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Aquatic invertebrate communities and functional indicators along the lower Waikato River

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Table of contents

List of Figures

List of Plates

List of Tables

Abstract

This report details the results of aquatic invertebrate sampling across 22 transects spanning the Waikato River from Hamilton to Mercer, and cotton strip decay and river metabolism measurements around discharges from (1) city, dairy factory meat processing waste water treatment plants (organic), (2) Waipa River (sediment) and (3) Huntly Power Station (thermal). Invertebrate collections and functional indicator measurements were made in autumn and/or spring at sites associated with the three stressors to document changes related to low flow and high flow periods. Macroinvertebrate collections were made from littoral areas on true left and true right banks and in deepwater benthic habitats at three points along transects across the river to account for any plume effects from discharges. Nutrient levels were slightly elevated in autumn below organic discharges and measured total phosphorus exceeded the concentration considered "satisfactory" for limiting nuisance aquatic plant growth. Turbidity was around 2-3 times higher downstream of the sediment discharge compared to outside the sediment plume, and exceeded "satisfactory" levels in autumn when flows were higher. Water temperatures were on average 1-2 ^{o}C higher downstream of the thermal discharge, and continuous temperature records indicated higher maxima (approaching 26 ^{o}C) in autumn than in spring, but greater difference in spring between ambient river temperatures and temperatures below the discharge. No differences in gross primary production or ecosystem respiration were evident in relation to the discharges, but significant change in cotton strip decay rates were evident downstream of discharges. Greater temporal sampling is necessary to confirm the effect of point-source impacts on river metabolism and clarify its utility for biomonitoring discharges in large rivers. Cotton strip assays appear to have utility for monitoring ecosystem process responses to discharges, but require the development of environmental quality classes for limit-setting purposes. The invertebrate fauna of the lower Waikato River is dominated by native species. More taxa were found in littoral compared to benthic habitats and community composition differed markedly between these habitats, highlighting the importance of river edges for diversity in the lower river. Coarser bottom substrates in the river between Hamilton and Ngaruawahia provide habitat for a range of taxa not commonly encountered in other parts of the river. Mayflies and stoneflies occur sporadically in littoral and benthic habitats in the river, including downstream of the Waipa confluence and around Rangiriri. A shift in macroinvertebrate community composition was evident around Huntly reflecting the onset of a floodplain morphology and apparent deposition of sediment from the Waipa River as the channel widens and water velocities decline. Near-field effects on invertebrate communities were detectable in littoral but not in benthic habitats where faunal composition seems to be driven mainly by longitudinal shifts in substrate size and sediment deposition. Littoral sampling is likely to be a useful method for sampling macroinvertebrates as part of biomonitoring in this river, but variations in water level may affect community composition by influencing access to available sampling habitat.

1 Introduction

Waikato Regional Council (WRC) uses indicators to report on state and trends of the region’s waterways, but to date indicators of ecological health have not been available for large rivers such as the Waikato River. Macroinvertebrates are widely used in wadeable streams as indicators of water quality because of their sessile nature, short-life histories, relatively well-known taxonomy and habitat requirements, and ease of collection (Hellawell 1978; Rosenberg & Resh 1993; Boothroyd & Stark 2000). As well as providing valuable indicators of ecological condition and change, macroinvertebrates can also (i) perform functional roles such as organic matter processing and bioturbation, (ii) mediate energy transfer from lower trophic levels to higher levels such as fish, and (iii) contribute to native biodiversity values. In addition to integrating the effects of water quality, macroinvertebrate community composition can be influenced by other environmental factors, including habitat quality, substrate type, and the flow regime prior to sampling. Recently, there has been accelerated use of functional indicators for assessing ecological health, such as river metabolism and organic matter decomposition rates which reflect biological processes (e.g., Gessner & Chauvet 2002; Fellows et al. 2006; Tiegs et al. 2013; Young et al. 2008). Some functional measures, appear particularly well-suited as monitoring indicators since they integrate a range of physical and chemical stressors (e.g., Pascoal et al. 2003), are relatively inexpensive to use without the need for specialised equipment, and they represent fundamental aspects of of the way ecosystems work (Palmer & Febria 2012).

WRC has been working with the University of Waikato to test the utility of macroinvertebrate indicators for monitoring large river health (Collier et al. 2013a, 2013b; Collier & Hamer 2013). The latter study highlighted that macroinvertebrate community indicators from the Waikato River did not respond to a land use pressure gradient in the same way as other non-wadeable rivers in the region, potentially because multiple stressors and fluctuating flows obscured land cover responses. This finding emphasised the need for a more detailed analysis of macroinvertebrate community stressor responses in the Waikato River. In contrast, relationships between cotton strip decay rates and gross primary production in relation to increasing land use pressure were detected for Waikato non-wadeable rivers generally (Collier et al. 2013c), although their utility for assessing the effects of novel stressors in the Waikato River is unclear.

This report details the results of aquatic invertebrate sampling across 22 transects spanning the Waikato River from Hamilton to Mercer, and cotton strip decay and river metabolism measurements around particular stressors. The objectives of this work were to:

(1) determine the relative significance of littoral and benthic habitats for river invertebrate communities along the lower Waikato River, and
(2) test responses of invertebrate and functional indicators to contrasting stressors characterising different parts of the river.

The stressors investigated comprised (i) organic discharges from sewerage, dairy factory and meatworks waste treatment (organic reach), (ii) a sediment discharge from the Waipa River (sediment reach), and (iii) a thermal discharge from Huntly power station (thermal reach). Additional invertebrate collections were made downstream of Huntly to Mercer to understand longitudinal patterns in community composition down the river. Samples were not collected upstream of Hamilton because of difficulties sampling benthic habitats in the much deeper and faster flowing water in that constrained part of the river, nor below Mercer because of the tidal influence on littoral zones. Invertebrate collections and functional indicator measurements were made in autumn and/or spring at sites associated with the three pressures to document seasonal changes related to low flow and high flow periods. Macroinvertebrate collections were made from littoral areas on true left and true right banks and in deepwater benthic habitats at three points along transects across the river to account for any plume effects from discharges.

2 Sampling sites

The 22 transects covered a river length of 73 km and their locations are shown in Plates 1 and 2 (see Appendix 1 for GPS coordinates and sampling year). All impact reaches had 1-3 upstream transects sampled to serve as controls. Additional functional indicator measurements were also made in April 2009 for sewerage and thermal discharges at points that did not coincide with macroinvertebrate sampling transects (see Table 1 for those locations).

Table 1: Locations and depths of functional indicator sites upstream (above) and downstream (below) of two discharges in the Waikato River in April 2009.

A.Sewerage	**Above**	**Below 1**	**Below 2**	**Below 3**
Location	E2707328 N6382979	E2707091 N6383396	E2706839 N6383821	E2706002 N6384969
Distance below upstream site (km)	0	0.5	1.0	2.5
Mean depth (m)	2.89	2.94	4.92	4.21
B. Thermal	**Above**	**Below 1**	**Below 2**	**Below 3**
Location	E2700642 N6404028	E2700608 N6404747	E2700965 N6406614	E2700636 N6409207
Distance below upstream site (km)	0	0.8	2.8	5.4
Mean depth (m)	1.58	1.46	2.30	1.70

The organic reach comprised two contiguous sections of river approximately 10-km long (Plate 2A). The upstream section (organic reach control; T1-T3) received stormwater inputs from Hamilton City directly and via small tributary streams, the larger ones of which are also influenced by agricultural activities in their upper catchments. The downstream section received discharges from the Pukete sewage treatment plant, a dairy factory and a meat processing plant which collectively have consent to discharge up to 225 kg of phosphorus per day to the river (NIWA 2010). Organic discharges were 1.5–3.0 km upstream of the impact sampling sites (T4-6). Additional measurements of metabolism and cotton strip decay were made in April 2009 at one site above and three sites at varying distances below the Pukete sewerage treatment plant (see Table 1) to provide finer spatial resolution around one of these discharges.

For macroinvertebrate sampling, the sediment reach comprised one transect upstream of the Waipa confluence (T7) and three transects at approximately 500 m intervals below the confluence (T8-T10). Paired locations on the true left (impact – inside sediment plume) and true right (outside plume) sides were used for both littoral macroinvertebrate and functional indicators which were measured in spring when turbidity is higher. Cotton strip decay rates were also measured on true left and right sides upstream of the sediment discharge. The Waipa River drains 20% of the total Waikato River catchment but contributes between half to two-thirds of the flow during peak discharge and two-thirds of the suspended sediment load to the lower river (174,000 tonnes per year past Whatawhata; Brown 2010; Hicks & Hill 2010). Consequently average turbidity is around three times higher downstream of the Waipa confluence at Huntly than above (see Fig. 6.3 in Vant 2010).

For macroinvertebrate sampling, the thermal reach comprised one (spring) or three (autumn) upstream control transects (T11-T13) and three downstream transects (T14-T16) spanning a river length of approximately 1 km. Paired locations on the true left (impact – inside thermal plume) and true right (outside plume) sides of the river were used for littoral macroinvertebrate sampling. Functional indicators were measured at one upstream and three downstream sites in autumn when water temperatures are higher (see Table 1 for locations). The impact reach started a few hundred metres below the thermal discharge of Huntly power station. Full transverse mixing is thought to occur somewhere downstream of Meremere (Rutherford 2010) and therefore the additional transects sampled below Huntly (T17-T22) were also likely to have been influenced to some extent by the thermal discharge.

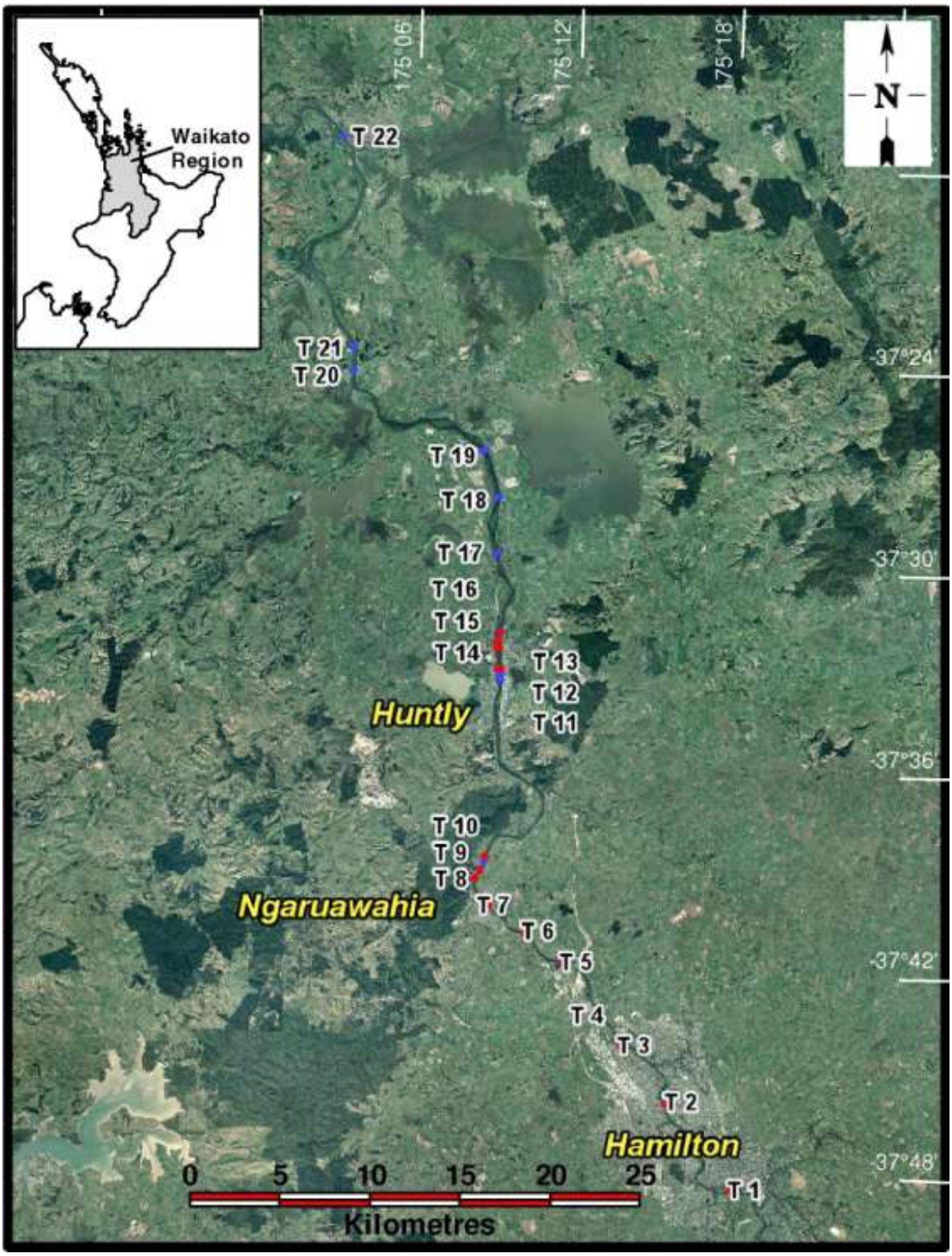
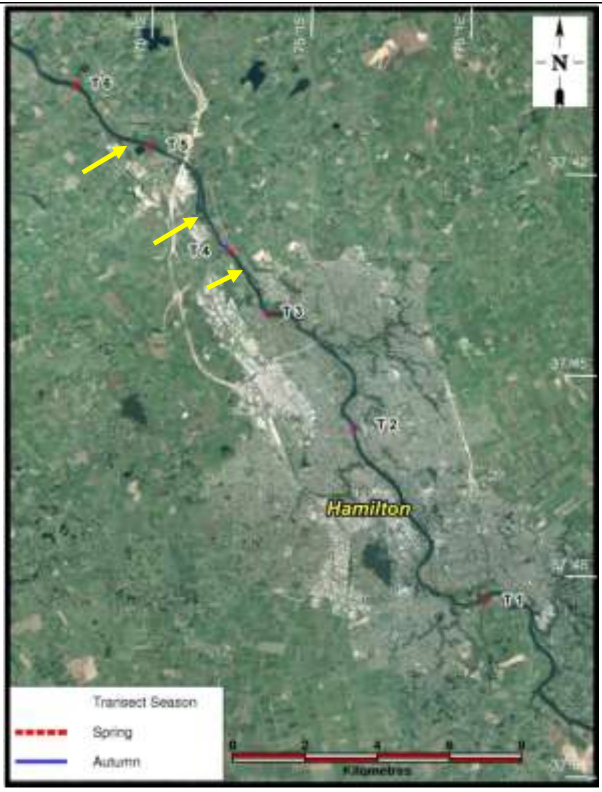


Plate 1: **Location of macroinvertebrate sampling transects along the lower Waikato River over 2008-2013 (see Appendix 1 for coordinates).**

A. Organic reach



B. Sediment reach

C. Thermal reach

Plate 2: **Location of macroinvertebrate sampling transects upstream and downstream of three different stressors in the lower Waikato River (blue = autumn, red = spring). Arrows indicate locations of discharges.**

3 Methods

3.1 Physicochemical measurements

For control and impact sections of the organic reach, water samples were collected during autumn low flows (three samples per transect) for analysis of phosphorus and nitrogen species. Samples for filterable nutrients were filtered and collected in 50 ml clean Vulcan™ centrifuge tubes, and samples for total nutrients were collected in separate Vulcan centrifuge tubes without filtration. All samples in centrifuge tubes were sealed, placed on ice, and frozen upon return to the laboratory. Concentrations of total phosphorus (TP), dissolved reactive phosphorus (PO_4-P), total nitrogen (TN), ammonium (NH_4-N), and nitrate (as NO_x-N–NO_2-N) were analysed spectrophotometrically with a Lachat Instruments flow injection analyser (model QuikChem 8000 FIA+) following thawing. For total nutrients a persulphate digestion step was used to oxidise nitrogen and phosphorus species prior to analysis (Ebina et al. 1983). Water temperature, conductivity and dissolved oxygen were measured in the river in spring 2012 (see Appendix 2A).

For the sediment reach, water samples were collected at control and impact sites during autumn and spring (three samples per transect – near-left bank, mid-river, near-right bank) for measurement of turbidity by Hills Laboratory. Water temperature, conductivity and dissolved oxygen were measured in the river in spring and autumn at these sites (see Appendices 2B & C), and also for sites below the thermal reach in autumn 2012 (Appendix 2D). Water temperatures above and below Huntly powerstation were measured by deploying Tidbit loggers (recording at 30 minute intervals) at sites (i) not influenced by the thermal discharge (true left bank above and below the Lake Waahi outlet upstream of the thermal discharge, and at the true right bank at similar locations to littoral sampling), and (ii) at three sites from the true left bank below the discharge near macroinvertebrate sampling transects (Fig. 2C). At each site downstream of the powerstation three water temperature loggers were deployed on a 30-m long chain set perpendicular to the true left bank. The three loggers were spaced at 10-m intervals along the chain and measured near-bottom water temperatures prior to the autumn (10 Feb. to 28 Mar.) and spring (15 Sept. to 1 Nov.) invertebrate sampling. All loggers used were compared over 3.5 days at room temperature; the largest difference in maximum temperature was $<0.3^{o}$C and coefficient of variation for mean temperature was <3%.

3.2 Functional measurements

3.2.1 Ecosystem metabolism

The combination of primary production and ecosystem respiration was estimated using the single-station open-channel approach which requires measurement of natural changes in dissolved oxygen (DO) concentration over at least 24 hours (Owens 1974; Young & Huryn 1999). DO concentration and temperature were recorded every 15 minutes for each transect in autumn and spring using calibrated optical probes with data loggers (D-Opto, Zebra-Tech Ltd, Nelson, New Zealand) suspended at approximately 1 m depth from buoys. Loggers were deployed for 24-hours in the organic reach and for 7 days in the sediment and thermal reaches. Light loggers (Odyssey, Dataflow Ltd, Christchurch, New Zealand) were set to record photosynthetically active radiation every 15 minutes to provide an indication of day length for the calculation of metabolism (except for the sediment reach). Average depth upstream of each site was calculated from hand-held depth sounder (Speedtech Depthmate) measurements at five points across five cross-sections spaced at regular intervals over several hundred metres to cover local variation in channel morphology.

Metabolism values were calculated by Cawthron Institute using a spreadsheet model described in Young & Collier (2009). Briefly, mean daily ecosystem respiration (ER) and the reaeration coefficient (k) were determined using the night-time regression method (Owens 1974). The reaeration coefficient and ecosystem respiration rate obtained were then used to determine gross photosynthetic rate over the sampling interval using:

$$GPP_t = dO/dt + ER - kD$$

where: GPP_t is the gross photosynthetic rate ($g/m^3/s$) over time interval t (s). Daily gross primary production (GPP, $g/m^3/d$) was estimated as the integral of all temperature-corrected photosynthetic rates during daylight (Wiley et al. 1990). Areal estimates were obtained by multiplying the volume-based estimates by average reach depth (m) which allowed comparison among sites with different depths. Where DO data were collected on multiple days (sediment and thermal reaches), metabolism values were calculated for each day and the average excluding highest and lowest values was used in subsequent analyses.

3.2.2 Cotton tensile strength loss

Cotton strips were attached to the same locations as the DO loggers in spring (n = 5 per location) to measure cellulose decomposition potential over a 7-day immersion period, which previous studies have indicated typically leads to around half the loss in tensile strength (Young & Collier 2009; Clapcott et al. 2012). This assay provides a standardised assessment organic matter processing (Boulton & Quinn 2000; Tiegs et al. 2007). After retrieval, cotton strips were gently washed and frozen until analysis by Cawthron Institute. Thawed strips were rinsed in tap water and dried at 40 °C for 24 h in a forced-draft oven. Threads were then frayed from the side of each strip until it was 100 threads (~3 cm) wide. Tensile strength (in kg) was measured using a commercial tensometer (Sundoo Instruments, Wenshou, China). Initial tensile strength was determined using a set of control strips soaked in tap water for one day to account for any loss in strength attributable to chemical leaching, and then frozen and processed in the same way as the other strips. Water temperature was recorded at each site throughout the deployment period every 15 minutes by a Hobo pendant logger (Onset, Massachusetts, USA), and used to calculate decay per degree day.

3.3 Invertebrate samples

3.3.1 Sample collection

Invertebrate samples were collected with similar effort from true left and true right banks at each transect by sweeping and brushing accessible substrates into a 0.5 mm mesh D-frame net. These near-shore littoral samples were collected mainly in water <1 m deep and predominantly from macrophytes (*Ceratophyllum* and *Egeria*), wood and submerged roots (mainly *Salix fragilis* but also *Alnus glutinosa*) (Table 2). Deepwater benthic samples were collected at three equidistant points (but see Table 2) across the channel at each transect using an air-lift sampler (Duncan & Associates, Cumbria, United Kingdom) deployed from a boat. This sampler consisted of sections of tube (10.5 cm internal diameter) linked together so that length approximated measured depth. Compressed air was forced through hoses which vented at the bottom of the tube that had been lowered onto the riverbed. The tube was held in place and/or moved up and down, with the help of an operator holding the upper section on the boat. Dislodged bottom material was then caught by the rising bubble within the tube and belched into a Nytex sample bag (0.5 mm mesh) at the surface. This method sampled sand-gravel and pumice substrates effectively at water depths of >1.5 m and up to around 5.0 m (mean sampling depth at each transect ranged from 1.6 to 3.7 m; Table 2). Air-lift samples were collected from the thermal reach in spring only.

Table 2: Depths (air-lift; mean of 3 samples per site) and substrate types (mean of true left and true right bank littoral sweeps) where macroinvertebrate samples were collected. -, no data.

A. Organic reach

	Upstream			Downstream		
	T1	T2	T3	T4	T5	T6
Autumn (April 2008)						
Depth (m)	3.5	3.7	2.1	3.4	2.4	2.4
Littoral substrate sampled (%)						
- macrophytes	60	55	40	55	70	85
- wood	38	40	20	25	20	15
- roots	0	5	40	20	10	0
- inorganic	2	0	0	0	0	0
Spring (Nov. 2012)						
Depth (m)	3.2	3.3	3.5	3.6	3.4	3.4
Littoral substrate sampled (%)						
- macrophytes	15	0	3	5	3	25
- wood	45	10	20	50	37	45
- roots	40	90	77	45	55	20
- edge	0	0	0	0	5	10

B. Sediment reach

	Upstream	Downstream		
	T7	T8	T9	T10
Autumn (April 2012)				
Depth (m)	3.5	3.1	2.4	2.2
Littoral substrate sampled (%)				
- macrophytes	20	35	30	45
- wood	30	30	35	0
- roots	50	35	30	55
- inorganic	0	0	0	0
Spring (Nov. 2012)				
Depth (m)	4.1	3.4	2.9	3.3
Littoral substrate sampled (%)				
- macrophytes	5	15	10	0
- wood	30	25	60	60
- roots	40	45	15	40
- inorganic (mud)	25	15	15	0

C. Thermal reach

	Upstream			Downstream		
	T11	T12	T13	T14	T15	T16
Autumn (March-April 2011)						
Depth (m)	2.7	2.5	2.4	2.2	2.7	2.6
Littoral substrate sampled (%)						
- macrophytes	0	0	0	5	0	0
- wood	45	60	50	30	28	45
- roots	55	30	50	60	57	50
- inorganic (bottom/edge)	0	10	0	5	15	5
Spring (November 2012)						
Depth (m)	-					
Littoral substrate sampled (%)		-	-	-	-	-
- macrophytes	0	-	-	0	0	30
- wood	50	-	-	90	85	60
- roots	50	-	-	10	10	10
- edge	0	-	-	0	5	0

D. Downstream transects (T17-T22)

	T17	T18	T19	T20	T21	T22
Depth (m)	2.0	1.7**	1.6*	2.4**	-	2.4
Littoral substrate sampled (%)		***	***			
- macrophytes	20	0	30	5	-	15
- wood	40	0	30	30	-	10
- roots	40	100	40	65	-	75
- inorganic	0	0	0	0	-	0

*, *n* = 1; **, *n* = 2; ***, one littoral sample collected

3.3.2 Sample analysis

Invertebrate samples were preserved in ca. 70% isopropyl alcohol. Processing was conducted by Stephen Moore of Landcare Research and involved spreading the sample across a white tray and randomly selecting grid squares from which invertebrates were picked. Grid squares were processed sequentially until ≥200 invertebrates were obtained or the entire sample had been processed to provide taxa relative abundances. Unprocessed parts of the sample were searched for additional unrecorded taxa which were noted separately and allocated a value of 0.5 so that their presence was included in analyses but had only a minor influence on relative abundance estimates. Invertebrate identifications were based on Winterbourn et al. (2000) (insects), Winterbourn (1973) (molluscs), and Chapman & Lewis (1976) (crustaceans). The level of taxonomic resolution was to genus for most insects and molluscs, and ranged from family to phylum for other groups. Sponges and bryozoans were allocated values of 0.5 to indicate presence but they were not enumerated due to likely fragmentation during sampling and processing. Of the 86 air-lift samples collected, five around Huntly and one near Ngaruawahia contained no invertebrates; of the remaining samples, 27 contained less than 20 individuals. All of the littoral samples collected contained more than 20 individuals.

3.4 Statistical analyses

Discharge effects on metabolism were assessed using ANOVA (organic reach with upstream/downstream and season as factors) or t-tests (sewerage, sediment and thermal reaches). Non-metric multidimensional scaling (nMDS) analyses were conducted to determine patterns in invertebrate community composition using 4^{th}-root transformed percent abundance data and Bray-Curtis similarity (Primer v.6.1.13; Primer-E Ltd 2009). Departure from monotonicity in nMDS is expressed as stress, with most ecological community datasets yielding stress values in the range 10 to 20; the lower half of that range indicates satisfactory representations of the data in ordination space, while stress values in the upper half of the range provide a useable picture of relationships between data points (McCune & Grace 2002). PERMANOVA was performed to test for effects of sampling habitat (littoral or benthic), season (autumn, spring) and stressor intensity ranked from 0 (no exposure) to 3 (high exposure) based on knowledge of discharge plume dynamics and measurements of nutrients, turbidity or temperature across the channel downstream of discharges. Samples with no invertebrates were excluded from the ordination analyses and one air-lift sample from T9 comprising 100% Naididae was also excluded because it was a significant outlier in nMDS plots. SIMPER was used to identify taxa contributing most to the discrimination between no exposure (0) and high exposure (3) sites and investigate taxa-specific responses to increasing pressure.

4 Results and Discussion

4.1 Stressor characterisation

Nutrient, turbidity and temperature levels recorded at control sites (upstream or outside expected plume influence) and impact sites (within expected influence of plume) are shown in Table 3 and continuous temperature data from sites within and outside the Huntly thermal discharge are shown in Fig. 1. Nutrient levels were slightly elevated when measured in autumn (samples were not taken in spring) and in the impact reach TP exceeded the concentration considered “satisfactory” for limiting nuisance aquatic plant growth. Turbidity was around 2-3 times higher in the impact reach compared to the control reach, and exceeded “satisfactory” levels in autumn when flows were higher. Water temperatures were on average 1-2 ^{o}C higher downstream of Huntly powerstation, and continuous temperature records indicated maxima (approaching 26 ^{o}C) were higher in autumn than spring but that the difference between ambient river temperatures and temperatures below the discharge were greater in spring. Daily variability in water temperature was much greater in the thermal plume. Temperature thresholds applied elsewhere in the Waikato Region are not used here because they relate to trout fisheries and trout spawning which is not a major value of the lower river, although trout are known to be present and there is a lower Waikato trout fishing camp held annually (Hicks et al. 2010; B. David pers. comm.).

Table 3: Mean (SE) conditions characterising stressors at sites influenced by organic, sediment and thermal discharges, and at control sites in 1-2 seasons

	Critical value[1]	Control		Impact	
A. Organic (Autumn)					
Total P (mg/L)	<0.04	0.035	(0.002)	0.058	(0.004)
PO_4-P(mg/L)	-	0.024	(0.002)	0.044	(0.003)
Total N (mg/L)	<0.50	0.275	(0.003)	0.285	(0.003)
NH_4-N (mg/L)	<0.88	0.020	(0.003)	0.034	(0.007)
NO_3-N (mg/L)	-	0.134	(0.010)	0.181	(0.008)
B. Sediment*					
Turbidity (NTU; Autumn)	<5	1.59	(0.15)	2.80	(0.44)
Turbidity (NTU; Spring)	<5	3.66	(0.19)	10.58	(1.50)
C. Thermal**					
Mean temp. (^{o}C; Autumn)	-	21.50	(0.11)	22.41	(0.08)
90%ile temp.	-	22.87	(0.18)	23.93	(0.11)
Max. temp.	-	23.91	(0.24)	25.62	(0.32)
Mean temp. (^{o}C; Spring)	-	14.78	(0.07)	16.43	(0.14)
90%ile temp.	-	16.40	(0.15)	18.10	(0.12)
Max. temp.	-	17.84	(0.13)	19.84	(0.13)

[1], Critical values except for water temperature are for “satisfactory” water quality from http://www.waikatoregion.govt.nz/Environment/Environmental-information/Environmental-indicators/Freshwater/River-and-streams/riv1-techinfo/.

*, control values = outside of discharge influence (e.g., upstream, opposite bank).

**, control values = upstream (above and below Lake Waahi and true right bank); Autumn = 10 Feb. - 28 Mar. 2011, Spring = 16 Sept. - 1 Nov. 2011.

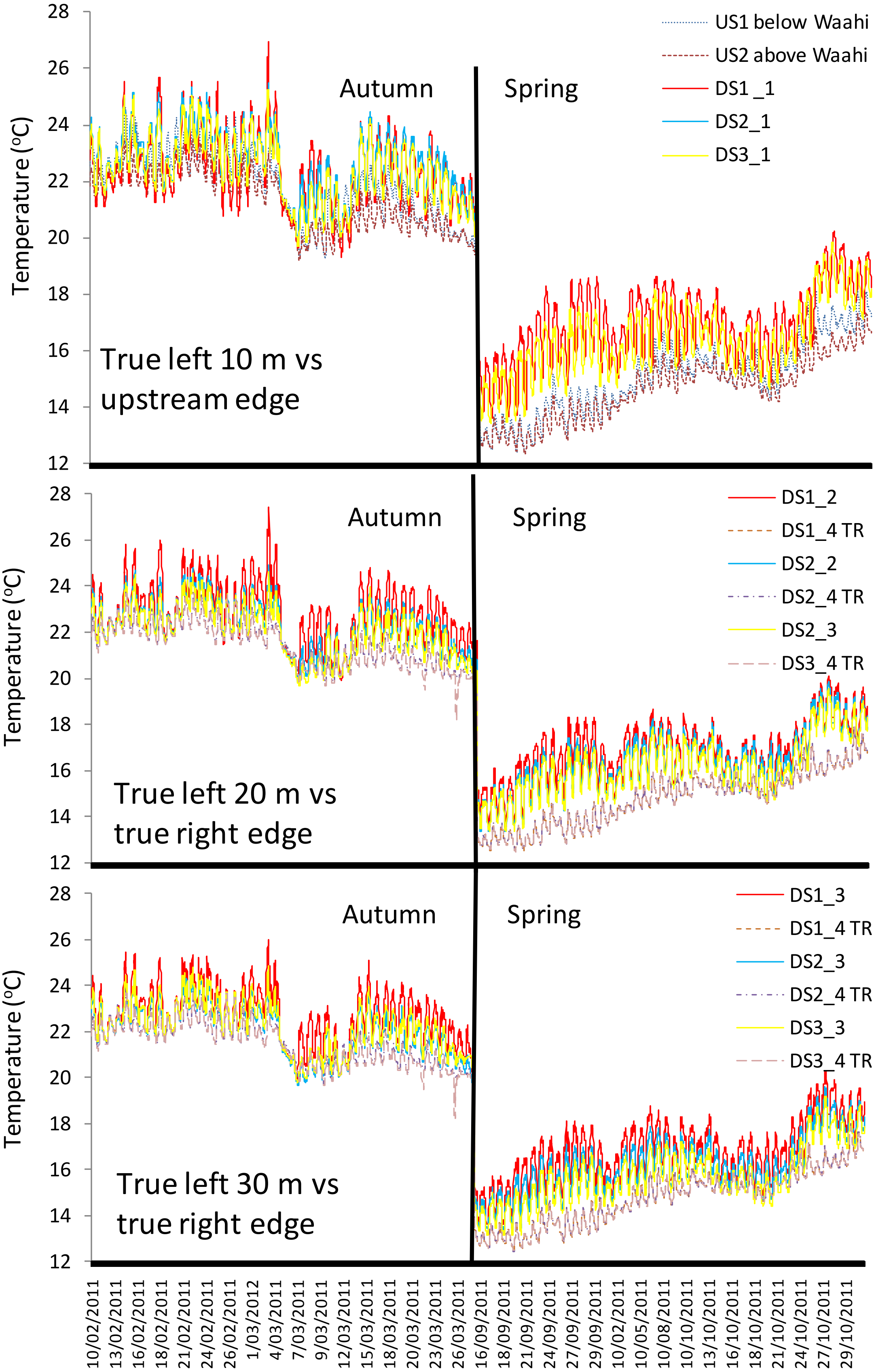


Figure 1: **Continuous water temperature data from sites within the thermal plume of the Huntly powerstation (DS1, 2, 3 on the true left bank below the discharge) and outside the plume influence (US1 and US2 above the discharge, and all TR records on the opposite bank to DS1-3) over 5-6 weeks prior to invertebrate sampling in autumn and spring.**

4.2 Functional measurements

4.2.1 Ecosystem metabolism

Rates of Gross primary production (GPP) for the organic reach ranged from 2.8 g $O_2/m^2/d$ to 7.8 g $O_2/m^2/d$, with the highest values recorded at T1 in autumn and T4 in spring (Fig. 2A). On average, there was no difference between GPP for upstream or organic reaches in autumn or spring (Collier et al. 2013b). Rates of Ecosystem respiration (ER) ranged from 4.3 g $O_2/m^2/d$ to 8.1 g $O_2/m^2/d$ in autumn and 3.5 g $O_2/m^2/d$ to 12.7 g $O_2/m^2/d$ in spring (Fig. 2A). As with GPP, ER was greatest at T1 in autumn but was highest at T2 in spring, and there was no significant difference between upstream or organic reaches in either season (Figure 2A). Additional sampling at different sites above and below the sewerage discharge in April 2009 indicated rates of GPP ranging from 3.07 g $O_2/m^2/d$ to 9.25 g $O_2/m^2/d$, with the highest values observed above the discharge (Fig. 2B; see also Clapcott & Young 2009). ER ranged from 4.42 g $O_2/m^2/d$ to 20.57 g $O_2/m^2/d$ above and below the sewerage point-source input (Fig. 2B) and was highest above the sewerage treatment plant suggesting this site is subject to some other environmental factors supporting high metabolic rates. There was no apparent trend in rates of ER with distance below the sewerage discharge.

For the sediment reach, rates of GPP ranged from 0.97 g $O_2/m^2/d$ to 3.69 g $O_2/m^2/d$, and ER was between 1.46 and 5.37 g $O_2/m^2/d$ (Fig. 2C). There were no significant differences between metabolism rates on true left (in plume) versus true right (outside plume) (paired *t*-test, $P>0.05$). Rates of GPP ranged from 0.42 to 1.61 g $O_2/m^2/d$ above and below the thermal discharge and there was no obvious pattern in relation to the discharge (Fig 2D). ER ranged from 1.02 to 13.94 g $O_2/m^2/d$, and at the two sites immediately below the thermal discharge rates were very high suggesting enhanced heterotrophy (more respiration) at elevated temperatures.

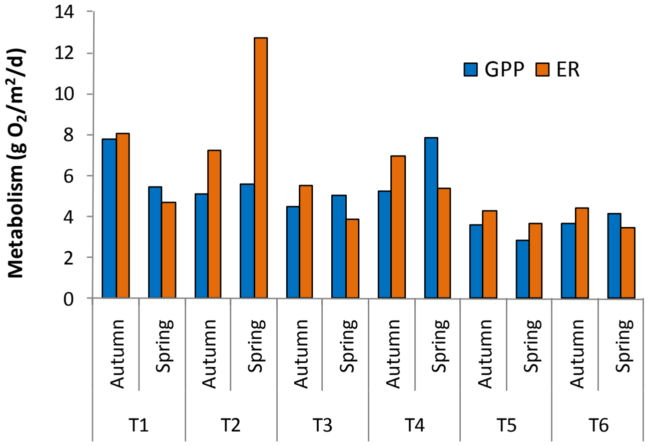
Overall these results for river metabolism indicate variable rates reflecting partly seasonal differences and variation along the river that appeared to override responses to organic and sediment discharges, although ER may respond to water temperature. In other non-wadeable rivers around the region GPP appeared to respond in a non-linear manner to upstream land cover in summer, suggesting it has utility for monitoring the cumulative impacts of land use (Collier et al. 2013c). However, greater temporal sampling is probably necessary to confirm the effect of point-source impacts on river metabolism and clarify its utility for biomonitoring novel discharges in large rivers. A two-station approach may be more effective than the single-station approach used here for determining discharge impacts.

4.2.2 Cotton strip decay

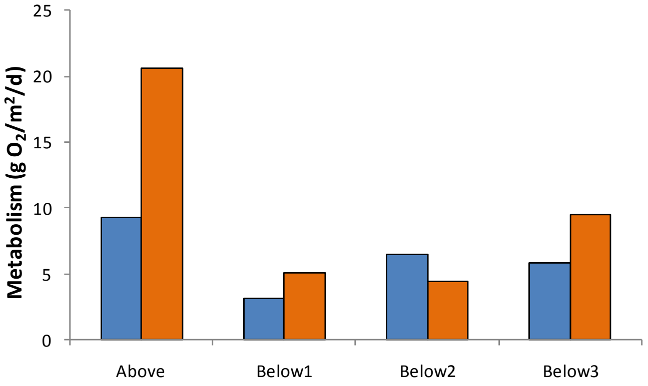
For the organic reach, rates of cotton decay ranged from 0.014 to 0.112 per d (Fig. 3A). Significant effects were detected for reach (impact vs. control), with decay rates typically faster in the organic reach than in the control reach (mean $-k$ = 0.070 and 0.041 per day, respectively). Decay rates were significantly faster in autumn than in spring even when degree days were accounted for (Collier et al. 2013b). Cotton decay rates ranged from 0.020 per d to 0.080 per d at sites above and below the treated sewerage discharge in April 2009 and were significantly higher below the discharge than above (t = 3.11, $P<0.01$; see Clapcott & Young 2009) (Fig. 3B). For the sediment reach, decay rates varied between 0.005 and 0.129 per d and were significantly higher at sites exposed to the sediment plume than those outside the plume (Fig. 3C, t = 14.89, $P<0.001$). There was no significant difference in decay rate between left and right banks upstream of the sediment discharge (paired *t*-test, $P>0.05$; Fig. 3B). Organic matter processing rates ranged from 0.008 per d to 0.130 per d at sites above and below thermal discharge (Fig. 3D). There were significantly greater rates of cotton decay above the thermal impact compared to below (t = 5.76, $P<0.001$; see Clapcott & Young 2009).

These results suggest that organic matter processing rates are significantly affected by nutrient, sediment and thermal point-source impacts but in different ways. Previous studies have observed similar accelerated organic matter processing rates associated with increased nutrient concentrations, reflecting a stimulation of microbial processing rates. Higher decay rates in the sediment plume may reflect the impacts of abrasion from suspended sediment particles in faster flowing water (water temperatures were similar on both true left and right banks; Appendix 2). However, the depressed decay rates in the thermal plume are difficult to explain since higher decay rates are usually associated with higher temperatures due to accelerated microbial activity (for review see Young et al. 2008). Cotton strip decay therefore seems to provide useful information for biomonitoring point source impacts in the Waikato River, although the mechanisms causing differences in decay are not always evident. Similarly for other non-wadeable rivers in the Waikato Region, a significant quantile relationship was found with upstream landcover, with slower decay rates in catchments with greater than 50% native vegetation cover (Collier et al. 2013c). For novel discharges, it may be necessary to measure decay rates at least seasonally to account for temporal differences in stressor intensity from different discharges. However, there are currently no environmental quality classes for decay rates which restricts their utility for biomonitoring studies aimed at determining limits (cf metabolism; see Young et al. 2008).

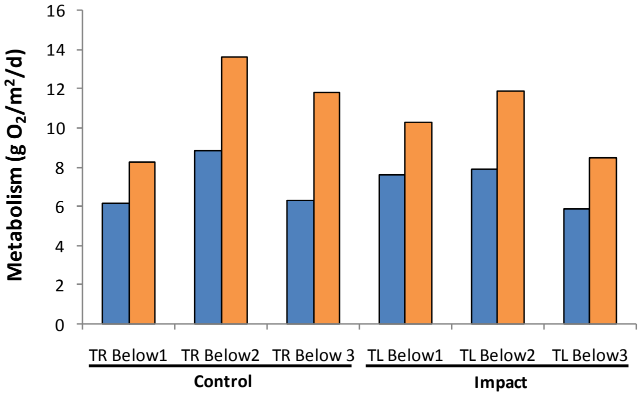
A. Organic reach



B. Sewerage reach (autumn)



C. Sediment reach (spring)



D. Thermal reach (autumn)

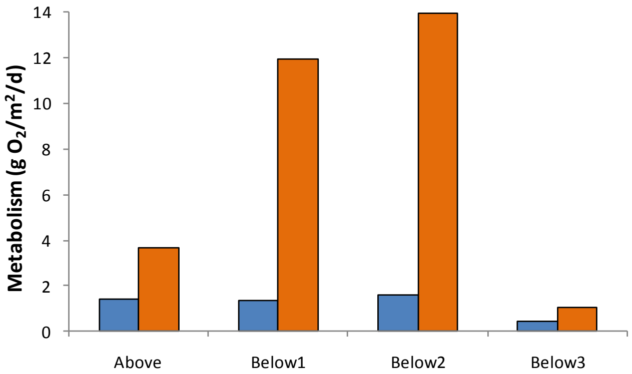
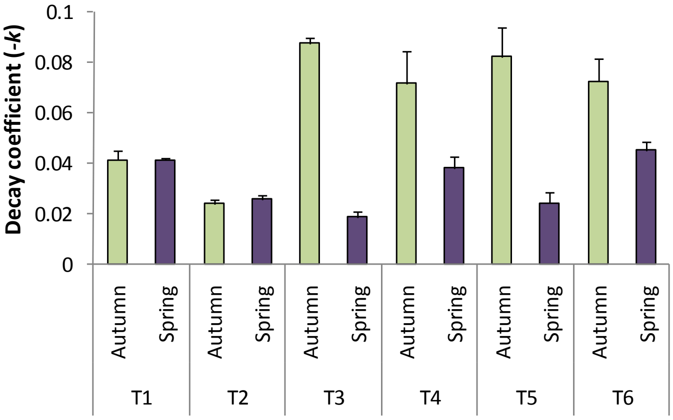
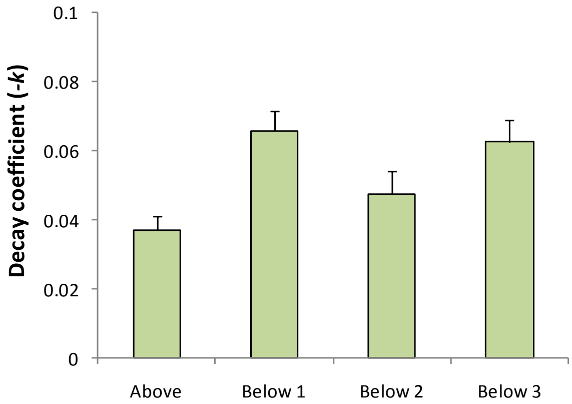


Figure 2: **Rates of gross primary production (GPP) and ecosystem respiration (ER) in autumn and/or spring at sites unimpacted (T1-T3, Above, TR Below) and impacted (T4-6, Below, TL Below) by various stressor types in the Waikato River.**

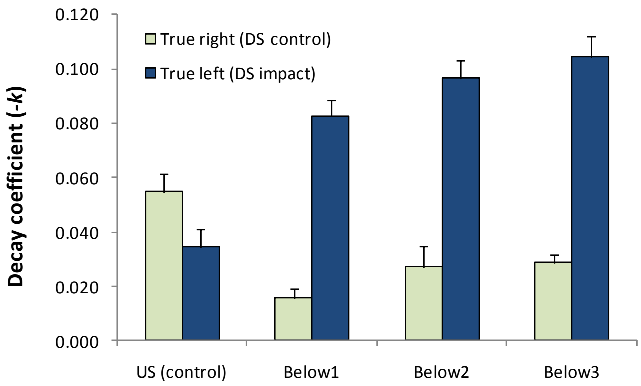
A. Organic reach



B. Sewerage reach (autumn)



C. Sediment reach (spring)



D. Thermal reach (autumn)

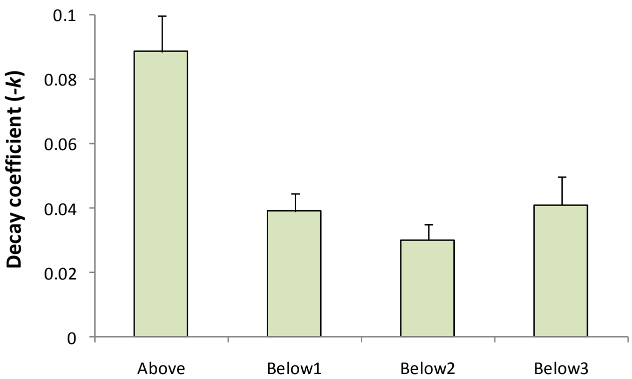


Figure 3: Mean (+1SE) decay rates of cotton strips (loss in tensile strength) in autumn and/or spring at sites unimpacted and impacted by various stressor types in the Waikato River. Bars denoted as “T1”, “T2” or “T3”, “Above”, “US (control)”, “True right (DS control)” indicate sites outside discharge influence and “T4”, “T5” or “T6”, “Below”, “True left (DS impact)” were within discharge influence.

4.3 Macroinvertebrate communities

4.3.1 Spatial patterns of Invertebrate community composition

A full taxonomic list of invertebrates collected is shown in Appendix 3. A total of 89 invertebrate taxa was recorded in the lower Waikato River in this study. Of these, 62 taxa were found in benthic samples and 80 taxa in littoral samples, more than the 63 taxa in littoral samples collected over a similar spatial extent by Collier & Lill (2008). Most benthic taxa were collected from the reach around Hamilton (mean per transect = 20 taxa), where benthic substrates were coarser, than below the Waipa confluence (mean per transect = 7 taxa), highlighting the role of substrate size in determining benthic diversity patterns down the river. Fourteen taxa were collected from a single gravel bank downstream of an island near Mercer. Seven taxa had more than one individual found only in benthic samples compared to 11 taxa with more than one individual only in littoral samples (Table 4). Five of the nine introduced invertebrate species known to be present in the Waikato River (Collier & Hogg 2010) were recorded during this study: the snails *Physa acuta* (71 samples), a keeled *Gyraulus* sp. (18 samples) and *Planorbella* sp. (one sample), the worm *Branchiura sowerbyi* (4 samples), and the leech *Helobdella europaea* (one sample). Thus, the invertebrate community in the lower river is dominated by native species with only one of the introduced species, *Physa*, widespread (44% of samples)

Crustacea was the dominant macroinvertebrate group (42% of total numbers) for all littoral and benthic samples collected in autumn (22 transects) and spring (10 airlift and 14 littoral transects), followed by Oligochaeta (25%), Diptera (13%) and Trichoptera (10%). The amphipod *Paracalliope fluviatilis* made up three-quarters of the amphipods collected, Naididae made up 82% of Oligochaeta, chironomids 85% of Diptera, and *Oxyethira* 64% of Trichoptera, indicating the invertebrate community was dominated by only a few taxa. Benthic habitats supported more oligochaete worms and fewer crustaceans than littoral habitats in both seasons, highlighting the affinity of worms for fine inorganic substrates and a preference by crustaceans for organic material (roots, wood, macrophytes) along river margins. Comparing transects 1-10 between Hamilton and Ngaruawahia, which were sampled in littoral and benthic habitats in both seasons, confirmed these differences (Table 5). The single mid-river gravel bank sample collected from near Rangiriri was dominated by Tanytarsini and Orthocladiinae midges (36% and 26% of numbers, respectively), while Nemertea, *Oxyethira*, the snail *Potamopyrgus* and caddisfly *Hydropsyche* comprised 6-10% of numbers in that sample (Table 3).

In benthic samples relative abundances were more evenly spread among groups in the upper transects (T1-7 above the Waipa confluence), potentially reflecting the coarser substrates present (Fig. 4). In contrast, faunas in fine substrates downstream of the Waipa confluence tended to be dominated by a few groups, particularly around Huntly where oligochaete worms dominated many samples. Littoral samples tended to show a different pattern with heavy dominance of crustaceans in upper and lower transects and a more even spread of groups in T11-16 in autumn. Diptera appeared to be relatively more abundant in spring than in autumn in littoral samples, whereas more Diptera were collected from benthic habitats in autumn (Table 5; Fig. 4) when water levels were lower and more stable, and potentially allowed the accrual of periphyton or other organic matter food resources. Mayflies and stoneflies occurred sporadically in samples in low numbers, including in the lower river (e.g., T21 littoral and benthic habitats in autumn; Fig. 4).

Non-metric multidimensional scaling analysis of taxa percent abundances in autumn (when all transects were sampled) highlighted the distinction between littoral and benthic faunas and did not indicate a clear longitudinal shift in taxonomic composition down river (Fig. 5A). Rather, a distinct separation of transects around Hamilton (T1-6) from most of those around Huntly (T11-16) was evident along axis 2, with most other transects occurring in between these areas in 2-dimensional ordination space. This separation reflects the taxonomic differences among groups mentioned above and also taxa-specific differences shown in Fig. 5B. Thus, a *Gyraulus* species, the flatworm *Cura*, cyclopoid crustaceans, the damselfly *Xanthocnemis*, the shrimp *Paratya*, and the snail *Physa* tended to be more indicative of littoral habitats in the lower river whereas the caddisflies *Hydropsyche* and *Pycnocentrodes*, the flatworm Prostoma, indeterminate worm species, orthoclad midges and *Sinelobus* shrimps tended to be more commonly associated with benthic samples in the upper river. The amphipod *Paracalliope*, a keeled *Gyraulus* species, and a hydroptilid caddis *Paroxyethria* were strongly associated with littoral samples, while Naididae worms tended to be more indicative of benthic habitats, particularly downstream of the Waipa confluence where bottom sediments appeared finer.

Distinct faunas were present in littoral and benthic habitats, particularly in the lower river, and the combination of benthic sediment size and food resources appeared to be factors influencing the composition of invertebrate communities in the Waikato River. The dominance by native species is in contrast to the fish fauna which is heavily dominated in terms of biomass by introduced species, particularly koi carp (Hicks *et al.* 2010). This sampling also highlights the presence of sensitive leptophlebiid mayfly, gripopterygid stonefly and conoesucid and hydropsychid caddisfly taxa along this section of the Waikato River. The marked difference in composition between Hamilton and Huntly sections of river may partly reflect deposition of benthic fine sediment from the Waipa River as the channel widens and water velocities decline.

Table 4: List of taxa with more than one individual found only in benthic or only in littoral samples.

Benthic only	Littoral only
Deleatidium	*Paroxyethira eatoni*
Sphaeriidae	Lymnaeidae (*Pseudosuccinea*)
Empididae	Dolichopodidae
Mischoderus	Hydrophilidae
Enchytraeidae	Muscidae
Bosminidae	*Triplectides obsoletus*
Elmidae	*Eiseniella*
	Calanoida
	Antiporus
	Hexatomini
	Psychodidae

Table 5: Mean percent abundance of macroinvertebrate groups in littoral, benthic and gravel bank habitats sampled in spring and/or autumn.

	Autumn				Spring			Gravel bank
	Air-lift		Littoral		Air-lift	Littoral		
	T1-22	(T1-10)	T1-22	(T1-10)	T1-10	T1-10, T13-16	(T1-10)	
Ephemeroptera	0.01	(0.02)	0.01	(0.00)	1.59	0.04	(0.06)	0.00
Plecoptera	0.12	(0.00)	0.04	(0.00)	0.73	0.37	(0.43)	0.49
Trichoptera	8.22	(14.10)	12.64	(8.34)	5.02	13.09	(13.28)	13.59
Odonata	0.05	(0.12)	2.05	(0.70)	0.01	0.58	(0.48)	0.00
Hemiptera	0.00	(0.00)	0.00	(0.00)	0.00	0.07	(0.10)	0.00
Coleoptera	0.00	(0.00)	0.00	(0.00)	0.02	0.10	(0.11)	0.00
Diptera	15.48	(17.84)	3.90	(5.19)	15.95	14.57	(15.11)	63.59
Lepidoptera	0.01	(0.01)	0.10	(0.12)	0.00	0.00	(0.00)	0.00
Crustacea	10.89	(20.93)	60.22	(74.62)	36.22	59.18	(60.00)	1.46
Mollusca	2.70	(5.53)	7.60	(4.59)	4.22	3.19	(3.02)	6.80
Oligochaeta	55.61	(33.07)	4.96	(1.69)	35.20	6.17	(5.61)	2.43
Acari	0.67	(1.02)	0.46	(0.11)	0.28	0.34	(0.36)	0.00
Other	6.23	(7.35)	8.02	(4.63)	0.75	2.30	(1.44)	11.65

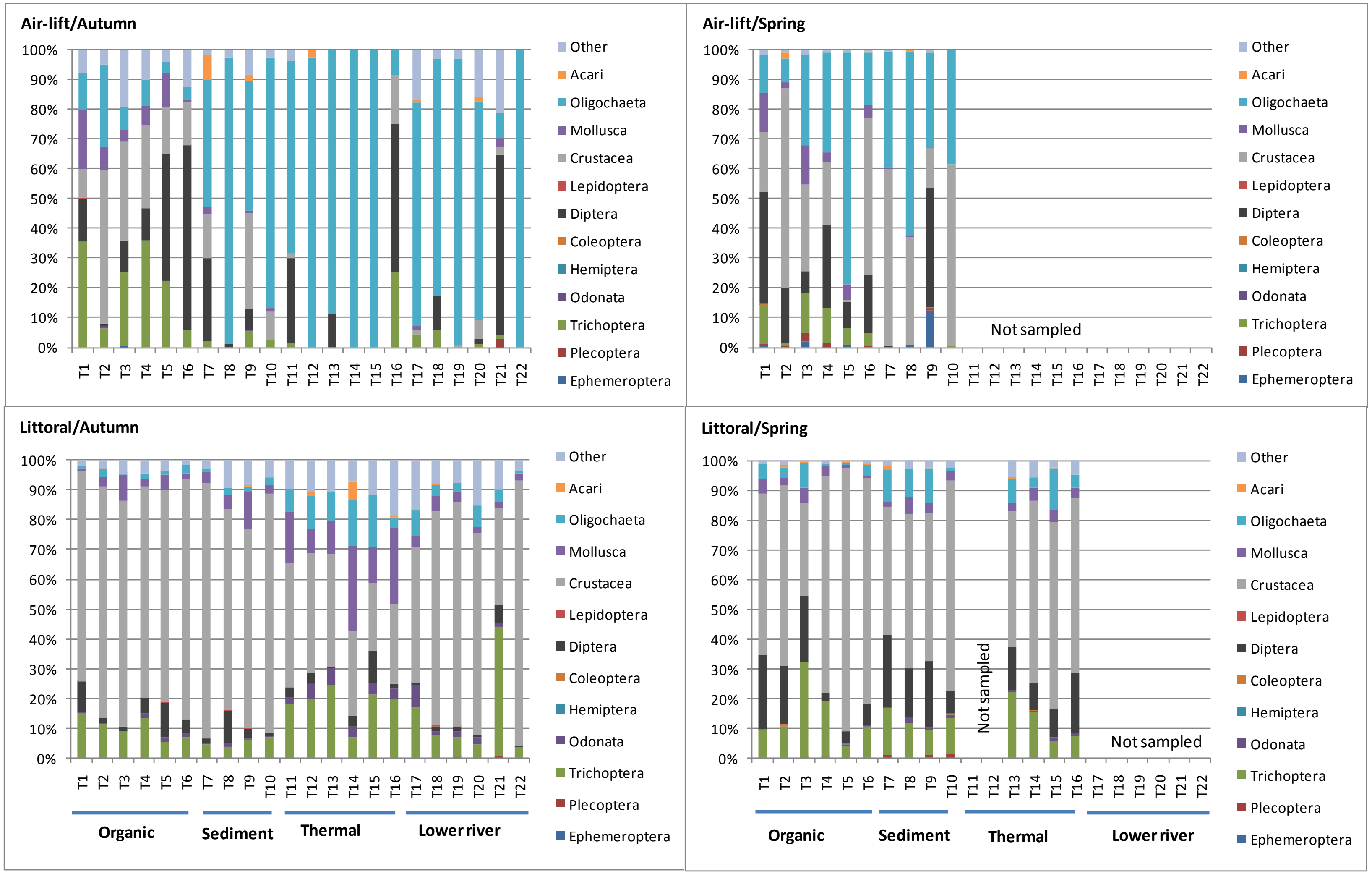


Figure 4: Percent abundance of macroinvertebrates in littoral and air-lift samples from 10-22 transects between Hamilton City and Mercer in autumn and spring over 2008-2012.

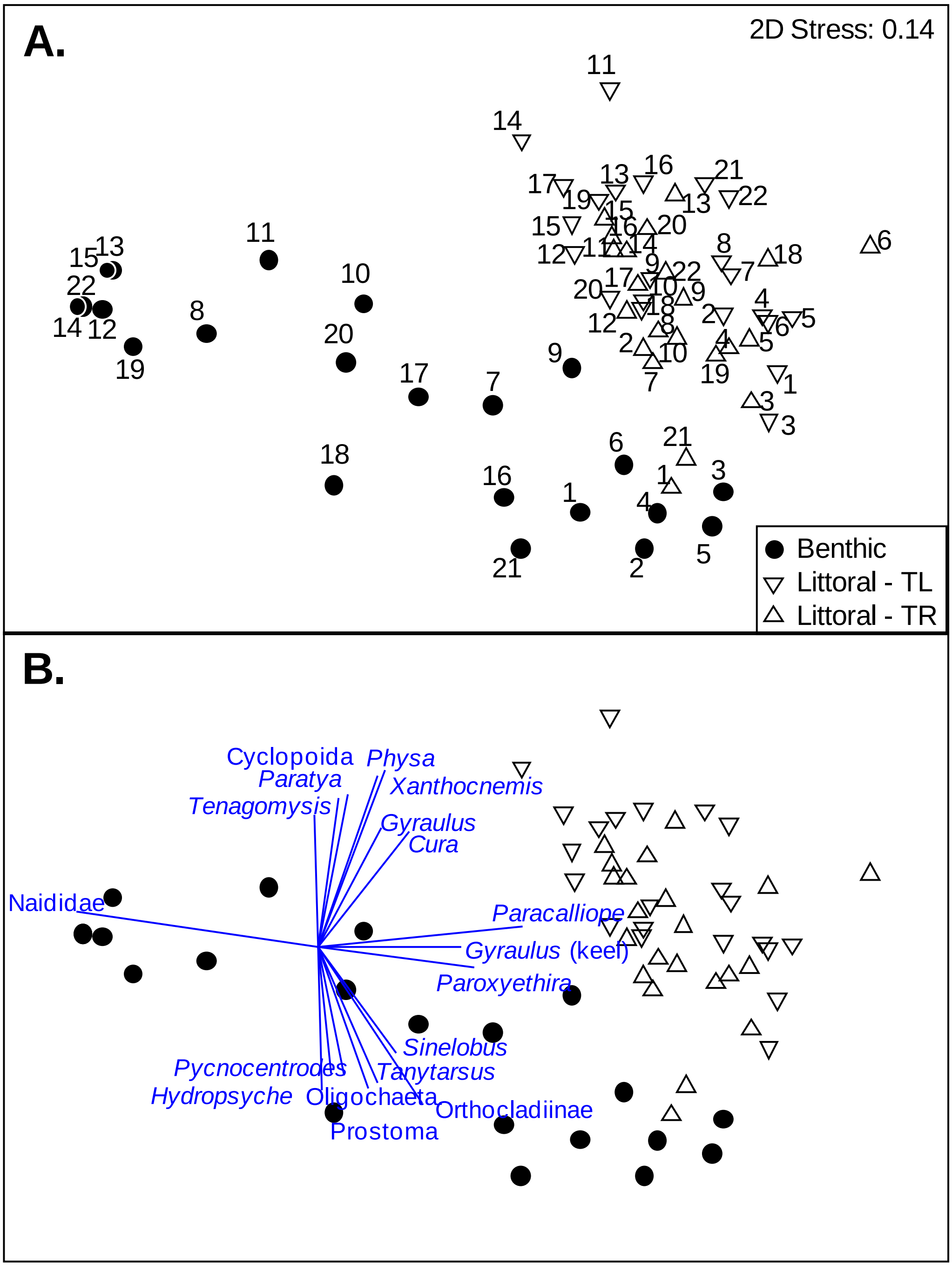


Figure 5: **Non-metric multidimensional scaling plot of autumn only percent abundance data for 22 transects sampled between Hamilton City and Mercer over 2008-2012. In panel A, numbers correspond to transects, and in panel B the taxa overlay indicates associations between macroinvertebrates and samples in ordination space.**

4.3.2 Macroinvertebrate responses to stressors

PERMANOVA analyses indicate statistically significant effects on invertebrate community composition associated with stressor Intensity, sampling Habitat and Season for the organic reach, and effects of Habitat and Season for the sediment reach (Table 6). The thermal reach indicated a significant effect of Habitat in autumn and a significant effect of stressor Intensity and Season for littoral samples (a fully factorial PERMANOVA was not possible because air-lift samples were not collected in spring) (Table 6). Interactions between Intensity x Habitat and Intensity x Season were not statistically significant. These results suggest that effects associated with thermal and organic stressor intensity were detectable on invertebrate community composition and that these effects were consistent across seasons and sampling habitats. Sediment impacts may not have been detectable in part because the Waipa River provided a source of additional colonists to the river which were locally more common in the sediment reach.

Pairwise comparisons of stressor intensities by sampling habitat were used to test for significant differences between lowest and highest intensities (0, 3) taken to infer an ecologically significant stressor response. Pairwise comparisons of lowest versus highest stressor intensities indicated no significant differences for benthic samples, but littoral samples from the organic (t = 1.54, P<0.05), sediment (t = 1.80, P<0.01) and thermal (t = 1.54, P<0.05) reaches were significantly different between stressor extremes. These comparisons indicate that effects associated with least and most stress were detectable for littoral faunas but not for benthic faunas where substrate size was likely the major factor affecting community composition along the lower river. Littoral macroinvertebrate sampling is therefore likely to be most effective for detecting near-field effects of discharges in the Waikato River, although the effects of the variable water level caused by hydropeaking will need to be considered when sampling, particularly above the Waipa confluence

Four taxa were identified by SIMPER to contribute >8% to the discrimination between extremes of the stress intensity rankings in littoral samples: the common amphipod *Paracalliope*, Naididae worms, the hydroptilid caddisfly *Oxyethira* and the midge larva *Tanytarsus*. Of these, *Tanytarsus* was the only taxon to show a consistent decline in relative abundance consistent with increasing stress effects. This analysis suggests that relative abundances of *Tanytarsus* midges in littoral habitats may be a general indicator of environmental stress in the lower river. This taxon occurred in 58% of samples collected and averaged 7% abundance across all samples (95^{th}-percentile 36%). However, single taxa are generally not reliable indicators for biomonitoring purposes. One difficulty when using invertebrates in larger rivers is the potential for particularly common and widespread taxa, such as *Paratya* and *Paracalliope*, to “swamp” responses in relative abundance among other taxa. It may be appropriate to exclude such taxa from invertebrate counts in subsequent monitoring to assess stressor impacts.

Table 6: PERMANOVA results testing for the effects of ranked pressure intensity, sampling method (littoral, air-lift), and season (autumn, spring). Air-lift samples were not collected from around Huntly (thermal) in spring so sampling method was tested only in autumn and seasonal effects were tested only for littoral samples. Significant effects (P<0.05) are shown in bold.

Organic					
Source	df	SS	MS	Pseudo-F	P(perm)
Intensity	3	8894	2964.7	2.59	0.055
Habitat	1	15791	15791	1.79	**0.001**
Season(Habitat)	2	18440	9218	8.31	**0.001**
Intensity x Habitat	2	2885	1442	1.26	0.289
Intensity x Season(Habitat)	5	5738	1148	1.03	0.408
Residual	46	51048	1110		
Total	59	101000			
Sediment					
Source	df	SS	MS	Pseudo-F	P(perm)
Intensity	3	3006.1	1002	1.10	0.343
Habitat	1	22124	22124	24.25	**0.001**
Season(Habitat)	2	8979	4490	4.92	**0.001**
Intensity x Habitat	3	3067	1022	1.12	0.334
Intensity x Season(Habitat)	3	2531.	844	0.92	0.517
Residual	25	22812	912		
Total	37	75018			
Thermal (Autumn)					
Source	df	SS	MS	Pseudo-F	P(perm)
Intensity	3	1140	379.91	0.50	0.86
Habitat	1	16199	16199	21.49	**0.001**
Intensity x Habitat	3	1706	568.78	0.75	0.577
Residual	17	12815	753.84		
Total	24	49688			
Thermal (Littoral)					
Source	df	SS	MS	Pseudo-F	P(perm)
Intensity	2	1540	770	1.77	**0.044**
Season	1	3529	3529	8.10	**0.001**
Intensity x Season	2	1360	680	1.56	0.092
Res	14	6100	436		
Total	19	14309			

5 Conclusions

- Greater temporal sampling is necessary to confirm the effect of point-source impacts on river metabolism and to clarify its utility for biomonitoring novel discharges in large rivers. This may involve maintaining (including regular calibration protocols) permanent dissolved oxygen loggers at some sites to better assess the temporal variability in ecosystem metabolism and links with water quality.

- Cotton strip assays appear to have utility for monitoring ecosystem process responses to land cover (Collier et al. 2013c) and novel discharges (this study) in large and non-weadeable rivers, but require the development of environmental quality classes for limit-setting purposes. For novel discharges, it may be necessary to measure decay rates at least seasonally to account for temporal differences in stressor intensity from different discharges.

- The invertebrate fauna of the lower Waikato River is dominated by native species. More taxa were found in littoral compared to benthic habitats and community composition differed markedly among these habitats, highlighting the importance of river edges for diversity in the lower river.

- Coarser bottom substrates in the river between Hamilton and Ngaruawahia provide habitat for a range of taxa not commonly encountered in other parts of the river. Mayflies and stoneflies occur sporadically in littoral and benthic habitats in the river, including downstream of the Waipa confluence and around Rangiriri.

- Near-field effects on invertebrate communities were detectable in littoral but not in benthic habitats where faunal composition seems to be driven mainly by longitudinal shifts in substrate size and sediment deposition. Littoral sampling is likely to be a useful method for sampling macroinvertebrates as part of biomonitoring, but variations in water level may affect community composition by influencing access to available sampling habitat.

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Appendix 1

Map references of true left and true right points along transects sampled for macroinvertebrates in in the lower Waikato River. ND = no data.

Location	Treatment	Transect	Bank	Season	Year	Easting	Northing
Hamilton	Control	T1	TL	Autumn	2012	2713508	6374747
Hamilton	Control	T1	TR	Autumn	2012	ND	ND
Hamilton	Control	T1	TL	Spring	2008	2713495	6374747
Hamilton	Control	T1	TR	Spring	2008	2713451	6374823
Hamilton	Control	T2	TL	Autumn	2012	2709813	6379500
Hamilton	Control	T2	TR	Autumn	2012	2709880	6379599
Hamilton	Control	T2	TL	Spring	2008	2709817	6379508
Hamilton	Control	T2	TR	Spring	2008	2709886	6379511
Hamilton	Control	T3	TL	Autumn	2012	2707454	6382676
Hamilton	Control	T3	TR	Autumn	2012	2707434	6382808
Hamilton	Control	T3	TL	Spring	2008	2707464	6382682
Hamilton	Control	T3	TR	Spring	2008	2707487	6382754
Hamilton	Impact	T4	TL	Autumn	2012	2706355	6384428
Hamilton	Impact	T4	TR	Autumn	2012	2706344	6384562
Hamilton	Impact	T4	TL	Spring	2008	2706388	6384391
Hamilton	Impact	T4	TR	Spring	2008	2706459	6384426
Hamilton	Impact	T5	TL	Autumn	2012	2704200	6387305
Hamilton	Impact	T5	TR	Autumn	2012	2704201	6387429
Hamilton	Impact	T5	TL	Spring	2008	2704204	6387312
Hamilton	Impact	T5	TR	Spring	2008	2704248	6387392
Hamilton	Impact	T6	TL	Autumn	2012	2702148	6388957
Hamilton	Impact	T6	TR	Autumn	2012	2702235	6389073
Hamilton	Impact	T6	TL	Spring	2008	2702150	6388967
Hamilton	Impact	T6	TR	Spring	2008	2702232	6389062
Ngaruawahia	Control	T7	TL	Autumn	2012	1789869	5828919
Ngaruawahia	Control	T7	TR	Autumn	2012	1789977	5828831
Ngaruawahia	Control	T7	TL	Spring	2011	1789868	5828915
Ngaruawahia	Control	T7	TR	Spring	2011	1789967	5828865
Ngaruawahia	Impact	T8	TL	Autumn	2012	1789602	5830394
Ngaruawahia	Impact	T8	TR	Autumn	2012	1789158	5830344
Ngaruawahia	Impact	T8	TL	Spring	2011	1789061	5830413
Ngaruawahia	Impact	T8	TR	Spring	2011	1789177	5830329
Ngaruawahia	Impact	T9	TL	Autumn	2012	1789387	5830929
Ngaruawahia	Impact	T9	TR	Autumn	2012	1789482	5830833
Ngaruawahia	Impact	T9	TL	Spring	2011	1789317	5830867
Ngaruawahia	Impact	T9	TR	Spring	2011	1789471	5830793
Ngaruawahia	Impact	T10	TL	Autumn	2012	1789593	5831308
Ngaruawahia	Impact	T10	TR	Autumn	2012	1789725	5831280
Ngaruawahia	Impact	T10	TL	Spring	2011	1789631	5831639
Ngaruawahia	Impact	T10	TR	Spring	2011	1789743	5831582
Huntly	Control	T11	TL	Autumn	2011	1790470	5841310
Huntly	Control	T11	TR	Autumn	2011	1790652	5841303

Huntly	Control	T12	TL	Autumn	2011	1790649	5841665
Huntly	Control	T12	TR	Autumn	2011	1790649	5841665
Huntly	Control	T13	TL	Autumn	2011	1790397	5841961
Huntly	Control	T13	TR	Autumn	2011	1790624	5841922
Huntly	Control	T13	TL	Spring	2011	1790412	5841949
Huntly	Control	T13	TR	Spring	2011	1790634	5841916
Huntly	Impact	T14	TL	Autumn	2011	1790311	5843142
Huntly	Impact	T14	TR	Autumn	2011	1790545	5843026
Huntly	Impact	T14	TL	Spring	2011	ND	ND
Huntly	Impact	T14	TR	Spring	2011	1790545	5843026
Huntly	Impact	T15	TL	Autumn	2011	1790296	5843494
Huntly	Impact	T15	TR	Autumn	2011	1790538	5843531
Huntly	Impact	T15	TL	Spring	2011	ND	ND
Huntly	Impact	T15	TR	Spring	2011	1790533	5843493
Huntly	Impact	T16	TL	Autumn	2011	1790415	5844013
Huntly	Impact	T16	TR	Autumn	2011	1790632	5843976
Huntly	Impact	T16	TL	Spring	2011	ND	ND
Huntly	Impact	T16	TR	Spring	2011	1790632	5843976
Rangiriri		T17	TL	Autumn	2012	1790273	5848273
Rangiriri		T17	TR	Autumn	2012	1790486	5848357
Rangiriri		T18	TL	Autumn	2012	1790326	5851421
Rangiriri		T18	TR	Autumn	2012	1792505	5851381
Rangiriri		T19	TL	Autumn	2012	1789550	5853928
Rangiriri		T19	TR	Autumn	2012	1789819	5854020
Opuatia		T20	TL	Autumn	2012	1782337	5858387
Opuatia		T20	TR	Autumn	2012	1782528	5858411
Opuatia		T21	TL	Autumn	2009	1782346	5859697
Opuatia		T21	TR	Autumn	2009	1782574	5859737
Mercer		T22	TL	Autumn	2012	1781855	5871231
Mercer		T22	TR	Autumn	2012	1781981	5871331

Appendix 2

Raw physicochemical data collected in the field in association with invertebrate sample collection.

A. Hamilton - Ngaruawahia INVERTEBRATE SAMPLING – 1-2 Nov 2012

Site	Transect	Time NZST	Depth m	Temp ^{o}C	Cond uS/cm	DO mg L	DO %	Root	Wood	Macrophyte	Edge
T1	TL	12:50		15.9	128.9	11.05	111.2	80		20	
	Mid-1		3.6								
	Mid-2		3.4	15.9	129.0	11.04	111				
	Mid-3		2.6								
	TR	1:28		15.9	118.8	11.06	111.4		90	10	
T2	TL	11:32		15.7	130.1	10.85	108.6	100			
	Mid-1		2.8								
	Mid-2	12:13	3.6	15.7	129.7	10.87	109				
	Mid-3		3.6								
	TR	11:46		15.7	129.8	10.82	108.5	80	20		
T3	TL	09:50		15.6	129.3	10.7	107.6	90	10		
	Mid-1		3.7								
	Mid-2		3.4	15.6	129.1	10.78	107.8				
	Mid-3		3.5								
	TR			15.6	128.7	10.75	106.7	65	30	5	
T4	TL	12:03		15.4	128.6	11.17	111.9	30	70		
	Mid-1		2.7								
	Mid-2	12:30	3.8	15.5	131.7	11.4	114				
	Mid-3		4.2								
	TR	12:54		15.6	131.5	11.14	112.4	60	30	10	
T5	TL	11:18		15.2	133.1	10.83	108	30	60		10
	Mid-1		3.5								
	Mid-2	11:27	3.0	15.2	124.3	10.94	109.2				
	Mid-3		3.6								
	TR	11:35		15.3	133.9	11.01	110	80	15	5	
T6	TL	10:32		15.1	132.4	11.06	102.1		70	10	20
	Mid-1		3.1								
	Mid-2	10:25	3.0	15.1	131.7	10.94					
	Mid-3		4.2								
	TR	10:16		15.1	132	10.87	102.1	40	20	40	

B. Ngaruawahia INVERTEBRATE SAMPLING – 2 Nov 2011

Trans-ect	Code	Sample	Date	Time NZST	DO mg/L	DO %	Cond	Temp °C	Turbid-ity NTU	Depth m	Wood	Root	Mud	Macrophyte
T7	US-A	TL	2/11/2011	13:27	9.88	104.2	148.2	17.1	3.5	0.7	20	50	30	0
		Mid-1	2/11/2011		10.11	106.5	149.3	17		4.7				
		Mid-2	2/11/2011		10.2	105.4	149.1	17		3.8				
		Mid-3	2/11/2011		10.8	106	149.2	16.9		3.9				
		TR	2/11/2011		10.4	105.5	149.1	16.9	3.2	0.5	40	30	20	10
T8	DS-1	TL	2/11/2011	12:07	8.17	82.4?	123.9	17.1	13.5	0.6	20	60	20	0
		Mid-1	2/11/2011		9.12	95.4	129	17		4.7			Compacted clay	
		Mid-2	2/11/2011		9.74	102	147.9	16.8	3.4	3.1				
		Mid-3	2/11/2011		9.75	101.9	146.9	16.7		2.5				
		TR	2/11/2011		9.69	101.4	146.5	16.9	4.4	0.5	30	30	10	30
T9	DS-2	TL	2/11/2011	10:25	8.45	84.5	123.8	17.2	14.2	0.5	80	0	20	0
		Mid-1	2/11/2011		8.96	94	134.4	16.9		3.4				
		Mid-2	2/11/2011		9.52	99.5	144.4	16.7	8.2	2.7				
		Mid-3	2/11/2011		9.78	102	147.3	16.6		2.7				
		TR	2/11/2011		9.9	103	147.3	16.6	3.8	0.5	40	30	10	20
T10	DS-3	TL	2/11/2011	9:23	8.22	88.2	124.9	17.9	14	0.6	80	20	0	0
		Mid-1	2/11/2011		8.5	90.1	127.9	17.3		3.1				
		Mid-2	2/11/2011	13:21	9.15	96.8	140.4	17.3	6.8	3.8				
		Mid-3	2/11/2011		9.05	94.8	141.5	16.8		3.1				
		TR	2/11/2011		9.57	99.6	147.3	16.5	6.8	0.5	40	60	0	0

C. Ngaruawahia INVERTEBRATE SAMPLING – 18/4/12

Trans-ect	Code	Sample	Date	Time NZST	DO mg/L	DO %	Cond	Temp °C	Turbidity NTU	Depth m	Wood	Root	Mud	Macrophye
T7	US-A	TL	18/04/2012	14:15	10.03	104.6	153.4	18.1	1.38		30	60		10
		Mid-1	18/04/2012	14:59	10.08	104.9	152.8	18		3.5				
		Mid-2	18/04/2012	14:52	10.01	104.7	152.7	18.1	1.96	3.8				
		Mid-3	18/04/2012	14:30	10.05	104.7	152.6	18.1		3.1				
		TR	18/04/2012	14:40	10.02	104.5	152.4	18.1	1.62		30	40		30
T8	DS-1	TL	18/04/2012	13:25	9.24	98.2	143.5	17.6	4		30	50		20
		Mid-1	18/04/2012	13:58	9.71	101.2	136.2	17.8		4.1				
		Mid-2	18/04/2012	14:05	9.81	102.4	136.2	17.8	1.86	3.1				
		Mid-3	18/04/2012	13:37	9.76	102.5	151.6	18.2		2.2				
		TR	18/04/2012	13:42	10.1	104.8	151.8	18.1	1.74		30	20		50
T9	DS-2	TL	18/04/2012	12:24	9.48	97.8	141.2	17.3	4		60	40		
		Mid-1	18/04/2012	12:19	9.49	98	144.7	17.4		2				
		Mid-2	18/04/2012	12:11	9.61	100	150.2	17.6	2.6	2.6				
		Mid-3	18/04/2012	12:05	9.65	101	152	17.5		2.6				
		TR	18/04/2012	11:45	9.91	102.2	151.1	17.5	0.98		10	30		60
T10	DS-3	TL	18/04/2012	10:35	9.14	95.9	142.4	17.6	2		0	90		10
		Mid-1	18/04/2012	10:50	9.5	96.4	144	16.9		1.5				
		Mid-2	18/04/2012	10:40	9.39	96.2	144.8	17	2.9	2.5				
		Mid-3	18/04/2012	11:13	9.5	97.6	147.5	17.2		2.6				
		TR	18/04/2012	11:25	9.8	101	151.7	17.5	1.29		0	20		80

D. Rangiriri-Mercer INVERTEBRATE SAMPLING – 19-20/4/12

Trans-ect	Code	Sample	Date	Time NZST	DO mg/L	DO %	Cond	Temp °C	Depth m	Wood	Root	Macrophye
T17	USR-1	TL	19/04/2012	11:04						50	50	
		Mid-1	19/04/2012		9.77	103.8	151.3	19.4	2.1			
		Mid-2	19/04/2012		9.73	99.7	150.3	17.5	2.1			
		Mid-3	19/04/2012		9.66	99.2	150.9	17.4	1.7			
		TR	19/04/2012	10:21						30	30	40
T18	USR-2	TL	19/04/2012	11:49						ND	ND	ND
		Mid-1	19/04/2012		9.81	103.6	150	19	ND			
		Mid-2	19/04/2012		9.84	100.9	150.1	17.7	1.7			
		Mid-3	19/04/2012		9.74	101.1	141.3	17.4	1.7			
		TR	19/04/2012	11:28							100	
T19	USR-3	TL	19/04/2012	12:45						ND	ND	ND
		Mid-1	19/04/2012		9.93	104.8	151	19.2	ND			
		Mid-2	19/04/2012		9.86	102.2	150.2	18.3	1.6			
		Mid-3	19/04/2012		9.8	100.5	150.3	17.4	ND			
		TR	19/04/2012	12:20						30	40	30
T20	DSR-1	TL	19/04/2012	14:30						30	70	
		Mid-1	19/04/2012		9.97	104	152	18.6	ND			
		Mid-2	19/04/2012		9.94	103.1	150	18	3.2			
		Mid-3	19/04/2012		9.89	103.4	149.9	18	1.6			
		TR	19/04/2012	13:55						30	60	10
T22	USM-1	TL	20/04/2012	10:22							100	
		Mid-1	20/04/2012		9.67	99.6	149.9	17.9	1.7			
		Mid-2	20/04/2012		9.77	100.3	150.4	17.8	2.7			
		Mid-3	20/04/2012		9.63	98.5	152.9	17.6	2.7			
		TR	20/04/2012	10:45						20	50	30

Appendix 3

Invertebrate taxa counts from air-lift and littoral samples collected in spring and autumn in the lower Waikato River based on 200+ counts (0.5 = present). See docs#2945673 for data.

	Hamilton T1 Air Mid 2 Autumn 2008	**Hamilton T1 Air Mid 1 Autumn 2008**	**Hamilton T1 Air Mid 3 Autumn 2008**	**Hamilton T1 Air Mid 1 Spring 2012**	**Hamilton T1 Air Mid 2 Spring 2012**	**Hamilton T1 Air Mid 3 Spring 2012**	**Hamilton T1 Lit TL Autumn 2008**	**Hamilton T1 Lit TR Autumn 2008**	**Hamilton T1 Lit TL Spring 2011**	**Hamilton T1 Lit TR Spring 2012**
Deleatidium	0	0	0	0	0	4	0	0	0	0
Mauiulus	0	0	0	0	0	0	0	0	0	0
Zephlebia	0	0	0	0	0	0	0	0	0	0
Zelandobius	0	0	0	1	1	3	0	0	0.5	0
Hydropsyche c.f. colonica	4	14	80	29	2	1	0	0.5	0	0
Beraeoptera	0	0	0	0	0	0	0	0	0	0
Hydrobiosis	0	0	0	0.5	0	0	0	0	0	0
Oxyethira albiceps	2	3	5	1	3	2	13	48	24	0
Paroxyethira hendersoni	0	0	0	0	0	0	2	0	0	0
Paroxyethira eatoni gp	0	0	0	0	0	0	0	0	0	0
Plectrocnemia	0	0	0	0	0	0	0	0	0	0
Pycnocentrodes c.f. modestus	5	50	208	15	17	17	0	1	4	0
Triplectides sp. (small)	0	0	0	0	0	0	0	0	0	0
Triplectides obsoletus	0	0	0	0	0	0	0	0	0	0
Adversaeshna	0	0	0	0	0	0	0	0	0	0
Xanthocnemis	0	0	0	0	0	0	0.5	0	0.5	0
Hemicordulia	0	0	0	0	0	0	0	0	0	0
Microvelia	0	0	0	0	0	0	0	0	0	0
Sigara	0	0	0	0	0	0	0	0	0	0
Antiporus	0	0	0	0	0	0	0	0	1	0
Elmidae (*Hydora*)	0	0	0	1	0.5	0	0	0	0	0
Hydrophilidae	0	0	0	0	0	0	0	0	0	0

	Hamilton T1 Air Mid 2 Autumn 2008	Hamilton T1 Air Mid 1 Autumn 2008	Hamilton T1 Air Mid 3 Autumn 2008	Hamilton T1 Air Mid 1 Spring 2012	Hamilton T1 Air Mid 2 Spring 2012	Hamilton T1 Air Mid 3 Spring 2012	Hamilton T1 Lit TL Autumn 2008	Hamilton T1 Lit TR Autumn 2008	Hamilton T1 Lit TL Spring 2011	Hamilton T1 Lit TR Spring 2012
Scirtidae	0	0	0	0	0	0	0	0	0	0
Aphrophila	0	0	0	0	0	0	0	0	0	1
Austrosimulium australense gp	0	1	0	0	0	0	0	0	0	0
Ceratopogonidae	0	0	0	0	0	0	0	0	0	0
Chironomini unidentified	0	0	0	1	0	0	0	0	0	0
Chironomus	0	0	0	0	0	0	0	0	0	0
Dolichopodidae	0	0	0	0	0	0	0	0	0	3
Empididae	0	0	0	0	0	0	0	0	0	0
Ephydridae	0	0	0	0	0	0	0	0	0	0
Harrisius	0	0	0	0	1	0	0	0.5	0.5	6
Hexatomini	0	0	0	0	0	0	0	0	0	0
Limonia	0	0	0	0	0	0	0	0	1	36
Mischoderus	0	0	0	0	2	0	0	0	0	0
Molophilus	0	0	0	0	0	0	0	0	0	0
Muscidae	0	0	0	0	0	0	0	0	0	2
Orthocladiinae	4	16	3	5	0	3	3	8	12	4
Corynoneura	0	0	0	0	0	0	0	0	0	0
Paralimnophila	0	0	0	0	0	0	0	0	0	0
Polypedilum	0	0	0	2	0	0	0	0	0	0
Psychodidae	0	0	0	0	0	0	0	0	0	1
Tanypodinae	0	0	0	0	0	0	0	0	0	0
Tanytarsus	14	56	60	91	94	50	0.5	32	6	4
Hygraula nitens	0	1	0	0	0	0	0.5	0	0	0
Cladocera - Bosminidae	0	0	0	0	0	0	0	0	0	0
Cladocera - *Daphnia*	0	0	0	0	0	0	0	0	1	2
Copepoda - Calanoida	0	0	0	0	0	0	0	0	0	0

	Hamilton T1 Air Mid 2 Autumn 2008	Hamilton T1 Air Mid 1 Autumn 2008	Hamilton T1 Air Mid 3 Autumn 2008	Hamilton T1 Air Mid 1 Spring 2012	Hamilton T1 Air Mid 2 Spring 2012	Hamilton T1 Air Mid 3 Spring 2012	Hamilton T1 Lit TL Autumn 2008	Hamilton T1 Lit TR Autumn 2008	Hamilton T1 Lit TL Spring 2011	Hamilton T1 Lit TR Spring 2012
Copepoda - Cyclopoida	0	0	0	0	0	0	0	0	2	0
Amarinus lacustris	0	0	0	0	0	0	0	0	0	0
Styloniscus	0	0	0	0	0	0	0	0	0	0
Tenagomysis	0	0	0	0	0	0	0	0	0	0
Ostracoda	0	0	0	0	0	0	0	0	0	0
Paracorophium	0	0	0	0	0	0	0	0	0	0
Paracalliope fluviatilis	4	38	56	16	48	31	196	96	152	8
Paraleptamphopus	0	0	0	0	0	0	0	0	0	0
Paranephrops planifrons	0	0	0	0	0	0	0	0	0	0
Paratya curvirostris	0	0	0	0	0	0	0	0	1	0
Phreatogammarus	1	2	1	4	28	8	0	0	0	0
Sinelobus	0	1	0	0	0	0	1	8	0	0
Ferrissia	0	0	6	1	0	0	0	0	0	0
Gyraulus species	0	0	0	0	0	0	0	0	3	0
Gyraulus (keel)	0	0	0	0	0	0	0	0	0	0
Latia neritoides	0	2	0	1	5	0	0	0	0	0
Lymnaeidae (*Pseudosuccinea*)	0	0	0	0	0	0	0	0	0	0
Physa acuta	0	0	0	0	0	0	1	0	0.5	0
Planorbarius	0	0	0	0	0	0	0	0	0	0
Potamopyrgus antipodarum	7	7	188	48	24	8	1	1	5	6
Sphaeriidae	0	0	0	0	0	0	0	0	0	0
Oligochaeta indet.	1	1	0	0	0	0	0	2	0	0
Enchytraeidae	0	0	0	0	0	0	0	0	0	0
Haplotaxidae	0	0	0	0	0	0	0	0	0	0
Lumbriculidae	0	0	0	0	0	0	0	0	0	0
Naididae	7	0	120	3	1	81	0	0	4	12
Eiseniella	0	0	0	0	0	0	0	0	0	0

	Hamilton T1 Air Mid 2 Autumn 2008	Hamilton T1 Air Mid 1 Autumn 2008	Hamilton T1 Air Mid 3 Autumn 2008	Hamilton T1 Air Mid 1 Spring 2012	Hamilton T1 Air Mid 2 Spring 2012	Hamilton T1 Air Mid 3 Spring 2012	Hamilton T1 Lit TL Autumn 2008	Hamilton T1 Lit TR Autumn 2008	Hamilton T1 Lit TL Spring 2011	Hamilton T1 Lit TR Spring 2012
Tubificidae	0	0	0	0	0	0	0.5	0	0	0
Branchiura sowerbyi	0	0	0	0	0	0	0	0	0	0
Cura	0	0	1	0	1	0	0.5	0	0	0
Dalyellidae	0	0	1	1	0	0	0.5	0.5	2	0
Rhabdocoel other	0	0	0	0	0	0	0	0	0	0
Nematoda	0	0	0	0	0	0	0	0	0	0
Nemertea other	2	1	56	2	1	1	0.5	7	0	0
Prostoma	0	0	7	1	0	0	0	0	0	0
Glossiphoniidae	0	6	5	1	0	0	0	0	0	0
Helobdella europaea	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Hydra	0	0	0	0	0	0	0	0	0	0
Byrozoa	0	0	0.5	0.5	0.5	0.5	0	0.5	0.5	0.5
Porifera	0	0	0	0.5	0.5	0	0	0	0	0
Acari	0	0	0	0	0	0	0	0	0	0
TOTAL NUMBERS	**51**	**199**	**797.5**	**225.5**	**229.5**	**209.5**	**220.5**	**205**	**221.5**	**85.5**

	Hamilton T2 Air Mid 2 Autumn 2008	Hamilton T2 Air Mid 1 Autumn 2008	Hamilton T2 Air Mid 3 Autumn 2008	Hamilton T2 Air Mid 1 Spring 2012	Hamilton T2 Air Mid 2 Spring 2012	Hamilton T2 Air Mid 3 Spring 2012	Hamilton T2 Lit TL Autumn 2008	Hamilton T2 Lit TR Autumn 2008	Hamilton T2 Lit TL Spring 2012	Hamilton T2 Lit TR Spring 2012
Deleatidium	0	0	0	0	0	0	0	0	0	0
Mauiulus	0	0	0	0	0	0	0	0	0	0
Zephlebia	0	0	0	0	0	0	0	0	0	0
Zelandobius	0	0	0	0	2	0	0	0	0	0
Hydropsyche c.f. colonica	0	0	1	0	1	0	0	0	0	0
Beraeoptera	0	0	0	0	0	0	0	0	0	0
Hydrobiosis	0	0	0	0	0	0	0	0	0	0
Oxyethira albiceps	1	0	6	6	0	0.5	11	34	1	30
Paroxyethira hendersoni	0	0	0	0	0	0	3	0.5	0	0
Paroxyethira eatoni gp	0	0	0	0	0	0	0	0	0	0
Plectrocnemia	0	0	0	0	0	0	0	0	0	0
Pycnocentrodes c.f. modestus	0	0	0	0	0	0.5	0	0	0	0
Triplectides sp. (small)	0	0	0	0	0	0	0	0	0	0
Triplectides obsoletus	0	0	0	0	0	0	0	0	0	0.5
Adversaeshna	0	0	0	0	0	0	0	0	0	0
Xanthocnemis	0	0	0	0	0	0.5	1	0	0	0
Hemicordulia	0	0	1	0	0	0	0	0	0	0
Microvelia	0	0	0	0	0	0	0	0	0	0
Sigara	0	0	0	0	0	0	0	0	0	0
Antiporus	0	0	0	0	0	0	0	0	0	0
Elmidae (*Hydora*)	0	0	0	0	0	0	0	0	0	0
Hydrophilidae	0	0	0	0	0	0	0	0	2	0
Scirtidae	0	0	0	0	0	0	0	0	0	0
Aphrophila	0	0	0	0	0	0	0	0	0	0
Austrosimulium australense gp	0	0	0	0	0	0	0	0	0	0
Ceratopogonidae	0	0	0	0	0	0	0	0	0	0
Chironomini unidentified	0	0	0	0	1	3	0	0	0	1

	Hamilton T2 Air Mid 2 Autumn 2008	Hamilton T2 Air Mid 1 Autumn 2008	Hamilton T2 Air Mid 3 Autumn 2008	Hamilton T2 Air Mid 1 Spring 2012	Hamilton T2 Air Mid 2 Spring 2012	Hamilton T2 Air Mid 3 Spring 2012	Hamilton T2 Lit TL Autumn 2008	Hamilton T2 Lit TR Autumn 2008	Hamilton T2 Lit TL Spring 2012	Hamilton T2 Lit TR Spring 2012
Chironomus	0	0	0	40	3	2	0	0	0	1
Dolichopodidae	0	0	0	0	0	0	0	0	2	0
Empididae	0	0	0	0	0	0	0	0	0	0
Ephydridae	0	0	0	0	0	0	0	0	0	0
Harrisius	0	0	0	0	0	0	0	0	0	1
Hexatomini	0	0	0	0	0	0	0	0	0	0
Limonia	0	0	0	0	0	0	0	0	14	0
Mischoderus	0	0	0	0	0	0	0	0	0	0
Molophilus	0	0	0	0	0	0	0	0	0	0
Muscidae	0	0	0	0	0	0	0	0	1	0
Orthocladiinae	0	0	0	6	11	0.5	2	2	14	0
Corynoneura	0	0	0	0	0	0	0	0	1	0
Paralimnophila	0	0	0	0	0	0	0	0	0	0
Polypedilum	0	0	0	0	0	0	0	0	0	1
Psychodidae	0	0	0	0	0	0	0	0	0	0.5
Tanypodinae	0	0	0	0	0	0	0	0	0	0
Tanytarsus	0	0	1	5	42	3	0	2	14	8
Hygraula nitens	0	0	0	0	0	0	0	0	0	0
Cladocera - Bosminidae	0	0	0	2	0	0	0	0	0	0
Cladocera - *Daphnia*	0	0	1	3	0	0	3	1	2	0
Copepoda - Calanoida	0	0	0	0	0	0	0	0	0	0
Copepoda - Cyclopoida	0	0	0	0	0	2	2	1	0	0.5
Amarinus lacustris	0	0	0	1	0	0	0	0	0	0
Styloniscus	0	0	0	0	0	0	0	0	0	0
Tenagomysis	0	0	0	0	0	0	0	0	0	0
Ostracoda	0	0	0	12	1	0	0	0	0	0
Paracorophium	0	0	0	0	0	0	0	0	0	0

	Hamilton T2 Air Mid 2 Autumn 2008	Hamilton T2 Air Mid 1 Autumn 2008	Hamilton T2 Air Mid 3 Autumn 2008	Hamilton T2 Air Mid 1 Spring 2012	Hamilton T2 Air Mid 2 Spring 2012	Hamilton T2 Air Mid 3 Spring 2012	Hamilton T2 Lit TL Autumn 2008	Hamilton T2 Lit TR Autumn 2008	Hamilton T2 Lit TL Spring 2012	Hamilton T2 Lit TR Spring 2012
Paracalliope fluviatilis	1	1	60	82	123	198	167	151	15	162
Paraleptamphopus	0	0	0	0	0	0	0	0	0	0
Paranephrops planifrons	0	0	0	0	0	0	0	0	0	0
Paratya curvirostris	0	0	0	0	0	1	0	0	0	0.5
Phreatogammarus	1	0	0	0	1	3	0	0	0	1
Sinelobus	0	0	0	0	2	0	0	2	0	0
Ferrissia	0	0	0	0	0	1	0.5	0.5	0	0
Gyraulus species	0	0	0	0	0	0	4	5	0	0
Gyraulus (keel)	0	0	0	0	0	0	0	0	0	0
Latia neritoides	0	0	0	0	0	0	0	0	0	0
Lymnaeidae (*Pseudosuccinea*)	0	0	0	0	0	0	0	0	0	0
Physa acuta	0	0	0	2	4	0.5	0.5	0.5	0	0
Planorbarius	0	0	0	0	0	0	0	0	0	0
Potamopyrgus antipodarum	0	4	6	3	3	0	1	1	2	5
Sphaeriidae	0	0	0	0	0	0	0	0	0	0
Oligochaeta indet.	11	2	3	0	0	0	0.5	0	0	0
Enchytraeidae	0	0	0	0	0	0	0	0	0	0
Haplotaxidae	1	0	0	0	0	0	0	0	0	0
Lumbriculidae	0	0	0	0	0	0	0	0	0	0
Naididae	1	0	1	30	16	5	0	9	6	5
Eiseniella	0	0	0	0	0	0	0	0	0	0
Tubificidae	1	10	3	0	0	0	0	0	0	0
Branchiura sowerbyi	0	0	1	0	0	0	0	1	0	0
Cura	0	0	0	0	0	0	1	1	1	0
Dalyellidae	0	0	1	0	0	0	0	0	1	1
Rhabdocoel other	0	0	1	0	0	0	0	0	0	0
Nematoda	0	0	0	0	0	0.5	0	0	0	0

	Hamilton T2 Air Mid 2 Autumn 2008	**Hamilton T2 Air Mid 1 Autumn 2008**	**Hamilton T2 Air Mid 3 Autumn 2008**	**Hamilton T2 Air Mid 1 Spring 2012**	**Hamilton T2 Air Mid 2 Spring 2012**	**Hamilton T2 Air Mid 3 Spring 2012**	**Hamilton T2 Lit TL Autumn 2008**	**Hamilton T2 Lit TR Autumn 2008**	**Hamilton T2 Lit TL Spring 2012**	**Hamilton T2 Lit TR Spring 2012**
Nemertea other	0	0	3	0	0	0.5	4	4	0	0
Prostoma	0	0	0	0	0.5	0	1	0	0	0
Glossiphoniidae	0	0	1	1	0	0.5	0	0	0	0
Helobdella europaea	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Hydra	0	0	0	0	0	0	0	0	0	0
Byrozoa	0	0	0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Porifera	0	0	0	0	0	0	0	0	0	0
Acari	0	0	0	10	3	0	0.5	0.5	2	0.5
TOTAL NUMBERS	**17**	**17**	**90**	**193.5**	**211**	**222.5**	**202**	**216**	**76.5**	**218.5**

	Hamilton T3 Air Mid 2 Autumn 2008	Hamilton T3 Air Mid 1 Autumn 2008	Hamilton T3 Air Mid 3 Autumn 2008	Hamilton T3 Air Mid 1 Spring 2012	Hamilton T3 Air Mid 2 Spring 2012	Hamilton T3 Air Mid 3 Spring 2012	Hamilton T3 Lit TL Autumn 2008	Hamilton T3 Lit TR Autumn 2008	Hamilton T3 Lit TL Spring 2012	Hamilton T3 Lit TR Spring 2012
Deleatidium	0	0	0	3	8	0	0	0	0	0
Mauiulus	0	1	0	0	0	0	0	0	0	0
Zephlebia	0	0	0	0	0	0	0	0	0	0.5
Zelandobius	0	0	0	5	10	0	0	0	0	0.5
Hydropsyche c.f. colonica	0	43	2	8	1	0	0	0	0	0
Beraeoptera	0	0	0	0	0	0	0	0	0	0
Hydrobiosis	0	0	0	0	0	0	0	0	0	0
Oxyethira albiceps	1	26	0	1	0	0	9	27	84	51
Paroxyethira hendersoni	0	1	0	0	0	0	0.5	3	1	0
Paroxyethira eatoni gp	0	0	0	0	0	0	0	0	0	0
Plectrocnemia	0	0	0	0	0	0	0	0	0	0
Pycnocentrodes c.f. modestus	1	36	9	30	28	1	0	0	1	0.5
Triplectides sp. (small)	0	0	0	0	0	0	0	0	0	0
Triplectides obsoletus	0	0	0	0	0	0	0.5	0	0	0
Adversaeshna	0	0	0	0	0	0	0	0	0	0
Xanthocnemis	0	0	0	0	0	0	0.5	0	0	0
Hemicordulia	0	0	0	0	0	0	0	0	0	0
Microvelia	0	0	0	0	0	0	0	0	0	0
Sigara	0	0	0	0	0	0	0	0	1	0
Antiporus	0	0	0	0	0	0	0	0	0	0
Elmidae (*Hydora*)	0	0	0	0	0	0	0	0	0	0
Hydrophilidae	0	0	0	0	0	0	0	0	0	0
Scirtidae	0	0	0	0	0	0	0	0	0	0
Aphrophila	0	0	0	0	0	0	0	0	0	0
Austrosimulium australense gp	0	0	0	0	0	0	0	0	0	0
Ceratopogonidae	0	0	0	0	0	0	0	0	0	0
Chironomini unidentified	0	0	0	0	0	0	0	0	0	0

	Hamilton T3 Air Mid 2 Autumn 2008	Hamilton T3 Air Mid 1 Autumn 2008	Hamilton T3 Air Mid 3 Autumn 2008	Hamilton T3 Air Mid 1 Spring 2012	Hamilton T3 Air Mid 2 Spring 2012	Hamilton T3 Air Mid 3 Spring 2012	Hamilton T3 Lit TL Autumn 2008	Hamilton T3 Lit TR Autumn 2008	Hamilton T3 Lit TL Spring 2012	Hamilton T3 Lit TR Spring 2012
Chironomus	0	0	0	0	0	0	0	0	0	0
Dolichopodidae	0	0	0	0	0	0	0	0	0	0
Empididae	0	0	0	1	0	0	0	0	0	0
Ephydridae	0	0	0	0	0	0	0	0	0	0
Harrisius	0	1	0	0	0	0	0.5	0.5	1	0.5
Hexatomini	0	0	0	0	0	0	0	0	0.5	0
Limonia	0	0	0	0	0	0	0	0	0	1
Mischoderus	0	0	0	0	0	0	0	0	0	0
Molophilus	0	0	0	0	0	0	0	0	0	0.5
Muscidae	0	0	0	0	0	0	0	0	0	0
Orthocladiinae	0	5	5	1	0	0	4	1	6	9
Corynoneura	0	0	0	0	0	0	0	0	0	0
Paralimnophila	0	0	0	0	0	0	0	0	0	0
Polypedilum	0	0	0	0.5	0	0	0	0	0.5	0
Psychodidae	0	0	0	0	0	0	0	0	0	0
Tanypodinae	0	0	0	0	0	0	0	0	0	0
Tanytarsus	0	31	10	27	7	1	1	0	4	74
Hygraula nitens	0	0	0	0	0	0	0	0	0	0
Cladocera - Bosminidae	0	0	0	0	0	0	0	0	0	0
Cladocera - *Daphnia*	0	0	0	3	2	0	0	0	0.5	0
Copepoda - Calanoida	0	0	0	0	0	0	0.5	0	0	0
Copepoda - Cyclopoida	0	0	0	0	0	0	0	0	10	0
Amarinus lacustris	0	0	0	0	0	0	0	0	0	0
Styloniscus	0	0	0	0	0	0	0	0	0	0
Tenagomysis	0	0	0	0	0	0	0	0	0	0
Ostracoda	0	0	0	0	0	0	0	0	0	0.5
Paracorophium	0	0	0	0	0	0	0	0	0	0

	Hamilton T3 Air Mid 2 Autumn 2008	Hamilton T3 Air Mid 1 Autumn 2008	Hamilton T3 Air Mid 3 Autumn 2008	Hamilton T3 Air Mid 1 Spring 2012	Hamilton T3 Air Mid 2 Spring 2012	Hamilton T3 Air Mid 3 Spring 2012	Hamilton T3 Lit TL Autumn 2008	Hamilton T3 Lit TR Autumn 2008	Hamilton T3 Lit TL Spring 2012	Hamilton T3 Lit TR Spring 2012
Paracalliope fluviatilis	3	142	11	69	52	0	157	179	73	49
Paraleptamphopus	0	0	0	0	0	0	0	0	0	0
Paranephrops planifrons	0	0	0	0	0	0	0	0	0	0
Paratya curvirostris	0	0	0	0	0	0	0.5	0	0	1
Phreatogammarus	0	1	0	4	23	0	0	0	0	0
Sinelobus	0	1	0	0	0	0	0	0	0	0
Ferrissia	0	2	0	0	0	0	0	0	1	0
Gyraulus species	0	1	1	0	1	0	0	4	4	0
Gyraulus (keel)	0	0	0	0	0	0	34	0	0	0
Latia neritoides	0	0	2	0	2	0	0	0	0	0
Lymnaeidae (*Pseudosuccinea*)	0	0	0	0	0	0	0	0	0	0
Physa acuta	0	1	0	1	0	0	0	0	0	0
Planorbarius	0	0	0	0	0	0	0	0	0	0
Potamopyrgus antipodarum	0	9	3	6	55	4	0.5	0	14	3
Sphaeriidae	0	0	0	0	0	0	0	0	0	0
Oligochaeta indet.	0	2	3	0	0	0	1	0	0	0
Enchytraeidae	0	0	3	0	0	0	0	0	0	0
Haplotaxidae	0	0	0	0	0	0	0	0	0	0
Lumbriculidae	0	0	0	0	0	0	0	0	0	0
Naididae	0	0	0	42	13	103	0	0	19	18
Eiseniella	0	0	0	0	0	0	0	0	0	0
Tubificidae	16	4	7	0	0	0	0.5	0	0	0
Branchiura sowerbyi	0	0	0	0	0	0	0	0	0	0
Cura	0	1	0	0	1	0	0	0	0	0
Dalyellidae	0	1	0	0	0	0	1	0	1	0
Rhabdocoel other	0	0	0	0	0	0	0	3	0	0
Nematoda	0	0	0	3	1	0	0	0	0	0

	Hamilton T3 Air Mid 2 Autumn 2008	Hamilton T3 Air Mid 1 Autumn 2008	Hamilton T3 Air Mid 3 Autumn 2008	Hamilton T3 Air Mid 1 Spring 2012	Hamilton T3 Air Mid 2 Spring 2012	Hamilton T3 Air Mid 3 Spring 2012	Hamilton T3 Lit TL Autumn 2008	Hamilton T3 Lit TR Autumn 2008	Hamilton T3 Lit TL Spring 2012	Hamilton T3 Lit TR Spring 2012
Nemertea other	0	69	11	0	2	0	1	11	0	0
Prostoma	1	5	0	0	0	0	1	1	0	0
Glossiphoniidae	0	4	0	0	0	0	0.5	0.5	0	0
Helobdella europaea	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Hydra	0	0	0	0	0	0	0	0	0	0
Byrozoa	0	0	0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Porifera	0	0	0.5	0	0	0	0	0	0	0
Acari	0	0	0	1	0	0	0	0.5	0	1
TOTAL NUMBERS	**22**	**387**	**67.5**	**205**	**206.5**	**109.5**	**214**	**230.5**	**222**	**209.5**

	Hamilton T4 Air Mid 2 Autumn 2008	Hamilton T4 Air Mid 1 Autumn 2008	Hamilton T4 Air Mid 3 Autumn 2008	Hamilton T4 Air Mid 1 Spring 2012	Hamilton T4 Air Mid 2 Spring 2012	Hamilton T4 Air Mid 3 Spring 2012	Hamilton T4 Lit TL Autumn 2008	Hamilton T4 Lit TR Autumn 2008	Hamilton T4 Lit TL Spring 2012	Hamilton T4 Lit TR Spring 2012
Deleatidium	0	0	0	0	0	0.5	0	0	0	0
Mauiulus	0	0	0	0	0	0	0	0	0.5	0
Zephlebia	0	0	0	0	0	0	0	0	0.5	0
Zelandobius	0	0	0	5	0	4	0	0	1	0
Hydropsyche c.f. colonica	1	1	134	23	0.5	2	0	0	0	0
Beraeoptera	0	0	0	0	0	0	0	0	0	0
Hydrobiosis	0	0	0	0	0	0	0	0	0	0
Oxyethira albiceps	0	0	11	1	0	1	21	41	74	9
Paroxyethira hendersoni	0	0	0	0	0	0	1	2	0.5	1
Paroxyethira eatoni gp	0	0	0	0	0	0	0	0	0	0
Plectrocnemia	0	0	0	0	0	0	0	0	0	0
Pycnocentrodes c.f. modestus	23	0	64	10	1	37	0	0	3	0
Triplectides sp. (small)	0	0	0	0	0	0	0	0	0	0
Triplectides obsoletus	0	0	0	0	0	0	0	0	0	0.5
Adversaeshna	0	0	0	0	0	0	0	0	0	0
Xanthocnemis	0	0	0	0	0	0	1	7	0	0
Hemicordulia	0	0	0	0	0	0	0	0	0	0
Microvelia	0	0	0	0	0	0	0	0	0	0
Sigara	0	0	0	0	0	0	0	0	0	0
Antiporus	0	0	0	0	0	0	0	0	0	0
Elmidae (*Hydora*)	0	0	0	0	0	0	0	0	0	0
Hydrophilidae	0	0	0	0	0	0	0	0	0	0
Scirtidae	0	0	0	0	0	0	0	0	0	0
Aphrophila	0	0	0	0	0	0	0	0	0	0
Austrosimulium australense gp	0	0	0	0	0	0	0	0	1	0
Ceratopogonidae	0	0	0	0	0	0	0	0	0	0
Chironomini unidentified	0	0	0	1	0	0	0	0	1	1

	Hamilton T4 Air Mid 2 Autumn 2008	Hamilton T4 Air Mid 1 Autumn 2008	Hamilton T4 Air Mid 3 Autumn 2008	Hamilton T4 Air Mid 1 Spring 2012	Hamilton T4 Air Mid 2 Spring 2012	Hamilton T4 Air Mid 3 Spring 2012	Hamilton T4 Lit TL Autumn 2008	Hamilton T4 Lit TR Autumn 2008	Hamilton T4 Lit TL Spring 2012	Hamilton T4 Lit TR Spring 2012
Chironomus	0	0	0	0	0	0	0	0	1	1
Dolichopodidae	0	0	0	0	0	0	0	0	0	0
Empididae	0	0	0	0	0	0	0	0	0	0
Ephydridae	0	0	0	0	0	0	0	0	0	0
Harrisius	0	0	0	0	1	0	0	0.5	0	0
Hexatomini	0	0	0	0	0	0	0	0	0	0
Limonia	0	0	0	0	0	0.5	0	0	0.5	0.5
Mischoderus	0	0	0	0	0	0	0	0	0	0
Molophilus	0	0	0	0	0	0	0	0	0	0
Muscidae	0	0	0	0	0	0	0	0	0	0
Orthocladiinae	4	0	15	0	0	3	4	16	1	2
Corynoneura	0	0	0	0	0	0	0	0	0	0
Paralimnophila	0	0	0	0	0	0	0	0	0	0
Polypedilum	0	0	0	0	0	0	0	0	0	0
Psychodidae	0	0	0	0	0	0	0	0	0	0
Tanypodinae	0	0	0	0	0	0	0	0	0	0
Tanytarsus	9	0	42	134	1	43	0	4	4	0
Hygraula nitens	0	0	0	0	0	0	1	0	0	0
Cladocera - Bosminidae	0	0	0	0	0	0	0	0	0	0
Cladocera - *Daphnia*	0	0	0	0	0	0	0	0	0	0
Copepoda - Calanoida	0	0	0	0	0	0	0	0	0	0
Copepoda - Cyclopoida	0	0	0	0	0	0	1	0	0	3
Amarinus lacustris	0	0	0	0	0	0	0	0	0	0
Styloniscus	0	0	0	0	0	0	0	0	0	0
Tenagomysis	0	0	0	0	0	0	0	0	1	0
Ostracoda	0	0	0	0	0	0	0	0	0.5	0
Paracorophium	0	0	0	0	0	0	0	0	0	0

	Hamilton T4 Air Mid 2 Autumn 2008	Hamilton T4 Air Mid 1 Autumn 2008	Hamilton T4 Air Mid 3 Autumn 2008	Hamilton T4 Air Mid 1 Spring 2012	Hamilton T4 Air Mid 2 Spring 2012	Hamilton T4 Air Mid 3 Spring 2012	Hamilton T4 Lit TL Autumn 2008	Hamilton T4 Lit TR Autumn 2008	Hamilton T4 Lit TL Spring 2012	Hamilton T4 Lit TR Spring 2012
Paracalliope fluviatilis	2	3	176	32	10	87	144	197	143	196
Paraleptamphopus	0	0	0	0	0	0	0	0	0	0
Paranephrops planifrons	0	0	0	0	0	0	1	0	0	0
Paratya curvirostris	0	0	0	0	0	0	0	0	0	0
Phreatogammarus	0	0	1	6	0	0.5	0	0	0.5	1
Sinelobus	1	0	2	0	0	0.5	0	1	0	0
Ferrissia	0	0	0	0	0	0	0	0	0	0
Gyraulus species	0	1	2	0	0	0	0.5	1	2	3
Gyraulus (keel)	0	0	0	0	0	0.5	6	1	0	0
Latia neritoides	0	0	1	0	0	0	0	0	0	0
Lymnaeidae (*Pseudosuccinea*)	0	0	0	0	0	0	0	0	0	0
Physa acuta	0	0	0	4	1	2	1	1	1	0
Planorbarius	0	0	0	0	0	0	0	0	0	0
Potamopyrgus antipodarum	15	1	21	3	1	10	0.5	0	2	7
Sphaeriidae	0	0	0	0	0	0	0	0	0	0
Oligochaeta indet.	18	1	8	0	0	0	0	0	0	0
Enchytraeidae	0	0	0	0	0	0	0	0	0	0
Haplotaxidae	0	0	0	0	0	0	0	0	0	0
Lumbriculidae	0	1	0	0	0	0	4	1	0	0
Naididae	4	0	0	0	195	24	0	0	1	2
Eiseniella	0	0	0	0	0	0	0	0	0	0
Tubificidae	22	0	3	0	0	0	4	0	0	0
Branchiura sowerbyi	0	0	0	0	0	0	0	0	0	0
Cura	0	0	1	1	0	1	6	1	1	0
Dalyellidae	0	0	0	0	0	0	0	1	2	0.5
Rhabdocoel other	0	0	0	0	0	0	0	0	0	0
Nematoda	0	0	0	0	0	1	0	0	0	0

	Hamilton T4 Air Mid 2 Autumn 2008	Hamilton T4 Air Mid 1 Autumn 2008	Hamilton T4 Air Mid 3 Autumn 2008	Hamilton T4 Air Mid 1 Spring 2012	Hamilton T4 Air Mid 2 Spring 2012	Hamilton T4 Air Mid 3 Spring 2012	Hamilton T4 Lit TL Autumn 2008	Hamilton T4 Lit TR Autumn 2008	Hamilton T4 Lit TL Spring 2012	Hamilton T4 Lit TR Spring 2012
Nemertea other	8	3	30	0	0	1	5	6	0	0
Prostoma	4	3	10	0	0	0	2	0	0	0
Glossiphoniidae	1	0	5	0	0	0	0.5	0	0.5	0
Helobdella europaea	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Hydra	0	0	0	0	0	0	0	0	0	0
Byrozoa	0	0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Porifera	0	0	0	0	0	0	0	0	0	0
Acari	0	0	0	0	0	0	0	0	0.5	0
TOTAL NUMBERS	**112**	**14**	**526.5**	**220.5**	**211**	**219**	**204**	**281**	**243**	**228**

	Hamilton T5 Air Mid 2 Autumn 2008	Hamilton T5 Air Mid 1 Autumn 2008	Hamilton T5 Air Mid 3 Autumn 2008	Hamilton T5 Air Mid 1 Spring 2012	Hamilton T5 Air Mid 2 Spring 2012	Hamilton T5 Air Mid 3 Spring 2012	Hamilton T5 Lit TL Autumn 2008	Hamilton T5 Lit TR Autumn 2008	Hamilton T5 Lit TL Spring 2012	Hamilton T5 Lit TR Spring 2012
Deleatidium	0	0	0	0	0	1	0	0	0	0
Mauiulus	0	0	0	0	0	0	0	0	0	0
Zephlebia	0	0	0	0	0	0	0	0	0	0
Zelandobius	0	0	0	0	0	3	0	0	0	0
Hydropsyche c.f. colonica	2	9	75	1	0	0	0	0	0	0
Beraeoptera	0	0	0	0	0	0	0	0	0	0
Hydrobiosis	0	0	0	0	0	0	0	0	0	0
Oxyethira albiceps	1	12	24	0	0	0	5	23	9	10
Paroxyethira hendersoni	0	0	0	0	0	0	0.5	0	0	0
Paroxyethira eatoni gp	0	0	0	0	0	0	0	0	0	0
Plectrocnemia	0	0	0	0	0	0	0	0	0	0
Pycnocentrodes c.f. modestus	6	14	46	1	1	24	0	0	0	0.5
Triplectides sp. (small)	0	0	0	0	0	0	0	0	0	0
Triplectides obsoletus	0	0	0	0	0	0	0	0	0	0
Adversaeshna	0	0	0	0	0	0	0	0	0	0
Xanthocnemis	0	0	0	0	0	0	1	7	0	1
Hemicordulia	0	0	0	0	0	0	0	0	0	0
Microvelia	0	0	0	0	0	0	0	0	0	0
Sigara	0	0	0	0	0	0	0	0	0	0
Antiporus	0	0	0	0	0	0	0	0	0	1
Elmidae (*Hydora*)	0	0	0	0	0	0	0	0	0	0
Hydrophilidae	0	0	0	0	0	0	0	0	0	0
Scirtidae	0	0	0	0	0	0	0	0	0	0
Aphrophila	0	0	0	0	0	0	0	0	0	0
Austrosimulium australense gp	0	0	0	0	0	0	0	0	0.5	1
Ceratopogonidae	0	0	0	0	0	0	0	0	0	0
Chironomini unidentified	0	0	0	0	0	0	0	0	0	2

	Hamilton T5 Air Mid 2 Autumn 2008	Hamilton T5 Air Mid 1 Autumn 2008	Hamilton T5 Air Mid 3 Autumn 2008	Hamilton T5 Air Mid 1 Spring 2012	Hamilton T5 Air Mid 2 Spring 2012	Hamilton T5 Air Mid 3 Spring 2012	Hamilton T5 Lit TL Autumn 2008	Hamilton T5 Lit TR Autumn 2008	Hamilton T5 Lit TL Spring 2012	Hamilton T5 Lit TR Spring 2012
Chironomus	0	0	0	0	0	0	0	0	1	0
Dolichopodidae	0	0	0	0	0	0	0	0	0	0
Empididae	1	1	1	0	0	0	0	0	0	0
Ephydridae	0	0	0	0	0	0	0.5	0	0	0
Harrisius	0	0	0	0	0	0	0	0	0.5	0.5
Hexatomini	0	0	0	0	0	0	0	0	0	0
Limonia	0	0	0	0	0	0	0	0	0	0
Mischoderus	0	1	0	0	0	0	0	0	0	0
Molophilus	0	0	0	0	0	0	0	0	0	0
Muscidae	0	0	0	0	0	0	0	0	0	0
Orthocladiinae	4	10	0	0	0	2	33	6	2	0
Corynoneura	0	0	39	0	0	0	0	0	0	0
Paralimnophila	0	0	0	0	0	0	0	0	0	0
Polypedilum	0	0	0	0	0	0	0	0	0	0
Psychodidae	0	0	0	0	0	0	0	0	0	0
Tanypodinae	0	0	0	0	0	0	0	0	0	0
Tanytarsus	14	90	205	36	0	2	13	9	5	5
Hygraula nitens	0	0	0	0	0	0	0.5	0	0	0
Cladocera - Bosminidae	0	0	0	0	0	0	0	0	0	0
Cladocera - *Daphnia*	0	0	0	0	0	0	0	0	0.5	0.5
Copepoda - Calanoida	0	0	0	0	0	0	0	0	0	0
Copepoda - Cyclopoida	0	0	0	0	0	0	1	0	3	0
Amarinus lacustris	0	0	0	0	0	0	0	0	0	0
Styloniscus	0	0	0	0	0	0	0	0	0	0
Tenagomysis	0	0	0	0	0	0	0	0	1	0.5
Ostracoda	0	0	0	0	0	0	0	0	0.5	0.5
Paracorophium	0	0	0	0	0	0	0	0	0	0

	Hamilton T5 Air Mid 2 Autumn 2008	Hamilton T5 Air Mid 1 Autumn 2008	Hamilton T5 Air Mid 3 Autumn 2008	Hamilton T5 Air Mid 1 Spring 2012	Hamilton T5 Air Mid 2 Spring 2012	Hamilton T5 Air Mid 3 Spring 2012	Hamilton T5 Lit TL Autumn 2008	Hamilton T5 Lit TR Autumn 2008	Hamilton T5 Lit TL Spring 2012	Hamilton T5 Lit TR Spring 2012
Paracalliope fluviatilis	8	67	16	0	0	2	162	206	186	196
Paraleptamphopus	0	0	0	0	0	0	0	0	0	0
Paranephrops planifrons	0	0	0	0	0	0	0	0	0	0
Paratya curvirostris	0	0	0	0	0	0	0	0.5	0	0.5
Phreatogammarus	0	0	0	0	0	2	0	0	0	0
Sinelobus	3	8	32	0	0	0	0	1	0	0
Ferrissia	0	0	0	0	0	0	0	3	0	0
Gyraulus species	0	0	1	0	0	0	1	0	0	0.5
Gyraulus (keel)	0	0	0	0	0.5	0	0	21	0	0
Latia neritoides	0	0	0	0	0	2	0	0	0	0
Lymnaeidae (*Pseudosuccinea*)	0	0	0	0	0	0	0.5	0	0	0
Physa acuta	0	6	0	0	0	0	0.5	1	0	1
Planorbarius	0	0	0	0	0	0	0.5	0	0	0
Potamopyrgus antipodarum	3	9	78	0	0	23	0	0.5	2	1
Sphaeriidae	0	0	0	0	0	0	0	0	0	0
Oligochaeta indet.	3	4	22	0	0	0	0	0	0	1
Enchytraeidae	0	0	0	0	0	0	0	0	0	0
Haplotaxidae	0	0	0	0	0	0	0	0	0	0
Lumbriculidae	0	0	1	0	0	0	5	1	0	0
Naididae	0	0	0	56	204	107	0	0	3	0
Eiseniella	0	0	0	0	0	0	0	0	0	0
Tubificidae	0	0	0	0	0	0	0	0	0	0
Branchiura sowerbyi	0	0	0	0	0	0	0	0	0	0
Cura	0	3	0	0	0	0	9	4	0	0
Dalyellidae	0	0	0	0	0	0	0	0	0.5	0.5
Rhabdocoel other	0	0	0	0	0	0	0	0	0	0
Nematoda	0	0	0	1	0	0	0	0	0	0

	Hamilton T5 Air Mid 2 Autumn 2008	Hamilton T5 Air Mid 1 Autumn 2008	Hamilton T5 Air Mid 3 Autumn 2008	Hamilton T5 Air Mid 1 Spring 2012	Hamilton T5 Air Mid 2 Spring 2012	Hamilton T5 Air Mid 3 Spring 2012	Hamilton T5 Lit TL Autumn 2008	Hamilton T5 Lit TR Autumn 2008	Hamilton T5 Lit TL Spring 2012	Hamilton T5 Lit TR Spring 2012
Nemertea other	2	12	8	0	0	0	3	3	0	0
Prostoma	0	4	2	0	0	0	0	0	0	0
Glossiphoniidae	0	0	3	0	0	0	0	0	0	0
Helobdella europaea	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Hydra	0	0	0	0	0	0	0	0	0	0
Byrozoa	0.5	0.5	0.5	0.5	0.5	0.5	0	0	0.5	0.5
Porifera	0	0	0	0	0.5	0.5	0	0	0	0
Acari	0	0	0	0	0	0	0	0.5	0.5	0.5
TOTAL NUMBERS	**47.5**	**250.5**	**553.5**	**95.5**	**206.5**	**169**	**236**	**286**	**215**	**223.5**

	Hamilton T6 Air Mid 2 Autumn 2008	Hamilton T6 Air Mid 1 Autumn 2008	Hamilton T6 Air Mid 3 Autumn 2008	Hamilton T6 Air Mid 1 Spring 2012	Hamilton T6 Air Mid 2 Spring 2012	Hamilton T6 Air Mid 3 Spring 2012	Hamilton T6 Lit TL Autumn 2008	Hamilton T6 Lit TR Autumn 2008	Hamilton T6 Lit TL Spring 2012	Hamilton T6 Lit TR Spring 2012
Deleatidium	0	0	0	0	0	0	0	0	0	0
Mauiulus	0	0	0	0	0	0	0	0	0	0
Zephlebia	0	0	0	0	0	0	0	0	0	0
Zelandobius	0	0	0	0	0	1	0	0	0	1
Hydropsyche c.f. colonica	0	0	40	0	0	3	0	0	0	0
Beraeoptera	0	0	0	0	0	0	0	0	0	0
Hydrobiosis	0	0	0	0	0	0	0	0	0	0
Oxyethira albiceps	0	15	80	0	0	5	21	2	14	31
Paroxyethira hendersoni	0	0	1	0	0	0	3	4	0	0
Paroxyethira eatoni gp	0	0	0	0	0	0	0	0	0	0
Plectrocnemia	0	0	0	0	0	0	0	0	0	0
Pycnocentrodes c.f. modestus	0	3	4	3	0	1	0	0	0	1
Triplectides sp. (small)	0	0	0	0	0	0	0	0	0	0
Triplectides obsoletus	0	0	0	0	0	0	0	0	0	0.5
Adversaeshna	0	0	0	0	0	0	0	0	0	0
Xanthocnemis	0	0	0	0	0	0	4	1	0.5	0.5
Hemicordulia	0	0	0	0	0	0	0	0	0	0
Microvelia	0	0	0	0	0	0	0	0	0	0
Sigara	0	0	0	0	0	0	0	0	0	0
Antiporus	0	0	0	0	0	0	0	0	0	0
Elmidae (*Hydora*)	0	0	0	0	0	0	0	0	0	0
Hydrophilidae	0	0	0	0	0	0	0	0	0	0
Scirtidae	0	0	0	0	0	0	0	0	0	0
Aphrophila	0	0	0	0	0	0	0	0	0	0
Austrosimulium australense gp	0	0	4	0	0	0	0	0	0	0
Ceratopogonidae	0	0	0	0	0	0	0	0	0	0
Chironomini unidentified	0	0	0	0	0	7	0	0	0	1

	Hamilton T6 Air Mid 2 Autumn 2008	Hamilton T6 Air Mid 1 Autumn 2008	Hamilton T6 Air Mid 3 Autumn 2008	Hamilton T6 Air Mid 1 Spring 2012	Hamilton T6 Air Mid 2 Spring 2012	Hamilton T6 Air Mid 3 Spring 2012	Hamilton T6 Lit TL Autumn 2008	Hamilton T6 Lit TR Autumn 2008	Hamilton T6 Lit TL Spring 2012	Hamilton T6 Lit TR Spring 2012
Chironomus	0	0	0	0	0	0	0	0	1	0
Dolichopodidae	0	0	0	0	0	0	0	0	0	0
Empididae	0	2	0	0	0	1	0	0	0	0
Ephydridae	0	0	0	0	0	0	0	0	0	0
Harrisius	0	0	0	0	0	0	0	0	0	0
Hexatomini	0	0	0	0	0	0	0	0	0	0
Limonia	0	0	0	0	0	0	0	0	2	0.5
Mischoderus	0	0	0	0	0	0	0	0	0	0
Molophilus	0	0	0	0	0	0	0	0	0	0
Muscidae	0	0	0	0	0	0	0	0	0	0
Orthocladiinae	0	39	56	0	0	5	11	0	8	5
Corynoneura	0	0	0	0	0	0	0	0	0	0
Paralimnophila	0	0	0	0	0	0	0	0	0	0
Polypedilum	0	0	0	1	0	0	0	0	0	0
Psychodidae	0	0	0	0	0	0	0	0	0	0
Tanypodinae	0	0	0	0	0	0	0	0	0	0
Tanytarsus	1	84	1256	1	2	36	9	0	7	7
Hygraula nitens	0	0	1	0	0	0	0	0.5	0	0
Cladocera - Bosminidae	0	0	0	0	0	0	0	0	0	0
Cladocera - *Daphnia*	0	0	0	0	0	0	3	0	0.5	1
Copepoda - Calanoida	0	0	0	0	0	0	0	0	0	0
Copepoda - Cyclopoida	0	0	0	0	0	0	1	0	3	0
Amarinus lacustris	0	0	0	0	0	0	0	0	0	0
Styloniscus	0	0	0	0	0	0	0	0	0	0
Tenagomysis	0	0	0	0	0	0	0	0	0	0.5
Ostracoda	0	0	0	0	0	0	0	0	1	0
Paracorophium	0	0	0	0	0	0	0	0	0	0

	Hamilton T6 Air Mid 2 Autumn 2008	Hamilton T6 Air Mid 1 Autumn 2008	Hamilton T6 Air Mid 3 Autumn 2008	Hamilton T6 Air Mid 1 Spring 2012	Hamilton T6 Air Mid 2 Spring 2012	Hamilton T6 Air Mid 3 Spring 2012	Hamilton T6 Lit TL Autumn 2008	Hamilton T6 Lit TR Autumn 2008	Hamilton T6 Lit TL Spring 2012	Hamilton T6 Lit TR Spring 2012
Paracalliope fluviatilis	0	49	272	0	0	127	137	202	164	165
Paraleptamphopus	0	0	0	0	0	0	0	0	0	0
Paranephrops planifrons	0	0	0	0	0	0	0	0	0	0
Paratya curvirostris	0	0	0	0	0	0	0	0	0	0.5
Phreatogammarus	0	0	1	0	0	0	0	0	0	0.5
Sinelobus	0	3	8	0	0	16	0	0.5	0	1
Ferrissia	1	1	0	0	0	0	0	0	0	0
Gyraulus species	0	0	0	0	0	1	1	0	0	0.5
Gyraulus (keel)	0	0	0	0	0	0	1	2	0	0
Latia neritoides	0	0	0	0	0	0	0	0	0	0
Lymnaeidae (*Pseudosuccinea*)	0	0	0	0	0	0	0	0	0	0
Physa acuta	0	0	8	0	0	2	0	3	1	0.5
Planorbarius	0	0	0	0	0	0	0	0	0	0
Potamopyrgus antipodarum	0	2	8	1	0	0	0	0	0	1
Sphaeriidae	0	0	0	0	0	8	0	0	0	0
Oligochaeta indet.	7	0	0	0	0	0	0	0	0	0
Enchytraeidae	0	0	0	0	0	0	0	0	0	0
Haplotaxidae	0	0	0	0	0	0	0	0	0	0
Lumbriculidae	0	2	1	0	0	0	12	0	0	0
Naididae	70	10	12	7	28	13	0	0	14	2
Eiseniella	0	0	0	0	0	0	0	0	0	0
Tubificidae	0	0	0	0	0	0	0	0	0	0
Branchiura sowerbyi	0	0	0	0	0	0	0	0	0	0
Cura	0	0	32	0	0	0	3	1	1	0
Dalyellidae	0	0	0	0	0	0	0	0	2	0.5
Rhabdocoel other	0	0	0	0	0	0	0	0	0	0
Nematoda	0	4	0	0	0	0	0	0	0	0

	Hamilton T6 Air Mid 2 Autumn 2008	Hamilton T6 Air Mid 1 Autumn 2008	Hamilton T6 Air Mid 3 Autumn 2008	Hamilton T6 Air Mid 1 Spring 2012	Hamilton T6 Air Mid 2 Spring 2012	Hamilton T6 Air Mid 3 Spring 2012	Hamilton T6 Lit TL Autumn 2008	Hamilton T6 Lit TR Autumn 2008	Hamilton T6 Lit TL Spring 2012	Hamilton T6 Lit TR Spring 2012
Nemertea other	2	29	96	0	0	0	3	0	0	0
Prostoma	0	67	40	0	0	0	0	0	0	0
Glossiphoniidae	0	0	16	0	0	0	0	0.5	0	0
Helobdella europaea	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Hydra	0	0	0	0	0	0	0	0	0	0
Byrozoa	0	0.5	0	0.5	0.5	0.5	0	0	0.5	0.5
Porifera	0	0	0	0	0	0	0	0	0	0
Acari	0	0	0	0	0	1	0.5	0	2	0.5
TOTAL NUMBERS	**81**	**310.5**	**1936**	**13.5**	**30.5**	**226.5**	**209**	**216.5**	**219.5**	**221**

	Ngaruawahia T7 Air Mid 1 Autumn 2012	Ngaruawahia T7 Air Mid 2 Autumn 2012	Ngaruawahia T7 Air Mid 3 Autumn 2012	Ngaruawahia T7 Air Mid 1 Spring 2011	Ngaruawahia T7 Air Mid 3 Spring 2011	Ngaruawahia T7 Lit TL Autumn 2012	Ngaruawahia T7 Lit TR Autumn 2012	Ngaruawahia T7 Lit TL Spring 2011	Ngaruawahia T7 Lit TR Spring 2011
Deleatidium	0	0	0	0	0	0	0	0	0
Mauiulus	0	0	0	0	0	0	0	0	0
Zephlebia	0	0	0	0	0	0	0	0	0
Zelandobius	0	0	0	0	0	0	0	2	3
Hydropsyche c.f. colonica	0	0	0	0	0	0	0.5	0	1
Beraeoptera	0	0	0	0	0	0	0	0	0
Hydrobiosis	0	0	0	0	0	0	0	0	0
Oxyethira albiceps	0	1	2	0	0	1	16	6	58
Paroxyethira hendersoni	0	0	0	0	0	0.5	2	2	1
Paroxyethira eatoni gp	0	0	0	0	0	1	0	0	0
Plectrocnemia	0	0	0	0	0	0	0	0	0
Pycnocentrodes c.f. modestus	0	0	0	0	0	0	0	0	0
Triplectides sp. (small)	0	0	0	0	0	0	0	0	0
Triplectides obsoletus	0	0	0	0	0	0	0	0	0
Adversaeshna	0	0	0	0	0	0	0	0	0
Xanthocnemis	0	0	0	0	0	0.5	0	1	0
Hemicordulia	0	0	0	0	0	0	0	0	0
Microvelia	0	0	0	0	0	0	0	0	0
Sigara	0	0	0	0	0	0	0	0	0
Antiporus	0	0	0	0	0	0	0	0	0
Elmidae (*Hydora*)	0	0	0	0	0	0	0	0	0
Hydrophilidae	0	0	0	0	0	0	0	0	0
Scirtidae	0	0	0	0	0	0	0	0	0
Aphrophila	0	0	0	0	0	0	0	0	0
Austrosimulium australense gp	0	0	0	0	0	0	0.5	0	0
Ceratopogonidae	0	0	0	0	0	0	0	0	1
Chironomini unidentified	0	0	0	0	0	0	0	0	0

	Ngaruawahia T7 Air Mid 1 Autumn 2012	Ngaruawahia T7 Air Mid 2 Autumn 2012	Ngaruawahia T7 Air Mid 3 Autumn 2012	Ngaruawahia T7 Air Mid 1 Spring 2011	Ngaruawahia T7 Air Mid 3 Spring 2011	Ngaruawahia T7 Lit TL Autumn 2012	Ngaruawahia T7 Lit TR Autumn 2012	Ngaruawahia T7 Lit TL Spring 2011	Ngaruawahia T7 Lit TR Spring 2011
Chironomus	0	0	0	0	0	0	0	3	0
Dolichopodidae	0	0	0	0	0	0	0	0	0
Empididae	0	0	0	0	0	0	0	0	0
Ephydridae	0	0	0	0	0	0	0	0	0
Harrisius	0	0	0	0	0	1	2	1	3
Hexatomini	0	0	0	0	0	0	0	0	0
Limonia	0	0	0	0	0	0	0	0	1
Mischoderus	0	0	0	0	0	0	0	0	0
Molophilus	0	0	0	0	0	0	0	0	0
Muscidae	0	0	0	0	0	0	0	0	0
Orthocladiinae	0	0	1	0	1	0	0.5	6	8
Corynoneura	0	0	0	0	0	0	0	0	0
Paralimnophila	0	0	0	0	0	0	0	0	0
Polypedilum	0	0	0	0	0	0	0	0	1
Psychodidae	0	0	0	0	0	0	0	0	0
Tanypodinae	0	0	0	0	0	0	0	1	0
Tanytarsus	0	46	0	0	1	1	2	20	59
Hygraula nitens	0	0	0	0	0	0	0	0	0
Cladocera - Bosminidae	0	0	0	0	0	0	0	0	0
Cladocera - *Daphnia*	0	0	0	127	84	1	0	34	25
Copepoda - Calanoida	0	0	0	0	0	0	0	0	0
Copepoda - Cyclopoida	0	0	0	0	0	0	1	1	1
Amarinus lacustris	0	0	0	0	0	0	0	0	0
Styloniscus	0	0	0	0	0	0	0	0	0
Tenagomysis	0	0	0	0	0	0	0	0	0.5
Ostracoda	0	0	0	0	0	0	0	0	1
Paracorophium	0	0	0	0	0	0	0	0	0

	Ngaruawahia T7 Air Mid 1 Autumn 2012	Ngaruawahia T7 Air Mid 2 Autumn 2012	Ngaruawahia T7 Air Mid 3 Autumn 2012	Ngaruawahia T7 Air Mid 1 Spring 2011	Ngaruawahia T7 Air Mid 3 Spring 2011	Ngaruawahia T7 Lit TL Autumn 2012	Ngaruawahia T7 Lit TR Autumn 2012	Ngaruawahia T7 Lit TL Spring 2011	Ngaruawahia T7 Lit TR Spring 2011
Paracalliope fluviatilis	0	14	10	0	1	195	180	90	32
Paraleptamphopus	0	0	0	0	0	0	0	0	0
Paranephrops planifrons	0	0	0	0	0	0	0	0	0
Paratya curvirostris	0	0	0	0	0	0	0	0	0
Phreatogammarus	0	0	0	0	0	0	0	0	1
Sinelobus	0	0	0	0	0	0	0	1	1
Ferrissia	0	0	0	0	0	0	0	0	0
Gyraulus species	0	0	0	0	0	7	1	3	0
Gyraulus (keel)	0	0	0	0	0	6	0.5	0	0
Latia neritoides	0	0	0	0	0	0	0	0	0
Lymnaeidae (*Pseudosuccinea*)	0	0	0	0	0	0	0	0	0
Physa acuta	0	0	0	0	0	1	0	1	0
Planorbarius	0	0	0	0	0	0	0	0	0
Potamopyrgus antipodarum	0	2	2	0	1	0	0	1	1
Sphaeriidae	0	0	0	0	0	0	0	0	0
Oligochaeta indet.	0	0	0	0	0	0	0	0	0
Enchytraeidae	0	0	0	0	0	0	0	0	0
Haplotaxidae	0	0	0	0	0	0	0	0	0
Lumbriculidae	0	0	0	0	0	0	0	0	0
Naididae	19	48	4	54	87	2	3	33	14
Eiseniella	0	0	0	0	0	0	0	0	0
Tubificidae	0	0	0	0	0	0	0	0	0
Branchiura sowerbyi	0	0	0	0	0	0	0	0	0
Cura	0	0	0	0	0	0	4	0	1
Dalyellidae	0	0	0	0	0	0.5	1	3	0
Rhabdocoel other	0	0	0	0	0	0	0	0	0
Nematoda	0	0	0	0	0	0	0	1	0

	Ngaruawahia T7 Air Mid 1 Autumn 2012	Ngaruawahia T7 Air Mid 2 Autumn 2012	Ngaruawahia T7 Air Mid 3 Autumn 2012	Ngaruawahia T7 Air Mid 1 Spring 2011	Ngaruawahia T7 Air Mid 3 Spring 2011	Ngaruawahia T7 Lit TL Autumn 2012	Ngaruawahia T7 Lit TR Autumn 2012	Ngaruawahia T7 Lit TL Spring 2011	Ngaruawahia T7 Lit TR Spring 2011
Nemertea other	0	2	0	0	0	1	5	2	0
Prostoma	0	0	0	0	0	0	0	0	0
Glossiphoniidae	0	0	0	0	0	0.5	0	0	0
Helobdella europaea	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Hydra	0	0	0	0	0	0	0	0	0
Byrozoa	0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Porifera	0	0	0	0	0	0.5	0	0	0
Acari	0	14	0	0	0	0	0	4	1
TOTAL NUMBERS	**19**	**113.5**	**19.5**	**181.5**	**175.5**	**220**	**219.5**	**212.5**	**214**

	Ngaruawahia T8 Air Mid 1 Autumn 2012	Ngaruawahia T8 Air Mid 2 Autumn 2012	Ngaruawahia T8 Air Mid 3 Autumn 2012	Ngaruawahia T8 Air Mid 1 Spring 2011	Ngaruawahia T8 Air Mid 2 Spring 2011	Ngaruawahia T8 Air Mid 3 Spring 2011	Ngaruawahia T8 Lit TL Autumn 2012	Ngaruawahia T8 Lit TR Autumn 2012	Ngaruawahia T8 Lit TL Spring 2011	Ngaruawahia T8 Lit TR Spring 2011
Deleatidium	0	0	0	4	0	0	0	0	0	0
Mauiulus	0	0	0	0	0	0	0	0	0	0
Zephlebia	0	0	0	0	0	0	0	0	0	0
Zelandobius	0	0	0	0	0	0	0	0	0	1
Hydropsyche c.f. colonica	0	0	0	0	0	0	0	0	0	0
Beraeoptera	0	0	0	0	0	0	0	0	0	0
Hydrobiosis	0	0	0	0	0	0	0	0	0	0
Oxyethira albiceps	0	0	0	0	0	0	4	10	9	34
Paroxyethira hendersoni	0	0	0	0	0	0	0	2	0	2
Paroxyethira eatoni gp	0	0	0	0	0	0	0	0	0	1
Plectrocnemia	0	0	0	0	0	0	0	0	0	1
Pycnocentrodes c.f. modestus	0	0	0	0	0	0	0	0	0	0
Triplectides sp. (small)	0	0	0	0	0	0	0	0	1	0
Triplectides obsoletus	0	0	0	0	0	0	0	0	0	0
Adversaeshna	0	0	0	0	0	0	0	0	0	0
Xanthocnemis	0	0	0	0	0	0	4	1	8	0
Hemicordulia	0	0	0	0	0	0	0	0	0	0
Microvelia	0	0	0	0	0	0	0	0	0	0
Sigara	0	0	0	0	0	0	0	0	0	0
Antiporus	0	0	0	0	0	0	0	0	0	0
Elmidae (*Hydora*)	0	0	0	0	0	0	0	0	0	0
Hydrophilidae	0	0	0	0	0	0	0	0	1	0
Scirtidae	0	0	0	0	0	0	0	0	0	0
Aphrophila	0	0	0	0	0	0	0	0	0	0
Austrosimulium australense gp	0	0	0	0	0	0	0	0	0	0
Ceratopogonidae	0	0	0	0	0	0	0	0	0	0

	Ngaruawahia T8 Air Mid 1 Autumn 2012	Ngaruawahia T8 Air Mid 2 Autumn 2012	Ngaruawahia T8 Air Mid 3 Autumn 2012	Ngaruawahia T8 Air Mid 1 Spring 2011	Ngaruawahia T8 Air Mid 2 Spring 2011	Ngaruawahia T8 Air Mid 3 Spring 2011	Ngaruawahia T8 Lit TL Autumn 2012	Ngaruawahia T8 Lit TR Autumn 2012	Ngaruawahia T8 Lit TL Spring 2011	Ngaruawahia T8 Lit TR Spring 2011
Chironomini unidentified	0	0	0	0	0	0	0	0	0	0
Chironomus	0	0	0	0	0	0	0	0	1	1
Dolichopodidae	0	0	0	0	0	0	0	0	0	0
Empididae	0	0	0	0	0	0	0	0	0	0
Ephydridae	0	0	0	0	0	0	0	0	0	0
Harrisius	1	0	0	0	0	0	1	1	0	0.5
Hexatomini	0	0	0	0	0	0	0	0	0	0
Limonia	0	0	0	0	0	0	0	0	0	0.5
Mischoderus	0	0	0	0	0	0	0	0	0	0
Molophilus	0	0	0	0	0	0	0	0	0	0
Muscidae	0	0	0	0	0	0	0	0	0	0
Orthocladiinae	0	0	0	0	0	0	1	3	2	31
Corynoneura	0	0	0	0	0	0	0	0	0	0
Paralimnophila	0	0	0	0	0	0	0	0	0	0
Polypedilum	0	0	0	0	0	0	0	0	0	0
Psychodidae	0	0	0	0	0	0	0	0	0	0
Tanypodinae	0	0	0	0	0	0	0	0	0	0
Tanytarsus	0	0	0	0	0	0	0	41	1	30
Hygraula nitens	0	0	0	0	0	0	0	2	0	0
Cladocera - Bosminidae	0	0	0	0	0	0	0	0	0	0
Cladocera - *Daphnia*	0	0	0	2	111	119	4	2	7	5
Copepoda - Calanoida	0	0	0	0	0	0	0	0	0	0
Copepoda - Cyclopoida	0	0	0	0	0	0	2	1	3	2
Amarinus lacustris	0	0	0	0	0	0	0	0	0	0
Styloniscus	0	0	0	0	0	0	0	0	0	0
Tenagomysis	0	0	0	0	0	0	0	0	0	4
Ostracoda	0	0	0	0	0	0	0	0	0	0

	Ngaruawahia T8 Air Mid 1 Autumn 2012	Ngaruawahia T8 Air Mid 2 Autumn 2012	Ngaruawahia T8 Air Mid 3 Autumn 2012	Ngaruawahia T8 Air Mid 1 Spring 2011	Ngaruawahia T8 Air Mid 2 Spring 2011	Ngaruawahia T8 Air Mid 3 Spring 2011	Ngaruawahia T8 Lit TL Autumn 2012	Ngaruawahia T8 Lit TR Autumn 2012	Ngaruawahia T8 Lit TL Spring 2011	Ngaruawahia T8 Lit TR Spring 2011
Paracorophium	0	0	0	0	0	0	0	0	0	0
Paracalliope fluviatilis	0	0	0	0	0	1	153	124	132	58
Paraleptamphopus	0	0	0	0	0	0	0	0	0	0
Paranephrops planifrons	0	0	0	0	0	0	0	0	0	0
Paratya curvirostris	0	0	0	0	0	0	0	0.5	4	0.5
Phreatogammarus	0	0	0	0	0	0	0	0	0	0
Sinelobus	0	0	0	0	0	0	0	0	0	0
Ferrissia	0	0	0	0	0	0	0	1	0	2
Gyraulus species	0	0	0	0	0	0	14	0.5	2	10
Gyraulus (keel)	0	0	0	0	0	0	0	0	1	1
Latia neritoides	0	0	0	0	0	0	0	0	0	0
Lymnaeidae (*Pseudosuccinea*)	0	0	0	0	0	0	0	0	0	0
Physa acuta	0	0	0	0	1	0	3	1	3	0.5
Planorbarius	0	0	0	0	0	0	0	0	0	0
Potamopyrgus antipodarum	0	0	0	0	0	0	1	0	1	2
Sphaeriidae	0	0	0	0	0	0	0	0	0	0
Oligochaeta indet.	0	0	0	0	0	0	0	0	0	0
Enchytraeidae	0	0	0	0	0	0	0	0	0	0
Haplotaxidae	0	0	0	0	0	0	0	0	0	0
Lumbriculidae	0	0	0	0	0	0	6	0	0	0
Naididae	9	16	56	202	90	103	0	2	16	24
Eiseniella	0	0	0	0	0	0	0	0	0	0
Tubificidae	0	0	0	0	0	0	0	0	0	0
Branchiura sowerbyi	0	0	0	0	0	0	2	0	0	0
Cura	0	0	0	0	0	0	1	7	0	0
Dalyellidae	0	0	0	0	0	0	4	0	8	2

	Ngaruawahia T8 Air Mid 1 Autumn 2012	Ngaruawahia T8 Air Mid 2 Autumn 2012	Ngaruawahia T8 Air Mid 3 Autumn 2012	Ngaruawahia T8 Air Mid 1 Spring 2011	Ngaruawahia T8 Air Mid 2 Spring 2011	Ngaruawahia T8 Air Mid 3 Spring 2011	Ngaruawahia T8 Lit TL Autumn 2012	Ngaruawahia T8 Lit TR Autumn 2012	Ngaruawahia T8 Lit TL Spring 2011	Ngaruawahia T8 Lit TR Spring 2011
Rhabdocoel other	0	0	0	0	0	0	0	0	0	0
Nematoda	0	0	0	0	0	0	0	1	0	0
Nemertea other	1	0	0	0	0	0	6	17	0	0
Prostoma	0	0	0	0	0	0	0	0	0	0
Glossiphoniidae	0	0	0	0	0	0	2	0	0	0
Helobdella europaea	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Hydra	0	0	0	0	0	0	0	0	0	0
Byrozoa	0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Porifera	0	0	0	0	0	0	0	0	0	0
Acari	0	0	0	0.5	0	0	0	1	0	0
TOTAL NUMBERS	**11**	**16.5**	**56.5**	**208.5**	**202.5**	**223.5**	**208.5**	**217.5**	**200.5**	**213.5**

	Ngaruawahia T9 Air Mid 1 Autumn 2012	Ngaruawahia T9 Air Mid 2 Autumn 2012	Ngaruawahia T9 Air Mid 3 Autumn 2012	Ngaruawahia T9 Air Mid 1 Spring 2011	Ngaruawahia T9 Air Mid 2 Spring 2011	Ngaruawahia T9 Air Mid 3 Spring 2011	Ngaruawahia T9 Lit TL Autumn 2012	Ngaruawahia T9 Lit TR Autumn 2012	Ngaruawahia T9 Lit TL Spring 2011	Ngaruawahia T9 Lit TR Spring 2011
Deleatidium	0	0	0	59	1	0	0	0	0	0
Mauiulus	0	0	0	0	0	0	0	0	0	0
Zephlebia	0	0	0	0	0	0.5	0	0	1	0
Zelandobius	0	0	0	3	1	1	0	0	3	0
Hydropsyche c.f. colonica	0	0	0	0	0	0	0	0	0	0
Beraeoptera	0	0	0	0	0	0	0	0	0	0
Hydrobiosis	0	0	0	0	0	0	0	0	0	0
Oxyethira albiceps	0	0	16	1	0	0	8	8	8	23
Paroxyethira hendersoni	0	0	0	0	0	0.5	0	0.5	0	4
Paroxyethira eatoni gp	0	0	0	0	0	0	0	9	1	0
Plectrocnemia	0	0	0	0	0	0	0	0	0	0
Pycnocentrodes c.f. modestus	0	0	0	0	0	0	0	0	0	0
Triplectides sp. (small)	0	0	0	0	0	0	0	0	0	0
Triplectides obsoletus	0	0	0	0	0	0	0.5	0	0	0
Adversaeshna	0	0	0	0	0	0	0	0	0	0
Xanthocnemis	0	0	1	0	0	0	2	1	3	0
Hemicordulia	0	0	0	0	0	0	0	0	0	0
Microvelia	0	0	0	0	0	0	0	0	0	0
Sigara	0	0	0	0	0	0	0	0	0	0
Antiporus	0	0	0	0	0	0	0	0	0	0
Elmidae (*Hydora*)	0	0	0	0	0	0	0	0	0	0
Hydrophilidae	0	0	0	0	0	0	0	0	0	0
Scirtidae	0	0	0	0	0	0	0	0	0	0
Aphrophila	0	0	0	0	0	0	0	0	0	0
Austrosimulium australense gp	0	0	0	2	0	0	1	0	0	0
Ceratopogonidae	0	0	0	0	0	0	0	0	0	0

	Ngaruawahia T9 Air Mid 1 Autumn 2012	Ngaruawahia T9 Air Mid 2 Autumn 2012	Ngaruawahia T9 Air Mid 3 Autumn 2012	Ngaruawahia T9 Air Mid 1 Spring 2011	Ngaruawahia T9 Air Mid 2 Spring 2011	Ngaruawahia T9 Air Mid 3 Spring 2011	Ngaruawahia T9 Lit TL Autumn 2012	Ngaruawahia T9 Lit TR Autumn 2012	Ngaruawahia T9 Lit TL Spring 2011	Ngaruawahia T9 Lit TR Spring 2011
Chironomini unidentified	0	0	0	0	0	0	0	0	0	0
Chironomus	0	0	0	0	0	0	0	0	2	1
Dolichopodidae	0	0	0	0	0	0	0	0	0	0
Empididae	0	0	0	0	0	0	0	0	0	0
Ephydridae	0	0	0	0	0	0	0	0	0	0
Harrisius	0	0	0	0	0	0	3	1	0	0
Hexatomini	0	0	0	0	0	0	0	0	0	0
Limonia	0	0	0	0	0	0	0	0	0	0
Mischoderus	0	0	0	0	0	0	0	0	0	0
Molophilus	0	0	0	0	0	0	0	0	0	0
Muscidae	0	0	0	0	0	0	0	0	0	0
Orthocladiinae	0	0	18	3	0	18	0	2	8	31
Corynoneura	0	0	0	0	0	0	0	0	0	0
Paralimnophila	0	0	0	0	0	0	0	0	0	0
Polypedilum	0	0	0	1	0	0	0	0	1	0
Psychodidae	0	0	0	0	0	0	0	0	0	0
Tanypodinae	0	0	0	6	0	0	0	0	0	0
Tanytarsus	0	0	1	0	1	165	1	5	6	46
Hygraula nitens	0	0	0	0	0	0	0	1	0	0
Cladocera - Bosminidae	0	0	0	0	0	0	0	0	0	0
Cladocera - *Daphnia*	0	0	0	6	33	3	0	2	10	2
Copepoda - Calanoida	0	0	0	0	0	0	0	0	0	0
Copepoda - Cyclopoida	0	0	0	0	0	0	0	0	0	4
Amarinus lacustris	0	0	0	0	0	0	0	0	0	0
Styloniscus	0	0	0	0	0	0	0	0	0	0
Tenagomysis	0	0	0	0	0	0	0	0	5	0
Ostracoda	0	0	1	0	0	0	0	0	0	0

	Ngaruawahia T9 Air Mid 1 Autumn 2012	Ngaruawahia T9 Air Mid 2 Autumn 2012	Ngaruawahia T9 Air Mid 3 Autumn 2012	Ngaruawahia T9 Air Mid 1 Spring 2011	Ngaruawahia T9 Air Mid 2 Spring 2011	Ngaruawahia T9 Air Mid 3 Spring 2011	Ngaruawahia T9 Lit TL Autumn 2012	Ngaruawahia T9 Lit TR Autumn 2012	Ngaruawahia T9 Lit TL Spring 2011	Ngaruawahia T9 Lit TR Spring 2011
Paracorophium	0	0	0	0	0	0	0	0	0	0
Paracalliope fluviatilis	0	0	89	5	0	21	154	119	137	52
Paraleptamphopus	0	0	0	0	0	0	0	0	0	0
Paranephrops planifrons	0	0	0	0	0	0	0	0	0	0
Paratya curvirostris	0	0	0	0	0	0	9	1	0	0
Phreatogammarus	0	0	0	0	0	0	0.5	0	0	0
Sinelobus	0	0	0	0	0	0	0	0	0	0
Ferrissia	0	0	1	0	0	0	0	2	0	0
Gyraulus species	0	0	0	0	0	0.5	14	26	2	5
Gyraulus (keel)	0	0	0	0	0	0	0	4	0	0
Latia neritoides	0	0	0	0	0	0	0	0	0	0
Lymnaeidae (*Pseudosuccinea*)	0	0	0	0	0	0	0	0	0	0
Physa acuta	0	0	0	0	0	0.5	4	4	1	1
Planorbarius	0	0	0	0	0	0	0	0	0	0
Potamopyrgus antipodarum	1	0	0	0	0	0	1	0	4	0
Sphaeriidae	0	0	0	0	0	0	0	0	0	0
Oligochaeta indet.	0	0	0	0	0	0	0	0	0	0
Enchytraeidae	0	0	0	0	0	0	0	0	0	0
Haplotaxidae	0	0	0	0	0	0	0	0	0	0
Lumbriculidae	0	47	0	0	0	0	0	0	0	0
Naididae	20	0	54	125	30	0.5	3	4	8	40
Eiseniella	0	0	0	0	0	0	0	0	1	0
Tubificidae	0	0	0	0	0	0	0	0	0	0
Branchiura sowerbyi	0	0	0	0	0	0	0	0	0	0
Cura	0	0	2	0	0	0	1	5	0	0
Dalyellidae	0	0	0	0	0	0	7	4	7	1

	Ngaruawahia T9 Air Mid 1 Autumn 2012	Ngaruawahia T9 Air Mid 2 Autumn 2012	Ngaruawahia T9 Air Mid 3 Autumn 2012	Ngaruawahia T9 Air Mid 1 Spring 2011	Ngaruawahia T9 Air Mid 2 Spring 2011	Ngaruawahia T9 Air Mid 3 Spring 2011	Ngaruawahia T9 Lit TL Autumn 2012	Ngaruawahia T9 Lit TR Autumn 2012	Ngaruawahia T9 Lit TL Spring 2011	Ngaruawahia T9 Lit TR Spring 2011
Rhabdocoel other	0	0	0	0	0	0	0	0	0	0
Nematoda	0	0	0	0	0	1	0	0	0	0
Nemertea other	0	0	20	0	0	0	5	13	0	0
Prostoma	0	0	0	0	0	0	0	0	0	0
Glossiphoniidae	0	0	1	0	0	0.5	0	0	0	0
Helobdella europaea	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Hydra	0	0	0	0	0	0.5	0	1	0	1
Byrozoa	0	0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Porifera	0.5	0	0	0	0	0	0	0	0	0
Acari	0	0	5	0	0	0.5	0	1	1	0
TOTAL NUMBERS	**21.5**	**47**	**204.5**	**211.5**	**66.5**	**213**	**214.5**	**213**	**208.5**	**211.5**

	Ngaruawahia T9 Air Mid 1 Nga DS2 Autumn 2012	Ngaruawahia T9 Air Mid 2 Nga DS2 Autumn 2012	Ngaruawahia T9 Air Mid 3 Nga DS2 Autumn 2012	Ngaruawahia T9 Air Mid 1 DS2 Mid 1 Spring 2011	Ngaruawahia T9 Air Mid 2 DS2 Mid 2 Spring 2011	Ngaruawahia T9 Air Mid 3 DS2 Mid 3 Spring 2011	Ngaruawahia T9 Lit TL DS2 TL Autumn 2012	Ngaruawahia T9 Lit TR DS2 TR Autumn 2012	Ngaruawahia T9 Lit TL DS2 TL Spring 2011	Ngaruawahia T9 Lit TR DS2 TR Spring 2011
Deleatidium	0	0	0	59	1	0	0	0	0	0
Mauiulus	0	0	0	0	0	0	0	0	0	0
Zephlebia	0	0	0	0	0	0.5	0	0	1	0
Zelandobius	0	0	0	3	1	1	0	0	3	0
Hydropsyche c.f. colonica	0	0	0	0	0	0	0	0	0	0
Beraeoptera	0	0	0	0	0	0	0	0	0	0
Hydrobiosis	0	0	0	0	0	0	0	0	0	0
Oxyethira albiceps	0	0	16	1	0	0	8	8	8	23
Paroxyethira hendersoni	0	0	0	0	0	0.5	0	0.5	0	4
Paroxyethira eatoni gp	0	0	0	0	0	0	0	9	1	0
Plectrocnemia	0	0	0	0	0	0	0	0	0	0
Pycnocentrodes c.f. modestus	0	0	0	0	0	0	0	0	0	0
Triplectidessp. (small)	0	0	0	0	0	0	0	0	0	0
Triplectides obsoletus	0	0	0	0	0	0	0.5	0	0	0
Adversaeshna	0	0	0	0	0	0	0	0	0	0
Xanthocnemis	0	0	1	0	0	0	2	1	3	0
Hemicordulia	0	0	0	0	0	0	0	0	0	0
Microvelia	0	0	0	0	0	0	0	0	0	0
Sigara	0	0	0	0	0	0	0	0	0	0
Antiporus	0	0	0	0	0	0	0	0	0	0
Elmidae (*Hydora*)	0	0	0	0	0	0	0	0	0	0
Hydrophilidae	0	0	0	0	0	0	0	0	0	0
Scirtidae	0	0	0	0	0	0	0	0	0	0
Aphrophila	0	0	0	0	0	0	0	0	0	0
Austrosimulium australense gp	0	0	0	2	0	0	1	0	0	0

	Ngaruawahia T9 Air Mid 1 Nga DS2 Autumn 2012	Ngaruawahia T9 Air Mid 2 Nga DS2 Autumn 2012	Ngaruawahia T9 Air Mid 3 Nga DS2 Autumn 2012	Ngaruawahia T9 Air Mid 1 DS2 Mid 1 Spring 2011	Ngaruawahia T9 Air Mid 2 DS2 Mid 2 Spring 2011	Ngaruawahia T9 Air Mid 3 DS2 Mid 3 Spring 2011	Ngaruawahia T9 Lit TL DS2 TL Autumn 2012	Ngaruawahia T9 Lit TR DS2 TR Autumn 2012	Ngaruawahia T9 Lit TL DS2 TL Spring 2011	Ngaruawahia T9 Lit TR DS2 TR Spring 2011
Ceratopogonidae	0	0	0	0	0	0	0	0	0	0
Chironomini unidentified	0	0	0	0	0	0	0	0	0	0
Chironomus	0	0	0	0	0	0	0	0	2	1
Dolichopodidae	0	0	0	0	0	0	0	0	0	0
Empididae	0	0	0	0	0	0	0	0	0	0
Ephydridae	0	0	0	0	0	0	0	0	0	0
Harrisius	0	0	0	0	0	0	3	1	0	0
Hexatomini	0	0	0	0	0	0	0	0	0	0
Limonia	0	0	0	0	0	0	0	0	0	0
Mischoderus	0	0	0	0	0	0	0	0	0	0
Molophilus	0	0	0	0	0	0	0	0	0	0
Muscidae	0	0	0	0	0	0	0	0	0	0
Orthocladiinae	0	0	18	3	0	18	0	2	8	31
Corynoneura	0	0	0	0	0	0	0	0	0	0
Paralimnophila	0	0	0	0	0	0	0	0	0	0
Polypedilum	0	0	0	1	0	0	0	0	1	0
Psychodidae	0	0	0	0	0	0	0	0	0	0
Tanypodinae	0	0	0	6	0	0	0	0	0	0
Tanytarsus	0	0	1	0	1	165	1	5	6	46
Hygraula nitens	0	0	0	0	0	0	0	1	0	0
Cladocera - Bosminidae	0	0	0	0	0	0	0	0	0	0
Cladocera - Chydoridae	0	0	0	0	0	0	0	0	0	0
Cladocera - *Daphnia*	0	0	0	6	33	3	0	2	10	2
Copepoda - Calanoida	0	0	0	0	0	0	0	0	0	0
Copepoda - Cyclopoida	0	0	0	0	0	0	0	0	0	4
Amarinus lacustris	0	0	0	0	0	0	0	0	0	0

	Ngaruawahia T9 Air Mid 1 Nga DS2 Autumn 2012	Ngaruawahia T9 Air Mid 2 Nga DS2 Autumn 2012	Ngaruawahia T9 Air Mid 3 Nga DS2 Autumn 2012	Ngaruawahia T9 Air Mid 1 DS2 Mid 1 Spring 2011	Ngaruawahia T9 Air Mid 2 DS2 Mid 2 Spring 2011	Ngaruawahia T9 Air Mid 3 DS2 Mid 3 Spring 2011	Ngaruawahia T9 Lit TL DS2 TL Autumn 2012	Ngaruawahia T9 Lit TR DS2 TR Autumn 2012	Ngaruawahia T9 Lit TL DS2 TL Spring 2011	Ngaruawahia T9 Lit TR DS2 TR Spring 2011
Styloniscus	0	0	0	0	0	0	0	0	0	0
Mysid Tenagomysis	0	0	0	0	0	0	0	0	5	0
Ostracoda	0	0	1	0	0	0	0	0	0	0
Paracorophium	0	0	0	0	0	0	0	0	0	0
Paracalliope fluviatilis	0	0	89	5	0	21	154	119	137	52
Paraleptamphopus	0	0	0	0	0	0	0	0	0	0
Paranephrops planifrons	0	0	0	0	0	0	0	0	0	0
Paratya curvirostris	0	0	0	0	0	0	9	1	0	0
Phreatogammarus	0	0	0	0	0	0	0.5	0	0	0
Sinelobus	0	0	0	0	0	0	0	0	0	0
Tanais	0	0	0	0	0	0	0	0	0	0
Ferrissia	0	0	1	0	0	0	0	2	0	0
Gyraulus species	0	0	0	0	0	0.5	14	26	2	5
Gyraulus (keel)	0	0	0	0	0	0	0	4	0	0
Latia neritoides	0	0	0	0	0	0	0	0	0	0
Lymnaeidae (*Pseudosuccinea*)	0	0	0	0	0	0	0	0	0	0
Physa acuta	0	0	0	0	0	0.5	4	4	1	1
Planorbarius	0	0	0	0	0	0	0	0	0	0
Potamopyrgus antipodarum	1	0	0	0	0	0	1	0	4	0
Sphaeriidae	0	0	0	0	0	0	0	0	0	0
Oligochaeta indet.	0	0	0	0	0	0	0	0	0	0
Enchytraeidae	0	0	0	0	0	0	0	0	0	0
Haplotaxidae	0	0	0	0	0	0	0	0	0	0
Lumbriculidae	0	47	0	0	0	0	0	0	0	0
Naididae	20	0	54	125	30	0.5	3	4	8	40

	Ngaruawahia T9 Air Mid 1 Nga DS2 Autumn 2012	Ngaruawahia T9 Air Mid 2 Nga DS2 Autumn 2012	Ngaruawahia T9 Air Mid 3 Nga DS2 Autumn 2012	Ngaruawahia T9 Air Mid 1 DS2 Mid 1 Spring 2011	Ngaruawahia T9 Air Mid 2 DS2 Mid 2 Spring 2011	Ngaruawahia T9 Air Mid 3 DS2 Mid 3 Spring 2011	Ngaruawahia T9 Lit TL DS2 TL Autumn 2012	Ngaruawahia T9 Lit TR DS2 TR Autumn 2012	Ngaruawahia T9 Lit TL DS2 TL Spring 2011	Ngaruawahia T9 Lit TR DS2 TR Spring 2011
Eiseniella	0	0	0	0	0	0	0	0	1	0
Tubificidae	0	0	0	0	0	0	0	0	0	0
Branchiura sowerbyi	0	0	0	0	0	0	0	0	0	0
Cura	0	0	2	0	0	0	1	5	0	0
Dalyellidae	0	0	0	0	0	0	7	4	7	1
Rhabdocoel other	0	0	0	0	0	0	0	0	0	0
Nematoda	0	0	0	0	0	1	0	0	0	0
Nemertea other	0	0	20	0	0	0	5	13	0	0
Prostoma	0	0	0	0	0	0	0	0	0	0
Glossiphoniidae	0	0	1	0	0	0.5	0	0	0	0
Helobdella europaea	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Hydra	0	0	0	0	0	0.5	0	1	0	1
Byrozoa	0	0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Porifera	0.5	0	0	0	0	0	0	0	0	0
Acari	0	0	5	0	0	0.5	0	1	1	0
TOTAL NUMBERS	**21.5**	**47**	**204.5**	**211.5**	**66.5**	**213**	**214.5**	**213**	**208.5**	**211.5**

	Huntly T11 Air Mid 1 Autumn 2011	Huntly T11 Air Mid 2 Autumn 2011	Huntly T11 Air Mid 3 Autumn 2011	Huntly T11 Lit TL Autumn 2011	Huntly T11 Lit TR Autumn 2011	Huntly T12 Air Mid 1 Autumn 2011	Huntly T12 Air Mid 2 Autumn 2011	Huntly T12 Lit TL Autumn 2011	Huntly T12 Lit TR Autumn 2011
Deleatidium	0	0	0	0	0	0	0	0	0
Mauiulus	0	0	0	0	0	0	0	0	0
Zephlebia	0	0	0	0	0	0	0	0	0
Zelandobius	0	0	0	0	0	0	0	0	0
Hydropsyche c.f. colonica	0	0	0	0	0	0	0	0	0
Beraeoptera	0	1	0	0	2	0	0	0	0
Hydrobiosis	0	0	0	0	0	0	0	0	0
Oxyethira albiceps	0	0	0	0	14	0	0	13	12
Paroxyethira hendersoni	0	0	0	0	1	0	0	0	0
Paroxyethira eatoni gp	0	0	0	0	0	0	0	0	0
Plectrocnemia	0	0	0	0	0	0	0	0	0
Pycnocentrodes c.f. modestus	0	0	0	0	0	0	0	0	0
Triplectides sp. (small)	0	0	0	0	0	0	0	0	0
Triplectides obsoletus	0	0	0	0	0	0	0	0	0
Adversaeshna	0	0	0	1	0	0	0	0	0
Xanthocnemis	0	0	0	1	0	0	0	6	0.5
Hemicordulia	0	0	0	0	0	0	0	0	0
Microvelia	0	0	0	0	0	0	0	0	0
Sigara	0	0	0	0	0	0	0	0	0
Antiporus	0	0	0	0	0	0	0	0	0
Elmidae (*Hydora*)	0	0	0	0	0	0	0	0	0
Hydrophilidae	0	0	0	0	0	0	0	0	0
Scirtidae	0	0	0	0	0	0	0	0	0
Aphrophila	0	0	0	0	0	0	0	0	0
Austrosimulium australense gp	0	0	0	0	0	0	0	0	0
Ceratopogonidae	0	0	0	0	0	0	0	0	0
Chironomini unidentified	0	0	0	0	0	0	0	0	0

	Huntly T11 Air Mid 1 Autumn 2011	Huntly T11 Air Mid 2 Autumn 2011	Huntly T11 Air Mid 3 Autumn 2011	Huntly T11 Lit TL Autumn 2011	Huntly T11 Lit TR Autumn 2011	Huntly T12 Air Mid 1 Autumn 2011	Huntly T12 Air Mid 2 Autumn 2011	Huntly T12 Lit TL Autumn 2011	Huntly T12 Lit TR Autumn 2011
Chironomus	0	0	0	0	0	0	0	0	0
Dolichopodidae	0	0	0	0	0	0	0	0	0
Empididae	0	0	0	0	0	0	0	0	0
Ephydridae	0	0	0	0	0	0	0	0	0
Harrisius	0	0	16	0	1	0	0	0	0
Hexatomini	0	0	0	0	0	0	0	0	0
Limonia	0	0	0	0	0	0	0	0	0
Mischoderus	0	0	0	0	0	0	0	0	0
Molophilus	0	0	0	0	0	0	0	0	0
Muscidae	0	0	0	0	0	0	0	0	0
Orthocladiinae	0	0	0	0	0	0	0	0	0.5
Corynoneura	0	0	0	0	0	0	0	0	0
Paralimnophila	0	0	0	0	0	0	0	0	0
Polypedilum	0	0	0	0	0	0	0	0	0
Psychodidae	0	0	0	0	0	0	0	0	0
Tanypodinae	0	0	0	0	0	0	0	0	0
Tanytarsus	0	0	0	0	2	0	0	0	4
Hygraula nitens	0	0	0	0	0	0	0	0	0
Cladocera - Bosminidae	0	0	0	0	0	0	0	0	0
Cladocera - *Daphnia*	0	0	0	1	0	0	0	0	0
Copepoda - Calanoida	0	0	0	0	0	0	0	0	0
Copepoda - Cyclopoida	0	0	0	4	1	0	0	0	0
Amarinus lacustris	0	0	0	0	0	0	0	0	0
Styloniscus	0	0	0	0	0	0	0	0	0
Tenagomysis	0	0	0	0.5	1	0	0	0	0
Ostracoda	0	0	0	0	0	0	0	0	0
Paracorophium	0	0	0	0	0	0	0	0	0

	Huntly T11 Air Mid 1 Autumn 2011	Huntly T11 Air Mid 2 Autumn 2011	Huntly T11 Air Mid 3 Autumn 2011	Huntly T11 Lit TL Autumn 2011	Huntly T11 Lit TR Autumn 2011	Huntly T12 Air Mid 1 Autumn 2011	Huntly T12 Air Mid 2 Autumn 2011	Huntly T12 Lit TL Autumn 2011	Huntly T12 Lit TR Autumn 2011
Paracalliope fluviatilis	0	1	0	12	15	0	0	33	15
Paraleptamphopus	0	0	0	0	0	0	0	0	0
Paranephrops planifrons	0	0	0	0	0	0	0	0	0
Paratya curvirostris	0	0	0	1	3	0	0	2	1
Phreatogammarus	0	0	0	0	0	0	0	0	0
Sinelobus	0	0	0	0	0	0	0	0	0
Ferrissia	0	0	0	0	1	0	0	0	0
Gyraulus species	0	0	0	2	4	0	0	0	5
Gyraulus (keel)	0	0	0	0	0	0	0	0	0
Latia neritoides	0	0	0	0	0	0	0	0	0
Lymnaeidae (*Pseudosuccinea*)	0	0	0	0	0	0	0	0	0
Physa acuta	0	0	0	4	1	0	0	2	1
Planorbarius	0	0	0	0	0	0	0	0	0
Potamopyrgus antipodarum	0	0	0	0	4	0	0	1	1
Sphaeriidae	0	0	0	0	0	0	0	0	0
Oligochaeta indet.	0	0	0	0	0	0	0	0	0
Enchytraeidae	0	0	0	0	0	0	0	0	0
Haplotaxidae	0	0	0	0	0	0	0	0	0
Lumbriculidae	0	0	0	0	0	0	0	0	0
Naididae	21	10	6	4	3	31	6	11	3
Eiseniella	0	0	0	0	0	0	0	0	0
Tubificidae	0	0	0	0	0	0	0	0	0
Branchiura sowerbyi	0	0	0	0	0	0	0	0	0
Cura	0	0	0	2	2	0	0	6	1
Dalyellidae	0	0	0	0	0	0	0	0	0
Rhabdocoel other	0	0	0	0	0	0	0	0	0
Nematoda	0	0	0	0	0	0	0	0	0

	Huntly T11 Air Mid 1 Autumn 2011	Huntly T11 Air Mid 2 Autumn 2011	Huntly T11 Air Mid 3 Autumn 2011	Huntly T11 Lit TL Autumn 2011	Huntly T11 Lit TR Autumn 2011	Huntly T12 Air Mid 1 Autumn 2011	Huntly T12 Air Mid 2 Autumn 2011	Huntly T12 Lit TL Autumn 2011	Huntly T12 Lit TR Autumn 2011
Nemertea other	0	0	2	0	3	0	0	5	1
Prostoma	0	0	0	0	0	0	0	0	0
Glossiphoniidae	0	0	0	2	0	0	0	0	0.5
Helobdella europaea	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
Hydra	0	0	0	0	0	0	0	0	0
Byrozoa	0	0	0	0	0	0	0	0	0
Porifera	0	0	0	0	0	0	0	0	0
Acari	0	0	0	0	0	0	1	2	0
TOTAL NUMBERS	**21**	**12**	**24**	**34.5**	**58**	**31**	**6**	**79**	**45.5**

	Huntly T13 Air Mid 1 Autumn 2011	Huntly T13 Air Mid 2 Autumn 2011	Huntly T13 Air Mid 3 Autumn 2011	Huntly T13 Lit TL Autumn 2011	Huntly T13 Lit TR Autumn 2011	Huntly T13 Lit TL Spring 2011	Huntly T13 Lit TR Spring 2011	Huntly T14 Air Mid 1 Autumn 2011	Huntly T14 Air Mid 2 Autumn 2011	Huntly T14 Lit TL Autumn 2011	Huntly T14 Lit TR Autumn 2011	Huntly T14 Lit TL Spring 2011	Huntly T14 Lit TR Spring 2011
Deleatidium	0	0	0	0	0	0	0	0	0	0	0	0	0
Mauiulus	0	0	0	0	0	0	0	0	0	0	0	0	0
Zephlebia	0	0	0	0	0	0	0	0	0	0	0	0	0
Zelandobius	0	0	0	0	0	1	0	0	0	0	0	0	2
Hydropsyche c.f. colonica	0	0	0	0	0	0	0	0	0	0	0	0	1
Beraeoptera	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrobiosis	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyethira albiceps	0	0	0	4	21	54	38	0	0	1	5	25	39
Paroxyethira hendersoni	0	0	0	0	1	0	1	0	0	0	0	0	1
Paroxyethira eatoni gp	0	0	0	0	0	0	0	0	0	0	0	0	0
Plectrocnemia	0	0	0	0	0	0	0	0	0	0	0	0	0
Pycnocentrodes c.f. modestus	0	0	0	0	0	0	0	0	0	0	0	0	0
Triplectides sp. (small)	0	0	0	0	0	0	0	0	0	0	0	0	0
Triplectides obsoletus	0	0	0	0	0	0	0	0	0	0	0	0	0
Adversaeshna	0	0	0	0	0	0	0	0	0	0	0	0	0
Xanthocnemis	0	0	0	5	0	4	1	0	0	2	1	1	1
Hemicordulia	0	0	0	0.5	0.5	0	0	0	0	0	0	0	0
Microvelia	0	0	0	0	0	0	0	0	0	0	0	0	0
Sigara	0	0	0	0	0	0	0	0	0	0	0	0	0
Antiporus	0	0	0	0	0	0	0	0	0	0	0	0	0
Elmidae (*Hydora*)	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrophilidae	0	0	0	0	0	0	0	0	0	0	0	0	1
Scirtidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Aphrophila	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrosimulium australense gp	0	0	0	0	0	0	0	0	0	0	0	0	0
Ceratopogonidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomini unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0

	Huntly T13 Air Mid 1 Autumn 2011	Huntly T13 Air Mid 2 Autumn 2011	Huntly T13 Air Mid 3 Autumn 2011	Huntly T13 Lit TL Autumn 2011	Huntly T13 Lit TR Autumn 2011	Huntly T13 Lit TL Spring 2011	Huntly T13 Lit TR Spring 2011	Huntly T14 Air Mid 1 Autumn 2011	Huntly T14 Air Mid 2 Autumn 2011	Huntly T14 Lit TL Autumn 2011	Huntly T14 Lit TR Autumn 2011	Huntly T14 Lit TL Spring 2011	Huntly T14 Lit TR Spring 2011
Chironomus	0	0	0	0	0	0	4	0	0	0	0	1	0
Dolichopodidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Empididae	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephydridae	0	0	0	0	0	0	0	0	0	0	0	0	0
Harrisius	0	0	4	0	0	1	0	0	0	0	1	1	0
Hexatomini	0	0	0	0	0	0	0	0	0	0	0	0	0
Limonia	0	0	0	0	0	0	0	0	0	0	0	0	0
Mischoderus	0	0	0	0	0	0	0	0	0	0	0	0	0
Molophilus	0	0	0	0	0	0	0	0	0	0	0	0	0
Muscidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladiinae	0	0	0	0	0	0	13	0	0	0	0	1	3
Corynoneura	0	0	0	0	0	4	0	0	0	0	0	0	0
Paralimnophila	0	0	0	0	0	0	0	0	0	0	0	0	0
Polypedilum	0	0	0	0	0	0	0	0	0	0	0	0	0
Psychodidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Tanypodinae	0	0	0	0	0	0	0	0	0	0	0	0	0
Tanytarsus	0	0	0	0	0.5	20	18	0	0	0	2	3	31
Hygraula nitens	0	0	0	0	0	0	0	0	0	0	0	0	0
Cladocera - Bosminidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Cladocera - *Daphnia*	0	0	0	0	0	2	6	0	0	0	0	0	1
Copepoda - Calanoida	0	0	0	0	0	0	0	0	0	0	0	0	0
Copepoda - Cyclopoida	0	0	0	4	1	0	3	0	0	1	1	1	1
Amarinus lacustris	0	0	0	0.5	0	0	0	0	0	0	0	0	0
Styloniscus	0	0	0	0	0	0	0	0	0	0	0	0	0
Mysid Tenagomysis	0	0	0	0.5	0	2	0	0	0	1	1	1	0
Ostracoda	0	0	0	0	0	0	0.5	0	0	0	0	0.5	0
Paracorophium	0	0	0	0	0	0	0	0	0	0	0	0	0

	Huntly T13 Air Mid 1 Autumn 2011	Huntly T13 Air Mid 2 Autumn 2011	Huntly T13 Air Mid 3 Autumn 2011	Huntly T13 Lit TL Autumn 2011	Huntly T13 Lit TR Autumn 2011	Huntly T13 Lit TL Spring 2011	Huntly T13 Lit TR Spring 2011	Huntly T14 Air Mid 1 Autumn 2011	Huntly T14 Air Mid 2 Autumn 2011	Huntly T14 Lit TL Autumn 2011	Huntly T14 Lit TR Autumn 2011	Huntly T14 Lit TL Spring 2011	Huntly T14 Lit TR Spring 2011
Paracalliope fluviatilis	0	0	0	12	19	95	83	0	0	1	18	151	110
Paraleptamphopus	0	0	0	0	0	0	0	0	0	0	0	0	1
Paranephrops planifrons	0	0	0	0	0	0	0	0	0	0	0	0	0
Paratya curvirostris	0	0	0	1	2	3	1	0	0	0	0.5	0.5	1
Phreatogammarus	0	0	0	0	0	0	0	0	0	0	0	0	0
Sinelobus	0	0	0	0	0	0	0	0	0	0	0	0	0
Ferrissia	0	0	0	0	0	1	0	0	0	1	0	1	0
Gyraulus species	0	0	0	4	4	1	4	0	0	0	13	3	4
Gyraulus (keel)	0	0	0	0	0	0	0	0	0	0	0	0	0
Latia neritoides	0	0	0	0	0	0	0	0	0	0	0	0	0
Lymnaeidae (*Pseudosuccinea*)	0	0	0	0	0	0	0	0	0	0	0	0	0
Physa acuta	0	0	0	1	1	0.5	1	0	0	3	3	7	3
Planorbarius	0	0	0	0	0	0	0	0	0	0	0	0	0
Potamopyrgus antipodarum	0	0	0	1	1	0.5	3	0	0	1	3	1	0
Sphaeriidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligochaeta indet.	0	0	0	0	0	0	0	0	0	0	0	0	0
Enchytraeidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Haplotaxidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Lumbriculidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Naididae	6	20	6	9	1	9	26	16	7	11	2	9	6
Eiseniella	0	0	0	0	0	0	0	0	0	0	0	0	0
Tubificidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Branchiura sowerbyi	0	0	0	0	0	0	0	0	0	0	0	0	0
Cura	0	0	0	5	4	0	1	0	0	1	1	3	0
Dalyellidae	0	0	0	0	0	14	5	0	0	0	0	0	6
Rhabdocoel other	0	0	0	0	0	0	0	0	0	0	0	0	0
Nematoda	0	0	0	0	0	0	0	0	0	0	0	0	0

	Huntly T13 Air Mid 1 Autumn 2011	Huntly T13 Air Mid 2 Autumn 2011	Huntly T13 Air Mid 3 Autumn 2011	Huntly T13 Lit TL Autumn 2011	Huntly T13 Lit TR Autumn 2011	Huntly T13 Lit TL Spring 2011	Huntly T13 Lit TR Spring 2011	Huntly T14 Air Mid 1 Autumn 2011	Huntly T14 Air Mid 2 Autumn 2011	Huntly T14 Lit TL Autumn 2011	Huntly T14 Lit TR Autumn 2011	Huntly T14 Lit TL Spring 2011	Huntly T14 Lit TR Spring 2011
Nemertea other	0	0	0	2	0	0	0	0	0	0	3	1	0
Prostoma	0	0	0	0	0	0	0	0	0	0	0	0	0
Glossiphoniidae	0	0	0	0.5	0	0	0	0	0	1	0	0	0
Helobdella europaea	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Hydra	0	0	0	0	0	0	2	0	0	0	0	11	2
Byrozoa	0	0	0	0	0	0.5	0.5	0	0	0	0	0.5	0.5
Porifera	0	0	0	0	0	0	0	0	0	0	0	0	0
Acari	0	0	0	0	0	1	2	0	0	5	0	0	1
TOTAL NUMBERS	**6**	**20**	**10**	**50**	**56**	**212.5**	**211**	**16**	**7**	**24**	**54.5**	**222.5**	**214.5**

	Huntly T15 Air Mid 1 Autumn 2011	Huntly T15 Air Mid 2 Autumn 2011	Huntly T15 Lit TL Autumn 2011	Huntly T15 Lit TR Autumn 2011	Huntly T15 Lit TL Spring 2011	Huntly T15 Lit TR Spring 2011	Huntly T16 Air Mid 3 Autumn 2011	Huntly T16 Lit TL Autumn 2011	Huntly T16 Lit TR Autumn 2011	Huntly T16 Lit TL Spring 2011	Huntly T16 Lit TR Spring 2011
Deleatidium	0	0	0	0	0	0	0	0	0	0	0
Mauiulus	0	0	0	0	0	0	0	0	0	0	0
Zephlebia	0	0	0	0	0	0	0	0	0	0	0
Zelandobius	0	0	0	0	0	0.5	0	0	0	0	0
Hydropsyche c.f. colonica	0	0	0	0	0	0	0	0	0	0	0
Beraeoptera	0	0	0	2	0	0	0	0	0.5	0	0
Hydrobiosis	0	0	0	0	0	0	0	0	0	0	0
Oxyethira albiceps	0	0	3	17	12	11	3	11	6	17	12
Paroxyethira hendersoni	0	0	0	0	1	1	0	0	0	1	3
Paroxyethira eatoni gp	0	0	0	0	0	0	0	0	0	0	0
Plectrocnemia	0	0	0	0	0	0	0	0	0	0	0
Pycnocentrodes c.f. modestus	0	0	0	0	0	0	0	0	0	0	0
Triplectides sp. (small)	0	0	0	0	0	0	0	0	0	0	0
Triplectides obsoletus	0	0	0	0	0	0	0	0	0	0	0
Adversaeshna	0	0	0	0	0	0	0	0	0	0	0
Xanthocnemis	0	0	1	3	1	4	0	2	1	2	0.5
Hemicordulia	0	0	0	0	0	0	0	0	0	0	0
Microvelia	0	0	0	0	0	0	0	0	0	0	0
Sigara	0	0	0	0	0	0	0	0	0	0	0
Antiporus	0	0	0	0	0	0	0	0	0	0	0
Elmidae (*Hydora*)	0	0	0	0	0	0	0	0	0	0	0
Hydrophilidae	0	0	0	0	0	0	0	0	0	0	0
Scirtidae	0	0	0	0	0	0	0	0	0	0	0
Aphrophila	0	0	0	0	0	0	0	0	0	0	0
Austrosimulium australense gp	0	0	0	0	0	0	0	0	0	0	0
Ceratopogonidae	0	0	0	0	0	0	0	0	0	0	0
Chironomini unidentified	0	0	0	0	0	0	0	0	0	0	0

	Huntly T15 Air Mid 1 Autumn 2011	Huntly T15 Air Mid 2 Autumn 2011	Huntly T15 Lit TL Autumn 2011	Huntly T15 Lit TR Autumn 2011	Huntly T15 Lit TL Spring 2011	Huntly T15 Lit TR Spring 2011	Huntly T16 Air Mid 3 Autumn 2011	Huntly T16 Lit TL Autumn 2011	Huntly T16 Lit TR Autumn 2011	Huntly T16 Lit TL Spring 2011	Huntly T16 Lit TR Spring 2011
Chironomus	0	0	0	0	4	2	0	0	0	2	0.5
Dolichopodidae	0	0	0	0	0	0	0	0	0	0	0
Empididae	0	0	0	0	0	0	0	0	0	0	0
Ephydridae	0	0	0	0	0	0	0	0	0	0	0
Harrisius	0	0	1	5	0	0	0	0	0	0	0
Hexatomini	0	0	0	0	1	0	0	0	0	0	0
Limonia	0	0	0	0	0	0	0	0	0	0	0
Mischoderus	0	0	0	0	0	0	0	0	0	0	0
Molophilus	0	0	0	0	0	0	0	0	0	0	0
Muscidae	0	0	0	0	0	0	0	1	0	0	0
Orthocladiinae	0	0	0	1	5	7	3	0	0	50	3
Corynoneura	0	0	0	0	0	0	0	0	0	0	0
Paralimnophila	0	0	0	1	0	0	0	0	0	0	0
Polypedilum	0	0	0	0	0	0	0	0	0	0	0
Psychodidae	0	0	0	0	0	0	0	0	0	0	0
Tanypodinae	0	0	0	0	0	0	0	0	0	0	0
Tanytarsus	0	0	0	3	11	9	3	0	0.5	27	6
Hygraula nitens	0	0	0	0	0	0	0	0	0	0	0
Cladocera - Bosminidae	0	0	0	0	0	0	0	0	0	0	0
Cladocera - *Daphnia*	0	0	0	0	3	1	0	0	0	1	0
Copepoda - Calanoida	0	0	0	0	0	0	0	0	0	0	0
Copepoda - Cyclopoida	0	0	3	2	2	3	0	3	0	0	0
Amarinus lacustris	0	0	0	0	0	0	0	0	0	0	0.5
Styloniscus	0	0	0	0	0	0	0	0	0	0	0
Tenagomysis	0	0	0	1	27	3	0	1	0	2	0
Ostracoda	0	0	0	0	1	0	0	0	0	1	0
Paracorophium	0	0	0	0	0	0	0	0	0	0	0

	Huntly T15 Air Mid 1 Autumn 2011	Huntly T15 Air Mid 2 Autumn 2011	Huntly T15 Lit TL Autumn 2011	Huntly T15 Lit TR Autumn 2011	Huntly T15 Lit TL Spring 2011	Huntly T15 Lit TR Spring 2011	Huntly T16 Air Mid 3 Autumn 2011	Huntly T16 Lit TL Autumn 2011	Huntly T16 Lit TR Autumn 2011	Huntly T16 Lit TL Spring 2011	Huntly T16 Lit TR Spring 2011
Paracalliope fluviatilis	0	0	5	5	118	101	2	11	7	84	153
Paraleptamphopus	0	0	0	0	0	0	0	0	0	0	0
Paranephrops planifrons	0	0	0	0	0	0	0	0	0	0	0
Paratya curvirostris	0	0	4	3	1	5	0	1	0.5	3	8
Phreatogammarus	0	0	0	0	0	0	0	0	0	0	1
Sinelobus	0	0	0	0	0	0	0	0	0	0	0
Ferrissia	0	0	1	0	0	0	0	0	0	0	0
Gyraulus species	0	0	1	3	2	7	0	3	9	0	3
Gyraulus (keel)	0	0	0	0	0	0	0	0	0	0	0
Latia neritoides	0	0	0	0	0	0	0	0	0.5	0	0
Lymnaeidae (*Pseudosuccinea*)	0	0	0	0	0	0	0	0	0	3	0
Physa acuta	0	0	5	1	2	3	0	6	0.5	1	1
Planorbarius	0	0	0	0	0	0	0	0	0	0	0
Potamopyrgus antipodarum	0	0	1	0	1	2	0	3	0.5	0	7
Sphaeriidae	0	0	0	0	0	0	0	0	0	0	0
Oligochaeta indet.	0	0	0	0	0	0	0	0	0	0	0
Enchytraeidae	0	0	0	0	0	0	0	0	0	0	0
Haplotaxidae	0	0	0	0	0	0	0	0	0	0	0
Lumbriculidae	0	0	0	0	0	0	0	0	0	0	0
Naididae	21	4	10	8	23	36	1	1	2	17	3
Eiseniella	0	0	0	0	0	0	0	0	0	0	0
Tubificidae	0	0	0	0	0	0	0	0	0	0	0
Branchiura sowerbyi	0	0	0	0	0	0	0	0	0	0	0
Cura	0	0	2	5	1	0	0	5	2	5	1
Dalyellidae	0	0	0	0	0	5	0	0	0	1	8
Rhabdocoel other	0	0	0	0	0	0	0	0	0	0	0
Nematoda	0	0	0	0	0	0	0	0	0	0	0

	Huntly T15 Air Mid 1 Autumn 2011	Huntly T15 Air Mid 2 Autumn 2011	Huntly T15 Lit TL Autumn 2011	Huntly T15 Lit TR Autumn 2011	Huntly T15 Lit TL Spring 2011	Huntly T15 Lit TR Spring 2011	Huntly T16 Air Mid 3 Autumn 2011	Huntly T16 Lit TL Autumn 2011	Huntly T16 Lit TR Autumn 2011	Huntly T16 Lit TL Spring 2011	Huntly T16 Lit TR Spring 2011
Nemertea other	0	0	2	1	3	0	0	7	0.5	1	0
Prostoma	0	0	0	0	0	0	0	0	0	0	0
Glossiphoniidae	0	0	0	2	0	0	0	0	2	0	0
Helobdella europaea	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Hydra	0	0	0	0	0	0	0	0	0	2	1
Byrozoa	0	0	0	0	0.5	0.5	0	0	0	0.5	0.5
Porifera	0	0	0	0	0	0	0	0	0	0	0
Acari	0	0	0	0	0	1	0	0	0.5	0	0
TOTAL NUMBERS	**21**	**4**	**39**	**63**	**219.5**	**201**	**12**	**55**	**32.5**	**220.5**	**212**

	Rangiriri T17 Air Mid 2 Autumn 2012	Rangiriri T17 Air Mid 3 Autumn 2012	Rangiriri T17 Lit TL Autumn 2012	Rangiriri T17 Lit TR Autumn 2012	Rangiriri T18 Air Mid 1 Autumn 2012	Rangiriri T18 Air Mid 2 Autumn 2012	Rangiriri T18 Air Mid 3 Autumn 2012	Rangiriri T18 Lit TL Autumn 2012	Rangiriri T18 Lit TR Autumn 2012
Deleatidium	0	0	0	0	0	0	0	0	0
Mauiulus	0	0	0	0	0	0	0	0	0
Zephlebia	0	0	0	0	0	0	0	0	0
Zelandobius	0	0	0	0	0	0	0	0	0
Hydropsyche c.f. colonica	0	1	0	1	0	2	2	3	0
Beraeoptera	0	0	0	0	0	0	0	0	0
Hydrobiosis	0	0	0	0	0	0	0	0	0
Oxyethira albiceps	0	6	1	45	0	0	2	22	7
Paroxyethira hendersoni	0	0	0	1	0	0	0	0	0.5
Paroxyethira eatoni gp	0	0	0	2	0	0	0	1	1
Plectrocnemia	0	0	0	0	0	0	0	0	0
Pycnocentrodes c.f. modestus	0	0	0	0	0	0	0	0	0
Triplectides sp. (small)	0	0	0	1	0	0	0	0	0
Triplectides obsoletus	0	0	0	0	0	0	0	0	0
Adversaeshna	0	0	0	0	0	0	0	0	0
Xanthocnemis	0	0	14	8	0	0	0	2	2
Hemicordulia	0	0	0	0	0	0	0	0	0
Microvelia	0	0	0	0	0	0	0	0	0
Sigara	0	0	0	0	0	0	0	0	0
Antiporus	0	0	0	0	0	0	0	0	0
Elmidae (*Hydora*)	0	0	0	0	0	0	0	0	0
Hydrophilidae	0	0	0	0	0	0	0	0	0
Scirtidae	0	0	0	0	0	0	0	0	0
Aphrophila	0	0	0	0	0	0	0	0	0
Austrosimulium australense gp	0	0	0	1	0	0	0	0	0
Ceratopogonidae	0	0	0	0	0	0	0	0	0
Chironomini unidentified	0	0	0	0	0	0	0	0	0

	Rangiriri T17 Air Mid 2 Autumn 2012	Rangiriri T17 Air Mid 3 Autumn 2012	Rangiriri T17 Lit TL Autumn 2012	Rangiriri T17 Lit TR Autumn 2012	Rangiriri T18 Air Mid 1 Autumn 2012	Rangiriri T18 Air Mid 2 Autumn 2012	Rangiriri T18 Air Mid 3 Autumn 2012	Rangiriri T18 Lit TL Autumn 2012	Rangiriri T18 Lit TR Autumn 2012
Chironomus	0	0	0	0	0	0	0	0	0
Dolichopodidae	0	0	0	0	0	0	0	0	0
Empididae	0	0	0	0	0	0	0	0	0
Ephydridae	0	0	0	0	0	0	0	0	0
Harrisius	0	0	0	0.5	0	0	4	0	0
Hexatomini	0	0	0	0	0	0	0	0	0
Limonia	0	0	0	0	0	0	0	0	0
Mischoderus	0	0	0	0	0	0	0	0	0
Molophilus	0	0	0	0	0	0	0	0	0
Muscidae	0	0	0	0	0	0	0	0	0
Orthocladiinae	0	0	0	0	0	0	2	4	3
Corynoneura	0	0	0	0	0	0	0	0	0
Paralimnophila	0	0	0	0	0	0	0	0	0
Polypedilum	0	0	0	0	0	0	0	0	0
Psychodidae	0	0	0	0	0	0	0	0	0
Tanypodinae	0	0	0	0	0	0	0	0	0
Tanytarsus	0	0	0	1	0	3	2	0.5	0
Hygraula nitens	0	0	0	1	0	0	0	2	0
Cladocera - Bosminidae	0	0	0	0	0	0	0	0	0
Cladocera - *Daphnia*	0	0	0	0	0	0	0	0	3
Copepoda - Calanoida	0	0	0	0	0	0	0	0	0
Copepoda - Cyclopoida	0	0	7	5	0	0	0	1	4
Amarinus lacustris	0	0	0	0	0	0	0	0	0
Styloniscus	0	0	0	0	0	0	0	0	0
Tenagomysis	0	0	0	0	0	0	0	4	1
Ostracoda	0	0	0	0	0	0	0	0	1
Paracorophium	0	0	0	0	0	0	0	0	0

	Rangiriri T17 Air Mid 2 Autumn 2012	Rangiriri T17 Air Mid 3 Autumn 2012	Rangiriri T17 Lit TL Autumn 2012	Rangiriri T17 Lit TR Autumn 2012	Rangiriri T18 Air Mid 1 Autumn 2012	Rangiriri T18 Air Mid 2 Autumn 2012	Rangiriri T18 Air Mid 3 Autumn 2012	Rangiriri T18 Lit TL Autumn 2012	Rangiriri T18 Lit TR Autumn 2012
Paracalliope fluviatilis	0	2	19	102	0	0	0	145	150
Paraleptamphopus	0	0	0	0	0	0	0	0	0
Paranephrops planifrons	0	0	0	0	0	0	0	0	0
Paratya curvirostris	0	0	1	1	0	0	0	3	0
Phreatogammarus	0	0	0	0	0	0	0	0	0
Sinelobus	0	0	0	0	0	0	0	0	0
Tanais	0	0	0	0	0	0	0	0	0
Ferrissia	0	0	0	0	0	0	0	0	0
Gyraulus species	0	0	0	5	0	0	0	1	4
Gyraulus (keel)	0	0	0	0	0	0	0	0	8
Latia neritoides	0	0	0	0	0	0	0	0	0
Lymnaeidae (*Pseudosuccinea*)	0	0	0	0	0	0	0	1	0
Physa acuta	0	0	1	1	0	0	0	2	6
Planorbarius	0	0	0	0	0	0	0	0	0
Potamopyrgus antipodarum	1	1	0	4	0	0	0	1	1
Sphaeriidae	0	0	0	0	0	0	0	0	0
Oligochaeta indet.	0	0	0	0	0	0	0	0	0
Enchytraeidae	0	0	0	0	0	0	0	0	0
Haplotaxidae	0	0	0	0	0	0	0	0	0
Lumbriculidae	0	0	0	0	0	0	0	0	6
Naididae	33	46	6	19	18	7	55	9	0
Eiseniella	0	0	0	0	0	0	0	0	0
Tubificidae	0	0	0	0	0	0	0	0	0
Branchiura sowerbyi	0	0	1	0	0	0	0	0	0
Cura	0	0	0	6	0	0	0	3	0
Dalyellidae	0	2	9	5	0	0	0	2	8
Rhabdocoel other	0	0	0	2	0	0	0	0	1

	Rangiriri T17 Air Mid 2 Autumn 2012	Rangiriri T17 Air Mid 3 Autumn 2012	Rangiriri T17 Lit TL Autumn 2012	Rangiriri T17 Lit TR Autumn 2012	Rangiriri T18 Air Mid 1 Autumn 2012	Rangiriri T18 Air Mid 2 Autumn 2012	Rangiriri T18 Air Mid 3 Autumn 2012	Rangiriri T18 Lit TL Autumn 2012	Rangiriri T18 Lit TR Autumn 2012
Nematoda	0	0	0	0	1	0	0	0	0
Nemertea other	0	16	14	8	0	0	0	11	4
Prostoma	3	2	0	0	0	0	0	0	0
Glossiphoniidae	0	0	1	3	0	0	0	0	3
Helobdella europaea	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Hydra	0	0	0	0	0	0	0	1	0
Byrozoa	1	1	1	1	0	1	1	2	1
Porifera	0	0	0	0	0	0	0	0	0
Acari	0	1	0	1	0	0	0	1	0
TOTAL NUMBERS	**38**	**77**	**75**	**223.5**	**19**	**13**	**68**	**220.5**	**214.5**

	Rangiriri T19 Air Mid 1 Autumn 2012	Rangiriri T19 Air Mid 2 Autumn 2012	Rangiriri T19 Air Mid 3 Autumn 2012	Rangiriri T19 Lit TL Autumn 2012	Rangiriri T19 Lit TR Autumn 2012	Rangiriri T20 Air Mid 1 Autumn 2012	Rangiriri T20 Air Mid 2 Autumn 2012	Rangiriri T20 Air Mid 3 Autumn 2012	Rangiriri T20 Lit TL Autumn 2012	Rangiriri T20 Lit TR Autumn 2012
Deleatidium	0	0	0	0	0	0	0	0	0	0
Mauiulus	0	0	0	0	1	0	0	0	0	0
Zephlebia	0	0	0	0	0	0	0	0	0	0
Zelandobius	0	0	0	0	1	0	0	0	0	0
Hydropsyche c.f. colonica	0	0	0	0	1	0	0	1	0	0
Beraeoptera	0	0	0	0	0	0	0	0	0	0
Hydrobiosis	0	0	0	0	0	0	0	0	0	0
Oxyethira albiceps	0	0	0	1	27	0	0	0	2	14
Paroxyethira hendersoni	0	0	0	0	1	0	0	0	1	1
Paroxyethira eatoni gp	0	0	0	0	0	0	0	0	0	0
Plectrocnemia	0	0	0	0	0	0	0	0	0	0
Pycnocentrodes c.f. modestus	0	0	0	0	0	0	0	0	0	0
Triplectides sp. (small)	0	0	0	0	0	0	0	0	0	0
Triplectides obsoletus	0	0	0	0	0	0	0	0	0	0
Adversaeshna	0	0	0	0	0	0	0	0	0	0
Xanthocnemis	0	0	0	8	1	0	0	0	4	5
Hemicordulia	0	0	0	0	0	0	0	0	0	0
Microvelia	0	0	0	0	0	0	0	0	0	0
Sigara	0	0	0	0	0	0	0	0	0	0
Antiporus	0	0	0	0	0	0	0	0	0	0
Elmidae (*Hydora*)	0	0	0	0	0	0	0	0	0	0
Hydrophilidae	0	0	0	0	0	0	0	0	0	0
Scirtidae	0	0	0	0	0	0	0	0	0	0
Aphrophila	0	0	0	0	0	0	0	0	0	0
Austrosimulium australense gp	0	0	0	0	0	0	0	0	0	0
Ceratopogonidae	0	0	0	0	0	0	0	0	0	0
Chironomini unidentified	0	0	0	0	0	0	0	0	0	0

	Rangiriri T19 Air Mid 1 Autumn 2012	Rangiriri T19 Air Mid 2 Autumn 2012	Rangiriri T19 Air Mid 3 Autumn 2012	Rangiriri T19 Lit TL Autumn 2012	Rangiriri T19 Lit TR Autumn 2012	Rangiriri T20 Air Mid 1 Autumn 2012	Rangiriri T20 Air Mid 2 Autumn 2012	Rangiriri T20 Air Mid 3 Autumn 2012	Rangiriri T20 Lit TL Autumn 2012	Rangiriri T20 Lit TR Autumn 2012
Chironomus	0	0	0	0	0	0	0	0	0	0
Dolichopodidae	0	0	0	0	0	0	0	0	0	0
Empididae	0	0	0	0	0	0	0	0	0	0
Ephydridae	0	0	0	0	0	0	0	0	0	0
Harrisius	0	0	0	0	0	0	0	1	1	0
Hexatomini	0	0	0	0	0	0	0	0	0	0
Limonia	0	0	0	0	0	0	0	0	0	0
Mischoderus	0	0	0	0	0	0	0	0	0	0
Molophilus	0	0	0	0	0	0	0	0	0	0
Muscidae	0	0	0	0	0	0	0	0	0	0
Orthocladiinae	0	0	0	0	4	0	0	0	1	0
Corynoneura	0	0	0	0	0	0	0	0	0	0
Paralimnophila	0	0	0	0	0	0	0	0	0	0
Polypedilum	0	0	0	0	0.5	0	0	0	0	0
Psychodidae	0	0	0	0	0	0	0	0	0	0
Tanypodinae	0	0	0	0	0	0	0	0	0	0
Tanytarsus	0	0	0	0	2	0	0	0	1	0
Hygraula nitens	0	0	0	0	1	0	0	0	0	0
Cladocera - Bosminidae	0	0	0	0	0	0	0	0	0	0
Cladocera - *Daphnia*	0	1	0	2	0	0	0	0	0	2
Copepoda - Calanoida	0	0	0	0	0	0	0	0	0	0
Copepoda - Cyclopoida	0	0	0	1	0	0	0	0	0	1
Amarinus lacustris	0	0	0	0	0	0	0	0	0	0
Styloniscus	0	0	0	0	0	0	0	0	0	0
Tenagomysis	0	0	0	3	0	0	0	1	6	15
Ostracoda	0	0	0	0	0	0	0	0	0	0
Paracorophium	0	0	0	0	0	0	0	0	0	1

	Rangiriri T19 Air Mid 1 Autumn 2012	Rangiriri T19 Air Mid 2 Autumn 2012	Rangiriri T19 Air Mid 3 Autumn 2012	Rangiriri T19 Lit TL Autumn 2012	Rangiriri T19 Lit TR Autumn 2012	Rangiriri T20 Air Mid 1 Autumn 2012	Rangiriri T20 Air Mid 2 Autumn 2012	Rangiriri T20 Air Mid 3 Autumn 2012	Rangiriri T20 Lit TL Autumn 2012	Rangiriri T20 Lit TR Autumn 2012
Paracalliope fluviatilis	0	0	0	163	169	0	0	4	145	85
Paraleptamphopus	0	0	0	0	0	0	0	0	0	0
Paranephrops planifrons	0	0	0	0	0	0	0	0	0	0
Paratya curvirostris	0	0	0	1	1	0	0	0	3	3
Phreatogammarus	0	0	0	0	0	0	0	0	0	0
Sinelobus	0	0	0	0	0	0	0	0	0	0
Ferrissia	0	0	0	0	0	0	0	0	0	0
Gyraulus species	0	0	0	0	3	0	0	0	0	1
Gyraulus (keel)	0	0	0	0	2	0	0	0	0	0
Latia neritoides	0	0	0	0	0	0	0	0	0	0
Lymnaeidae (*Pseudosuccinea*)	0	0	0	0	1	0	0	0	0	0
Physa acuta	0	0	0	4	3	0	0	0	1	4
Planorbarius	0	0	0	0	0	0	0	0	0	0
Potamopyrgus antipodarum	0	0	0	0	0	0	0	0	1	2
Sphaeriidae	0	0	0	0	0	0	0	0	0	0
Oligochaeta indet.	0	0	0	0	0	0	0	0	0	0
Enchytraeidae	0	0	0	0	0	0	0	0	0	0
Haplotaxidae	0	0	0	0	0	0	0	0	0	0
Lumbriculidae	0	0	0	0	0	0	0	0	0	0
Naididae	13	61	23	13	1	46	3	7	18	9
Eiseniella	0	0	0	0	2	0	0	0	0	0
Tubificidae	0	0	0	0	0	0	0	0	0	0
Branchiura sowerbyi	0	0	0	0	0	0	0	0	0	0
Cura	0	0	0	0	0	0	0	0	25	0
Dalyellidae	0	0	0	6	1	0	0	0	0	18
Rhabdocoel other	0	0	0	0	0	0	0	0	0	0
Nematoda	0	0	0	0	0	0	0	0	0	0

	Rangiriri T19 Air Mid 1 Autumn 2012	Rangiriri T19 Air Mid 2 Autumn 2012	Rangiriri T19 Air Mid 3 Autumn 2012	Rangiriri T19 Lit TL Autumn 2012	Rangiriri T19 Lit TR Autumn 2012	Rangiriri T20 Air Mid 1 Autumn 2012	Rangiriri T20 Air Mid 2 Autumn 2012	Rangiriri T20 Air Mid 3 Autumn 2012	Rangiriri T20 Lit TL Autumn 2012	Rangiriri T20 Lit TR Autumn 2012
Nemertea other	0	0	0	15	7	0	0	9	9	3
Prostoma	0	0	0	0	0	0	1	1	0	0
Glossiphoniidae	0	0	0	3	0	0	0	0	0	1
Helobdella europaea	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**
Hydra	0	0	0	0	0	0	0	0	0	0
Byrozoa	1	1	1	1	1	0	0	1	1	1
Porifera	0	0	0	0	0	0	0	0	0	0
Acari	0	0	0	0	0	0	1	0	0	0
TOTAL NUMBERS	**14**	**63**	**24**	**221**	**230.5**	**46**	**4**	**25**	**220**	**166**

	Opuatia T21 Air Mid 1 Autumn 2009	Opuatia T21 Air Mid 3 Autumn 2009	Opuatia T21 Air Mid 2 Autumn 2009	Opuatia T21 Lit TL Autumn 2009	Opuatia T21 Lit TR Autumn 2009	Mercer T22 Air Mid 1 Autumn 2012	Mercer T22 Air Mid 2 Autumn 2012	Mercer T22 Air Mid 3 Autumn 2012	Mercer T22 Lit TL Autumn 2012	Mercer T22 Lit TR Autumn 2012	Rangiriri N/A Sandbank Autumn 2012
Deleatidium	0	0	0	0	0	0	0	0	0	0	0
Mauiulus	0	0	0	0	0	0	0	0	0	0	0
Zephlebia	0	0	0	0	0	0	0	0	0	0	0
Zelandobius	0	3	4	0	2	0	0	0	0	0	1
Hydropsyche c.f. colonica	0	0	0	0	3	0	0	0	0	0	13
Beraeoptera	0	0	0	0	0	0	0	0	0	0	0
Hydrobiosis	0	0	0	0	0	0	0	0	0	0	0
Oxyethira albiceps	1	1	1	6	125	0	0	0	5	10	15
Paroxyethira hendersoni	0	0	0	0	2	0	0	0	0	0	0
Paroxyethira eatoni gp	0	0	0	0	0	0	0	0	1	0	0
Plectrocnemia	0	0	0	0	0	0	0	0	0	0	0
Pycnocentrodes c.f. modestus	0	0	0.5	0	0	0	0	0	0	0	0
Triplectides sp. (small)	0	0	0	0	0	0	0	0	0	0	0
Triplectides obsoletus	0	0	0	0	0	0	0	0	0	0	0
Adversaeshna	0	0	0	0	0	0	0	0	0	0	0
Xanthocnemis	0	0	0	3	0	0	0	0	1	0.5	0
Hemicordulia	0	0	0	1	0	0	0	0	0	0	0
Microvelia	0	0	0	0	0	0	0	0	0	0	0
Sigara	0	0	0	0	0	0	0	0	0	0	0
Antiporus	0	0	0	0	0	0	0	0	0	0	0
Elmidae (*Hydora*)	0	0	0	0	0	0	0	0	0	0	0
Hydrophilidae	0	0	0	0	0	0	0	0	0	0	0
Scirtidae	0	0	0	0	0	0	0	0	0	0	0
Aphrophila	0	0	0	0	0	0	0	0	0	0	1
Austrosimulium australense gp	0	0	0	0	0	0	0	0	0	0	0
Ceratopogonidae	0	0	0	0	0	0	0	0	0	0	0
Chironomini unidentified	0	0	0	0	0	0	0	0	0	0	0

	Opuatia T21 Air Mid 1 Autumn 2009	Opuatia T21 Air Mid 3 Autumn 2009	Opuatia T21 Air Mid 2 Autumn 2009	Opuatia T21 Lit TL Autumn 2009	Opuatia T21 Lit TR Autumn 2009	Mercer T22 Air Mid 1 Autumn 2012	Mercer T22 Air Mid 2 Autumn 2012	Mercer T22 Air Mid 3 Autumn 2012	Mercer T22 Lit TL Autumn 2012	Mercer T22 Lit TR Autumn 2012	Rangiriri N/A Sandbank Autumn 2012
Chironomus	0	0	0	0	0	0	0	0	0	0	0
Dolichopodidae	0	0	0	0	0	0	0	0	0	0	0
Empididae	0	0	0	0	0	0	0	0	0	0	0
Ephydridae	0	0	0	0	0	0	0	0	0	0	0
Harrisius	0	0	0	1	0	0	0	0	0	0	0
Hexatomini	0	0	0	0	0	0	0	0	0	0	0
Limonia	0	0	0	0	1	0	0	0	0	0	0
Mischoderus	0	0	0	0	0	0	0	0	0	0	0
Molophilus	0	0	0	0	0	0	0	0	0	0	0
Muscidae	0	0	0	0	0	0	0	0	0	0	0
Orthocladiinae	0	15	105	1	9	0	0	0	0	0.5	54
Corynoneura	0	0	0	0	0	0	0	0	0	0	0
Paralimnophila	0	0	0	0	0	0	0	0	0	0	0
Polypedilum	0	0	0	0	0	0	0	0	0	0	0
Psychodidae	0	0	0	0	0	0	0	0	0	0	0
Tanypodinae	0	0	0	0	0	0	0	0	0	0	1
Tanytarsus	0	5	35	0	6	0	0	0	0	0	75
Hygraula nitens	0	0	0	0	0	0	0	0	0	0	0
Cladocera - Bosminidae	0	0	0	0	0	0	0	0	0	0	0
Cladocera - *Daphnia*	0	0	0	0	0	0	0	0	0	0	0
Copepoda - Calanoida	0	0	0	2	0	0	0	0	0	0	0
Copepoda - Cyclopoida	0	0	0	0	0	0	0	0	2	0	0
Amarinus lacustris	0	0	0	0	0	0	0	0	0	0	0
Styloniscus	0	0	0	1	0	0	0	0	0	0	0
Tenagomysis	0	0	0	15	1	0	0	0	7	0	0
Ostracoda	0	0	0	0	0	0	0	0	0	0	0
Paracorophium	0	1	4	0	0	0	0	0	0	0	0

	Opuatia T21 Air Mid 1 Autumn 2009	Opuatia T21 Air Mid 3 Autumn 2009	Opuatia T21 Air Mid 2 Autumn 2009	Opuatia T21 Lit TL Autumn 2009	Opuatia T21 Lit TR Autumn 2009	Mercer T22 Air Mid 1 Autumn 2012	Mercer T22 Air Mid 2 Autumn 2012	Mercer T22 Air Mid 3 Autumn 2012	Mercer T22 Lit TL Autumn 2012	Mercer T22 Lit TR Autumn 2012	Rangiriri N/A Sandbank Autumn 2012
Paracalliope fluviatilis	0	0	2	26	37	0	0	0	176	189	3
Paraleptamphopus	0	0	0	0	0	0	0	0	0	0	0
Paranephrops planifrons	0	0	0	0	0	0	0	0	0	0	0
Paratya curvirostris	0	0	0	10	11	0	0	0	10	4	0
Phreatogammarus	0	0	0	0	0	0	0	0	0	0	0
Sinelobus	0	1	0	0	0	0	0	0	0	0	0
Ferrissia	0	0	0	0	0	0	0	0	1	0	0
Gyraulus species	0	0	0	1	0	0	0	0	3	0.5	0
Gyraulus (keel)	0	0	0	0	0	0	0	0	2	0	0
Latia neritoides	0	0	0	0	0	0	0	0	0	0	0
Lymnaeidae (*Pseudosuccinea*)	0	0	0	0	0	0	0	0	0	0	0
Physa acuta	0	1	0	2	1	0	0	0	3	0.5	0
Planorbarius	0	0	0	0	0	0	0	0	0	0	0
Potamopyrgus antipodarum	0	0	6	1	1	0	0	0	0	0	14
Sphaeriidae	0	0	0	0	0	0	0	0	0	0	0
Oligochaeta indet.	0	0	0	0	13	0	0	0	0	0	0
Enchytraeidae	0	0	0	0	0	0	0	0	0	0	0
Haplotaxidae	0	0	0	0	0	0	0	0	0	0	0
Lumbriculidae	0	0	0	0	0	0	0	0	0	0	0
Naididae	4	5	13	0	0	2	4	24	0	3	5
Eiseniella	0	0	0	0	0	0	0	0	0	0	0
Tubificidae	0	0	0	0	0	0	0	0	0	0	0
Branchiura sowerbyi	0	0	0	0	0	0	0	0	0	0	0
Cura	0	0	0	2	0	0	0	0	5	3	0
Dalyellidae	0	0	0	0	0	0	0	0	0	0	0
Rhabdocoel other	0	0	0	0	0	0	0	0	0	0	0
Nematoda	0	0	2	0	0	0	0	0	0	0	0

	Opuatia T21 Air Mid 1 Autumn 2009	Opuatia T21 Air Mid 3 Autumn 2009	Opuatia T21 Air Mid 2 Autumn 2009	Opuatia T21 Lit TL Autumn 2009	Opuatia T21 Lit TR Autumn 2009	Mercer T22 Air Mid 1 Autumn 2012	Mercer T22 Air Mid 2 Autumn 2012	Mercer T22 Air Mid 3 Autumn 2012	Mercer T22 Lit TL Autumn 2012	Mercer T22 Lit TR Autumn 2012	Rangiriri N/A Sandbank Autumn 2012
Nemertea other	0	13	37	5	4	0	0	0	0.5	3	21
Prostoma	0	3	1	0	0	0	0	0	0	0	1
Glossiphoniidae	0	0	0	0	0	0	0	0	1	0	0
Helobdella europaea	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Hydra	0	0	0	0	0	0	0	0	0	2	0
Byrozoa	0	0	0	0	19	0	0	0	1	1	1
Porifera	0	0	0	0	0	0	0	0	0	0	1
Acari	0	0	0	0	1	0	0	0	0	0	0
TOTAL NUMBERS	**5**	**48**	**210.5**	**77**	**235**	**2**	**4**	**24**	**218.5**	**217**	**206**