# Table S1. Classification of niche breadth measures into habitat, diet and environmental tolerance categories.

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| --- | --- | --- |
| Niche | Detail | Examples |
| Habitat | Number of biomes occupied | (Fernandez & Vrba 2005) |
|  | Categorical specialist/generalist | (Kolb *et al.* 2006) |
|  | Co-occurrence | (Boulangeat *et al.* 2012) |
|  | Environmental characteristics of occupied habitats | (Lappalainen & Soininen 2006; Köckemann *et al.* 2009; Siquiera *et al.* 2009) |
|  | Number of depth zones occupied | (Harley *et al.* 2003) |
|  | Number of different habitat types occupied | (Harcourt *et al.* 2002) |
|  | Number of habitat categories occupied | (Carrascal *et al.* 2008) |
|  | Number of host species used | (Krasnov *et al.* 2008) |
|  | Number of reef zones occupied | (Berkström *et al.* 2012) |
|  | Number of substrates occupied | (Callaghan & Ashton 2008) |
|  | Proportion of breeding habitats utilised | (Brändle *et al.* 2002b) |
|  | Proportion of different habitats utilised | (Cowley *et al.* 2001) |
|  | Range of grain sizes in occupied habitats | (Frost *et al.* 2004) |
|  | Soil characteristics of occupied habitats | (Burgman 1989; Baltzer *et al.* 2007) |
|  | Vegetation characteristics of occupied habitats | (Reif *et al.* 2006) |
|  |  |  |
| Diet | Categorical specialist/generalist | (Rickart *et al.* 2011) |
|  | Diversity of flowers used | (Goulson & Darvill 2004) |
|  | Number of different food types used | (Eeley & Foley 1999; Brändle *et al.* 2002b; Harcourt 2006) |
|  | Number of host plant families used | (Garcia-Barros & Benito 2010) |
|  | Number of host plant genera used | (Forister *et al.* 2011; Jahner *et al.* 2011) |
|  | Number of host plant species used | (Brändle *et al.* 2002a; Garcia-Barros & Benito 2010) |
|  |  |  |
| Tolerance | Annual temperature range in habitat | (Pither 2003) |
|  | Calcium requirements | (Briers 2003) |
|  | Elevational range | (Brändle *et al.* 2002a; Essl *et al.* 2009) |
|  | Germination temperatures | (Luna & Moreno 2010; Luna *et al.* 2012) |
|  | Thermal tolerance breadth | (Cruz *et al.* 2005; Calosi *et al.* 2008; Calosi *et al.* 2010) |

# References

Baltzer J.L., Davies S.J., Noor N.S.M., Kassim A.R. & LaFrankie J.V. (2007). Geographical distributions in tropical trees: can geographical range predict performance and habitat association in co-occurring tree species? *Journal of Biogeography*, 34, 1916-1926.

Berkström C., Jones G.P., McCormick M.I. & Srinivasan M. (2012). Ecological versatility and its importance for the distribution and abundance of coral reef wrasses. *Marine Ecology Progress Series*, 461, 151-163.

Boulangeat I., Lavergne S., Van Es J., Garraud L. & Thuiller W. (2012). Niche breadth, rarity and ecological characteristics within a regional flora spanning large environmental gradients. *Journal of Biogeography*, 39, 204-214.

Brändle M., Öhlschläger S. & Brandl R. (2002a). Range sizes in butterflies: correlation across scales. *Evolutionary Ecology Research*, 4, 993-1004.

Brändle M., Prinzing A., Pfeifer R. & Brandl R. (2002b). Dietary niche breadth for Central European birds: correlations with species-specific traits. *Evolutionary Ecology Research*, 4, 643-657.

Briers R.A. (2003). Range size and environmental calcium requirements of British freshwater gastropods. *Global Ecology and Biogeography*, 12, 47-51.

Burgman M.A. (1989). The habitat volumes of scarce and ubiquitous plants: a test of the model of environmental control. *American Naturalist*, 133, 228-239.

Callaghan D.A. & Ashton P.A. (2008). Attributes of rarity in a regional bryophyte assemblage. *Journal of Bryology*, 30, 101-107.

Calosi P., Bilton D.T., Spicer J.I. & Atfield A. (2008). Thermal tolerance and geographical range size in the *Agabus brunneus* group of European diving beetles (Coleoptera : Dytiscidae). *Journal of Biogeography*, 35, 295-305.

Calosi P., Bilton D.T., Spicer J.I., Votier S.C. & Atfield A. (2010). What determines a species' geographical range? Thermal biology and latitudinal range size relationships in European diving beetles (Coleoptera: Dytiscidae). *Journal of Animal Ecology*, 79, 194-204.

Carrascal L.M., Seoane J., Palomino D. & Polo V. (2008). Explanations for bird species range size: ecological correlates and phylogenetic effects in the Canary Islands. *Journal of Biogeography*, 35, 2061-2073.

Cowley M.J.R., Thomas C.D., Wilson R.J., Leon-Cortes J.L., Gutierrez D. & Bulman C.R. (2001). Density-distribution relationships in British butterflies. II. An assessment of mechanisms. *Journal of Animal Ecology*, 70, 426-441.

Cruz F.B., Fitzgerald L.A., Espinoza R.E. & Schulte J.A. (2005). The importance of phylogenetic scale in tests of Bergmann's and Rapoport's rules: lessons from a clade of South American lizards. *Journal of Evolutionary Biology*, 18, 1559-1574.

Eeley H.A.C. & Foley R.A. (1999). Species richness, species range size and ecological specialisation among African primates: geographical patterns and conservation implications. *Biodiversity and Conservation*, 8, 1033-1056.

Essl F., Staudinger M., Stöhr O., Schratt-Ehrendorfer L., Rabitsch W. & Niklfeld H. (2009). Distribution patterns, range size and niche breadth of Austrian endemic plants. *Biological Conservation*, 142, 2547-2558.

Fernandez M.H. & Vrba E.S. (2005). Macroevolutionary processes and biomic specialization: testing the resource-use hypothesis. *Evolutionary Ecology*, 19, 199-219.

Forister M.L., Jahner J.P., Casner K.L., Wilson J.S. & Shapiro A.M. (2011). The race is not to the swift: Long-term data reveal pervasive declines in California's low-elevation butterfly fauna. *Ecology*, 92, 2222-2235.

Frost M.T., Attrill M.J., Rowden A.A. & Foggo A. (2004). Abundance-occupancy relationships in macrofauna on exposed sandy beaches: patterns and mechanisms. *Ecography*, 27, 643-649.

Garcia-Barros E. & Benito H.R. (2010). The relationship between geographic range size and life history traits: is biogeographic history uncovered? A test using the Iberian butterflies. *Ecography*, 33, 392-401.

Goulson D. & Darvill B. (2004). Niche overlap and diet breadth in bumblebees: are rare species more specialized in their choice of flowers? *Apidologie*, 35, 55-63.

Harcourt A.H. (2006). Rarity in the tropics: biogeography and macroecology of the primates. *Journal of Biogeography*, 33, 2077-2087.

Harcourt A.H., Coppeto S.A. & Parks S.A. (2002). Rarity, specialization and extinction in primates. *Journal of Biogeography*, 29, 445-456.

Harley C.D.G., Smith K.F. & Moore V.L. (2003). Environmental variability and biogeography: the relationship between bathymetric distribution and geographical range size in marine algae and gastropods. *Global Ecology and Biogeography*, 12, 499-506.

Jahner J.P., Bonilla M.M., Badik K.J., Shapiro A.M. & Forister M.L. (2011). Use of exotic hosts by lepidoptera: widespread species colonize more novel hosts. *Evolution*, 65, 2719-2724.

Köckemann B., Buschmann H. & Leuschner C. (2009). The relationships between abundance, range size and niche breadth in Central European tree species. *Journal of Biogeography*, 36, 854-864.

Kolb A., Barsch F. & Diekmann M. (2006). Determinants of local abundance and range size in forest vascular plants. *Global Ecology and Biogeography*, 15, 237-247.

Krasnov B.R., Mouillot D., Khokhlova I.S., Shenbrot G.I. & Poulin R. (2008). Scale-invariance of niche breadth in fleas parasitic on small mammals. *Ecography*, 31, 630-635.

Lappalainen J. & Soininen J. (2006). Latitudinal gradients in niche breadth and position - regional patterns in freshwater fish. *Naturwissenschaften*, 93, 246-250.

Luna B. & Moreno J.M. (2010). Range-size, local abundance and germination niche-breadth in Mediterranean plants of two life-forms. *Plant Ecology*, 210, 85-95.

Luna B., Pérez B., Torres I. & Moreno J.M. (2012). Effects of incubation temperature on seed germination of Mediterranean plants with different geographical distribution ranges. *Folia Geobotanica*, 47, 17-27.

Pither J. (2003). Climate tolerance and interspecific variation in geographic range size. *Proceedings of the Royal Society B*, 270, 475-481.

Reif J., Hořák D., Sedláček O., Riegert J., Pešata M., Hrázský Z., Janeček Š. & Storch D. (2006). Unusual abundance-range size relationship in an Afromontane bird community: the effect of geographical isolation? *Journal of Biogeography*, 33, 1959-1968.

Rickart E.A., Balete D.S., Rowe R.J. & Heaney L.R. (2011). Mammals of the northern Philippines: tolerance for habitat disturbance and resistance to invasive species in an endemic insular fauna. *Diversity and Distributions*, 17, 530-541.

Siquiera T., Bini L.M., Cianciaruso M.V., Roque F.O. & Trivinho-Strixino S. (2009). The role of niche measures in explaining the abundance-distribution relationship in tropical lotic chironomids. *Hydrobiologia*, 636, 163-172.