

## Supplementary material

### **Phytoplankton in dryland riverine waterholes: environmental drivers, variability and ecosystem-monitoring potential using different levels of taxonomic resolution and dataset reduction**

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**Table S1. List of species recorded at each site (1, 2 and 3) on each river**

| Phylum          | Order                | Genus & species                   | Basalt River         |   |   | Keelbottom Creek |   |   | Suttor River |   |   |   |   |
|-----------------|----------------------|-----------------------------------|----------------------|---|---|------------------|---|---|--------------|---|---|---|---|
|                 |                      |                                   | 1                    | 2 | 3 | 1                | 2 | 3 | 1            | 2 | 3 |   |   |
| Bacillariophyta | Achnanthes           | <i>Achnanthes</i> sp. 1           |                      |   |   | X                | X | X |              |   |   | X |   |
|                 |                      | <i>Achnanthes</i> sp. 2           |                      |   |   |                  | X | X |              |   |   |   |   |
|                 | Bacillariales        | <i>Nitzschia reversa</i> W. Smith |                      |   |   |                  |   | X |              |   |   |   |   |
|                 |                      | <i>Nitzschia</i> sp. 1            | X                    | X |   |                  |   |   | X            |   |   |   |   |
|                 | Cymbellales          | <i>Nitzschia</i> sp. 2            |                      |   |   | X                |   |   | X            |   |   |   |   |
|                 |                      | <i>Cymbella</i> sp. 1             | X                    | X | X | X                | X | X |              |   |   |   |   |
|                 |                      | <i>Cymbella</i> sp. 2             |                      |   |   |                  |   | X |              |   |   |   |   |
|                 |                      | <i>Gomphonema</i> sp. 1           | X                    | X | X | X                | X | X |              |   |   |   |   |
|                 |                      | <i>Gomphonema</i> sp. 2           |                      |   | X |                  |   | X | X            |   |   |   |   |
|                 |                      | <i>Gomphonema</i> sp. 3           |                      |   |   | X                | X | X |              |   |   |   |   |
|                 |                      | <i>Gomphonema</i> sp. 4           |                      |   | X |                  |   |   | X            |   |   |   |   |
|                 |                      | Eunotiales                        | <i>Eunotia</i> sp. 1 |   |   |                  | X |   |              | X |   |   |   |
|                 | <i>Eunotia</i> sp. 2 |                                   |                      |   | X |                  |   |   |              |   |   |   |   |
|                 | Fragilariales        | <i>Fragilaria</i> sp. 1           | X                    | X |   | X                | X | X |              | X | X |   | X |
|                 |                      | <i>Fragilaria</i> sp. 2           |                      |   | X |                  |   |   |              |   |   |   |   |
|                 |                      | <i>Fragilaria</i> sp. 3           |                      |   |   |                  |   |   | X            |   |   |   | X |
|                 |                      | <i>Synedra ulna</i> Ehrenberg     |                      | X | X | X                | X | X | X            |   |   |   |   |
|                 | Mastogloiales        | <i>Mastogloia</i> sp. 1           | X                    | X | X |                  |   |   | X            |   |   |   |   |
|                 |                      | <i>Mastogloia</i> sp. 2           |                      |   | X |                  |   |   | X            |   |   |   |   |
|                 | Meloseirales         | <i>Melosira</i> sp. 1             |                      |   |   |                  |   | X | X            |   |   |   |   |
|                 |                      | <i>Melosira</i> sp. 2             |                      |   |   | X                | X | X |              | X |   |   |   |
|                 | Naviculales          | <i>Gyrosigma</i> sp. 1            | X                    | X |   | X                | X | X |              | X | X |   | X |
|                 |                      | <i>Gyrosigma</i> sp. 2            |                      |   | X | X                | X |   |              |   |   |   |   |
|                 |                      | <i>Gyrosigma</i> sp. 3            | X                    | X | X | X                | X | X |              |   |   |   |   |
|                 |                      | <i>Navicula</i> sp. 1             | X                    | X | X | X                | X | X |              | X |   |   | X |
|                 |                      | <i>Navicula</i> sp. 2             |                      |   | X |                  |   |   |              |   |   |   |   |
|                 |                      | <i>Navicula</i> sp. 3             |                      |   |   |                  |   | X | X            |   |   |   |   |
|                 |                      | <i>Pinnularia</i> sp. 1           | X                    | X | X | X                | X | X |              | X | X |   | X |
|                 |                      | <i>Pinnularia</i> sp. 2           |                      |   | X |                  |   |   |              | X |   |   |   |
|                 |                      | <i>Pinnularia</i> sp. 3           |                      |   | X |                  |   |   |              | X |   |   |   |
|                 |                      | <i>Stauroneis</i> sp. 1           |                      |   | X |                  |   |   | X            |   |   |   |   |
|                 |                      | Thalassiophysales                 | <i>Amorpha</i> sp. 2 | X |   |                  |   |   |              | X |   |   |   |
|                 | <i>Amorpha</i> sp. 1 |                                   |                      |   |   |                  |   | X |              | X | X |   | X |
| Indeterminate   | Diatom 1             |                                   | X                    | X |   |                  |   |   |              |   |   |   |   |
|                 | Diatom 2             | X                                 | X                    | X |   |                  |   |   |              |   |   |   |   |
| Chlorophyta     | Chlorococcales       | <i>Coelastrum</i> sp. 1           |                      |   |   |                  | X |   | X            |   |   |   |   |

| Phylum | Order           | Genus & species   | Basalt River |   |   | Keelbottom Creek |   |   | Suttor River |   |   |
|--------|-----------------|---|--------------|---|---|------------------|---|---|--------------|---|---|
|        |                 |   | 1            | 2 | 3 | 1                | 2 | 3 | 1            | 2 | 3 |
|        |                 | <i>Crucigenia quadrata</i> var. <i>secta</i> Playfair       |              | X | X | X                | X | X |              | X | X |
|        |                 | <i>Crucigeniella crucifera</i> (Wolle) Komárek              |              |   | X | X                | X | X |              |   |   |
|        |                 | <i>Dictyosphaerium</i> sp. 1                                |              |   |   | X                |   | X |              |   |   |
|        |                 | <i>Kirchneriella lunaris</i> (Kirchner) K. Möbius           |              | X |   | X                | X | X |              |   |   |
|        |                 | <i>Lagerheimia longiseta</i> (Lemmermann) Wille             |              |   |   |                  |   | X |              |   |   |
|        |                 | <i>Monoraphidium arcuatum</i> (Korshikov) Hindák            |              | X |   |                  | X | X |              |   | X |
|        |                 | <i>Monoraphidium contortum</i> (Thuret) Komárková-Legnerová | X            | X | X | X                | X | X | X            |   |   |
|        |                 | <i>Pediastrum boryanum</i> (Turpin) Meneghini               | X            | X | X | X                | X | X |              |   |   |
|        |                 | <i>Pediastrum duplex</i> Meyen                              | X            |   | X | X                | X | X |              |   |   |
|        |                 | <i>Pediastrum simplex</i> Meyen                             | X            | X | X | X                |   | X |              |   |   |
|        |                 | <i>Scenedesmus bernardii</i> G.M. Smith                     |              |   | X | X                | X |   |              |   |   |
|        |                 | <i>Scenedesmus bijugatus</i> Kützing                        | X            |   | X |                  | X | X |              | X |   |
|        |                 | <i>Scenedesmus denticulatus</i> Lagerheim                   |              |   |   |                  |   |   |              | X |   |
|        |                 | <i>Scenedesmus dimorphus</i> (Turpin) Kützing               |              |   | X | X                | X | X |              | X | X |
|        |                 | <i>Scenedesmus ellipticus</i> (Corda)                       | X            | X | X | X                | X | X |              | X | X |
|        |                 | <i>Scenedesmus quadricauda</i> (Turpin) Brébisson           | X            | X | X | X                | X | X | X            | X | X |
|        |                 | <i>Tetraedron gracile</i> (Reinsch) Hansgrig                |              |   |   |                  | X |   |              | X | X |
|        |                 | <i>Tetraedron incus</i> (Teiling) G.M. Smith                |              |   |   |                  |   |   | X            |   |   |
|        |                 | <i>Tetraedron regulare</i> Kützing                          |              | X | X | X                | X |   |              | X | X |
|        |                 | <i>Tetrastrum elegans</i> Playfair                          |              |   |   | X                |   |   |              |   |   |
|        |                 | <i>Treubaria triappendiculata</i> C. Bernard                |              |   |   | X                | X | X |              | X | X |
|        | Cladophorales   | <i>Cladophora fracta</i> (O.F. Müller ex Vahl) Kützing      | X            | X | X |                  |   |   |              |   |   |
|        |                 | <i>Rhizoclonium hieroglyphicum</i> (C. Agardh) Kützing      | X            |   |   |                  |   |   |              |   |   |
|        | Klebsormidiales | <i>Koliella spiculiformis</i> (Vischer) Hindák              |              |   |   |                  | X |   |              |   |   |
|        | Microsporales   | <i>Microspora</i> sp. 1                                     |              |   |   |                  |   |   |              |   | X |
|        | Oedogoniales    | <i>Oedogonium</i> sp. 1                                     |              |   |   |                  | X | X |              |   |   |
|        | Tetrasporales   | <i>Gloeocystis</i> sp. 1                                    |              |   | X | X                | X | X |              |   | X |
|        | Volvocales      | <i>Actinastrum hantzschii</i> Lagerheim                     |              |   | X | X                |   | X |              |   |   |
|        |                 | <i>Eudorina elegans</i> Ehrenberg                           |              |   |   |                  | X | X |              |   |   |
|        |                 | <i>Gonium</i> sp. 1   |              |   |   |                  | X |   |              |   |   |
|        | Zygnematales    | <i>Closterium acerosum</i> (Schrank) Ehrenberg ex Ralfs     | X            | X | X | X                | X | X |              |   |   |
|        |                 | <i>Closterium diana</i> Ehrenberg ex Ralfs                  |              | X |   |                  |   | X |              |   |   |
|        |                 | <i>Closterium kuetzingii</i> Brébisson                      |              |   |   |                  |   | X |              |   |   |
|        |                 | <i>Closterium moniliferum</i> Ehrenberg ex Ralfs            | X            |   | X | X                | X | X | X            |   | X |
|        |                 | <i>Closterium parvulum</i> Nägeli                           |              |   |   |                  |   |   |              |   | X |
|        |                 | <i>Closterium praelongum</i> Brébisson                      |              |   |   |                  |   | X |              |   | X |

| Phylum        | Order           | Genus & species   | Basalt River |   |   | Keelbottom Creek |   |   | Suttor River |   |   |
|---------------|-----------------|---|--------------|---|---|------------------|---|---|--------------|---|---|
|               |                 |   | 1            | 2 | 3 | 1                | 2 | 3 | 1            | 2 | 3 |
|               |                 | <i>Closterium</i> sp. 1   |              | X |   |                  |   |   |              |   | X |
|               |                 | <i>Cosmarium binum</i> Nordstedt  | X            | X | X | X                | X | X | X            |   |   |
|               |                 | <i>Cosmarium contractum</i> O. Kirchner   |              |   |   |                  |   | X |              |   |   |
|               |                 | <i>Cosmarium pseudopyramidatum</i> P. Lundell                                     | X            | X | X | X                | X | X | X            |   | X |
|               |                 | <i>Cosmarium retusifforme</i> (Wille) Gutivinski                                  | X            |   | X | X                |   |   |              |   |   |
|               |                 | <i>Euastrum bidentatum</i> Nägeli   |              |   |   |                  |   | X |              |   |   |
|               |                 | <i>Euastrum didelta</i> Ralfs ex Ralfs  |              |   |   |                  |   | X |              |   |   |
|               |                 | <i>Euastrum elegans</i> Kützing ex Ralfs  |              |   |   |                  | X |   |              |   |   |
|               |                 | <i>Euastrum</i> sp. 1   |              |   |   | X                |   |   |              |   |   |
|               |                 | <i>Euastrum</i> sp. 2   |              |   |   |                  |   | X |              |   |   |
|               |                 | <i>Micrasterias decemdentata</i> (Nägeli) W. Archer                               |              |   |   |                  | X | X |              |   |   |
|               |                 | <i>Micrasterias mahabuleshwariensis</i> J. Hobson                                 |              |   |   |                  | X |   |              |   |   |
|               |                 | <i>Mougeotia</i> sp. 1  | X            | X | X | X                | X | X |              |   |   |
|               |                 | <i>Sphaeroszma pulchrum</i> Bailey  |              |   |   |                  | X |   |              |   |   |
|               |                 | <i>Spinoclosterium cuspidatum</i> (Bailey) Hirano                                 |              |   | X |                  |   |   |              |   |   |
|               |                 | <i>Spirogyra</i> sp. 1  |              | X | X | X                | X | X |              |   |   |
|               |                 | <i>Staurastrum chaetoceras</i> (Schröder) G.M. Smith                              |              | X | X | X                | X | X |              | X | X |
|               |                 | <i>Staurastrum gracile</i> Ralfs ex Ralfs   | X            | X | X | X                | X | X |              |   |   |
|               |                 | <i>Staurastrum muticum</i> Brébisson ex Ralfs                                     |              |   |   |                  |   |   |              |   | X |
|               |                 | <i>Staurastrum</i> sp. 1  |              | X |   |                  |   | X |              |   |   |
|               |                 | <i>Staurastrum tetracerum</i> Ralfs   | X            |   |   | X                | X | X | X            |   | X |
|               |                 | <i>Staurastrum wildemanii</i> var <i>unispiniferum</i> A.M. Scott & G.W. Prescott |              |   |   |                  |   | X |              |   |   |
|               |                 | <i>Stauroidesmus gibberulus</i> (Joshua) Teiling                                  |              |   |   |                  | X | X | X            |   |   |
|               |                 | <i>Stauroidesmus</i> sp. 1  | X            |   |   |                  | X | X |              |   | X |
|               |                 | <i>Stauroidesmus triangularis</i> (Lagerheim) Teiling                             |              |   |   |                  |   |   | X            |   | X |
| Cyanobacteria | Chroococcales   | <i>Microcystis</i> sp. 1  |              |   |   | X                | X |   |              |   |   |
|               | Nostocales      | <i>Spirulina</i> sp. 1  | X            | X | X |                  |   |   |              |   |   |
|               |                 | <i>Dolichospermum oscillarioides</i> (Bory de Saint-Vincent)                      | X            | X | X |                  | X | X |              |   |   |
|               |                 | <i>Dolichospermum spiroides</i> (Klebahn)   | X            | X | X |                  |   |   |              |   |   |
|               |                 | <i>Anabenopsis elenkinii</i> V.V. Miller  |              | X |   |                  |   |   |              |   | X |
|               |                 | <i>Aphanizomenon gracile</i> Lemmermann   | X            | X | X |                  | X |   |              | X | X |
|               |                 | <i>Cylindrospermum</i> sp. 1  |              | X |   |                  |   |   |              |   |   |
|               | Oscillatoriales | <i>Oscillatoria</i> sp. 1   | X            |   |   |                  |   |   |              |   | X |
|               |                 | <i>Oscillatoria tenuis</i> C. Agardh  | X            | X | X |                  |   |   |              |   | X |
|               |                 | <i>Phormidium</i> sp. 1   |              | X |   |                  |   |   |              |   | X |

| Phylum                                      | Order            | Genus & species                                    | Basalt River                                |    |    | Keelbottom Creek |    |    | Suttor River |    |    |   |
|---|------------------|--|---|----|----|------------------|----|----|--------------|----|----|---|
|   |                  |  | 1   | 2  | 3  | 1                | 2  | 3  | 1            | 2  | 3  |   |
| Euglenozoa                                  | Pseudanabaenales | <i>Limnothrix redekei</i> (van Goor) M.E. Meffert  | X   | X  | X  |                  | X  | X  | X            |    | X  |   |
|   | Synechococcales  | <i>Merismopedia glauca</i> (Ehrenberg) Kützing     |   | X  | X  |                  | X  | X  |              |    | X  |   |
|   | Euglenales       | <i>Euglena acus</i> Ehrenberg                      | X   | X  | X  | X                | X  | X  | X            | X  | X  | X |
|   |                  | <i>Euglena granulata</i> (G.A. Klebs) Schmitz      | X   | X  | X  | X                | X  | X  | X            | X  | X  | X |
|   |                  | <i>Euglena limnophila</i> Lemmermann               | X   | X  | X  | X                | X  | X  |              |    | X  | X |
|   |                  | <i>Phacus acuminatus</i> Stokes                    |   |    | X  |                  |    |    |              |    |    | X |
|   |                  | <i>Phacus alatus</i> G.A. Klebs                    |   |    |    |                  |    |    | X            |    |    |   |
|   |                  | <i>Phacus caudatus</i> Hübner                      | X   |    |    | X                | X  | X  | X            | X  | X  | X |
|   |                  | <i>Phacus curvicauda</i> Svirenko                  |   |    |    |                  |    |    | X            |    |    |   |
|   |                  | <i>Phacus longicauda</i> (Ehrenberg) Dujardin      |   |    |    |                  | X  | X  | X            |    |    | X |
|   |                  | <i>Strombomonas acuminata</i> (Schmarda) Deflandre | X   |    |    |                  | X  |    | X            | X  | X  | X |
|   |                  | <i>Strombomonas</i> sp. 1                          |   |    |    |                  | X  |    |              | X  | X  | X |
|   |                  | <i>Strombomonas tambowika</i> (Svirenko) Deflandre | X   | X  | X  | X                |    |    |              | X  | X  | X |
|   |                  | <i>Trachelomonas armata</i> (Ehrenberg) F. Stein   |   |    |    |                  | X  | X  | X            |    |    |   |
|   |                  | <i>Trachelomonas curta</i> A.M. Cunha              |   |    | X  |                  |    |    | X            |    |    | X |
|   |                  | <i>Trachelomonas granulata</i> Svirenko            |   |    |    | X                |    |    | X            | X  | X  | X |
|   |                  | <i>Trachelomonas hispida</i> (Perty) F. Stein      | X   | X  | X  | X                | X  | X  | X            | X  | X  | X |
|   |                  | <i>Trachelomonas oblonga</i> Lemmermann            | X   | X  | X  | X                | X  | X  | X            | X  | X  | X |
|   |                  | <i>Trachelomonas planctonica</i> Svirenko          |   |    |    |                  | X  | X  | X            | X  | X  | X |
|   |                  | <i>Trachelomonas volvocina</i> Ehrenberg           | X   | X  |    | X                | X  | X  | X            | X  | X  | X |
| Myzozoa                                     | Peridinales      | <i>Glenodinium</i> sp. 1                           |   |    |    |                  | X  | X  |              |    |    |   |
|   |                  | <i>Peridinium bipes</i> F. Stein                   | X   | X  | X  | X                | X  | X  | X            | X  | X  |   |
|   |                  | <i>Peridinium inconspicuum</i> Lemmermann          |   |    | X  | X                | X  | X  | X            |    |    |   |
|   |                  | <i>Peridinium lomnickii</i> Woloszynska            | X   | X  | X  | X                | X  | X  | X            | X  |    |   |
|   |                  | <i>Peridinium volzii</i> Lemmermann                |   |    | X  |                  |    |    |              |    |    |   |
| Ochrophyta                                  | Eustigmatales    | <i>Pseudostaurastrum enorme</i> (Ralfs) R. Chodat  |   |    |    |                  |    | X  |              |    |    |   |
|   |                  | Mischococcales                                     | <i>Centrtractus belanophorus</i> Lemmermann | X  | X  | X                | X  | X  |              | X  | X  | X |
|   | Tribonematales   | <i>Goniochloris smithii</i> (Bourelly) Fott        |   |    |    |                  |    | X  |              |    |    |   |
|   |                  | <i>Ophiocytium capitatum</i> Wolle                 |   |    |    |                  |    |    |              |    | X  |   |
|   |                  | <i>Tribonema affine</i> (Kützing) G.S. West        |   |    | X  |                  |    |    |              |    |    |   |
| Total number of species (grand total = 137) |                  |  | 48  | 66 | 55 | 61               | 76 | 89 | 32           | 29 | 52 |   |

**Table S2. ANOVA and ANCOVA comparing A, rivers and B, seasons within sites (see Fig. 3)**

| Variable                              | ANOVA  |          |          | ANCOVA |          |          |
|---------------------------------------|--------|----------|----------|--------|----------|----------|
|                                       | d.f.   | <i>F</i> | <i>P</i> | d.f.   | <i>F</i> | <i>P</i> |
| A. ANOVA and ANCOVA for RIVER         |        |          |          |        |          |          |
| N                                     | 2, 106 | 34.25    | <0.001   | 2, 104 | 43.84    | <0.001   |
| S                                     | 2, 106 | 39.32    | <0.001   | 2, 104 | 39.33    | <0.001   |
| E                                     | 2, 106 | 27.48    | <0.001   | 2, 104 | 30.24    | <0.001   |
| B. ANOVA for SITE × SEASON (P < 0.05) |        |          |          |        |          |          |
| N Basalt River                        | 4, 45  | 4.51     | 0.004    |        |          |          |
| Keelbottom Creek                      | 4, 43  | 13.19    | <0.001   |        |          |          |
| Suttor River                          | 4, 18  | 7.18     | 0.001    |        |          |          |
| S Basalt River                        | 4, 45  | 4.33     | 0.005    |        |          |          |
| Keelbottom Creek                      | 4, 43  | 3.21     | 0.022    |        |          |          |
| Suttor River                          | 4, 18  | 14.13    | <0.001   |        |          |          |
| E Basalt River                        | 4, 45  | 1.26     | 0.299    |        |          |          |
| Keelbottom Creek                      | 4, 43  | 7.17     | <0.001   |        |          |          |
| Suttor River                          | 4, 18  | 13.65    | <0.001   |        |          |          |

**Table S3. Distance-based linear model marginal tests**

‘Proportion’ indicates percentage of variance explained by each variable in its individual test

| Variable                       | Pseudo- <i>F</i> | <i>P</i> | Proportion (%) |
|--------------------------------|------------------|----------|----------------|
| Series 1 (d.f. = 119)          |                  |          |                |
| Depth                          | 3.4328           | 0.001    | 2.8            |
| Minimum temperature            | 5.482            | 0.001    | 4.4            |
| Maximum temperature            | 3.3884           | 0.001    | 2.77           |
| Minimum dissolved oxygen       | 2.3198           | 0.006    | 1.91           |
| Maximum dissolved oxygen       | 1.094            | 0.355    | 0.91           |
| Minimum pH                     | 0.95544          | 0.551    | 0.80           |
| Maximum pH                     | 3.9966           | 0.001    | 3.25           |
| Conductivity                   | 15.592           | 0.001    | 11.58          |
| Minimum PAR                    | 1.0165           | 0.443    | 0.85           |
| Maximum PAR                    | 1.6754           | 0.046    | 1.39           |
| Turbidity                      | 7.6934           | 0.001    | 6.07           |
| Series 2 (d.f. = 51)           |                  |          |                |
| Temperature                    | 11.134           | 0.001    | 17.92          |
| Dissolved oxygen               | 1.5796           | 0.114    | 3.00           |
| pH                             | 11.611           | 0.001    | 18.55          |
| Conductivity                   | 9.54             | 0.001    | 15.76          |
| PAR                            | 1.1893           | 0.288    | 2.28           |
| Turbidity                      | 7.2751           | 0.001    | 12.48          |
| Particulate nitrogen           | 3.5122           | 0.001    | 6.44           |
| Total filterable nitrogen      | 6.5964           | 0.001    | 11.45          |
| Filterable organic nitrogen    | 4.4906           | 0.001    | 8.09           |
| Ammonia                        | 2.6569           | 0.009    | 4.95           |
| Nitrite                        | 8.0048           | 0.001    | 13.57          |
| Total filterable phosphorus    | 2.3809           | 0.028    | 4.46           |
| Filterable organic phosphorus  | 3.5479           | 0.002    | 6.50           |
| Filterable reactive phosphorus | 6.3614           | 0.001    | 11.09          |

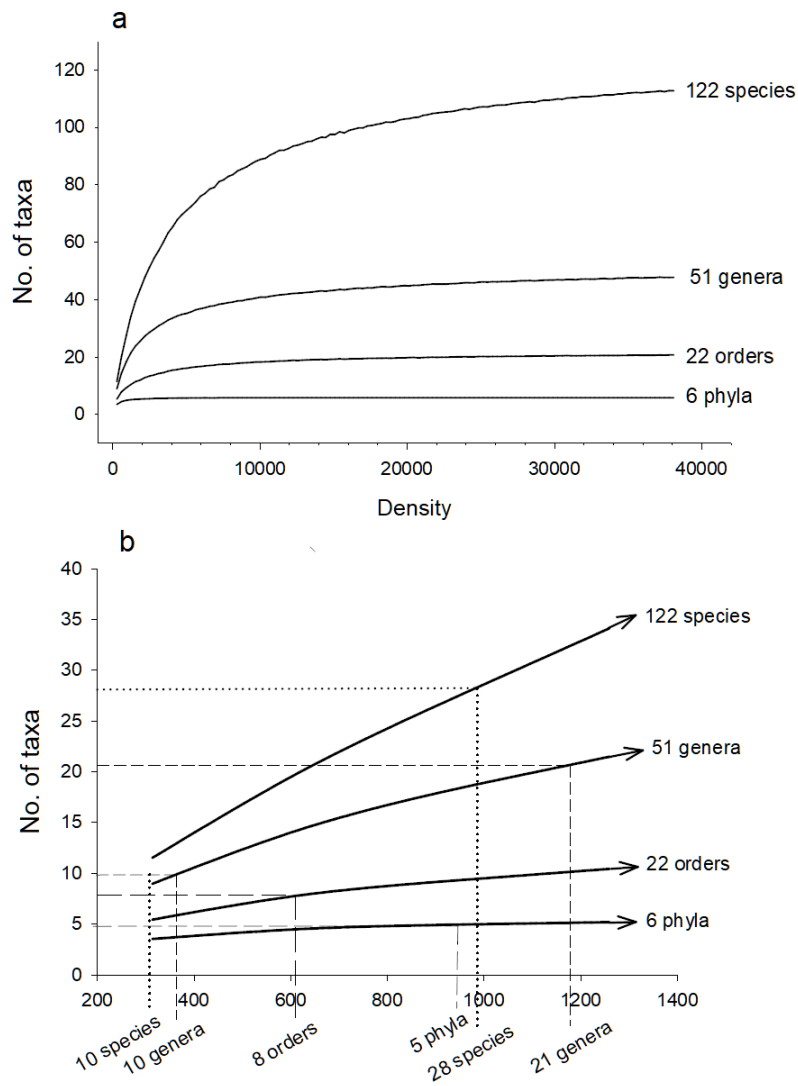
**Table S4. Indicator values (IV %) by river, season within river and site within river**

Only values of IV with P < 0.01 are shown

| Species          | Indicator values |    |    |                 |     |     |                |     |     |            |     |    |               |    |    |                |    |    |            |    |  |
|------------------|------------------|----|----|-----------------|-----|-----|----------------|-----|-----|------------|-----|----|---------------|----|----|----------------|----|----|------------|----|--|
|                  | River            |    |    | Season by River |     |     |                |     |     |            |     |    | Site by River |    |    |                |    |    |            |    |  |
|                  | B                | K  | S  | Basalt (B)      |     |     | Keelbottom (K) |     |     | Suttor (S) |     |    | Basalt (B)    |    |    | Keelbottom (K) |    |    | Suttor (S) |    |  |
| Jul              |                  |    |    | Nov             | Apr | Jul | Nov            | Apr | Jul | Nov        | Apr | B1 | B2            | B3 | K1 | K2             | K3 | S1 | S2         | S3 |  |
| Actinastrum 1    |                  |    |    |                 |     |     | 31             |     |     |            |     |    |               |    |    |                | 83 |    |            |    |  |
| Dolichospermum 1 | 39               |    |    |                 | 73  |     |                |     |     |            |     |    |               |    |    |                |    |    |            |    |  |
| Dolichospermum 4 | 22               |    |    |                 |     |     |                |     |     |            |     |    |               |    |    |                |    |    |            |    |  |
| Dolichospermum 5 |                  |    |    |                 |     | 40  |                |     |     |            | 67  |    |               |    |    | 30             |    |    |            |    |  |
| Anabaenopsis 1   |                  |    |    |                 |     |     |                |     |     |            |     |    |               | 30 |    |                |    |    |            |    |  |
| Ankistrodesmus 1 |                  | 33 |    |                 |     | 52  |                |     |     | 57         |     |    |               |    |    |                |    |    |            |    |  |
| Ankistrodesmus 2 |                  | 14 |    |                 |     |     |                |     |     | 45         |     |    |               |    |    |                |    | 39 |            |    |  |
| Centrtractus 1   |                  | 20 |    |                 |     |     |                |     |     |            |     |    |               |    |    |                |    | 44 |            |    |  |
| Closterium 2     |                  | 16 |    |                 |     |     |                |     |     | 39         |     |    |               |    |    |                |    |    |            |    |  |
| Cosmarium 2      |                  |    |    |                 |     |     |                |     |     | 54         |     |    |               |    |    |                |    |    |            |    |  |
| Crucigenia 1     |                  | 27 |    |                 |     |     |                |     |     |            |     |    |               |    |    |                |    |    |            |    |  |
| Crucigenia 2     |                  | 26 |    |                 |     |     |                |     |     |            |     |    |               |    |    |                |    | 41 |            |    |  |
| Diatom 1         |                  |    |    | 33              |     |     |                |     |     |            |     |    |               |    |    |                |    |    |            |    |  |
| Diatom 15        |                  |    | 17 |                 |     |     |                |     |     |            |     |    |               |    |    |                |    |    |            |    |  |
| Diatom 18        |                  |    |    |                 |     | 33  |                |     |     |            |     |    |               |    |    |                |    |    |            |    |  |
| Diatom 19        |                  |    |    |                 |     | 33  |                |     |     |            |     |    |               |    |    |                |    |    |            |    |  |
| Diatom 20        |                  | 13 |    |                 |     |     |                |     |     |            |     |    |               |    |    |                |    |    |            |    |  |
| Diatom 21        |                  | 16 |    |                 |     |     |                |     |     |            |     |    |               |    |    |                |    | 44 |            |    |  |
| Euglena 1        |                  |    |    |                 |     |     | 52             |     |     |            |     | 66 |               |    |    |                |    |    |            |    |  |
| Euglena 4        |                  |    |    |                 |     | 28  |                |     | 60  |            | 32  |    |               |    |    |                |    |    |            |    |  |
| Fragillaria 1    |                  | 32 |    |                 |     |     |                |     |     |            |     |    |               |    |    |                |    |    |            |    |  |
| Gloeocapsa 1     |                  | 23 |    |                 |     |     |                |     |     | 57         |     |    |               |    |    |                |    |    |            |    |  |
| Mougoetia 1      | 23               |    |    |                 | 41  |     |                |     |     |            |     |    |               |    |    |                |    |    |            |    |  |
| Microspora 1     |                  |    | 11 |                 |     |     |                |     |     |            |     |    |               |    |    |                |    |    |            |    |  |
| Navicula 1       |                  |    |    |                 |     |     |                |     |     | 56         |     |    |               |    |    |                |    |    | 53         |    |  |
| Navicula 3       |                  | 25 |    |                 |     |     |                |     |     |            |     |    |               |    |    |                |    | 39 |            |    |  |
| Oscillatoria 1   |                  |    |    |                 | 34  |     |                |     |     |            |     |    |               |    |    |                |    |    |            |    |  |
| Pediastrum 1     |                  |    |    |                 | 30  |     |                |     |     |            |     |    |               |    |    |                |    |    |            |    |  |
| Pediastrum 2     | 26               |    |    |                 |     |     |                |     |     |            |     |    |               |    |    |                |    |    |            |    |  |
| Pediastrum 3     |                  |    |    |                 |     |     |                |     |     |            | 50  |    |               |    |    |                |    |    |            |    |  |

| Species         | Indicator values |    |    |                 |     |     |                |     |     |            |     |     |               |    |    |                |    |    |            |    |    |
|-----------------|------------------|----|----|-----------------|-----|-----|----------------|-----|-----|------------|-----|-----|---------------|----|----|----------------|----|----|------------|----|----|
|                 | River            |    |    | Season by River |     |     |                |     |     |            |     |     | Site by River |    |    |                |    |    |            |    |    |
|                 |                  |    |    | Basalt (B)      |     |     | Keelbottom (K) |     |     | Suttor (S) |     |     | Basalt (B)    |    |    | Keelbottom (K) |    |    | Suttor (S) |    |    |
|                 | B                | K  | S  | Jul             | Nov | Apr | Jul            | Nov | Apr | Jul        | Nov | Apr | B1            | B2 | B3 | K1             | K2 | K3 | S1         | S2 | S3 |
| Peridinium 1    |                  |    |    | 52              |     |     |                |     |     |            |     | 78  |               |    |    |                |    |    |            |    |    |
| Peridinium 3    |                  |    |    |                 |     |     |                |     | 56  |            |     |     |               |    |    |                |    |    |            |    |    |
| Phacus 1        |                  | 30 |    |                 |     |     | 61             |     |     |            |     |     |               |    |    |                |    |    |            |    |    |
| Scenedesmus 1   |                  | 32 |    |                 |     |     |                |     |     |            |     |     |               |    |    |                |    |    |            |    |    |
| Scenedesmus 2   |                  | 25 |    |                 |     |     | 38             |     |     |            |     |     |               |    | 45 |                |    |    |            |    |    |
| Scenedesmus 4   |                  | 20 |    |                 |     |     |                |     |     |            |     |     |               |    |    |                |    |    |            |    |    |
| Scenedesmus 5   |                  |    |    | 22              |     |     |                |     |     |            |     |     |               |    |    |                |    |    |            |    |    |
| Scenedesmus 6   |                  |    |    |                 |     | 43  |                |     |     |            |     |     |               |    |    |                |    |    |            |    |    |
| Staurastrum 2   |                  | 24 |    |                 |     |     |                |     |     |            |     |     |               |    |    |                |    |    |            |    |    |
| Strombomonas 1  |                  |    | 24 |                 |     |     |                |     |     |            | 55  |     |               |    |    |                |    |    |            |    |    |
| Strombomonas 2  |                  |    | 31 |                 |     |     |                |     |     |            |     |     |               |    |    |                |    |    |            |    |    |
| Strombomonas 4  |                  |    | 27 |                 |     | 28  |                |     |     |            |     |     |               |    |    |                |    |    |            |    |    |
| Synedra 1       |                  |    |    |                 |     | 44  |                |     |     |            |     |     |               |    |    |                |    |    |            |    |    |
| Tracholomonas 1 |                  |    | 46 |                 |     |     |                |     |     |            |     |     |               |    |    |                |    |    |            |    |    |
| Tracholomonas 2 |                  |    | 41 |                 |     |     | 52             |     |     |            |     |     |               |    |    |                |    |    | 56         |    |    |
| Tracholomonas 3 |                  |    |    |                 |     |     |                | 45  |     |            |     |     |               |    |    |                |    |    |            |    |    |
| Tracholomonas 4 |                  | 23 |    |                 |     |     |                |     |     |            |     |     |               |    |    |                | 48 |    |            |    |    |
| Treubaria 1     |                  |    |    |                 |     |     |                |     | 37  |            |     |     |               |    |    |                |    |    |            |    |    |
| Tribonema 1     |                  |    |    |                 |     | 33  |                |     |     |            |     |     |               | 33 |    |                |    |    |            |    |    |
| Unknown 17      |                  |    |    |                 |     | 50  |                |     |     |            |     |     |               |    |    |                |    |    |            |    |    |
| Count           | 4                | 17 | 7  | 2               | 5   | 10  | 5              | 1   | 9   | 0          | 5   | 1   | 0             | 1  | 2  | 2              | 5  | 1  | 2          | 0  | 0  |





**Fig. S1.** Sample sizes to achieve nominated number of taxa: (a) accumulation curves based on total dataset; (b) expansion of lower end of x- and y-axes showing sample size relevant to each taxonomic grouping.