**Supplementary material**

*Table S1 - PerMANOVA pairwise tests of environmental characteristics (based on the Euclidian distance) of ponds in Halton, Loughborough, Stockport, Birmingham and Huddersfield.*

|  |  |  |  |
| --- | --- | --- | --- |
| Pairs | F.model | *R2* | p-adjusted |
| Halton vs Loughborough | 1.38 | 0.02 | 1.00 |
| Halton vs Stockport | 18.62 | 0.32 | 0.01 |
| Halton vs Birmingham | 16.24 | 0.23 | 0.01 |
| Halton vs Huddersfield | 9.03 | 0.17 | 0.01 |
| Loughborough vs Stockport | 0.06 | 0.001 | 1.00 |
| Loughborough vs Birmingham | 15.18 | 0.18 | 0.01 |
| Loughborough vs Huddersfield | 7.74 | 0.16 | 0.08 |
| Stockport vs Birmingham | 6.95 | 0.14 | 0.07 |
| Stockport vs Huddersfield | 3.57 | 0.01 | 0.45 |
| Birmingham vs Huddersfield | 0.14 | 0.003 | 1.00 |

*Table S2 - Post hoc Tukey pairwise tests of multivariate dispersion of environmental conditions of ponds in ponds in Halton, Loughborough, Stockport, Birmingham and Huddersfield.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Pairs | Difference | Lower | Upper | p-adjusted |
| Loughborough vs Halton | 646.6 | -1194.9 | 2488.2 | 0.86 |
| Stockport vs Halton | 309.2 | -2014.4 | 2632.7 | 0.99 |
| Birmingham vs Halton | 2400.3 | 434.9 | 4365.6 | 0.01 |
| Huddersfield vs Halton | 3282.9 | 205.7 | 4560.2 | 0.02 |
| Stockport vs Loughborough | -337.4 | -2476.7 | 1801.9 | 0.99 |
| Birmingham vs Loughborough | 1753.7 | 10.0 | 3497.3 | 0.04 |
| Huddersfield vs Loughborough | 1736.3 | -243.1 | 3715.8 | 0.11 |
| Birmingham vs Stockport | 2091.1 | -155.6 | 4337.7 | 0.08 |
| Huddersfield vs Stockport | 2073.8 | -360.5 | 4507.9 | 0.13 |
| Huddersfield vs Birmingham | -17.3 | -2112.4 | 2077.7 | 0.99 |

*Table S3 - PerMANOVA pairwise tests of macroinvertebrate assemblages (based on the Sorenson dissimilarity) in ponds in Halton, Loughborough, Stockport, Birmingham and Huddersfield.*

|  |  |  |  |
| --- | --- | --- | --- |
| Pairs | F.model | *R2* | p-adjusted |
| Halton vs Loughborough | 16.40 | 0.20 | 0.01 |
| Halton vs Stockport | 5.59 | 0.13 | 0.01 |
| Halton vs Birmingham | 16.44 | 0.24 | 0.01 |
| Halton vs Huddersfield | 14.99 | 0.26 | 0.01 |
| Loughborough vs Stockport | 14.07 | 0.20 | 0.01 |
| Loughborough vs Birmingham | 12.72 | 0.16 | 0.01 |
| Loughborough vs Huddersfield | 4.89 | 0.08 | 0.01 |
| Stockport vs Birmingham | 16.31 | 0.27 | 0.01 |
| Stockport vs Huddersfield | 12.82 | 0.27 | 0.01 |
| Birmingham vs Huddersfield | 15.02 | 0.24 | 0.01 |

*Table S4* - *Macroinvertebrate taxa identified as statistically significant indicator taxa for ponds in Halton, Loughborough, Stockport, Birmingham or Huddersfield.*

|  |  |  |  |
| --- | --- | --- | --- |
| Urban settlement | Taxon | Statistic | p-value |
| Halton | *Anacaena limbata* | 0.696 | 0.001 |
|  | *Nepa cinerea* | 0.58 | 0.001 |
|  | *Scrtitdae larvae* | 0.506 | 0.001 |
|  | *Anisus leucostoma* | 0.42 | 0.002 |
|  | *Laccobius bipunctatus* | 0.401 | 0.003 |
|  | *Copelatus haemorrhoidalis* | 0.346 | 0.011 |
|  |  |  |  |
| Loughborough | Planaridae spp. | 0.563 | 0.001 |
|  | *Physa acuta* | 0.518 | 0.001 |
|  | *Zonitoides nitidus* | 0.383 | 0.015 |
|  | Hydrophilidae larvae | 0.312 | 0.036 |
|  | Collembola | 0.312 | 0.049 |
|  |  |  |  |
| Stockport | *Hydroporus planus* | 0.68 | 0.001 |
|  | *Hydroporus memnonius* | 0.612 | 0.001 |
|  | *Limnephilus vittatus* | 0.593 | 0.001 |
|  | *Hydroporus gyllenhalii* | 0.559 | 0.001 |
|  | *Hydroporus nigrita* | 0.559 | 0.001 |
|  | *Helophorus minutus* | 0.549 | 0.001 |
|  | *Laccophilus minutus* | 0.546 | 0.001 |
|  | *Helochares punctatus* | 0.538 | 0.001 |
|  | *Laccobius biguttatus* | 0.507 | 0.001 |
|  | *Hydroporus erythrocephalus* | 0.5 | 0.001 |
|  | *Phaedon armoraciae* | 0.5 | 0.001 |
|  | *Hydroporus angustatus* | 0.483 | 0.001 |
|  | *Colymbetes fuscus* | 0.476 | 0.002 |
|  | *Hydroporus pubescens* | 0.469 | 0.001 |
|  | *Coccidula rufa* | 0.464 | 0.002 |
|  | *Agabus nebulosus* | 0.446 | 0.002 |
|  | *Hydroporus neglectus* | 0.433 | 0.002 |
|  | *Agabus melanocornis* | 0.433 | 0.003 |
|  | *Haemopis sanguisuga* | 0.433 | 0.001 |
|  | *Gerris gibbifer* | 0.407 | 0.004 |
|  | *Musculium lacustre* | 0.363 | 0.01 |
|  | *Hydroporus obscurus* | 0.354 | 0.019 |
|  | *Hydroporus tesselatus* | 0.354 | 0.02 |
|  | *Enochrus affinis* | 0.354 | 0.019 |
|  | *Scirtes hemisphaericus* | 0.354 | 0.01 |
|  |  |  |  |
| Birmingham | Sphaerium spp. | 0.853 | 0.001 |
|  | Corixidae nymph | 0.776 | 0.001 |
|  | Zygoptera instar I +II | 0.753 | 0.001 |
|  | *Dugesia tigrina* | 0.73 | 0.001 |
|  | Hydrometra nypmh | 0.707 | 0.001 |
|  | Anisoptera instar I +II | 0.707 | 0.001 |
|  | *Theromyzon tessulatum* | 0.707 | 0.001 |
|  | *Notonecta nypmhs* | 0.693 | 0.001 |
|  | *Dixidae* | 0.671 | 0.001 |
|  | *Dugesia polychroa* | 0.66 | 0.001 |
|  | *Gerris Nypmhs* | 0.639 | 0.001 |
|  | Tricladida spp. | 0.632 | 0.001 |
|  | *Acroloxus lacustris* | 0.614 | 0.001 |
|  | *Dendrocoelum lacteum* | 0.606 | 0.001 |
|  | *Agraylea multipunctata* | 0.606 | 0.001 |
|  | *Armiger crista* | 0.603 | 0.001 |
|  | Syrphidae | 0.557 | 0.001 |
|  | *Hemiclepsis marginata* | 0.548 | 0.001 |
|  | Velidae nymph | 0.548 | 0.001 |
|  | Limnoidae | 0.548 | 0.001 |
|  | *Planorbis planorbis* | 0.517 | 0.001 |
|  | *Polycelis nigra* | 0.516 | 0.001 |
|  | *Hesperocorixa moesta* | 0.494 | 0.001 |
|  | *Mystacides longicornis* | 0.493 | 0.001 |
|  | Hydroptila spp. | 0.483 | 0.002 |
|  | Nepidae nymph | 0.483 | 0.001 |
|  | *Triaenodes bicolor* | 0.482 | 0.001 |
|  | *Micronecta poweri* | 0.475 | 0.001 |
|  | *Sympetrum sanguineum* | 0.429 | 0.004 |
|  | *Ranatra linearis* | 0.422 | 0.004 |
|  | *Caenis rivulorum* | 0.408 | 0.004 |
|  | Oxyethira spp. | 0.408 | 0.004 |
|  | *Leptocerus tineiformis* | 0.408 | 0.003 |
|  | *Erythromma najas* | 0.406 | 0.013 |
|  | Ilyocoris cimicoides nymph | 0.401 | 0.01 |
|  | *Holocentropus picicornis* | 0.381 | 0.009 |
|  | *Gammarus lacustris* | 0.365 | 0.008 |
|  | *Laccobius minutus* | 0.365 | 0.015 |
|  | *Helophorus aequalis* | 0.365 | 0.01 |
|  | *Helophorus flavipes* | 0.365 | 0.017 |
|  | *Agraylea sexmaculata* | 0.365 | 0.01 |
|  | *Agrypnia pagetana* | 0.365 | 0.017 |
|  | *Microvelia reticulata* | 0.365 | 0.014 |
|  | Tabanidae | 0.365 | 0.011 |
|  | *Corixa panzeri* | 0.339 | 0.045 |
|  | *Micronecta scholtzi* | 0.316 | 0.029 |
|  |  |  |  |
| Huddersfield | *Leptophlebia marginata* | 0.548 | 0.001 |
|  | *Nemurella picteti* | 0.5 | 0.001 |
|  | *Tinodes waeneri* | 0.5 | 0.001 |
|  | *Agrypnia obsoleta* | 0.447 | 0.001 |
|  | *Pisidium indet* | 0.447 | 0.003 |
|  | *Limnephilus rhombicus* | 0.422 | 0.002 |
|  | *Limnephilus centralis* | 0.387 | 0.004 |
|  | *Pisidium subtruncatum* | 0.387 | 0.005 |
|  | *Pisidium hybernicum* | 0.387 | 0.007 |
|  | *Caenis robusta* | 0.359 | 0.016 |
|  | *Oulimnius tuberculatus* | 0.316 | 0.039 |