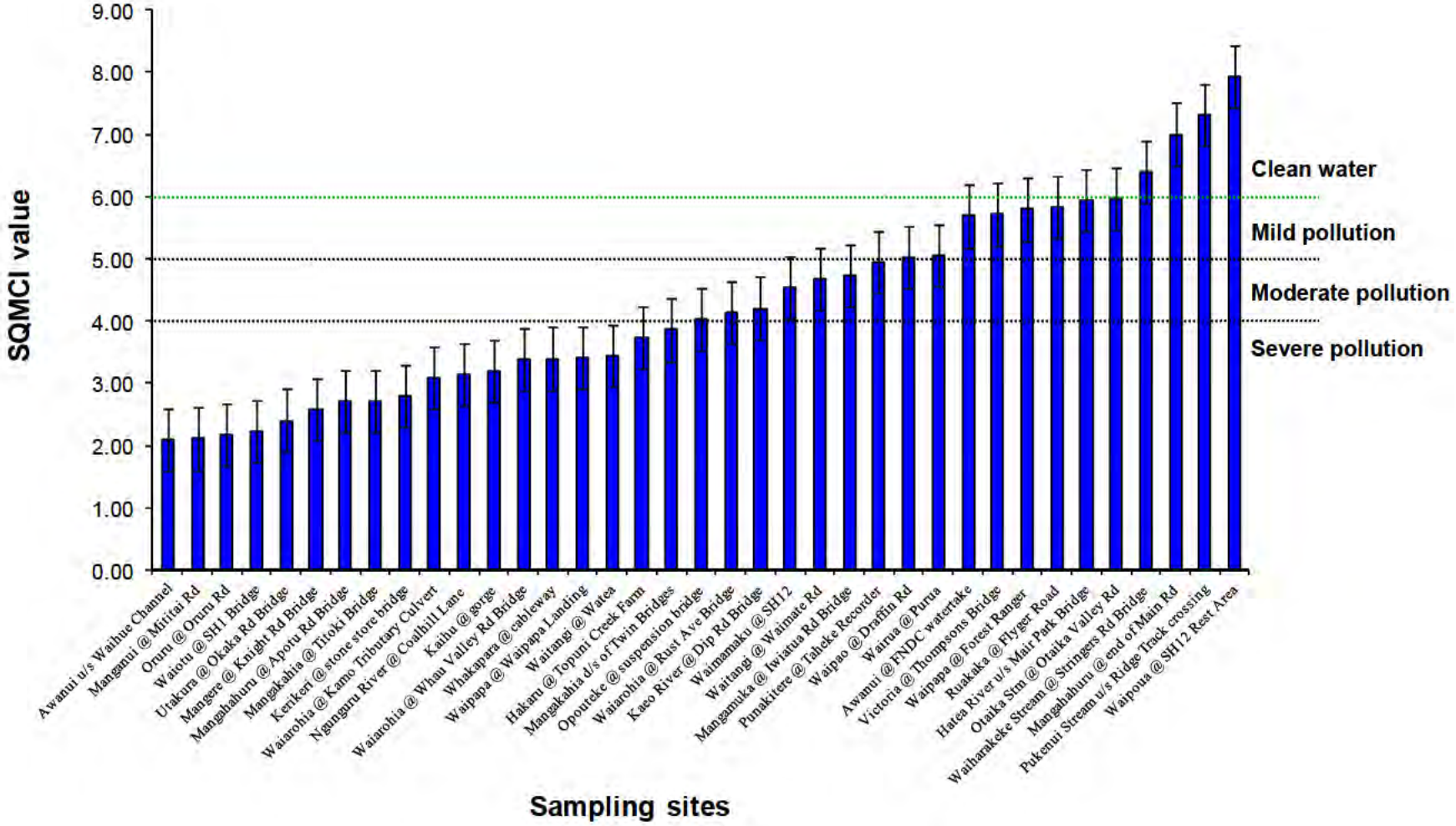

Figure 9. SQMCI scores of the 37 State of Environment sites for 2013. Error bars represent a buffer of one SQMCI unit. Green dashed line indicates lower limit of 'healthy' stream communities.

3.2 Trend analysis

Analysis of 32 (of 37) SoE sites was carried out, looking at the MCI and SQMCI results over time (Fig. 10). Five (of 37) other SoE sites have been established over the last six years and were considered inadequate to produce reliable trends, thus were excluded from analysis. Collier & Kelly (2006) considered that a minimum time series of eight occasions were sufficient to detect meaningful ecological (but not statistical) treads in invertebrate data, thus caution should be taken for several of the reported analyses e.g., Kaeo @ Dip Road, Waimamaku @ SH12, Ruakaka @ Flyger Road, Utakura @ Okaka Rd Bridge (and others on that page). Further, it was observed in these data that there was considerable improvement in LOWESS trends between sites with nine years of data and the same sites with ten years of data.

A 'shotgun' inspection of collective MCI and SQMCI index trends overtime, for SoE sites, indicated that 21 of the 32 sites analysed (65.6%) showed little ecological change. A further seven sites (21.9%) indicated a reduction in their biotic index over time and four sites (12.5%) indicated an increase in their biotic index over time.

When looking at the trend results of MCI and SQMCI collectively, and loosely fitting them into the water quality classes presented in Boothroyd & Stark (2000), 71.9% of sites regularly fell into the 'probable moderate' or 'probable severe pollution' classes, 21.9% regularly as 'mild pollution' and 6.3% regularly as 'clean water'.

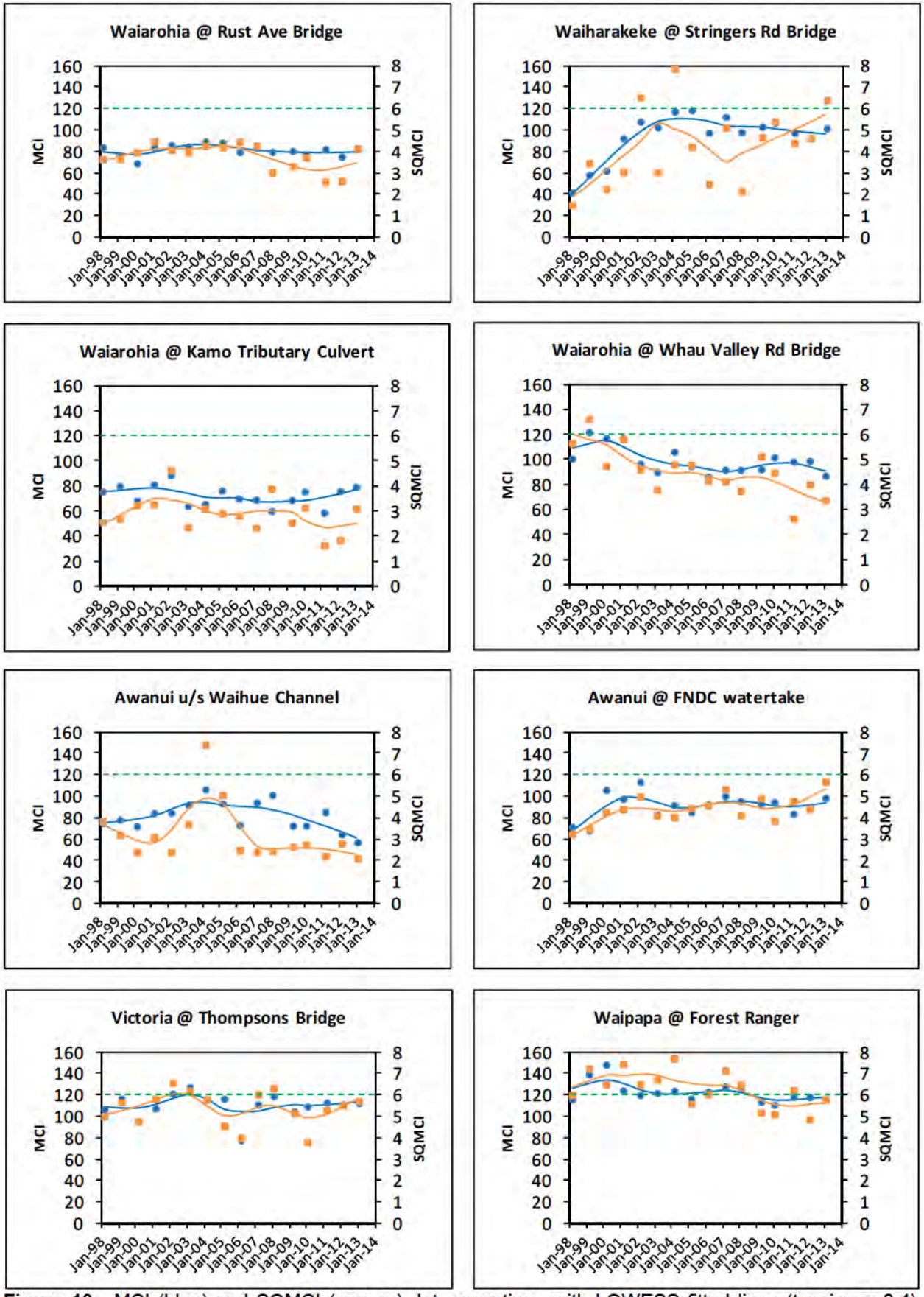

Figure 10. MCI (blue) and SQMCI (orange) data over time, with LOWESS fitted lines (tension = 0.4). Green dashed lines represent lower 'clean water' limit.

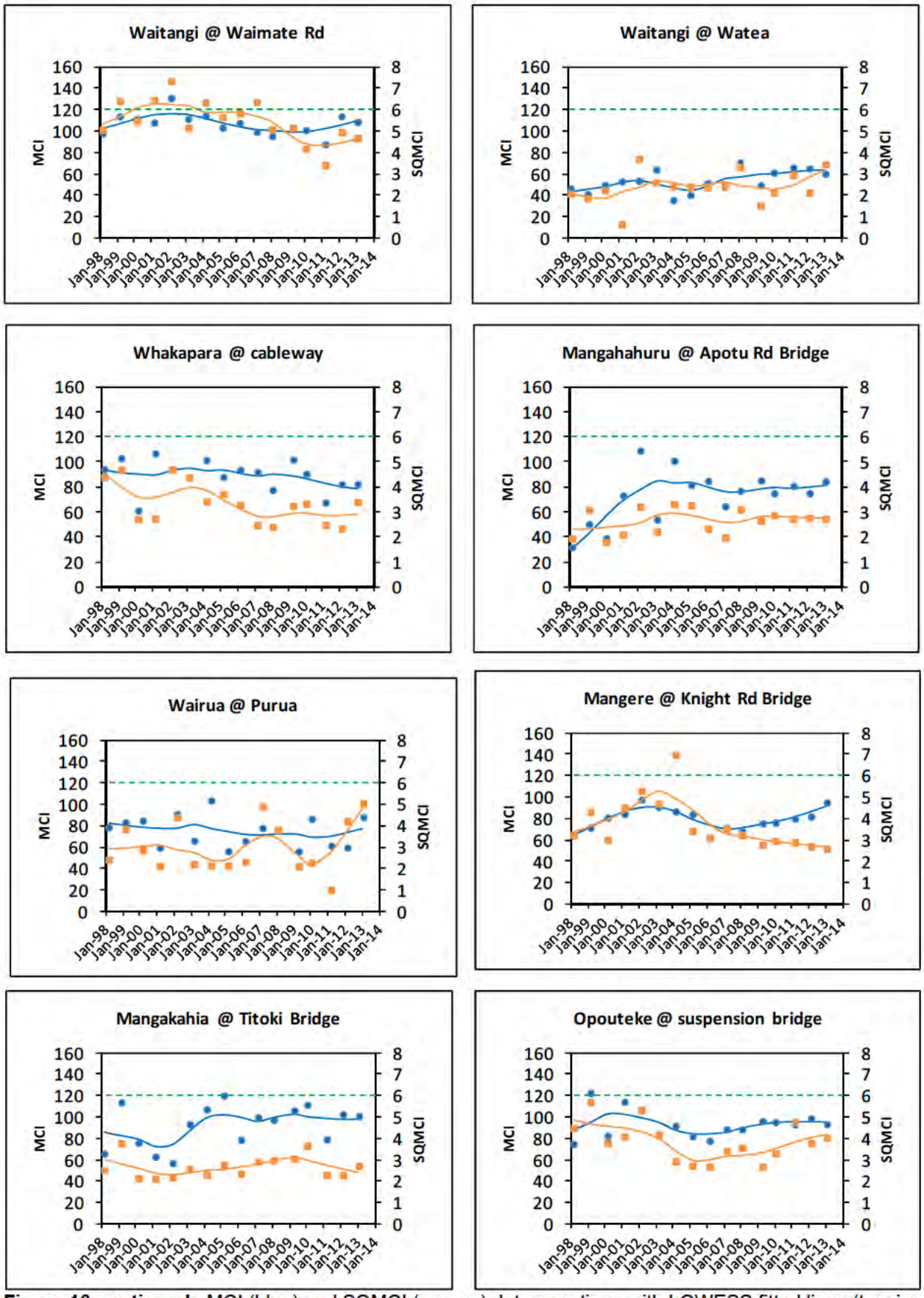

Figure 10 continued. MCI (blue) and SQMCI (orange) data over time, with LOWESS fitted lines (tension = 0.4). Green dashed lines represent lower 'clean water' limit.

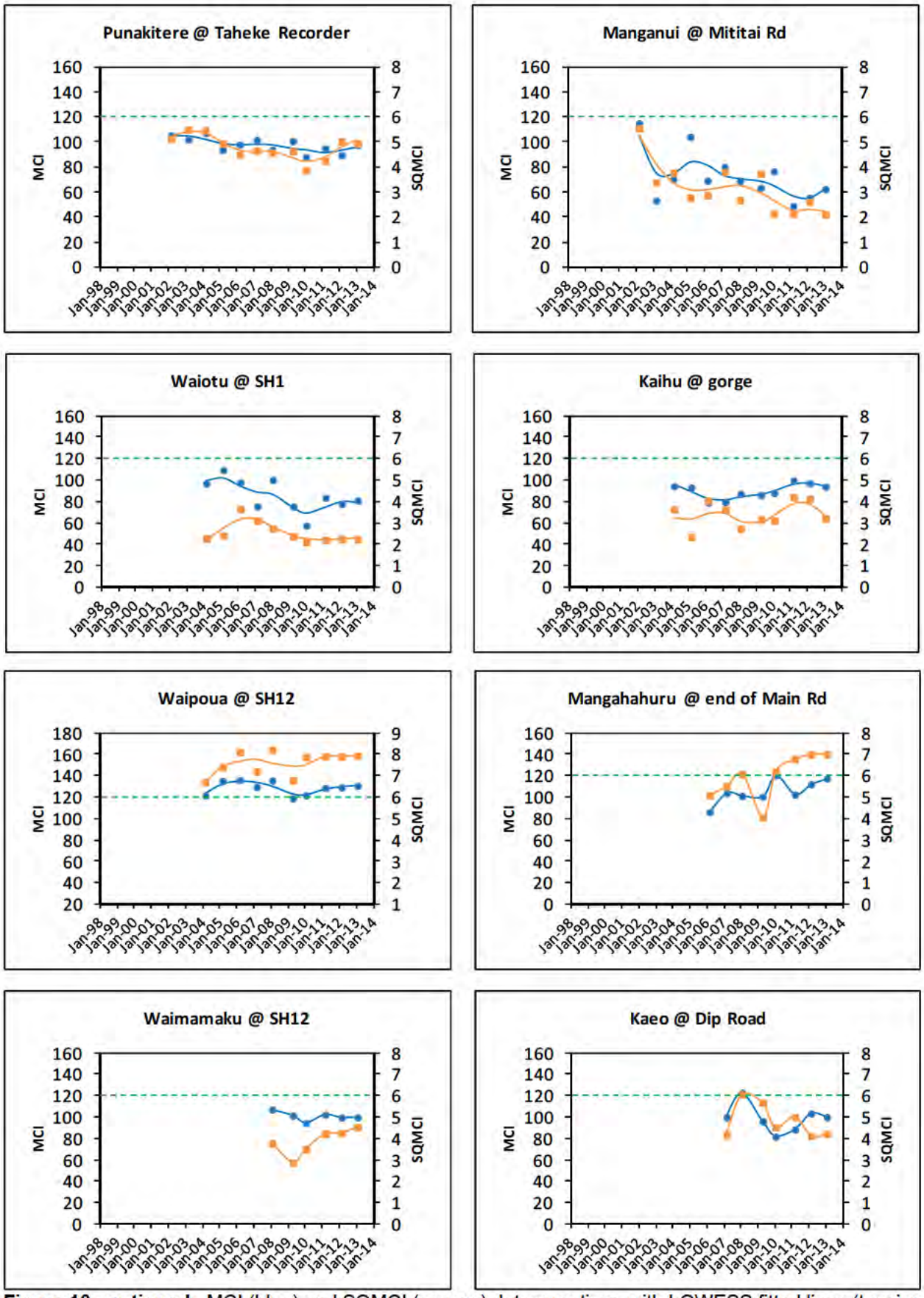

Figure 10 continued. MCI (blue) and SQMCI (orange) data over time, with LOWESS fitted lines (tension = 0.4). Green dashed lines represent lower 'clean water' limit.

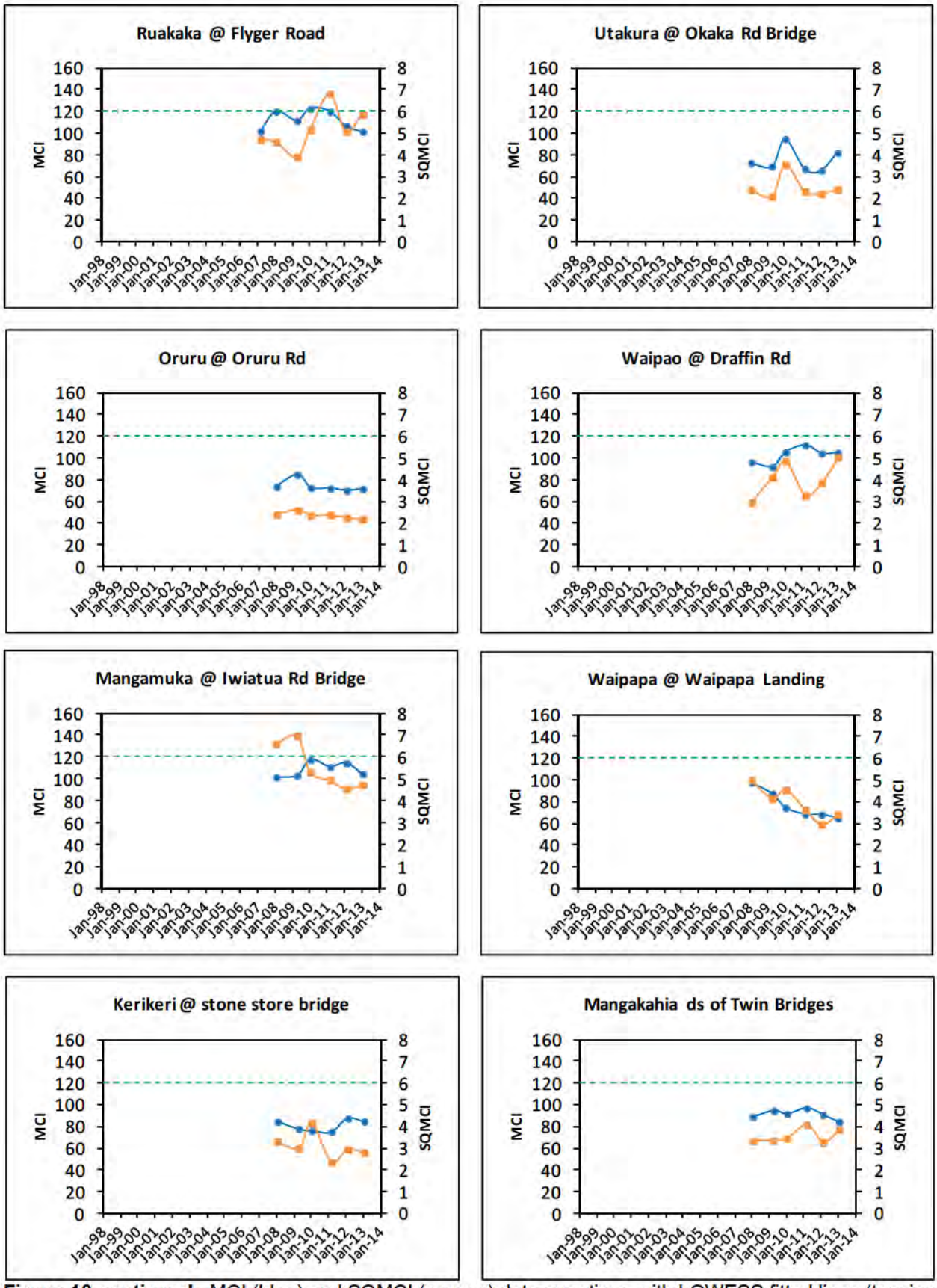

Figure 10 continued. MCI (blue) and SQMCI (orange) data over time, with LOWESS fitted lines (tension = 0.4). Green dashed lines represent lower 'clean water' limit.

4. Conclusions

- Taxonomic richness at the 37 sites ranged from 5–45 at with a mean of 20.4 ± 1.4 (SE, n=37) taxa. The range of %EPT* taxa was 0.0–67.9%. Sixteen sites (43.2%) scored at least 40% EPT* however 21 sites (56.8%) scored <40% EPT* taxa, which represents an approximate lower limit of 'healthy' Northland stream communities. Mean %EPT* for all sites was 35.3% ± 2.8 (SE, n=37).

- Macroinvertebrate Community Index (MCI) scores for the SoE sites ranged from 57.1–141.8, with a mean of 93.1 ± 3.0 (SE, n=37). Semi-Quantitative Macroinvertebrate Community Index (SQMCI) results ranged from 2.10–7.93 with a mean of 4.26 ± 0.26 (SE, n=37).

- Four sites (10.8%) recorded 'clean water' this year based on SQMCI results. Six further sites potentially fall into the SQMCI 'clean water' category if a buffer is considered. The top six streams/rivers this year, based on combined MCI and SQMCI scores, were:

Stream/River	SQMCI value	MCI value
Waipoua River @ SH12 Rest Area	7.93	130.4
Pukenui Stream u/s Ridge Track crossing	7.31	141.8
Mangahahuru Stream @ end of Main Rd	7.00	117.4
Otaika Stream @ Otaika Valley Rd	5.97	110.3
Ruakaka River @ Flyger Rd	5.84	101.4
Waipapa River @ Forest Ranger	5.80	116.2

- Eighteen sites (48.6%) recorded SQMCI scores of less than 4.00, which is interpreted as water of probable 'severe pollution'. However, a further seven sites (18.9%) were recorded in the 'moderate pollution' interpretation (**a total of 67.5% of sites in poorly polluted categories**, SQMCI <5.00). The worst six streams/rivers this year, based on combined MCI and SQMCI scores, were:

Stream/River	SQMCI value	MCI value
Awanui River u/s Waihue Channel	2.10	57.1
Manganui River @ Mititai Rd	2.11	62.3
Oruru River @ Oruru Rd	2.17	71.5
Waiotu River @ SH1 Bridge	2.24	80.9
Utakura River @ Okaka Rd Bridge	2.41	81.7
Waiarohia Stream @ Kamo Tributary Culvert	3.10	79.2

  These sites regularly feature at/near the bottom of the invertebrate monitoring programme and for most part the reasons will be related to difficulties of sampling due to their large size combined with the nature of their position in their river continuum, effectively receiving nutrients and other pollutants from largely agricultural catchments (exception being Waiarohia Stream @ Kamo Tributary Culvert).

- A 'shotgun' inspection of collective MCI and SQMCI trends overtime indicated that 21 of the 32 sites analysed (65.6%) showed little ecological change. A further seven sites (21.9%) indicated a reduction in their biotic index over time and four sites (12.5%) indicated an increase in their biotic index over time. When looking at the trend results of MCI and SQMCI collectively, and loosely fitting them into the water quality classes, 71.9% of sites regularly fell into the 'probable moderate' or 'probable severe pollution' categories, 21.9% regularly as 'mild pollution' and 6.3% regularly as 'clean water'.

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6. Acknowledgements

Many thanks to the following NRC staff: Alan Bee for providing hydrological data and John Ballinger for general communications. Thanks also to Professor Michael Winterbourn (University of Canterbury) for carrying out the quality control procedure on 10% of the macroinvertebrate samples.

7. Appendix A

Results of 2013 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 within the report.

Quality Control exercise: Four samples collected from streams in Northland, and a list of identified taxa, were provided for examination. Individuals of all taxa found had been separated into site vials and the remaining preserved sample including detritus was also provided.

Streams represented were:

1. Pukenui us Ridge Track crossing
2. Waiarohia @ Kamo Trib.
3. Manganui @ Mititai Rd
4. Utakura @ Okaka Rd Bridge

The 4 streams provided a diverse range of invertebrate species, the numbers of taxa in each ranging from 13 to 28.

Results
My identifications of taxa agreed with those listed by the investigator in all cases.
The following comments might be of interest.

- In the Waiarohia sample snails that could be identified as *Gyraulus* occurred with two shell types. One had the standard shell form with rounded whorls, whereas the other possessed a sharp keel (carina) bearing a thin fringe of periostracum. This form does not appear to have been described from New Zealand snails. The North American species *Gyraulus deflectus* can have a marginal carina of periostracal hairs so it is possible that the Waiarohia specimens belong to that species or at least are indeed a *Gyraulus* species.
- The Manganui sample contained both adult and larval Hydrophilidae. The adults at least belong to the genus *Laccobius*.

Bulk samples
I emptied the samples into white trays replacing the alcohol preservative with water so many invertebrates would float to the surface. This procedure enables small species such as dipteran larvae to be found. Detritus was subsequently removed from the trays and material on the bottom of the trays was examined for heavier animals including snail shells and caddis cases. Pulmonate snails present were checked to confirm their identifications (*Physa*).

I found no additional taxa in the bulk samples.
Overall, I concluded that the samples had been processed and identified to a high standard. This is a highly satisfactory result.

Michael Winterbourn
Aquatic entomologist and Emeritus Professor in Zoology
University of Canterbury

7. Appendix B

Table 2. Physico-chemical data (water temperature, dissolved oxygen, air saturated dissolved oxygen, temperature compensated conductivity, and salinity) recorded with YSI-85 meter at the 37 State of the Environment sites throughout Northland during 2013 macroinvertebrate sampling (u/s = upstream, d/s = downstream).

Site name	Temp. (°C)	D.O. (%)	D.O. (mg/L)	Cond.[‡] (μS_{25}/cm)	Sal. (ppt)
Awanui River @ FNDC watertake	21.5	100	8.82	221	0.1
Awanui River u/s of Waihue Channel	22.0	94	8.20	231	0.1
Hakaru River @ Topuni Creek Farm	20.8	99	8.85	185	0.1
Hatea River u/s Mair Park Bridge	18.2	118	11.12	246	0.1
Kaeo River @ Dip Road	19.2	85	7.85	144	0.1
Kaihu River @ gorge	17.3	97	9.27	131	0.1
Kerikeri River @ stone store bridge	20.8	84	7.54	88	0.0
Mangahahuru Stream @ Apotu Rd Bridge	20.8	120	10.73	135	0.1
Mangahahuru Stream @ end of Main Road	18.3	97	9.15	104	0.1
Mangakahia River @ Titoki Bridge	21.3	96	8.53	172	0.1
Mangakahia River d/s of Twin Bridges	21.3	110	9.72	146	0.1
Mangamuka River @ Iwiatua Road Bridge	22.3	113	9.83	183	0.1
Manganui River @ Mititai Road	21.7	84	7.41	227	0.1
Mangere Stream @ Knight Road	18.4	81	7.59	172	0.1
Ngunguru River @ Coalhill Lane	21.8	140	12.33	118	0.1
Opouteke River @ suspension bridge	21.2	104	9.21	155	0.1
Oruru River @ Oruru Road	20.5	86	7.73	188	0.1
Otaika Stream @ Otaika Valley Road	16.4	87	8.47	235	0.1
Pukenui Stream u/s of Ridge Track crossing	15.5	87	8.70	163	0.1
Punakitere River @ Taheke Recorder	20.8	111	9.93	143	0.1
Ruakaka River @ Flyger Road	16.8	74	7.15	254	0.1
Utakura River @ Okaka Road Bridge	20.9	72	6.41	110	0.1
Victoria River @ Thompsons Bridge	20.9	101	9.00	181	0.1
Waiarohia Stream @ Kamo tributary culvert	16.6	85	8.29	204	0.1
Waiarohia Stream @ Rust Ave Bridge	20.8	133	11.91	320	0.2
Waiarohia Stream @ Whau Valley Road	18.0	99	9.32	379	0.2
Waiharakeke Stream @ Stringers Road Bridge	21.7	100	8.81	173	0.1
Waimamaku River @ SH12	19.7	102	9.36	140	0.1
Waiotu River @ SH1	20.4	104	9.41	90	0.0
Waipao River @ Draffin Road	18.6	133	12.39	211	0.1
Waipapa River @ Forest Ranger	21.5	86	7.60	130	0.1
Waipapa River @ Waipapa Landing Bridge	21.7	74	6.48	82	0.0
Waipoua River @ SH12 Rest Area	15.5	90	8.99	112	0.1
Wairua River @ Purua	19.8	88	7.99	124	0.1
Waitangi River @ Watea	20.8	60	5.35	131	0.1
Waitangi River @ Waimate Road	18.2	86	8.05	105	0.1
Whakapara River @ cableway	20.9	99	8.78	94	0.0

[‡] Conductivity temperature compensated to 25°C.

7. Appendix C

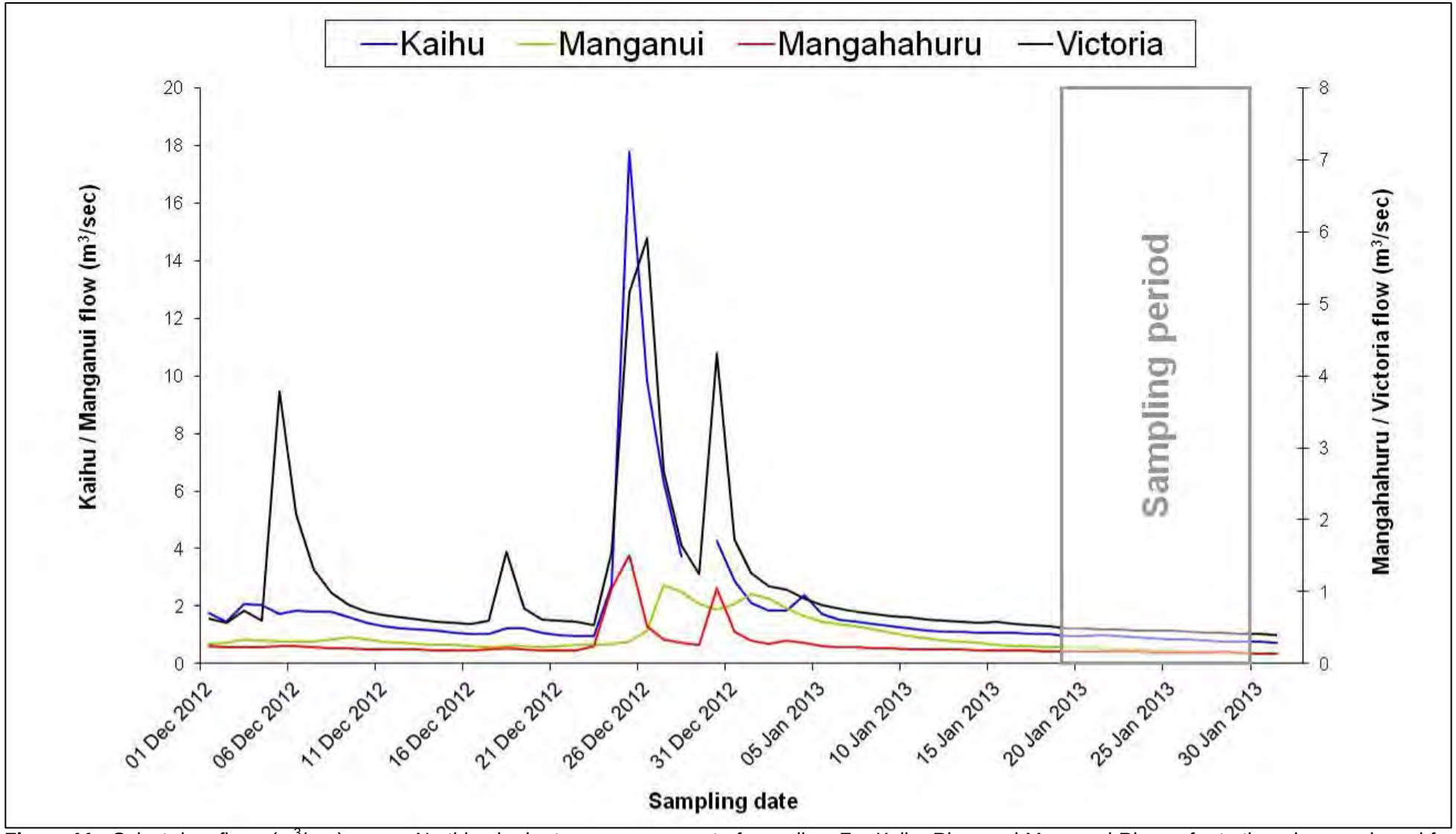

Figure 11. Select river flows (m^3/sec) across Northland prior to commencement of sampling. For Kaihu River and Manganui River refer to the primary axis and for Mangahahuru Stream and Victoria River refer to the secondary axis. Flow data are raw data (not quality controlled) supplied by NRC.

7. Appendix D

Table 3. Raw macroinvertebrate coded-abundance data for the State of Environment sites, January 2013. Sites in red have been reprocessed by an independent taxonomist as a measure of Quality Control.

Site name			Waiarohia @ Rust Ave Bridge	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 u/s Ridge Track crossing	Waitangi @ Waimate Rd	Waitangi @ Watea	Kaeo River @ Dip Rd Bridge	Waipapa @ Waipapa Landing	Kerikeri @ stone store bridge	Whakapara @ cableway	Mangahahuru @ Apotu Rd Bridge	Mangahahuru @ end of Main Rd
Site number			105672	105677	107773	100370	100363	105532	109020	108978	108979	101751	110370	103178	101752	102674	101524	101530	102249	100281	100237
Collection date			19.01.13	19.01.13	19.01.13	29.01.13	29.01.13	29.01.13	29.01.13	29.01.13	29.01.13	29.01.13	19.01.13	29.01.13	29.01.13	29.01.13	29.01.13	29.01.13	29.01.13	29.01.13	27.01.13
TAXA	Tolerance values																				
INSECTA	**HB**	**SB** [1]																			
Ephemeroptera																					
Acanthophlebia	7	9.6								5		20	5								
Ameletopsis	10	10.0						1													1
Arachnocolus	8	8.1							1				20								
Atalophlebioides	9	4.4										1									
Austroclima	9	6.5	1										5	1							
Austronella [1]	7	4.7																			20
Coloburiscus	9	8.1						5		5		20	20	5							100
Deleatidium	8	5.6	20		20		5	100	1	100		100	5	20							100
Ichthybotus	8	9.2						1					1								
Isothraulus	8	7.1											5								
Mauiulus	5	4.1					100	1			1	5									20
Neozephlebia	7	7.6						1				1	20								
Nesameletus	9	8.6			1																1
Oniscigaster	10	5.1																		1	1
Rallidens	9	3.9										5									
Siphlaenigma	9	**9.0**											5								
Tepakia [1]	8	7.6																			1
Zephlebia	7	8.8			1		20	1	1		1		100	5				5	100	20	20
Plecoptera																					
Austroperla	9	8.4											5								
Megaleptoperla	9	7.3										1									
Spaniocerca	8	8.8											1								
Stenoperla	10	9.1											1								
Zelandobius	5	7.4						1													
Zelandoperla	10	8.9											1								
Megaloptera																					
Archichauliodes	7	7.3	1	1	5			5		1		5	5	5				1			20
Odonata																					
Antipodochlora	6	6.3																			1
Hemicordulia	5	0.4			1										1		1				
Xanthocnemis	5	1.2		1					1		1				5		5		5		
Hemiptera																					
Anisops	5	2.2													1						
Microvelia	5	4.6											1			1					
Saldidae [1]	5	3.9																			
Sigara	5	2.4				1									5						
Coleoptera																					
Antiporus	5	3.5													1						
Elmidae	6	7.2	20	1	5		20	20		20		100		20		1					20
Hydraenidae	8	6.7										1									20
Hydrophilidae	5	8.0														1					
Liodessus	5	4.9																			
Ptilodactylidae	8	7.1						1													1
Rhantus	5	1.0																			
Scirtidae	8	6.4											1								
Staphylinidae	5	6.2							1												

Diptera																				
Aphrophila	5	5.6	5		1		5					5		1				5		
Austrosimulium	3	3.9			1			1		5		1	1	5				1	1	5
Chironominae [2]	**2.5**	**4.7**	5	5	20		5	20		1		20	5	5	1		1	20		20	5
Dolichopodidae	3	8.6																		
Empididae	3	5.4																		
Eriopterini	9	7.5						5		1		5	1	5						5
Hexatomini	5	6.7								1		1		1						
Limonia	6	6.3		1																
Maoridiamesa	3	4.9						1												
Mischoderus	4	5.9		1																1
Muscidae	3	1.6	1	1	5		1							5						
Orthocladiinae	2	3.2	20	1	100		5	20		5		1		20	5		5	100		20	1
Paradixa	4	8.5																		
Paralimnophila	6	7.4																		1
Sciomyzidae	3	3.0			1															
Tabanidae	3	6.8										1								
Tanypodinae	5	6.5			5	1	1	20		5		1		5	20				1	5
Trichoptera																				
Aoteapsyche	4	6.0	100		20		1	20		20		100		5				20		5
Beraeoptera	8	7.0										1								
Costachorema	7	7.2										1								
Helicopsyche	10	8.6																		
Hudsonema	6	6.5				1	5	5		5		1		20					5	
Hydrobiosella	9	7.6																		
Hydrobiosis	5	6.7	5		20		5	5		20		5		1					5	5	1
Neurochorema	6	6.0						5				1								
Olinga	9	7.9						1		5		20		1						
Orthopsyche	9	7.5											5							
Oxyethira	2	1.2	20		20	1		20	1	5	1	20		20	5		1	1	5	100	1
Paroxyethira	2	3.7													1		5			5	
Plectrocnemia	8	6.6																			
Polyplectropus	8	8.1											1								1
Psilochorema	8	7.8			1		1	5		1		5	1	1				1			1
Pycnocentria	7	6.8					100			1		1	1	5					20		1
Pycnocentrodes	5	3.8	5		20		20	20		5		100		1				5	5		5
Triplectides	5	5.7		1		1			1	1	1	5	1	1	5		1		20	1	20
Lepidoptera																					
Hygraula	4	1.3																			
Collembola	6	5.3																			1
Acarina	5	5.2								1								1			
CRUSTACEA																					
Amarinus [1]	**3**	5.1					1													5	
Amphipoda	5	5.5	100		1				1				1		20						1
Cladocera	5	0.7				1															
OSTRACODA	3	1.9	5		1			1		1		1		1	5						
Paranephrops	5	8.4																			
Paratya	5	3.6				1			5		20					1	5				
Tanaidacea	4	6.8																			
MOLLUSCA																					
Ferrissia	3	2.4	5				5		1								20	1		1	
Gyraulus	3	1.7	5	5	5	1															
Latia	3	6.1																5			
Lymnaeidae	3	1.2										1					1				
Melanopsis	3	1.9									5						5	5			
Physa	3	0.1	5	1	1	5			1						20		1		5	1	
Potamopyrgus	4	2.1	20	1	20	100	20	5	100	5	500		5		5	20	20	5	500	100	5
Sphaeriidae	3	2.9							5										1		

HIRUDINEA	3	1.2	1		1															
NEMATODA	3	3.1																		
NEMERTEA	3	1.8			5					1							1			1
OLIGOCHAETA	1	3.8	20	5	20			1	1	100		5	1	20	1		1		1	1	20
PLATYHELMINTHES	3	0.9	20		5	1															1
Total (Minimum) coded abundances (c_i)			384	25	306	114	320	292	121	320	530	561	224	179	101	24	73	176	673	281	413
Taxonomic richness			21	13	27	11	18	28	14	25	8	34	28	25	16	5	15	15	13	14	35
MCI / MCI-sb value			82.4	79.2	87.0	57.1	98.3	112.5	81.7	104.4	71.5	116.2	141.8	108.4	60.1	100.0	64.7	84.7	82.3	84.4	117.4
SQMCI / SQMCI-sb value			4.14	3.10	3.38	2.10	5.69	5.72	2.41	4.73	2.17	5.80	7.31	4.67	3.45	4.21	3.42	2.80	3.40	2.72	7.00
EPT* count			5	1	7	2	9	15	4	11	3	19	19	12	1	0	1	4	6	4	16
%EPT*			23.8	7.7	25.9	18.2	50.0	53.6	28.6	44.0	37.5	55.9	67.9	48.0	6.3	0.0	6.7	26.7	46.2	28.6	45.7

* 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 3 continued. Raw macroinvertebrate coded-abundance data for the State of Environment sites, January 2013. Sites in red have been reprocessed by an independent taxonomist as a measure of Quality Control.

Site name			Wairua @ Purua	Waipao @ Draffin Rd	Mangere @ Knight Rd Bridge	Mangakahia @ Titoki Bridge	Opouteke @ suspension bridge	Mangakahia d/s of Twin Bridges	Punakitere @ Taheke Recorder	Waiotu @ SH1 Bridge	Kaihu @ gorge	Waipoua @ SH12 Rest Area	Waimamaku @ SH12	Manganui @ Mititai Rd	Ruakaka @ Flyger Road	Hakaru @ Topuni Creek Farm	Hatea u/s Mair Park Bridge	Ngunguru @ Coalhill Lane	Otaika @ Otaika Valley Rd	Waiharakeke @ Stringers Rd Bridge
Site number			**101753**	**108941**	**101625**	**101038**	**102258**	**109096**	**105231**	**102248**	**102256**	**103304**	**109098**	**102257**	**105008**	**109021**	**100194**	**110603**	**110431**	**100007**
Collection date			**21.01.13**	**21.01.13**	**22.01.13**	**21.01.13**	**21.01.13**	**21.01.13**	**21.01.13**	**29.01.13**	**21.01.13**	**21.01.13**	**21.01.13**	**20.01.13**	**20.01.13**	**20.01.13**	**19.01.13**	**26.01.13**	**20.01.13**	**29.01.13**
TAXA	Tolerance values																			
INSECTA	**HB**	**SB** [1]																		
Ephemeroptera																				
Acanthophlebia	7	9.6										5	1							
Ameletopsis	10	10.0										5								
Arachnocolus	8	8.1																		
Atalophlebioides	9	4.4										20								
Austroclima	9	6.5										5						5		
Austronella [1]	7	4.7													1					
Coloburiscus	9	8.1		1					1			20	5		1		5	5	5	
Deleatidium	8	5.6					20	5	1		1	100	5				1	20	20	20
Ichthybotus	8	9.2										1								
Isothraulus	8	7.1																		
Mauiulus	5	4.1		20			5		5			1	5		5				5	20
Neozephlebia	7	7.6										1			1				5	
Nesameletus	9	8.6									1	100								
Oniscigaster	10	5.1																		
Rallidens	9	3.9										5					1			
Siphlaenigma	9	**9.0**																		
Tepakia [1]	8	7.6																		
Zephlebia	7	8.8	20	20	5	1		5	20	5	5	20			20	1	20	1	100	100
Plecoptera																				
Austroperla	9	8.4										1								
Megaleptoperla	9	7.3										1			1					
Spaniocerca	8	8.8																		
Stenoperla	10	9.1										1								
Zelandobius	5	7.4																		
Zelandoperla	10	8.9										5								
Megaloptera																				
Archichauliodes	7	7.3					5		1		5	5	5		1	1	5	1	5	
Odonata																				
Antipodochlora	6	6.3																		
Hemicordulia	5	0.4																		
Xanthocnemis	5	1.2		1	5			1		5				5	1	1				

Hemiptera																				
Anisops	5	2.2																		
Microvelia	5	4.6			1															
Saldidae [1]	5	3.9												1						
Sigara	5	2.4																		
Coleoptera																				
Antiporus	5	3.5			1															
Elmidae	6	7.2					20	20	20		5	20	20		5		20	20	20	20
Hydraenidae	8	6.7										1	1							
Hydrophilidae	5	8.0			1	1								5						
Liodessus	5	4.9	1											1						
Ptilodactylidae	8	7.1										1								
Rhantus	5	1.0												1						
Scirtidae	8	6.4																		
Staphylinidae	5	6.2										1								
Diptera																				
Aphrophila	5	5.6					5	5			20	20	5				1	1	1	
Austrosimulium	3	3.9		20	20	1	5		1		1	5	1		1		1	1	5	1
Chironominae [2]	**2.5**	**4.7**	1		1	1	100	5	5		100	1	5		5	20	5	100	5	5
Dolichopodidae	3	8.6																1		
Empididae	3	5.4			1								1				1			
Eriopterini	9	7.5					1					1							5	
Hexatomini	5	6.7									1		1						1	
Limonia	6	6.3																		
Maoridiamesa	3	4.9					1				5		1			1	1			
Mischoderus	4	5.9									1				1					
Muscidae	3	1.6					5	1	1		5		1			1	1			
Orthocladiinae	2	3.2			5		20	20	5		100	5	1		1	20	5	5	5	
Paradixa	4	8.5			5															
Paralimnophila	6	7.4																	1	
Sciomyzidae	3	3.0																		
Tabanidae	3	6.8																		
Tanypodinae	5	6.5					5	20				1	5		1			1		1
Trichoptera																				
Aoteapsyche	4	6.0					100	20	5		20	20	100		5	100	20	20	5	20
Beraeoptera	8	7.0									1	5	1							
Costachorema	7	7.2																		
Helicopsyche	10	8.6										100					100			
Hudsonema	6	6.5		1	5	1	1	1	1	5	1	1			1	1	5		1	5
Hydrobiosella	9	7.6										1								
Hydrobiosis	5	6.7		5			5	1	5		5	5	1		1	1	1	5	5	5
Neurochorema	6	6.0					1	1			5	1					1	1		
Olinga	9	7.9		1								100	1						1	
Orthopsyche	9	7.5																	1	
Oxyethira	2	1.2	1		5	5	5	20			20	1	5		1	1	1	20	5	1
Paroxyethira	2	3.7				1				1						5				
Plectrocnemia	8	6.6										5								
Polyplectropus	8	8.1													5				1	
Psilochorema	8	7.8					1								1				1	
Pycnocentria	7	6.8	1	20		1	20		5	1	1	1			1				20	20
Pycnocentrodes	5	3.8	1	20				20	20		20	20	5		5	20	100	20	20	5
Triplectides	5	5.7		1	20	5			1	5	1				20	1	5		5	20
Lepidoptera																				
Hygraula	4	1.3												1						
Collembola	6	5.3												1						
Acarina	5	5.2										1						1		

CRUSTACEA																			
Amarinus [1]	**3**	5.1		5	5										1		5	5	
Amphipoda	5	5.5	500	500	20	100			1					5	5	20		5	
Cladocera	5	0.7								1									
OSTRACODA	3	1.9														5			
Paranephrops	5	8.4														1			
Paratya	5	3.6				5									5	1	5		
Tanaidacea	4	6.8															1		
MOLLUSCA																			
Ferrissia	3	2.4		1			1	1			20	1	1		1	1			5	
Gyraulus	3	1.7														5			
Latia	3	6.1						1	5			5				5	5			5
Lymnaeidae	3	1.2									1								
Melanopsis	3	1.9													1		5		
Physa	3	0.1												20		20			
Potamopyrgus	4	2.1	100	100	500	500	20	20	20	500	100	20	20	500	5	100	100	20	20	20
Sphaeriidae	3	2.9			1									1	1	5				
HIRUDINEA	3	1.2												1						
NEMATODA	3	3.1					1													
NEMERTEA	3	1.8	1					1					5		1		1			1
OLIGOCHAETA	1	3.8					1	20	5		20	5			1	5	5	100	5	20
PLATYHELMINTHES	3	0.9						1		1	5	1						1		
Total (Minimum) coded abundances (c_i)			626	716	601	622	348	189	128	524	470	645	202	542	105	342	423	349	288	294
Taxonomic richness			9	15	17	12	23	21	20	9	27	45	25	12	31	25	29	21	30	19
MCI / MCI-sb value			88.0	104.8	95.1	100.8	93.5	84.3	97.5	80.9	93.7	130.4	99.6	62.3	101.4	77.2	94.1	96.7	110.3	101.5
SQMCI / SQMCI-sb value			5.05	5.03	2.59	2.72	4.03	3.86	4.95	2.24	3.21	7.93	4.54	2.11	5.84	3.75	5.94	3.15	5.97	6.41
EPT* count			3	9	3	4	8	7	10	4	11	27	9	0	14	6	11	8	15	9
%EPT*			33.3	60.0	17.6	33.3	34.8	33.3	50.0	44.4	40.7	60.0	36.0	0.0	45.2	24.0	37.9	38.1	50.0	47.4

* 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.