**S3. Trait Descriptions**

Original name and description of trait variables in each of four datasets used in this study.

|  |  |  |
| --- | --- | --- |
| **Name** | **Type** | **Description** |
| DepthRangeDeep | ecological | Depth Range |
| Vulnerability | ecological | FishBase Vulnerability |
| Length | physical | Length |
| UsedforAquaculture\_commercial | economic | Aquaculture: Commercial Species |
| UsedforAquaculture\_likely future use | economic | Aquaculture: Future Likely |
| UsedforAquaculture\_never/rarely | economic | Aquaculture: Never/Rarely |
| Electrogenic\_Electrosensing only | physical | Electrosensing Only |
| Electrogenic\_electrosensing only | physical |  |
| Electrogenic\_no special ability | physical | No Electrosensing |
| Electrogenic\_strongly discharging | physical | Strong Electric Discharge |
| Electrogenic\_weakly discharging | physical | Weak Electric Discharge |
| DemersPelag\_bathydemersal | ecological | Bathydemersal |
| DemersPelag\_benthopelagic | ecological | Benthopelagic |
| DemersPelag\_demersal | ecological | Demersal |
| DemersPelag\_pelagic-neritic | ecological | Pelagic-Neritic |
| DemersPelag\_pelagic-oceanic | ecological | Pelagic-Oceanic |
| DemersPelag\_reef-associated | ecological | Reef-Associated |
| LTypeMaxM\_FL | Physical | Length Type – ? |
| LTypeMaxM\_SL | Physical | Length Type – ? |
| LTypeMaxM\_TL | Physical | Length Type – ? |
| Fresh\_-1 | ecological | Freshwater: Present |
| Fresh\_0 | ecological | Freshwater: Not Present |
| Brack\_-1 | ecological | Brackish: Present |
| Brack\_0 | ecological | Brackish: Not Present |
| Saltwater\_-1 | ecological | Saltwater: Present |

**Table 1**: Traits of marine organisms from FishBase (Pauly and Froese, 2010).

|  |  |  |
| --- | --- | --- |
| **Name** | **Type** | **Description** |
| StorageOrgan | n/a | Storage Organ Presence |
| ReprModeCode | n/a |  |
| flwr\_mo\_start | phenology | Flowering Start (month) |
| flwr\_mo\_end | phenology | Flowering End (month) |
| flwr\_dur\_mos | phenology | Flowering Duration (months) |
| earliest\_seed\_shed\_mo | phenology | Seed Shed Month (earliest) |
| latest\_seed\_shed\_mo | phenology | Seed Shed Month (latest) |
| seed\_shed\_dur\_mos | phenology | Seed Shed Duration (months) |
| SI01\_1.0 | n/a | Self Compatibility: No |
| SI01\_0.0 | n/a | Self Compatibility: Yes |
| seed\_mass\_mg | dispersal | Seed Mass (mg) |
| diaspore\_mass\_mg | dispersal | Diaspore Mass (mg) |
| diaspore\_min\_len\_mm | dispersal | Diaspore Minimum Length (mm) |
| Ave\_seed\_shed\_ht\_m | dispersal | Average Seed Shed Height (m) |
| diaspore\_ave\_len\_mm | dispersal | Average Diaspore Length (mm) |
| Min\_seed\_shed\_ht\_m | dispersal | Minimum Seed Shed Height (m) |
| Max\_seed\_shed\_ht\_m | dispersal | Maximum Seed Shed Height (m) |
| Ave\_seed\_shed\_ht\_m | dispersal | Average Seed Shed Height (M) |
| nichebreadth\_num\_flor\_zones | ecological | Total Number of Floristic Zones |
| nichebreadth\_amplit\_ocean | ecological | Total Number of Oceanic Zones |
| Bio1\_mean\_nosyn | climatic | BioClim: Bio1 (mean) |
| Bio1\_std\_nosyn | climatic | BioClim: Bio1 (std dev) |
| Bio1\_var\_nosyn | climatic | BioClim: Bio1 (var) |
| Bio1\_mean\_inclsyn | climatic | BioClim: Bio1 (mean) |
| Bio1\_std\_inclsyn | climatic | BioClim: Bio1 (std dev) |
| Bio1\_var\_inclsyn | climatic | BioClim: Bio1 (var) |
| Nbound\_lat\_GBIF\_nosyn | ecological | Northernmost Latitude (GBIF) |
| GenTime | n/a |  |
| Resil | n/a |  |
| MaxAlt | ecological | Maximum Altitude |
| oceanity\_ks | ecological | Oceanity: Continental - Oceanic |
| oceanity\_o | ecological | Oceanity: Oceanic |
| oceanity\_os | ecological | Oceanity: Oceanic - Continental |
| oceanity\_sks | ecological | Oceanity: Moderate Continental |
| oceanity\_so | ecological | Oceanity: Moderate Both |
| oceanity\_sos | ecological | Oceanity: Moderate Oceanic |
| dispersal\_mode\_animal | dispersal | Animal Dispersal Mode (binary) |
| dispersal\_mode\_gravity | dispersal | Gravity Dispersal Mode (binary) |
| dispersal\_mode\_water | dispersal | Water Dispersal Mode (binary) |
| dispersal\_mode\_wind | dispersal | Wind Dispersal Mode (binary) |
| BreedSysCode\_1.0 | dispersal | Breeding: Obligate Outcrossing |
| BreedSysCode\_2.0 | dispersal | Breeding: Mostly Outcrossing, Selfing Possible |
| BreedSysCode\_3.0 | dispersal | Breeding: Mixed Mating I |
| BreedSysCode\_4.0 | dispersal | Breeding: Mixed Mating II |

**Table 2.** Traits of Alpine Plants. Data from Angert et al, 2011 via the BiolFlor Database (Kühn et al, 2004).

|  |  |  |
| --- | --- | --- |
| **Name** | **Type** | **Description** |
| Orig\_high\_limit | ecological | Altitudinal Limit |
| Litter\_size | reproductive | Litter Size (individuals) |
| Litters\_per\_yr | reproductive | Litters / year |
| Young\_per\_yr | reproductive | Young / year |
| Mass\_g | physical | Mass (g) |
| Longevity\_yrs | physical | Longevity (years) |
| Bio1\_mean | climatic | BioClim: Bio 1 (mean) |
| Bio1\_std | climatic | BioClim: Bio 1 (std dev) |
| Rangesize\_km2 | ecological | Range Size (km2) |
| Food\_code | ecological | ? |
| Daily01\_0 | physical | Daily Rhythm Data – Absent |
| Daily01\_1 | physical | Daily Rhythm Data – Present |
| Annual01\_0 | physical | Annual Rhythm Data – Absent |
| Annual01\_1 | physical | Annual Rhythm Data – Present |
| Food01\_0 | physical | Food Preference Data – Absent |
| Food01\_1 | physical | Food Preference Data – Present |
| Daily\_rhythm\_both | physical | Daily Rhythm – Diurnal + Nocturnal (binary) |
| Daily\_rhythm\_diur | physical | Daily Rhythm – Diurnal (binary) |
| Daily\_rhythm\_noct | physical | Daily Rhythm – Nocturnal (binary) |
| Annual\_rhythm\_fachib | physical | Annual Rhythm – Facultative Hibernation (binary) |
| Annual\_rhythm\_nonhib | physical | Annual Rhythm – No Hibernation (binary) |
| Annual\_rhythm\_oblhib | physical | Annual Rhythm – Obligate Hibernation (binary) |
| Food\_gran | ecological | Food – Granivore (binary) ?? |
| Food\_herb | ecological | Food – Herivore (binary) |
| Food\_inse | ecological | Food – Insectivore (binary) |
| Food\_omni | ecological | Food – Omnivore (binary) |

**Table 3.** Traits of Mammals. From Angert et al. 2011.

|  |  |  |
| --- | --- | --- |
| **Name** | **Type** | **Description** |
| RelativeAbundance | ecological | Species Relative Abundance |
| TemperatureIndicator | climatic | Temperature Indicator: 1, alpine to nival; 1.5, lower alpine to upper subalpine; 2, subalpine; 2.5, lower subalpine to upper montane; 3, montane; 3.5, lower montane to upper colline; 4, colline. |
| NutrientIndicator | ecological | Nutrient indicator: 1, very nutrient-poor; 2, nutrient-poor; 3, moderately nutrient-poor to moderately nutrient-rich; 4, nutrient-rich |
| TerminalVelocity | physical | Shift Velocity |
| RetInFurCattle | physical | Fur Seed Retention: Cattle |
| RetInFurSheep | physical | Fur Seed Retention: Sheep |
| GutSurvival | physical | Seed Gut Survival |
| SeedReleaseHeight | physical | Seed Release Height |
| LifeStrategy | ecological | Life Strategy (C-S-R) |
| LifeSpan | ecological | LifeSpan (yr) |
| Dominance | ecological | Dominance Index |
| NoOfVegOffspings | physical | Number Vegetative Offsprings / year |
| Persistence | physical | Persistence Index |
| Dispersal | physical | Dispersal Index |

**Table 4.** Traits of European Plants data. From Rumpf et al. 2018.

**Supplementary Material References**

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Kühn, I., Durka, W., & Klotz, S. (2004). BiolFlor — a new plant-trait database as a tool for plant invasion ecology. *Diversity and Distributions*, *10*(5‐6), 363–365. <http://doi.org/10.1111/j.1366-9516.2004.00106.x>