*Supporting Information 1*

Table 1. Location and characteristics of field sites.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Site # | Gauge Name | Longitude | Latitude | Catchment area (km2) | Elevation (m asl) |
| 1 | Mammy Johnsons River at Pikes Crossing | 151.979 | -32.244 | 158 | 104 |
| 2 | Wallagaraugh River at Princes Highway | 149.714 | -37.371 | 477 | 35 |
| 3 | Genoa River at Bondi | 149.321 | -37.174 | 234 | 417 |
| 4 | Wadbilliga River at Wadbilliga | 149.694 | -36.259 | 126 | 201 |
| 5 | Tuross River D/S Wadbilliga Junction | 149.761 | -36.197 | 918 | 79 |
| 6 | Tuross River at Belowra | 149.709 | -36.201 | 564 | 105 |
| 7 | Jacobs River at Jacobs Ladder | 148.427 | -36.727 | 184 | 343 |
| 8 | Nariel Creek at Upper Nariel | 147.826 | -36.444 | 261 | 711 |
| 9 | Gibbo River at Gibbo Park | 147.709 | -36.756 | 390 | 515 |
| 10 | Snowy Creek at Below Granite Flat | 147.413 | -36.569 | 416 | 331 |
| 11 | Mann River at Mitchell | 152.105 | -29.695 | 890 | 401 |
| 12 | Cataract Creek at Sandy Hill | 152.217 | -28.934 | 237 | 595 |
| 13 | Sportsmans Creek at Gurranang Siding | 152.981 | -29.467 | 205 | 13 |
| 14 | Goodradigbee River at Brindabella | 148.731 | -35.421 | 432 | 510 |
| 15 | Jilliby Creek at U/S Wyong River | 151.389 | -33.246 | 93 | 39 |

Table 2. Importance of components PC1 - PC5, from Principal Components Analysis of the set of 37 hydrological metrics used as explanatory variables in this study.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **PC1** | **PC2** | **PC3** | **PC4** | **PC5** |
| Standard deviation | 3.848 | 1.824 | 1.377 | 0.935 | 0.788 |
| Proportion of variance | 0.644 | 0.145 | 0.082 | 0.038 | 0.027 |
| Cumulative proportion | 0.644 | 0.788 | 0.871 | 0.909 | 0.936 |

Table 3. Loadings across principal components for the set of 37 hydrological metrics used in this study.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **metric** | **PC1** | **PC2** | **PC3** | **PC4** | **PC5** |
| *HSPeak* | -0.24 | 0.09 | 0.23 | 0.13 | 0.02 |
| *MDFAnnHSNum* | -0.08 | -0.46 | -0.08 | -0.39 | 0.03 |
| *CVAnnHSNum* | 0.00 | 0.40 | -0.34 | 0.43 | 0.06 |
| *CVAnnHSPeak* | -0.19 | 0.06 | -0.42 | -0.22 | 0.03 |
| *MRateRise* | -0.22 | -0.18 | 0.20 | 0.18 | 0.12 |
| *MRateFall* | -0.21 | -0.25 | 0.10 | 0.22 | -0.02 |
| *CVAnnMRateRise* | -0.22 | 0.26 | -0.02 | -0.15 | 0.02 |
| *CVAnnMRateFall* | -0.24 | 0.14 | 0.08 | -0.05 | 0.22 |
| *AS20YrARI* | -0.25 | 0.02 | 0.01 | 0.05 | -0.02 |
| *C\_MDFM* | 0.24 | -0.10 | -0.14 | 0.12 | 0.24 |
| *M\_MDFM* | 0.25 | 0.01 | 0.02 | 0.09 | -0.30 |
| *C\_MinM* | 0.24 | -0.07 | -0.15 | 0.19 | 0.14 |
| *M\_MinM* | 0.22 | 0.11 | 0.10 | 0.10 | -0.53 |
| *C\_MaxM* | 0.02 | -0.43 | 0.33 | 0.27 | 0.10 |
| *M\_MaxM* | 0.25 | -0.02 | 0.00 | 0.07 | -0.01 |
| *MDFMDFSpring* | 0.24 | 0.08 | 0.11 | -0.19 | 0.19 |
| *MDFMDFSummer* | -0.18 | -0.19 | -0.44 | 0.19 | 0.07 |
| *MDFMDFAutumn* | -0.23 | -0.13 | -0.04 | 0.17 | -0.42 |
| *MDFMDFWinter* | 0.14 | 0.30 | 0.40 | -0.13 | 0.23 |
| *CVMDFSpring* | -0.22 | 0.10 | 0.20 | 0.35 | 0.14 |
| *CVMDFSummer* | -0.22 | 0.11 | 0.14 | -0.20 | -0.42 |
| *CVMDFAutumn* | -0.24 | 0.02 | 0.01 | -0.24 | 0.09 |
| *CVMDFWinter* | -0.21 | 0.22 | 0.03 | 0.08 | 0.06 |

Table 4. Summary statistics for hydrological variables. From left: minimum, maximum, mean and standard deviation.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **metric** | **min** | **max** | **mean** | **sd** |
| *HSPeak* | 5.38 | 29.81 | 16.67 | 8.34 |
| *MDFAnnHSNum* | 2.8 | 5.93 | 4.1 | 0.96 |
| *CVAnnHSNum* | 0.48 | 0.84 | 0.74 | 0.11 |
| *CVAnnHSPeak* | 0.24 | 1.47 | 0.69 | 0.34 |
| *MRateRise* | 0.2 | 1.99 | 0.91 | 0.57 |
| *MRateFall* | 0.07 | 0.8 | 0.34 | 0.23 |
| *CVAnnMRateRise* | 0.43 | 1.18 | 0.85 | 0.25 |
| *CVAnnMRateFall* | 0.41 | 1.46 | 0.9 | 0.34 |
| *AS20YrARI* | 17.94 | 209.99 | 126.13 | 81.19 |
| *C\_MDFM* | 0.05 | 0.31 | 0.14 | 0.09 |
| *M\_MDFM* | 0.06 | 0.2 | 0.12 | 0.05 |
| *C\_MinM* | 0.01 | 0.27 | 0.12 | 0.08 |
| *M\_MinM* | 0.07 | 0.16 | 0.11 | 0.03 |
| *C\_MaxM* | 0.19 | 0.44 | 0.28 | 0.09 |
| *M\_MaxM* | 0.04 | 0.18 | 0.09 | 0.06 |
| *MDFMDFSpring* | 0.19 | 1.81 | 1.02 | 0.55 |
| *MDFMDFSummer* | 0.42 | 1.49 | 0.88 | 0.33 |
| *MDFMDFAutumn* | 0.28 | 1.82 | 1 | 0.52 |
| *MDFMDFWinter* | 0.64 | 1.44 | 1.08 | 0.25 |
| *CVMDFSpring* | 0.36 | 2.1 | 1.12 | 0.54 |
| *CVMDFSummer* | 0.6 | 1.66 | 1.15 | 0.39 |
| *CVMDFAutumn* | 0.48 | 1.49 | 1.07 | 0.35 |
| *CVMDFWinter* | 0.46 | 1.99 | 1.05 | 0.46 |

Table 5. Data density information for trait dataset. Coverage describes the total proportional coverage at a site for which species were included in the analysis. Density values for each trait describe the proportional coverage at a site for which data for that trait were included in the analysis. N.B. leaf narrowness and wood density were not available for grasses or ferns; seed mass and flowering period were also not available for ferns.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **site #** | **coverage** | **wood density** | **max. height** | **seed mass** | **SLA** | **flowering period** | **leaf narrowness** |
| 1 | 0.98 | 0.615 | 1 | 0.846 | 1 | 0.923 | 0.692 |
| 2 | 0.959 | 0.333 | 1 | 0.667 | 1 | 0.667 | 0.333 |
| 3 | 0.949 | 0.455 | 1 | 0.727 | 1 | 0.727 | 0.545 |
| 4 | 0.903 | 0.4 | 1 | 0.867 | 1 | 0.867 | 0.6 |
| 5 | 0.968 | 0.455 | 1 | 1 | 1 | 1 | 0.545 |
| 6 | 0.964 | 0.7 | 1 | 1 | 1 | 1 | 0.7 |
| 7 | 1 | 0.5 | 1 | 1 | 0.9 | 1 | 0.7 |
| 8 | 1 | 0.529 | 1 | 0.882 | 1 | 0.882 | 0.765 |
| 9 | 0.988 | 0.474 | 1 | 0.842 | 1 | 0.842 | 0.737 |
| 10 | 0.976 | 0.583 | 1 | 0.917 | 1 | 0.917 | 0.667 |
| 11 | 0.96 | 0.188 | 1 | 1 | 0.938 | 1 | 0.688 |
| 12 | 0.992 | 0.381 | 1 | 0.952 | 0.952 | 0.952 | 0.714 |
| 13 | 0.935 | 0.55 | 0.95 | 0.9 | 1 | 0.9 | 0.7 |
| 14 | 1 | 0.636 | 1 | 1 | 1 | 1 | 1 |
| 15 | 0.963 | 0.455 | 1 | 0.909 | 0.909 | 0.909 | 0.727 |

Table 6. Summary statistics for trait dataset. From left: minimum, maximum, mean and standard deviation.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **trait** | **min** | **max** | **mean** | **sd** |
| *Max. height (m)* | 0.2 | 50 | 10.47 | 13.18 |
| *Seed mass (mg)* | 0.04 | 323.99 | 16.55 | 45.06 |
| *SLA (m2 / kg)* | 1.41 | 63.27 | 17.93 | 14 |
| *Flowering period length (proportion of year)* | 0.17 | 1 | 0.45 | 0.24 |
| *Leaf narrowness (unitless ratio)* | 0.59 | 233.33 | 9.86 | 32.53 |
| *Wood density (g / cm3)* | 0.33 | 0.95 | 0.61 | 0.13 |

Table 7. Importance of principal components PC1 – PC5 from principal components analysis of trait dataset, using species with data available for all traits (55 species).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **PC1** | **PC2** | **PC3** | **PC4** | **PC5** | **PC6** |
| *Standard deviation* | 1.3938 | 1.0962 | 1.0827 | 0.9247 | 0.7438 | 0.52457 |
| *Proportion of variance* | 0.3238 | 0.2003 | 0.1954 | 0.1425 | 0.0922 | 0.04586 |
| *Cumulative proportion* | 0.3238 | 0.5240 | 0.7194 | 0.8619 | 0.9541 | 1 |

Table 8. Importance of principal components PC1 – PC5 from principal components analysis of trait dataset, using species with data available for SLA, maximum height, seed mass and flowering period length (97 species).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **PC1** | **PC2** | **PC3** | **PC4** |
| *Standard deviation* | 1.4160 | 1.0016 | 0.8326 | 0.54649 |
| *Proportion of variance* | 0.5012 | 0.2508 | 0.1733 | 0.07466 |
| *Cumulative proportion* | 0.5012 | 0.7520 | 0.9253 | 1 |

**Bioclimatic variables assessed for relationships with FDis:**

Annual Mean Temperature

Mean Diurnal Range (Mean of monthly (max temp - min temp))

Isothermality (BIO2/BIO7) (\* 100)

Temperature Seasonality (standard deviation \*100)

Max Temperature of Warmest Month

Min Temperature of Coldest Month

Temperature Annual Range (BIO5-BIO6)

Mean Temperature of Wettest Quarter

Mean Temperature of Driest Quarter

Mean Temperature of Warmest Quarter

Mean Temperature of Coldest Quarter

Annual Precipitation

Precipitation of Wettest Month

Precipitation of Driest Month

Precipitation Seasonality (Coefficient of Variation)

Precipitation of Wettest Quarter

Precipitation of Driest Quarter

Precipitation of Warmest Quarter

Precipitation of Coldest Quarter

**Soil variables assessed for relationships with FDis:**

Available Water Capacity

Bulk Density – Whole Earth (g cm-3)

Clay (%)

Depth of Regolith (m)

Depth of Soil (m)

Effective Cation Exchange Capacity (meq / 100 g)

Total Nitrogen (%)

pH – CaCl2

Total Phosphorous (%)

Silt (%)

Sand (%)

Organic Carbon (%)

Further information on soil variables can be found at: <http://www.clw.csiro.au/aclep/soilandlandscapegrid/ProductDetails-SoilAttributes.html> (09/06/2015)

Table 9. Statistics for univariate linear regression models comparing FDis with hydrological metrics. p.adj represents p values which have been adjusted to control the false discovery rate. Relationships which remained significant following adjustment are shown in bold typeface. \* All models are linear apart from M\_MinM and CVMDFSummer, for which a quadratic model (df = 2,12) provided a substantially better fit.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **metric** | **p** | **p.adj** | **R2** | **F(1,13)** |
| *CVAnnHSPeak* | **0.0010** | **0.0152** | **0.5773** | **17.7500** |
| *M\_MinM* | **0.0094** | **0.0278** | **0.5404** | **\*7.0560** |
| *MDFMDFSummer* | **0.0031** | **0.0230** | **0.5032** | **13.1700** |
| *CVMDFSummer* | **0.0218** | **0.0325** | **0.4716** | **\*5.3560** |
| *CVMDFWinter* | **0.0096** | **0.0278** | **0.4143** | **9.1940** |
| *CVAnnMRateRise* | **0.0110** | **0.0278** | **0.4031** | **8.7810** |
| *CVAnnMRateFall* | **0.0129** | **0.0278** | **0.3896** | **8.2990** |
| *MDFMDFSpring* | **0.0134** | **0.0278** | **0.3862** | **8.1800** |
| *AS20YrARI* | **0.0148** | **0.0278** | **0.3774** | **7.8790** |
| *M\_MDFM* | **0.0209** | **0.0325** | **0.3470** | **6.9080** |
| *M\_MaxM* | **0.0258** | **0.0325** | **0.3275** | **6.3300** |
| *CVMDFSpring* | **0.0260** | **0.0325** | **0.3269** | **6.3130** |
| *CVMDFAutumn* | **0.0342** | **0.0386** | **0.3009** | **5.5950** |
| *CVAnnHSNum* | **0.0360** | **0.0386** | **0.2961** | **5.4680** |
| *HSPeak* | 0.0648 | 0.0648 | 0.2384 | 4.0690 |
| *MDFMDFWinter* | 0.0881 | 0.0780 | 0.2073 | 3.4010 |
| *C\_MaxM* | 0.0885 | 0.0780 | 0.2069 | 3.3920 |
| *C\_MDFM* | 0.1086 | 0.0861 | 0.1859 | 2.9680 |
| *MDFMDFAutumn* | 0.1091 | 0.0861 | 0.1854 | 2.9590 |
| *C\_MinM* | 0.1361 | 0.1021 | 0.1626 | 2.5240 |
| *MRateRise* | 0.1556 | 0.1072 | 0.1488 | 2.2720 |
| *MRateFall* | 0.1572 | 0.1072 | 0.1477 | 2.2530 |
| *MDFAnnHSNum* | 0.7270 | 0.4741 | 0.0097 | 0.1273 |