*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 |

Table 6. 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 |