

R. J. Vogt, P. R. Peres-Neto and B. E. Beisner 2013. Using functional traits to investigate the determinants of crustacean zooplankton community structure. – Oikos 000: 000–000.

Appendix A1

Table A1. Cladoceran and copepod genera encountered in this study and their functional traits. Functional traits taken from Barnett et al. (2007).

Genus	Length (mm)	Feeding type	Predator defense	Habitat type	Trophic group
<i>Daphnia catawba</i>	1.13	D-filtration	rapid swimming	pelagic	herbivore
<i>Daphnia ambigua</i>	0.88	D-filtration	rapid swimming	pelagic	herbivore
<i>Daphnia longiremis</i>	0.84	D-filtration	rapid swimming	pelagic	herbivore
<i>Daphnia Dubia</i>	1.19	D-filtration	rapid swimming	pelagic	herbivore
<i>Daphnia mendotae</i>	1.5	D-filtration	rapid swimming	pelagic	herbivore
<i>Daphnia retrocurva</i>	0.87	D-filtration	rapid swimming	pelagic	herbivore
<i>Daphnia pulicaria</i>	1.3	D-filtration	rapid swimming	pelagic	herbivore
<i>Daphnia dentifera</i>	0.79	D-filtration	rapid swimming	pelagic	herbivore
<i>Daphnia parvula</i>	1.1	D-Filtration	rapid swimming	pelagic	herbivore
<i>Ceriodaphnia reticulata</i>	0.8	D-filtration	rapid swimming	pelagic	herbivore
<i>Ceriodaphnia affinis</i>	0.47	D-filtration	rapid swimming	pelagic	herbivore
<i>Ceriodaphnia lacustris</i>	0.416	D-filtration	rapid swimming	pelagic	herbivore
<i>Sinobosmina lieperi</i>	0.28	B-filtration	reduced swimming	pelagic	herbivore
<i>Sinobosmina freyii</i>	0.28	B-filtration	reduced swimming	pelagic	herbivore
<i>Eubosmina longispina</i>	0.28	B-filtration	reduced swimming	pelagic	herbivore
<i>Eubosmina tubicen</i>	0.4	B-filtration	reduced swimming	pelagic	herbivore
<i>Eubosmina corregoni</i>	0.5	B-filtration	reduced swimming	pelagic	herbivore
<i>Neobosmine spp.</i>	0.35	B-filtration	reduced swimming	pelagic	herbivore
<i>Polyphemus spp.</i>	0.83	raptorial	no behavioural defense	intermediate	carnivore
<i>Holopedium spp.</i>	0.77	S-filtration	no behavioural defense	pelagic	herbivore
<i>Diaphansoma birgei</i>	0.606	S-filtration	pausing and jumping	intermediate	herbivore
<i>Diaphanasoma leuchtenbergeum</i>	0.54	S-filtration	pausing and jumping	intermediate	herbivore

<i>Chydorus brevilaris</i>	0.29	C-filtration	no behavioural defense	intermediate	herbivore
<i>Alonella</i>	0.26	C-filtration	no behavioural defense	littoral	herbivore
<i>Leydigia quadrangularis</i>	0.75	C-filtration	no behavioural defense	littoral	herbivore
<i>Anthocyclops vernalis</i>	1.2	raptorial	pausing and jumping	intermediate	omnivore-carnivore
<i>Acanthocyclops robustus</i>	1.14	raptorial	pausing and jumping	intermediate	omnivore-carnivore
<i>Cyclops scutifer</i>	1.5	raptorial	pausing and jumping	pelagic	omnivore
<i>Diacyclops bicuspidatus</i>	0.92	raptorial	pausing and jumping	pelagic	omnivore-carnivore
<i>Eucyclops sperratus</i>	0.8	raptorial	pausing and jumping	littoral	omnivore-herbivore
<i>Mesocyclops edax</i>	1.3	raptorial	pausing and jumping	pelagic	omnivore-carnivore
<i>Tropocyclops prasinus</i>	0.67	raptorial	pausing and jumping	pelagic	omnivore-herbivore
<i>Leptodiptomus minutus</i>	0.86	stationary suspension	pausing and jumping	pelagic	herbivore
<i>Leptodiptomus sicilis</i>	1.24	stationary suspension	pausing and jumping	pelagic	omnivore
<i>Epischura lacustris</i>	1.75	stationary suspension	pausing and jumping	pelagic	omnivore-carnivore
<i>Skistodiptomus oregonensis</i>	1.2	stationary suspension	pausing and jumping	pelagic	omnivore
<i>Skistodiptomus reighardi</i>	1.06	stationary suspension	pausing and jumping	pelagic	omnivore

Appendix A2

Table A2. Standardized functional diversity scores (Z) for each lake and their associated significance values, computed using NRI, NTI and sdND. Standardized functional diversity was computed according to zooplankton incidence (presence–absence in each lake), with a permutation procedure that selected species at random. Negative values occurred where observed functional diversity was less than for the average randomly generated community, while positive values occurred where observed functional diversity was greater. Values are presented for the entire zooplankton community, cladocerans only and copepods only. Rows with a significant value are in bold.

Whole community		NRI		NTI		sdND	
Lake	Region	Z-score	p	Z-score	p	Z-score	p
Baldwin	Eastern Townships	-0.293	0.356	0.142	0.565	0.003	0.539
Bowker	Eastern Townships	-1.689	0.059	-2.046	0.013	-2.109	0.010
Brome	Eastern Townships	-0.704	0.225	0.786	0.781	1.210	0.887
Caribou	Eastern Townships	0.499	0.668	0.453	0.687	0.541	0.657
Coulombe	Eastern Townships	-1.313	0.105	-1.161	0.120	-1.161	0.104
D'Argent	Eastern Townships	-1.019	0.151	-1.835	0.025	-2.071	0.012
Des Monts	Eastern Townships	-1.192	0.120	-0.930	0.178	-1.220	0.084
Drolet	Eastern Townships	-2.545	0.016	-1.892	0.024	-2.063	0.015
Est	Eastern Townships	-1.228	0.114	0.386	0.663	-0.295	0.422
Fitch	Eastern Townships	-1.053	0.145	0.841	0.801	0.248	0.667
Fraser	Eastern Townships	-2.159	0.029	-1.848	0.025	-2.031	0.014
Huit	Eastern Townships	-0.592	0.251	-0.351	0.373	-0.296	0.410
Lovering	Eastern Townships	-1.583	0.077	-1.217	0.105	-1.222	0.090
Lyster	Eastern Townships	-1.579	0.072	-0.582	0.296	-1.046	0.124
Massawippi	Eastern Townships	0.078	0.487	0.684	0.755	1.085	0.865
Nicolette	Eastern Townships	-0.156	0.399	0.485	0.697	0.081	0.596
Orford	Eastern Townships	-0.954	0.164	-1.048	0.147	-1.926	0.024
Parker	Eastern Townships	0.287	0.576	-0.504	0.317	-0.470	0.329
PetitBrompton	Eastern Townships	-1.784	0.051	-0.970	0.173	-0.932	0.153
Simoneau	Eastern Townships	-1.766	0.058	-1.560	0.054	-1.655	0.051
St. Georges	Eastern Townships	-1.070	0.141	-0.402	0.365	-1.180	0.091
Stukely	Eastern Townships	-1.782	0.053	-1.326	0.084	-0.870	0.177
Tomcod	Eastern Townships	0.822	0.786	0.699	0.758	0.250	0.562
Trois Lacs	Eastern Townships	1.608	0.970	0.550	0.718	0.706	0.762
TruiteEstrie	Eastern Townships	-2.135	0.030	-0.059	0.487	-0.163	0.499
Waterloo	Eastern Townships	0.024	0.469	1.265	0.890	0.820	0.808
Achigan	Laurentians	-0.399	0.310	-0.207	0.433	-1.210	0.091
Bleu	Laurentians	-0.865	0.180	1.626	0.939	1.090	0.865
Boeuf	Laurentians	-0.634	0.240	-0.500	0.326	-0.967	0.147
Connelly	Laurentians	-0.155	0.397	0.602	0.737	-0.340	0.425
Croche	Laurentians	-0.371	0.319	0.306	0.643	-0.482	0.362
Cromwell	Laurentians	0.014	0.460	0.320	0.644	-0.459	0.363
Desormeaux	Laurentians	-0.790	0.204	0.903	0.827	0.564	0.708
Dupuis	Laurentians	-0.206	0.387	0.708	0.764	-0.654	0.286
Echo	Laurentians	0.197	0.538	1.528	0.931	0.369	0.589

EnCoeur	Laurentians	0.463	0.648	0.614	0.742	-0.299	0.453
GrandLacNoir	Laurentians	-0.735	0.216	-0.131	0.456	-0.465	0.331
Heney	Laurentians	-0.857	0.187	-0.455	0.341	-1.039	0.138
Ludger	Laurentians	-0.462	0.292	-0.360	0.371	-0.505	0.313
Masson	Laurentians	-1.396	0.092	-0.698	0.254	-0.374	0.405
Montagne_Noir	Laurentians	-0.945	0.164	-0.734	0.239	-0.967	0.144
Morency	Laurentians	-0.600	0.251	0.310	0.648	-0.486	0.365
Noir	Laurentians	0.107	0.491	0.509	0.700	0.407	0.616
Nord	Laurentians	-1.367	0.095	-1.161	0.125	-1.164	0.105
PinRouge	Laurentians	-2.228	0.026	-0.026	0.503	-0.117	0.521
Renaud	Laurentians	-0.277	0.379	0.872	0.820	0.502	0.644
Seizelles	Laurentians	-0.607	0.251	-0.895	0.186	-1.093	0.126
TruiteLaur	Laurentians	-0.295	0.345	-0.723	0.242	-0.556	0.323
Vert	Laurentians	0.782	0.774	1.566	0.931	0.606	0.692
Victoria	Laurentians	-1.607	0.072	-1.020	0.168	-0.426	0.397
Walfred	Laurentians	-0.554	0.259	0.671	0.749	-0.280	0.457
Cladocerans only		NRI		NTI		sdND	
Lake	Region	Z-score	p	Z-score	p	Z-score	p
Baldwin	Eastern Townships	-0.862	0.202	0.163	0.611	-0.182	0.452
Bowker	Eastern Townships	-0.819	0.187	-1.071	0.151	-0.727	0.204
Brome	Eastern Townships	0.060	0.516	0.843	0.781	1.151	0.814
Caribou	Eastern Townships	-0.346	0.315	0.191	0.578	0.489	0.677
Coulombe	Eastern Townships	-0.730	0.238	-0.547	0.256	-0.622	0.240
D'Argent	Eastern Townships	-0.839	0.192	-1.125	0.142	-0.907	0.151
Des Monts	Eastern Townships	-0.880	0.222	-0.338	0.421	-0.428	0.339
Drolet	Eastern Townships	-1.915	0.038	-1.230	0.109	-0.999	0.136
Est	Eastern Townships	-0.407	0.320	0.783	0.751	-0.212	0.455
Fitch	Eastern Townships	-1.105	0.149	0.147	0.601	-0.157	0.460
Fraser	Eastern Townships	-1.340	0.106	-1.170	0.124	-1.003	0.125
Huit	Eastern Townships	-0.053	0.467	0.291	0.650	-0.114	0.502
Lovering	Eastern Townships	-0.994	0.191	-0.470	0.293	-0.601	0.260
Lyster	Eastern Townships	-0.277	0.371	-0.164	0.454	-0.062	0.502
Massawippi	Eastern Townships	0.438	0.661	0.975	0.843	0.970	0.796
Nicolette	Eastern Townships	-0.274	0.375	-0.396	0.443	-0.370	0.373
Orford	Eastern Townships	-0.873	0.179	-1.145	0.137	-0.926	0.149
Parker	Eastern Townships	0.026	0.490	-0.436	0.380	-0.458	0.316
PetitBrompton	Eastern Townships	-0.574	0.299	-0.315	0.409	-0.242	0.440
Simoneau	Eastern Townships	-1.264	0.168	-1.256	0.175		
St. Georges	Eastern Townships	-0.488	0.317	-0.122	0.493	-0.753	0.191
Stukely	Eastern Townships	-0.838	0.228	-0.325	0.426	-0.318	0.406
Tomcod	Eastern Townships	0.328	0.644	-0.422	0.344	0.326	0.507
Trois Lacs	Eastern Townships	0.187	0.550	0.445	0.715	0.755	0.816
TruiteEstrie	Eastern Townships	-1.029	0.140	0.018	0.524	-0.457	0.303
Waterloo	Eastern Townships	0.781	0.778	0.928	0.823	0.882	0.803
Achigan	Laurentians	1.285	0.896	0.935	0.824	0.354	0.523
Bleu	Laurentians	-0.018	0.477	1.504	0.925	1.085	0.809
Boeuf	Laurentians	-0.240	0.356	0.105	0.509	-0.517	0.298
Connelly	Laurentians	0.778	0.778	1.174	0.870	-0.172	0.454
Croche	Laurentians	-0.672	0.279	-0.325	0.384	-0.221	0.450
Cromwell	Laurentians	-0.194	0.388	0.219	0.587	-0.364	0.382
Desormeaux	Laurentians	0.864	0.799	1.452	0.918	0.822	0.793
Dupuis	Laurentians	0.578	0.737	1.060	0.873	-1.058	0.204
Echo	Laurentians	0.665	0.738	1.377	0.883	0.696	0.790
EnCoeur	Laurentians	0.364	0.660	0.393	0.693	-0.187	0.452
GrandLacNoir	Laurentians	0.256	0.589	0.267	0.633	-0.262	0.424
Heney	Laurentians	-0.590	0.273	-0.534	0.239	-0.617	0.237

Ludger	Laurentians	-0.608	0.280	-0.549	0.240	-0.601	0.238
Masson	Laurentians	-0.448	0.332	-0.574	0.224	-0.598	0.243
Montagne_Noir	Laurentians	-0.897	0.216	-0.349	0.416	-0.348	0.389
Morency	Laurentians	0.423	0.673	0.464	0.733	-0.212	0.454
Noir	Laurentians	0.133	0.530	0.379	0.672	0.691	0.780
Nord	Laurentians	-0.707	0.249	-0.559	0.238	-0.612	0.236
PinRouge	Laurentians	-1.241	0.103	0.036	0.529	-0.417	0.327
Renaud	Laurentians	-0.166	0.453	0.246	0.603	0.462	0.637
Seizelles	Laurentians	-0.427	0.329	-0.580	0.225	-0.600	0.244
TruiteLaur	Laurentians	-0.448	0.288	-0.956	0.191	-0.575	0.266
Vert	Laurentians	0.650	0.737	1.355	0.878	0.693	0.790
Victoria	Laurentians	-1.284	0.111	-1.593	0.063	-1.820	0.050
Walfred	Laurentians	0.252	0.590	0.842	0.797	-0.453	0.328
Copepods only		NRI		NTI		sdND	
Lake	Region	Z-score	p	Z-score	p	Z-score	p
Baldwin	Eastern Townships	0.424	0.649	-0.326	0.443	-0.304	0.511
Bowker	Eastern Townships	-0.979	0.196	-0.687	0.261	0.325	0.635
Brome	Eastern Townships	-0.153	0.480	-0.097	0.557	0.500	0.787
Caribou	Eastern Townships	-0.013	0.485	-0.173	0.474	-0.573	0.358
Coulombe	Eastern Townships	-0.154	0.481	-0.105	0.546	0.449	0.774
D'Argent	Eastern Townships	-0.852	0.213	-0.332	0.368	0.391	0.612
Des Monts	Eastern Townships	-0.613	0.258	-0.540	0.328	-0.694	0.257
Drolet	Eastern Townships	-0.152	0.484	-0.092	0.559	0.482	0.775
Est	Eastern Townships	-0.585	0.347	-0.365	0.391	-0.679	0.313
Fitch	Eastern Townships	-1.180	0.137	0.704	0.798	-0.690	0.262
Fraser	Eastern Townships	-1.406	0.090	-0.283	0.382	0.383	0.605
Huit	Eastern Townships	0.505	0.673	-0.185	0.509	0.569	0.813
Lovering	Eastern Townships	-1.197	0.125	-0.786	0.202	-0.017	0.518
Lyster	Eastern Townships	-1.286	0.115	-0.072	0.494	-1.364	0.055
Massawippi	Eastern Townships	-0.993	0.197	-0.695	0.260	0.316	0.633
Nicolette	Eastern Townships	0.884	0.793	2.096	0.981	-0.424	0.399
Orford	Eastern Townships	0.404	0.629	0.879	0.778	-1.568	0.032
Parker	Eastern Townships	-0.445	0.336	-0.975	0.185	-0.705	0.285
PetitBrompton	Eastern Townships	-1.356	0.105	-0.938	0.208	-0.674	0.309
Simoneau	Eastern Townships	-1.272	0.116	-0.391	0.353	-0.023	0.546
St. Georges	Eastern Townships	0.197	0.575	0.232	0.600	0.075	0.539
Stukely	Eastern Townships	-0.737	0.269	-0.972	0.120	0.365	0.716
Tomcod	Eastern Townships	1.064	0.827	1.711	0.916	-0.938	0.166
Trois Lacs	Eastern Townships	-0.400	0.348	-0.431	0.394	-1.003	0.173
TruiteEstrie	Eastern Townships	0.485	0.765	0.514	0.772		
Waterloo	Eastern Townships	0.515	0.770	0.528	0.772		
Achigan	Laurentians	-0.334	0.373	0.529	0.716	-1.451	0.050
Bleu	Laurentians	-0.235	0.473	-0.028	0.576	-0.482	0.414
Boeuf	Laurentians	-0.731	0.266	-0.883	0.183	-1.069	0.102
Connelly	Laurentians	-0.249	0.465	-0.028	0.579	-0.483	0.420
Croche	Laurentians	0.880	0.795	2.066	0.979	-0.423	0.401
Cromwell	Laurentians	0.670	0.711	0.427	0.670	0.309	0.609
Desormeaux	Laurentians	-5.200	0.000	-2.509	0.000		
Dupuis	Laurentians	0.534	0.776	0.513	0.775		
Echo	Laurentians	0.503	0.772	0.542	0.782		
EnCoeur	Laurentians	1.281	0.916	1.646	0.906	-0.592	0.363
GrandLacNoir	Laurentians	-0.246	0.471	-0.027	0.581	-0.482	0.421
Heney	Laurentians	-0.534	0.308	0.964	0.827	-0.618	0.347
Ludger	Laurentians	0.662	0.705	0.416	0.666	0.319	0.617
Masson	Laurentians	0.527	0.777	0.539	0.778		
Montagne_Noir	Laurentians	0.117	0.541	0.185	0.584	-0.261	0.439

Morency	Laurentians	0.037	0.522	0.517	0.754	-0.549	0.394
Noir	Laurentians	-0.222	0.480	-0.056	0.570	-0.479	0.425
Nord	Laurentians	-0.763	0.250	-0.862	0.195	-1.067	0.099
PinRouge	Laurentians	0.529	0.777	0.526	0.773		
Renaud	Laurentians	0.016	0.522	0.561	0.766	-0.558	0.388
Seizelles	Laurentians	0.145	0.557	0.202	0.591	-0.248	0.446
TruiteLaur	Laurentians	1.261	0.909	1.762	0.925	-0.706	0.289
Vert	Laurentians	0.125	0.542	0.202	0.595	-0.251	0.442
Victoria	Laurentians	0.524	0.776	0.538	0.781		
Walfred	Laurentians	0.508	0.773	0.519	0.770		

Appendix A3

Table A3. Standardized functional diversity scores (Z) for each lake and their associated significance values, computed using NRI, NTI and sdND. Standardized functional diversity was computed according to species biomass and with a permutation procedure that selected species according to their regional biomass. Negative values occurred where observed functional diversity was less than for the average randomly generated community, while positive values occurred where observed functional diversity was greater. Values are presented for the entire zooplankton community, cladocerans only and copepods only. Rows with a significant value are bolded.

Whole community		NRI		NTI		sdND	
Lake	Region	Z-Score	p	Z-Score	p	Z-Score	p
Baldwin	Eastern Townships	1.743	0.970	0.739	0.786	0.507	0.778
Bowker	Eastern Townships	-0.315	0.370	-1.780	0.018	-1.882	0.025
Brome	Eastern Townships	0.885	0.806	1.785	0.959	2.286	0.990
Caribou	Eastern Townships	1.938	0.980	1.524	0.931	1.384	0.868
Coulombe	Eastern Townships	0.158	0.549	-0.642	0.281	-0.673	0.247
D'Argent(1)	Eastern Townships	0.463	0.673	-1.540	0.055	-1.825	0.033
Des Monts	Eastern Townships	0.258	0.588	-0.345	0.376	-0.757	0.182
Drolet	Eastern Townships	-1.205	0.130	-1.566	0.049	-1.776	0.049
Est	Eastern Townships	0.340	0.622	1.284	0.891	0.381	0.676
Fitch	Eastern Townships	0.893	0.815	1.398	0.949	0.438	0.383
Fraser	Eastern Townships	-0.708	0.243	-1.520	0.062	-1.781	0.048
Huit	Eastern Townships	1.102	0.861	0.332	0.624	0.357	0.652
Lovering	Eastern Townships	-0.298	0.392	-0.706	0.264	-0.730	0.227
Lyster	Eastern Townships	-0.308	0.393	0.148	0.581	-0.509	0.289
Massawippi	Eastern Townships	1.648	0.957	1.711	0.950	2.117	0.980
Nicolette	Eastern Townships	1.500	0.939	1.442	0.923	0.879	0.862
Orford	Eastern Townships	0.694	0.747	-0.546	0.301	-1.693	0.083
Parker	Eastern Townships	1.982	0.982	0.169	0.573	0.155	0.535
PetitBrompton	Eastern Townships	-0.512	0.299	-0.357	0.380	-0.359	0.329
Simoneau	Eastern Townships	-0.687	0.258	-1.132	0.135	-1.267	0.112
St. Georges	Eastern Townships	0.477	0.677	0.287	0.615	-0.719	0.200
Stukely	Eastern Townships	-0.646	0.261	-0.820	0.214	-0.320	0.362
Tomcod	Eastern Townships	2.160	0.991	1.900	0.957	0.988	0.820
Trois Lacs	Eastern Townships	3.004	1.000	1.693	0.941	1.508	0.908
TruiteEstrie	Eastern Townships	-0.861	0.200	0.796	0.773	0.553	0.762
Waterloo	Eastern Townships	1.322	0.905	2.675	0.996	1.674	0.946
Achigan	Laurentians	1.173	0.882	0.586	0.718	-0.707	0.218
Bleu	Laurentians	0.648	0.733	2.876	0.997	2.096	0.982
Boeuf	Laurentians	0.633	0.721	0.281	0.637	-0.427	0.315
Connelly	Laurentians	1.219	0.891	1.714	0.945	0.342	0.702
Croche	Laurentians	0.891	0.803	1.388	0.914	0.134	0.625
Cromwell	Laurentians	1.415	0.926	1.345	0.909	0.184	0.633
Desormeaux	Laurentians	0.366	0.635	2.228	0.983	1.277	0.868
Dupuis	Laurentians	0.835	0.796	1.978	0.957	-0.228	0.465
Echo	Laurentians	1.392	0.918	3.072	0.998	1.030	0.791
EnCoeur	Laurentians	1.783	0.968	1.793	0.949	0.391	0.730

GrandLacNoir	Laurentians	0.787	0.780	0.678	0.737	0.190	0.578
Heney	Laurentians	0.675	0.740	0.190	0.585	-0.585	0.288
Ludger	Laurentians	1.166	0.874	0.331	0.625	0.111	0.519
Masson	Laurentians	-0.133	0.441	-0.010	0.518	0.285	0.676
Montagne_Noir	Laurentians	0.399	0.638	-0.055	0.488	-0.420	0.305
Morency	Laurentians	0.680	0.733	1.418	0.918	0.174	0.637
Noir	Laurentians	1.305	0.900	1.697	0.941	1.120	0.815
Nord	Laurentians	0.122	0.535	-0.620	0.280	-0.664	0.250
PinRouge	Laurentians	-0.945	0.171	0.855	0.788	0.637	0.795
Renaud	Laurentians	0.487	0.673	2.126	0.978	1.247	0.845
Seizelles	Laurentians	0.983	0.828	-0.328	0.386	-0.607	0.282
TruiteLaur	Laurentians	0.990	0.836	-0.017	0.506	0.054	0.580
Vert	Laurentians	2.210	0.991	2.980	0.998	1.425	0.874
Victoria	Laurentians	-0.503	0.308	-0.367	0.411	0.187	0.650
Walfred	Laurentians	0.690	0.740	1.862	0.954	0.401	0.732
Cladocerans only		NRI		NTI		sdND	
Lake	Region	Z-Score	p	Z-Score	p	Z-Score	p
Baldwin	Eastern Townships	0.941	0.813	0.814	0.886	0.447	0.558
Bowker	Eastern Townships	0.442	0.621	-0.834	0.286	-0.314	0.290
Brome	Eastern Townships	1.797	0.986	1.892	0.967	2.809	0.997
Caribou	Eastern Townships	0.751	0.745	1.302	0.843	1.308	0.865
Coulombe	Eastern Townships	0.650	0.726	-0.160	0.399	-0.225	0.368
D'Argent(1)	Eastern Townships	0.271	0.606	-0.862	0.209	-0.557	0.247
Des Monts	Eastern Townships	0.129	0.571	0.474	0.705	0.095	0.519
Drolet	Eastern Townships	-0.862	0.195	-1.147	0.126	-0.802	0.239
Est	Eastern Townships	1.178	0.875	1.819	0.955	0.436	0.741
Fitch	Eastern Townships	0.722	0.733	0.732	0.813	0.469	0.477
Fraser	Eastern Townships	-0.228	0.427	-1.033	0.173	-0.743	0.150
Huit	Eastern Townships	1.798	0.989	1.068	0.899	0.644	0.844
Lovering	Eastern Townships	0.015	0.521	0.268	0.534	-0.114	0.403
Lyster	Eastern Townships	0.690	0.747	0.859	0.829	0.498	0.786
Massawippi	Eastern Townships	2.015	0.991	2.217	0.997	2.089	0.997
Nicolette	Eastern Townships	1.245	0.893	0.087	0.628	0.187	0.608
Orford	Eastern Townships	0.272	0.608	-0.868	0.210	-0.568	0.248
Parker	Eastern Townships	1.514	0.943	0.103	0.503	0.076	0.463
PetitBrompton	Eastern Townships	0.347	0.626	0.605	0.714	0.255	0.688
Simoneau	Eastern Townships	-0.870	0.190	-0.870	0.190		
St. Georges	Eastern Townships	0.991	0.861	0.551	0.672	-0.375	0.260
Stukely	Eastern Townships	0.192	0.605	0.479	0.737	0.224	0.751
Tomcod	Eastern Townships	1.581	0.958	0.352	0.577	1.098	0.790
Trois Lacs	Eastern Townships	1.242	0.878	1.765	0.947	1.530	0.923
TruiteEstric	Eastern Townships	0.286	0.545	0.690	0.665	0.043	0.421
Waterloo	Eastern Townships	2.235	0.997	2.287	0.994	1.870	0.982
Achigan	Laurentians	2.682	0.999	2.447	0.996	1.096	0.787
Bleu	Laurentians	1.543	0.943	2.914	0.999	2.436	0.997
Boeuf	Laurentians	0.876	0.763	1.149	0.823	-0.038	0.457
Connelly	Laurentians	2.247	0.996	2.615	0.999	0.459	0.775
Croche	Laurentians	0.241	0.596	0.562	0.675	0.256	0.689
Cromwell	Laurentians	0.951	0.789	1.336	0.853	0.175	0.647
Desormeaux	Laurentians	2.337	0.998	3.046	0.999	1.792	0.980
Dupuis	Laurentians	1.683	0.944	2.708	0.990	-0.840	0.248
Echo	Laurentians	1.972	0.987	3.165	0.999	1.577	0.962
EnCoeur	Laurentians	1.571	0.958	1.569	0.937	0.397	0.771
GrandLacNoir	Laurentians	1.904	0.989	1.083	0.887	0.366	0.715
Heney	Laurentians	0.721	0.716	-0.032	0.429	-0.139	0.400

Ludger	Laurentians	0.832	0.804	-0.138	0.398	-0.197	0.384
Masson	Laurentians	0.882	0.790	-0.109	0.348	-0.140	0.400
Montagne_Noir	Laurentians	0.110	0.568	0.449	0.696	0.213	0.721
Morency	Laurentians	1.662	0.967	1.721	0.981	0.345	0.766
Noir	Laurentians	1.189	0.868	1.674	0.940	1.468	0.897
Nord	Laurentians	0.678	0.733	-0.165	0.382	-0.211	0.375
PinRouge	Laurentians	0.009	0.460	0.745	0.683	0.111	0.449
Renaud	Laurentians	0.606	0.728	1.383	0.856	1.241	0.826
Seizelles	Laurentians	1.032	0.873	-0.195	0.342	-0.191	0.385
TruiteLaur	Laurentians	0.636	0.728	-0.486	0.391	-0.091	0.424
Vert	Laurentians	1.899	0.987	3.120	0.998	1.559	0.963
Victoria	Laurentians	-0.328	0.368	-1.539	0.061	-1.723	0.045
Walfred	Laurentians	1.606	0.966	2.144	0.992	0.105	0.535
Copepods only		NRI		NTI		sdND	
Lake	Region	Z-Score	p	Z-Score	p	Z-Score	p
Baldwin	Eastern Townships	2.629	0.990	-0.009	0.597	0.126	0.653
Bowker	Eastern Townships	-0.288	0.446	-0.347	0.443	1.054	0.881
Brome	Eastern Townships	0.577	0.798	0.471	0.690	1.493	0.956
Caribou	Eastern Townships	1.095	0.801	0.373	0.670	-0.325	0.472
Coulombe	Eastern Townships	0.584	0.802	0.477	0.692	1.495	0.957
D'Argent(1)	Eastern Townships	0.167	0.623	0.069	0.573	1.081	0.835
Des Monts	Eastern Townships	0.826	0.815	-0.386	0.401	-0.511	0.405
Drolet	Eastern Townships	0.600	0.809	0.484	0.686	1.541	0.959
Est	Eastern Townships	0.002	0.556	0.133	0.551	-0.480	0.440
Fitch	Eastern Townships	0.046	0.499	1.454	0.977	-0.615	0.330
Fraser	Eastern Townships	-0.736	0.252	0.155	0.686	1.083	0.787
Huit	Eastern Townships	1.412	0.933	0.354	0.625	1.623	0.979
Lovering	Eastern Townships	-0.585	0.212	-0.442	0.237	0.558	0.648
Lyster	Eastern Townships	-0.498	0.448	0.516	0.808	-1.465	0.101
Massawippi	Eastern Townships	-0.278	0.450	-0.331	0.448	1.099	0.890
Nicolette	Eastern Townships	2.274	0.987	3.502	0.999	-0.088	0.506
Orford	Eastern Townships	3.214	0.995	1.849	0.972	-2.069	0.011
Parker	Eastern Townships	0.797	0.766	-0.918	0.171	-0.468	0.367
PetitBrompton	Eastern Townships	-0.619	0.386	-0.871	0.266	-0.460	0.420
Simoneau	Eastern Townships	-0.531	0.442	-0.015	0.401	0.524	0.640
St. Georges	Eastern Townships	1.381	0.931	0.974	0.834	0.719	0.690
Stukely	Eastern Townships	-0.218	0.478	-0.655	0.233	1.271	0.850
Tomcod	Eastern Townships	2.184	0.945	2.820	0.976	-0.913	0.140
Trois Lacs	Eastern Townships	0.520	0.769	0.014	0.587	-0.970	0.202
TruiteEstrie	Eastern Townships	1.204	0.953	1.204	0.953		
Waterloo	Eastern Townships	1.187	0.952	1.187	0.952		
Achigan	Laurentians	1.313	0.864	1.383	0.943	-1.689	0.040
Bleu	Laurentians	0.452	0.708	0.553	0.849	-0.116	0.647
Boeuf	Laurentians	-0.213	0.426	-0.522	0.329	-1.137	0.109
Connelly	Laurentians	0.454	0.715	0.562	0.851	-0.129	0.645
Croche	Laurentians	2.305	0.988	3.515	0.999	-0.095	0.503
Cromwell	Laurentians	2.017	0.969	1.206	0.939	1.058	0.706
Desormeaux	Laurentians	-7.365	0.000	-3.612	0.000	-2.348	0.000
Dupuis	Laurentians	1.218	0.954	1.218	0.954		
Echo	Laurentians	1.180	0.951	1.180	0.951		
EnCoeur	Laurentians	2.419	0.999	2.742	0.976	-0.338	0.486
GrandLacNoir	Laurentians	0.460	0.714	0.571	0.848	-0.116	0.643
Heney	Laurentians	0.649	0.744	2.060	0.977	-0.362	0.489
Ludger	Laurentians	2.001	0.969	1.209	0.937	1.043	0.707
Masson	Laurentians	1.220	0.955	1.220	0.955		
Montagne_Noir	Laurentians	1.252	0.834	0.896	0.754	0.191	0.602

Morency	Laurentians	0.793	0.852	1.280	0.930	-0.269	0.529
Noir	Laurentians	0.447	0.705	0.548	0.844	-0.130	0.639
Nord	Laurentians	-0.226	0.420	-0.537	0.320	-1.135	0.106
PinRouge	Laurentians	1.199	0.950	1.199	0.950		
Renaud	Laurentians	0.800	0.853	1.255	0.925	-0.248	0.537
Seizelles	Laurentians	1.251	0.834	0.898	0.752	0.186	0.604
TruiteLaur	Laurentians	2.393	0.980	2.878	0.996	-0.511	0.315
Vert	Laurentians	1.271	0.839	0.919	0.761	0.178	0.597
Victoria	Laurentians	1.239	0.956	1.239	0.956		
Walfred	Laurentians	1.202	0.952	1.202	0.952		

Appendix A4

Table A4. Relations between standardized functional diversity z-scores (NRI, NTI, sdND) and environmental variables (standard and geographically weighed to account for spatial autocorrelation and the influence of unmeasured environmental variables). Standardized functional diversity was computed according to species biomass and with a permutation procedure that selected species according to their regional biomass. Values are presented for the entire zooplankton community, cladocerans only and copepods only. Rows with a significant value are in bold.

	NRI				NTI				sdND				
	Correlation		Geographically weighted		Correlation		Geographically weighted		Correlation		Geographically weighted		
	R	p	R	p	R	p	R	p	R	p	R	p	
Community													
TP	0.37	0.01	0.34	0.02	0.48	0.00	0.45	0.00	0.49	0.00	0.47	0.00	
TN	0.33	0.02	0.32	0.02	0.44	0.00	0.42	0.00	0.48	0.00	0.47	0.00	
Chl	0.42	0.00	0.42	0.00	0.49	0.00	0.49	0.00	0.47	0.00	0.46	0.00	
pH	0.18	0.20	0.19	0.19	0.33	0.02	0.33	0.02	0.42	0.00	0.42	0.00	
Altitude	-0.15	0.32	-0.15	0.34	-0.38	0.01	-0.37	0.01	-0.40	0.01	-0.39	0.01	
Avg. depth	-0.23	0.10	-0.21	0.10	-0.22	0.13	-0.18	0.15	-0.18	0.20	-0.16	0.17	
Surface area	0.02	0.89	0.02	0.90	-0.13	0.35	-0.13	0.40	0.04	0.80	0.02	0.86	
DOC mg l ⁻¹	0.24	0.10	0.23	0.08	0.28	0.05	0.26	0.06	0.34	0.02	0.33	0.01	
N:P	-0.19	0.19	-0.15	0.26	-0.26	0.07	-0.23	0.18	-0.23	0.11	-0.21	0.17	
Cladocerans													
TP	0.29	0.04	0.26	0.05	0.18	0.20	0.15	0.32	0.29	0.04	0.25	0.10	
TN	0.30	0.03	0.29	0.05	0.30	0.04	0.28	0.08	0.43	0.00	0.42	0.00	
Chl	0.28	0.05	0.27	0.05	0.20	0.16	0.20	0.19	0.38	0.01	0.38	0.01	
pH	0.30	0.03	0.28	0.04	-0.07	0.64	0.26	0.06	0.45	0.00	0.41	0.00	
Altitude	-0.39	0.01	-0.36	0.01	-0.12	0.40	-0.33	0.03	-0.40	0.01	-0.36	0.01	
Avg. depth	0.03	0.83	0.04	0.76	-0.11	0.43	-0.10	0.53	0.04	0.80	0.04	0.76	
Surface area	0.19	0.19	0.17	0.23	0.08	0.56	0.06	0.68	0.34	0.02	0.30	0.03	
DOC mg l ⁻¹	0.17	0.25	0.16	0.26	0.18	0.20	0.17	0.25	0.15	0.30	0.15	0.31	
N:P	-0.22	0.13	-0.19	0.22	-0.09	0.55	-0.06	0.73	-0.02	0.87	0.00	0.98	

Copepods												
TP	0.03	0.86	0.03	0.81	0.14	0.32	0.15	0.26	-0.15	0.35	-0.15	0.33
TN	-0.06	0.66	-0.06	0.75	-0.04	0.78	-0.04	0.84	-0.09	0.57	-0.08	0.60
Chl	0.09	0.55	0.09	0.51	0.10	0.48	0.10	0.51	-0.11	0.47	-0.12	0.41
pH	-0.30	0.03	-0.28	0.03	-0.12	0.40	-0.09	0.55	-0.21	0.17	-0.21	0.18
Altitude	0.27	0.07	0.24	0.09	0.16	0.29	0.12	0.42	0.14	0.38	0.14	0.39
Avg depth	-0.06	0.69	-0.05	0.74	0.08	0.58	0.10	0.48	0.07	0.66	0.06	0.70
Surface area	-0.10	0.47	-0.10	0.36	-0.04	0.78	-0.01	0.96	0.25	0.11	0.23	0.13
DOC mg l ⁻¹	-0.07	0.64	-0.06	0.66	-0.13	0.39	-0.13	0.37	-0.01	0.94	0.01	0.94
N:P	-0.02	0.88	-0.02	0.81	-0.02	0.89	-0.03	0.82	-0.10	0.51	-0.10	0.53

Appendix A5

Table A5. Relations between standardized functional diversity z-scores (NRI, NTI, sdND) and environmental variables. Standardized functional diversity was computed according to zooplankton incidence (presence-absence in each lake), with a permutation procedure that selected species at random. Regressions were geographically weighted to account for spatial autocorrelation and the influence of unmeasured environmental variables. Values are presented for the entire zooplankton community, cladocerans only and copepods only. Rows with a significant value are in bold.

Community	NRI		NTI		sdND	
	R	p	R	p	R	p
TP	0.403	0.003	0.359	0.004	0.388	0.002
TN	0.405	0.002	0.381	0.006	0.440	0.001
Chl a	0.404	0.002	0.372	0.005	0.386	0.001
pH	0.198	0.192	0.344	0.013	0.435	0.003
Altitude	-0.169	0.280	-0.362	0.017	-0.383	0.011
Avg. depth	-0.044	0.729	-0.108	0.447	-0.072	0.547
Surface area	0.031	0.801	0.041	0.762	0.189	0.126
DOC mg l ⁻¹	0.274	0.024	0.200	0.163	0.291	0.026
N:P	-0.220	0.110	-0.164	0.262	-0.168	0.206
<u>Cladocerans</u>						
TP	0.306	0.017	0.133	0.375	0.254	0.088
TN	0.311	0.046	0.273	0.082	0.440	0.003
Chl a	0.276	0.032	0.196	0.202	0.384	0.005
pH	0.262	0.058	0.268	0.049	0.405	0.005
Altitude	-0.388	0.006	-0.329	0.026	-0.347	0.022
Avg. depth	0.039	0.801	-0.097	0.542	0.036	0.814
Surface area	0.099	0.508	0.087	0.564	0.248	0.068
DOC mg l ⁻¹	0.155	0.296	0.169	0.269	0.165	0.254
N:P	-0.160	0.297	-0.080	0.638	0.025	0.874
<u>Copepods</u>						
TP	0.136	0.256	0.179	0.187	-0.159	0.313
TN	-0.012	0.951	-0.023	0.880	-0.093	0.576
Chl a	0.130	0.426	0.121	0.452	-0.116	0.406
pH	-0.250	0.063	-0.066	0.625	-0.213	0.164
Altitude	0.249	0.087	0.097	0.495	0.140	0.415
Avg. depth	-0.119	0.448	0.083	0.588	0.072	0.635
Surface area	-0.142	0.287	-0.043	0.752	0.219	0.141
DOC mg l ⁻¹	0.017	0.916	-0.116	0.406	-0.003	0.978
N:P	-0.110	0.398	-0.034	0.792	-0.110	0.471