# DistributionFunctionRaw4Table4.r

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```
rm(list=ls(all=TRUE))  # remove all existing items from the workspace
library(dplyr)
library(reshape2)

#You can install the released version of TraitEnvMLMWA from github by
#invoking the R-code within an R-console:
#
#install.packages("remotes")
#remotes::install_github("CajoterBraak/TraitEnvMLMWA")
#
library(TraitEnvMLMWA)
source("expand4glmm.r")

# function definition ------------------------------------------------
TabEnvTrait <- function(Env,L, Traits, Envname, Traitname, Effort =
rep(1,nrow(L)), Effort.reference = 1){
  # numbers per habitat class
  Env <- data.frame(Env[,Envname]); names(Env)<- Envname
  Traits <-  data.frame(Traits[,Traitname]); names(Traits)<- Traitname
  TotH <- tapply(rowSums(L), INDEX= Env[[Envname]], FUN = sum)
  TotEff <- tapply(Effort, INDEX= Env[[Envname]], FUN = sum)
  CountsPerEnvClass <- TotH/TotEff

  TotTrait <- tapply(colSums(L), INDEX= Traits[[Traitname]], FUN = sum)
  CountTrait <- TotTrait/mean(Effort)/nrow(L)
  CountTrait <- c(CountTrait, total = sum(CountTrait))

  # Number of beetles in crossclass of env and trait using L ----------------
--

  obj <- make_obj_for_traitenv(Env, L, Traits )
  mydat <- expand4glmm(obj, with_interactions = FALSE)
  form <- as.formula( paste("y~",Envname,"+",Traitname, sep =""))
  tabCounts <- xtabs(form, data = mydat)

  #tabCounts
  #dim(tabCounts)
  #length(TotEff)
  CountPerDay <- sweep(tabCounts, MARGIN= 1, STATS=
TotEff[dimnames(tabCounts)[[1]]], FUN=
"/")[levels(Env[[names(dimnames(tabCounts)[1])]]),
```

```
levels(Traits[[names(dimnames(tabCounts)[2])]])]


  CountPerDayMarg <- addmargins(CountPerDay, margin =
seq_along(dim(CountPerDay)), FUN = sum, quiet = FALSE)

  CountPerDayRowwise <- sweep(CountPerDayMarg, MARGIN = 1, STATS =
CountPerDayMarg[,ncol(CountPerDayMarg)], FUN= "/" )# 100 each row
  CountPerDayRowwise[,"sum"] <-
Effort.reference*CountPerDayMarg[,ncol(CountPerDayMarg)]
  CountPerDayRowwise["sum",] <- Effort.reference*CountTrait

  colnames(CountPerDayRowwise)[ncol(CountPerDayRowwise)] <- "250d-total"
  rownames(CountPerDayRowwise)[nrow(CountPerDayRowwise)] <- "250day-total"

  #round(CountPerDayRowwise, 2)
  out <- list(CountPerDayRowwise = CountPerDayRowwise,
              CountPerDayMarg= CountPerDayMarg,
              CountPerDay = CountPerDay,
              CountTrait=CountTrait,
              EffortPerEnvClass=TotEff,
              CountsPerEnvClass = CountsPerEnvClass,
              tabCounts = tabCounts)
  return(out)
}




# get data set ------------------------------------------------------------

Abun0<- read.csv("data/AbundancePF_reordered_imputed.csv", skip = 1)
#View(Abun0)
Env0<- read.csv("data/EnvironmentPF_reordered_imputed.csv", skip = 1)
#View(Env0)
names(Env0)

##  [1] "X"         "X.1"       "Plot"      "Transect" "Sector"    "Elevatio"
##  [7] "Habitat"   "Soil"      "Rock"      "Bedding"  "Grass"     "Shrub1m"
## [13] "Shrub5m"   "Canopy"    "Grass_he" "Humidity" "Humus"     "Granulom"
## [19] "Temp"      "Ph"        "So"        "C"        "Exposure" "Steepnes"
## [25] "NSpeci"    "UtmX"      "UtmY"      "EffrDays" "Weight"   "IeffDays"
## [31] "DryShrub" "LarcFors" "HayMeadw" "SprcFors" "StnPinFr" "Scree"
## [37] "SublHeat" "CalcGras" "CalPinFr" "SilAlpGr" "GreAldRp" "Wetland"

nlevels(factor(Env0$Plot)) -nlevels(factor(Env0$Transect))

## [1] 65
```

```r
nrow(Env0) -nlevels(factor(Env0$Plot))
```

```
## [1] 308
```

```r
Trait0<- read.csv("data/TraitsPF_with_dummies.csv",skip=1)
#View(Trait0)

#Env0$Soil <- log(Env0$Soil+1)
Effort0 <- Env0$EffrDays
range(Effort0,na.rm = TRUE)
```

```
## [1] 190 333
```

```r
id <- which(is.na(Effort0))
Env0$X[id]
```

```
##  [1] "BZ_1.1.4" "BZ_1.9.1" "BZ_1.9.3" "BZ_2.9.2" "BZ_2.9.4" "BZ_4.1.1"
##  [7] "BZ_4.1.2" "BZ_4.1.3" "BZ_4.5.1" "BZ_4.5.2" "BZ_4.5.4" "LO_1.1.1"
## [13] "LO_1.1.3" "LO_1.1.5" "LO_2.3.4" "LO_2.4.5" "LO_2.5.3" "LO_3.1.2"
## [19] "LO_3.6.4" "LO_6.1.1" "LO_6.1.2" "LO_6.4.2" "LO_6.5.2"
```

```r
Effort <- Env0$EffrDays

L0 <- Abun0[,-(1:2)]
names(L0)
```

```
##  [1] "AbaxParl"   "AbaxPill"   "AgonGrac"   "AgonMuel"   "AgonSexp"
##  [6] "AgonVidu"   "AmarAene"   "AmarAulc"   "AmarComm"   "AmarCurt"
## [11] "AmarEque"   "AmarErrt"   "AmarFaml"   "AmarLucd"   "AmarLunc"
## [16] "AmarMont"   "AmarNigr"   "AmarNitd"   "AmarPrae"   "AmarQuen"
## [21] "AmarSprt"   "AnisBint"   "BadsBull"   "CaltErrt"   "CaltFusc"
## [26] "CaltMeln"   "CaltMicr"   "CarbConv"   "CarbDepr"   "CarbGerm"
## [31] "CarbGlab"   "CarbGran"   "CarbHort"   "CarbProb"   "CarbSylv"
## [36] "CicnCamp"   "CicnGall"   "ClivFoss"   "CychAngs"   "CychAttn"
## [41] "CychItal"   "CymnCing"   "CymnHumr"   "CymnVapr"   "DyscGlob"
## [46] "HarpAffn"   "HarpAtrt"   "HarpHons"   "HarpLaev"   "HarpLats"
## [51] "HarpMarg"   "HarpRubr"   "HarpTard"   "LaemJant"   "LeisFerr"
## [56] "LeisNitd"   "LeisPice"   "LimdAssm"   "LorcPilc"   "MetlLamp"
## [61] "MetlProp"   "MicrMaur"   "NebrBrev"   "NotiBigt"   "NotiPals"
## [66] "OphnLatc"   "OphnPunc"   "OreoCast"   "PoecLepd"   "PoecVers"
## [71] "PseuRufp"   "PterBurm"   "PterDiss"   "PterMeln"   "PterMult"
## [76] "PterNigr"   "PterNigr.1" "PterObln"   "PterStrn"   "PterUnct"
## [81] "SyntTrun"   "SyncVivl"   "TrecQuad"   "TricLaev"
```

```r
names(Env0)
```

```
##  [1] "X"        "X.1"      "Plot"     "Transect" "Sector"   "Elevatio"
##  [7] "Habitat"  "Soil"     "Rock"     "Bedding"  "Grass"    "Shrub1m"
## [13] "Shrub5m"  "Canopy"   "Grass_he" "Humidity" "Humus"    "Granulom"
## [19] "Temp"     "Ph"       "So"       "C"        "Exposure" "Steepnes"
## [25] "NSpeci"   "UtmX"     "UtmY"     "EffrDays" "Weight"   "IeffDays"
```

```
## [31] "DryShrub" "LarcFors" "HayMeadw" "SprcFors" "StnPinFr" "Scree"
## [37] "SublHeat" "CalcGras" "CalPinFr" "SilAlpGr" "GreAldRp" "Wetland"

#E <- as.matrix(Env0[,-c(1:5, 7, 26:30)])
Plot <- Env0$Plot
Transect <- Env0$Transect
Sector <- Env0$Sector
# permutation of plots along transects is only possible for balanced data,
therefore we impute the missings abundance and effort
# impute effort to the mean of the other pitfalls (hm: generates extra data;
aim to allow Abundance/Effort)
mean_effort_per_plot <- tapply(Effort0, Plot, function(x)mean(x,na.rm=TRUE))
impute_effort <- mean_effort_per_plot[Plot[id]]
Effort[id] <- impute_effort
Env0$Effort <- Effort

names(Trait0)

##  [1] "X"        "X.1"      "Chorolog" "BLength"  "WMorph"   "Diet"
##  [7] "LarvDevl" "III"      "II"       "IV"       "V"        "Brachypt"
## [13] "Macroptr" "Dimorphc" "PolpPred" "Omnivoro" "Spermoph" "SpecPred"
## [19] "LDAnnua"  "LDSummr"  "LDWintr"

traits <- Trait0[,-c(1:2)]
names(traits)

##  [1] "Chorolog" "BLength"  "WMorph"   "Diet"     "LarvDevl" "III"
##  [7] "II"       "IV"       "V"        "Brachypt" "Macroptr" "Dimorphc"
## [13] "PolpPred" "Omnivoro" "Spermoph" "SpecPred" "LDAnnua"  "LDSummr"
## [19] "LDWintr"

Env <- Env0[-id, ]
L <- L0[-id,]
Effort <- Env$EffrDays

# Number of beetles in Habitat using Env0$Habitat and L0 -----------------


# Define suitable levels of variables and orders thereof -----------------

# from 0 1 to reverse 1 2 with 1 == 1 of 0 1

# in Env
Env$Habitat <- factor(2*(-0.5*Env$HayMeadw+1))
levels(Env$Habitat) <- c("Hay meadow", "Other habitat")
Env$pH <- cut(Env$Ph, breaks = c(0,4,5,6,10))
levels(Env$pH) <- c("<4", "4-5", "5-6", ">6")

Env$Elevation <- cut(Env$Elevatio, breaks = c(0,1500,2000,2500,3000))
levels(Env$Elevation) <- c("<1500", "1500-2000", "2000-2500", ">2500" )
```

```r
Env$Canopy <- factor(ifelse(Env$Canopy >0, "Canopy", "No canopy"))


# in Trait
traits$Wing <- factor(2*(-0.5*as.numeric(traits$Brachypt) +1 ))
levels(traits$Wing) <- c("Brachypterous","Other wing types")
traits$Diet <- factor(2*(-0.5*as.numeric(traits$SpecPred) +1 ))
levels(traits$Diet) <- c("Specialized predator","Other diet types")
traits$bodylength <- log(traits$BLength)
exp(c(1.7,2.5))
```

```
## [1]  5.473947 12.182494
```

```r
summary(traits$BLength)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    2.50    7.00    8.50   10.82   13.12   30.00
```

```r
summary(cut(traits$bodylength,breaks= 3))
```

```
## (0.914,1.74]  (1.74,2.57]   (2.57,3.4]
##           12           51           21
```

```r
traits$bodylength <- cut(traits$BLength, breaks = c(0,7,10,3000))
summary(traits$bodylength)
```

```
##      (0,7]     (7,10] (10,3e+03]
##         22         29         33
```

```r
levels(traits$bodylength) <- c("<7","7-10", ">10")

Env$Elevation <- cut(Env$Elevatio, breaks = c(0,1500,2000,2500,3000))
levels(Env$Elevation) <- c("<1500", "1500-2000", "2000-2500", ">2500" )


summary(Env)
```

```
##       X                X.1                Plot             Transect
##  Length:362         Length:362         Length:362         Length:362
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
##
##
##
##     Sector             Elevatio              Habitat         Soil
##  Length:362         Min.   : 763   Hay meadow   : 63   Min.   : 0.000
##  Class :character   1st Qu.:1587   Other habitat:299   1st Qu.: 0.000
##  Mode  :character   Median :1913                       Median : 1.000
##                     Mean   :1882                       Mean   : 4.727
##                     3rd Qu.:2190                       3rd Qu.: 5.000
```

```
##                    Max.   :2694                        Max.   :64.000
##       Rock           Bedding           Grass           Shrub1m
##  Min.   : 0.000   Min.   :  0.00   Min.   :  0.00   Min.   : 0.00
##  1st Qu.: 0.000   1st Qu.:  4.00   1st Qu.: 35.00   1st Qu.: 0.00
##  Median : 0.000   Median : 10.00   Median : 70.00   Median : 0.00
##  Mean   : 4.072   Mean   : 18.75   Mean   : 60.12   Mean   : 9.32
##  3rd Qu.: 5.000   3rd Qu.: 20.00   3rd Qu.: 88.00   3rd Qu.: 5.00
##  Max.   :71.000   Max.   :100.00   Max.   :100.00   Max.   :90.00
##     Shrub5m             Canopy       Grass_he         Humidity
##  Min.   : 0.0000   Canopy   :133   Min.   :  0.00   Min.   :1.000
##  1st Qu.: 0.0000   No canopy:229   1st Qu.: 10.00   1st Qu.:2.283
##  Median : 0.0000                   Median : 20.00   Median :2.630
##  Mean   : 0.2044                   Mean   : 26.44   Mean   :2.653
##  3rd Qu.: 0.0000                   3rd Qu.: 35.00   3rd Qu.:2.998
##  Max.   :70.0000                   Max.   :130.00   Max.   :5.000
##      Humus          Granulom          Temp             Ph
##  Min.   :1.300   Min.   :1.000   Min.   :1.020   Min.   :3.180
##  1st Qu.:3.000   1st Qu.:2.442   1st Qu.:1.980   1st Qu.:4.400
##  Median :3.350   Median :3.000   Median :2.530   Median :4.900
##  Mean   :3.503   Mean   :2.983   Mean   :2.521   Mean   :5.173
##  3rd Qu.:3.995   3rd Qu.:3.607   3rd Qu.:3.042   3rd Qu.:5.918
##  Max.   :6.430   Max.   :5.000   Max.   :4.230   Max.   :8.000
##        So              C              Exposure        Steepnes
##  Min.   : 14.3   Min.   :  8.294   Min.   :  0.0   Min.   : 0.00
##  1st Qu.:102.2   1st Qu.: 59.264   1st Qu.: 90.0   1st Qu.:15.00
##  Median :177.5   Median :102.966   Median :157.5   Median :25.00
##  Mean   :227.8   Mean   :132.112   Mean   :159.8   Mean   :22.98
##  3rd Qu.:316.3   3rd Qu.:183.481   3rd Qu.:220.0   3rd Qu.:30.00
##  Max.   :746.3   Max.   :432.900   Max.   :360.0   Max.   :65.00
##      NSpeci            UtmX             UtmY            EffrDays
##  Min.   : 0.000   Min.   :598470   Min.   :5123172   Min.   :190.0
##  1st Qu.: 5.000   1st Qu.:611302   1st Qu.:5141803   1st Qu.:246.0
##  Median : 8.000   Median :627600   Median :5147532   Median :257.0
##  Mean   : 8.566   Mean   :622873   Mean   :5147976   Mean   :265.8
##  3rd Qu.:12.000   3rd Qu.:633056   3rd Qu.:5157021   3rd Qu.:296.8
##  Max.   :24.000   Max.   :643207   Max.   :5165781   Max.   :333.0
##      Weight     IeffDays        DryShrub         LarcFors         HayMeadw
##  Min.   :1   Min.   :2.279   Min.   :0.0000   Min.   :0.0000   Min.
:0.000
##  1st Qu.:1   1st Qu.:2.391   1st Qu.:0.0000   1st Qu.:0.0000   1st
Qu.:0.000
##  Median :1   Median :2.410   Median :0.0000   Median :0.0000   Median
:0.000
##  Mean   :1   Mean   :2.420   Mean   :0.0442   Mean   :0.1243   Mean
:0.174
##  3rd Qu.:1   3rd Qu.:2.472   3rd Qu.:0.0000   3rd Qu.:0.0000   3rd
Qu.:0.000
##  Max.   :1   Max.   :2.522   Max.   :1.0000   Max.   :1.0000   Max.
:1.000
##     SprcFors         StnPinFr           Scree            SublHeat
```

```
##  Min.   :0.0000   Min.   :0.00000   Min.   :0.00000   Min.   :0.000
##  1st Qu.:0.0000   1st Qu.:0.00000   1st Qu.:0.00000   1st Qu.:0.000
##  Median :0.0000   Median :0.00000   Median :0.00000   Median :0.000
##  Mean   :0.1768   Mean   :0.03315   Mean   :0.02486   Mean   :0.116
##  3rd Qu.:0.0000   3rd Qu.:0.00000   3rd Qu.:0.00000   3rd Qu.:0.000
##  Max.   :1.0000   Max.   :1.00000   Max.   :1.00000   Max.   :1.000
##     CalcGras          CalPinFr          SilAlpGr        GreAldRp
##  Min.   :0.00000   Min.   :0.00000   Min.   :0.000   Min.   :0.00000
##  1st Qu.:0.00000   1st Qu.:0.00000   1st Qu.:0.000   1st Qu.:0.00000
##  Median :0.00000   Median :0.00000   Median :0.000   Median :0.00000
##  Mean   :0.03039   Mean   :0.01934   Mean   :0.221   Mean   :0.01934
##  3rd Qu.:0.00000   3rd Qu.:0.00000   3rd Qu.:0.000   3rd Qu.:0.00000
##  Max.   :1.00000   Max.   :1.00000   Max.   :1.000   Max.   :1.00000
##     Wetland            Effort        pH          Elevation
##  Min.   :0.00000   Min.   :190.0   <4 : 36   <1500    : 74
##  1st Qu.:0.00000   1st Qu.:246.0   4-5:167   1500-2000:130
##  Median :0.00000   Median :257.0   5-6: 74   2000-2500:124
##  Mean   :0.01657   Mean   :265.8   >6 : 85   >2500    : 34
##  3rd Qu.:0.00000   3rd Qu.:296.8
##  Max.   :1.00000   Max.   :333.0

summary(traits)

##    Chorolog            BLength         WMorph
##  Length:84          Min.   : 2.50   Length:84
##  Class :character   1st Qu.: 7.00   Class :character
##  Mode  :character   Median : 8.50   Mode  :character
##                     Mean   :10.82
##                     3rd Qu.:13.12
##                     Max.   :30.00
##                    Diet      LarvDevl             III
##  Specialized predator:10   Length:84          Min.   :0.0000
##  Other diet types    :74   Class :character   1st Qu.:0.0000
##                            Mode  :character   Median :0.0000
##                                               Mean   :0.1786
##                                               3rd Qu.:0.0000
##                                               Max.   :1.0000
##        II               IV               V             Brachypt
##  Min.   :0.0000   Min.   :0.0000   Min.   :0.0000   Min.   :0.0000
##  1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.0000
##  Median :0.0000   Median :0.0000   Median :0.0000   Median :0.0000
##  Mean   :0.1667   Mean   :0.4405   Mean   :0.2143   Mean   :0.2857
##  3rd Qu.:0.0000   3rd Qu.:1.0000   3rd Qu.:0.0000   3rd Qu.:1.0000
##  Max.   :1.0000   Max.   :1.0000   Max.   :1.0000   Max.   :1.0000
##     Macroptr         Dimorphc         PolpPred         Omnivoro
##  Min.   :0.0000   Min.   :0.0000   Min.   :0.0000   Min.   :0.000
##  1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.000
##  Median :0.0000   Median :0.0000   Median :0.0000   Median :0.000
##  Mean   :0.4762   Mean   :0.2381   Mean   :0.4643   Mean   :0.369
##  3rd Qu.:1.0000   3rd Qu.:0.0000   3rd Qu.:1.0000   3rd Qu.:1.000
```

```
##  Max.   :1.0000   Max.   :1.0000   Max.   :1.0000   Max.   :1.000
##     Spermoph          SpecPred        LDAnnua          LDSummr
##  Min.   :0.00000   Min.   :0.000   Min.   :0.000   Min.   :0.0000
##  1st Qu.:0.00000   1st Qu.:0.000   1st Qu.:0.000   1st Qu.:0.0000
##  Median :0.00000   Median :0.000   Median :0.000   Median :1.0000
##  Mean   :0.04762   Mean   :0.119   Mean   :0.119   Mean   :0.5119
##  3rd Qu.:0.00000   3rd Qu.:0.000   3rd Qu.:0.000   3rd Qu.:1.0000
##  Max.   :1.00000   Max.   :1.000   Max.   :1.000   Max.   :1.0000
##     LDWintr                   Wing    bodylength
##  Min.   :0.000   Brachypterous   :24   <7  :22
##  1st Qu.:0.000   Other wing types:60   7-10:29
##  Median :0.000                         >10 :33
##  Mean   :0.369
##  3rd Qu.:1.000
##  Max.   :1.000

# Start calculations ------------------------------------------------------




# Apply function----------------------------------------------------------
------

dim(L)

## [1] 362  84

dim(Env)

## [1] 362  45

dim(traits)

## [1] 84 21

length(Effort)

## [1] 362

#traits$Wing
names(Env)

##  [1] "X"         "X.1"       "Plot"      "Transect"  "Sector"
"Elevatio"
##  [7] "Habitat"   "Soil"      "Rock"      "Bedding"   "Grass"     "Shrub1m"
## [13] "Shrub5m"   "Canopy"    "Grass_he"  "Humidity"  "Humus"
"Granulom"
## [19] "Temp"      "Ph"        "So"        "C"         "Exposure"
"Steepnes"
## [25] "NSpeci"    "UtmX"      "UtmY"      "EffrDays"  "Weight"
"IeffDays"
```

```
## [31] "DryShrub"  "LarcFors"  "HayMeadw"  "SprcFors"  "StnPinFr"  "Scree"
## [37] "SublHeat"  "CalcGras"  "CalPinFr"  "SilAlpGr"  "GreAldRp"  "Wetland"
## [43] "Effort"    "pH"        "Elevation"

names(traits)

##  [1] "Chorolog"   "BLength"    "WMorph"     "Diet"       "LarvDevl"
##  [6] "III"        "II"         "IV"         "V"          "Brachypt"
## [11] "Macroptr"   "Dimorphc"   "PolpPred"   "Omnivoro"   "Spermoph"
## [16] "SpecPred"   "LDAnnua"    "LDSummr"    "LDWintr"    "Wing"
## [21] "bodylength"

EnvFactornames <- c("Habitat", "pH","Elevation","Canopy")
summary(Env[,EnvFactornames])

##           Habitat      pH          Elevation         Canopy
##  Hay meadow   : 63   <4 : 36   <1500    : 74   Canopy   :133
##  Other habitat:299   4-5:167   1500-2000:130   No canopy:229
##                      5-6: 74   2000-2500:124
##                      >6 : 85   >2500    : 34

TraitFactornames <- c( "Wing", "Diet", "bodylength")
summary(traits[,TraitFactornames])

##                Wing                        Diet    bodylength
##  Brachypterous   :24   Specialized predator:10   <7  :22
##  Other wing types:60   Other diet types    :74   7-10:29
##                                                  >10 :33

Effort.reference <- 250

out.list <- list()
tab.list <- list()


for (idt in seq_along(TraitFactornames)){

out<-   TabEnvTrait(Env= Env,L= L, Traits = traits, Effort = Effort,
                    Envname = EnvFactornames[length(EnvFactornames)],
                    Traitname = TraitFactornames[idt], Effort.reference =
Effort.reference )
tab <-out$CountPerDayRowwise# last table

for (Envname in rev(EnvFactornames)[-1]){
  out<-   TabEnvTrait(Env= Env,L= L, Traits = traits, Effort = Effort,
                      Envname = Envname,Traitname = TraitFactornames[idt],
Effort.reference = Effort.reference )
  tab <- rbind( out$CountPerDayRowwise[-nrow(out$CountPerDayRowwise),], tab)
}
out.list[[idt]] <- out
tab.list[[idt]] <- tab
```

```
print(TraitFactornames[idt])
print(round(tab, 2))
}

## Margins computed over dimensions
## in the following order:
## 1: Canopy
## 2: Wing
## Margins computed over dimensions
## in the following order:
## 1: Elevation
## 2: Wing
## Margins computed over dimensions
## in the following order:
## 1: pH
## 2: Wing
## Margins computed over dimensions
## in the following order:
## 1: Habitat
## 2: Wing
## [1] "Wing"
##                Brachypterous Other wing types 250d-total
## Hay meadow              0.27              0.73      32.27
## Other habitat           0.81              0.19      17.44
## <4                      0.80              0.20      18.06
## 4-5                     0.81              0.19      18.74
## 5-6                     0.61              0.39      22.97
## >6                      0.36              0.64      21.59
## <1500                   0.48              0.52      29.09
## 1500-2000               0.65              0.35      20.03
## 2000-2500               0.80              0.20      17.62
## >2500                   0.77              0.23       8.23
## Canopy                  0.83              0.17      20.53
## No canopy               0.53              0.47      20.01
## 250day-total           13.12              7.08      20.21
## Margins computed over dimensions
## in the following order:
## 1: Canopy
## 2: Diet
## Margins computed over dimensions
## in the following order:
## 1: Elevation
## 2: Diet
## Margins computed over dimensions
## in the following order:
## 1: pH
## 2: Diet
## Margins computed over dimensions
## in the following order:
## 1: Habitat
```

```
## 2: Diet
## [1] "Diet"
##                Specialized predator Other diet types 250d-total
## Hay meadow                     0.01              0.99      32.27
## Other habitat                  0.06              0.94      17.44
## <4                             0.12              0.88      18.06
## 4-5                            0.04              0.96      18.74
## 5-6                            0.03              0.97      22.97
## >6                             0.02              0.98      21.59
## <1500                          0.02              0.98      29.09
## 1500-2000                      0.06              0.94      20.03
## 2000-2500                      0.04              0.96      17.62
## >2500                          0.04              0.96       8.23
## Canopy                         0.08              0.92      20.53
## No canopy                      0.02              0.98      20.01
## 250day-total                   0.84             19.37      20.21
## Margins computed over dimensions
## in the following order:
## 1: Canopy
## 2: bodylength
## Margins computed over dimensions
## in the following order:
## 1: Elevation
## 2: bodylength
## Margins computed over dimensions
## in the following order:
## 1: pH
## 2: bodylength
## Margins computed over dimensions
## in the following order:
## 1: Habitat
## 2: bodylength
## [1] "bodylength"
##                  <7 7-10   >10 250d-total
## Hay meadow    0.13 0.41  0.46      32.27
## Other habitat 0.18 0.17  0.66      17.44
## <4            0.24 0.12  0.64      18.06
## 4-5           0.18 0.15  0.67      18.74
## 5-6           0.14 0.28  0.59      22.97
## >6            0.13 0.40  0.47      21.59
## <1500         0.14 0.30  0.56      29.09
## 1500-2000     0.18 0.23  0.60      20.03
## 2000-2500     0.18 0.20  0.63      17.62
## >2500         0.04 0.24  0.71       8.23
## Canopy        0.23 0.12  0.65      20.53
## No canopy     0.12 0.32  0.57      20.01
## 250day-total  3.27 4.85 12.08      20.21

names(tab.list) <- TraitFactornames
```

```
write.csv(tab.list[[1]], file="Brachcount.csv")
write.csv(tab.list[[2]], file="SpecPredcount.csv")
write.csv(tab.list[[3]], file="BodyLengthcount.csv")

out.list

## [[1]]
## [[1]]$CountPerDayRowwise
##                Wing
## Habitat         Brachypterous Other wing types 250d-total
##   Hay meadow        0.2688822        0.7311178 32.2737910
##   Other habitat     0.8109544        0.1890456 17.4397802
##   250day-total     13.1232914        7.0839787 20.2072700
##
## [[1]]$CountPerDayMarg
##                Wing
## Habitat         Brachypterous Other wing types        sum
##   Hay meadow       0.03471139       0.09438378 0.12909516
##   Other habitat    0.05657147       0.01318766 0.06975912
##   sum              0.09128285       0.10757143 0.19885428
##
## [[1]]$CountPerDay
##                Wing
## Habitat         Brachypterous Other wing types
##   Hay meadow       0.03471139       0.09438378
##   Other habitat    0.05657147       0.01318766
##
## [[1]]$CountTrait
##    Brachypterous Other wing types            total
##       0.05249317       0.02833591       0.08082908
##
## [[1]]$EffortPerEnvClass
##    Hay meadow Other habitat
##         17948         78255
##
## [[1]]$CountsPerEnvClass
##    Hay meadow Other habitat
##    0.12909516    0.06975912
##
## [[1]]$tabCounts
##                Wing
## Habitat         Brachypterous Other wing types
##   Hay meadow              623             1694
##   Other habitat          4427             1032
##
##
## [[2]]
## [[2]]$CountPerDayRowwise
```

```
##                Diet
## Habitat         Specialized predator Other diet types   250d-total
##   Hay meadow             0.005610703      0.994389297 32.273790952
##   Other habitat          0.056970141      0.943029859 17.439780206
##   250day-total           0.841969585     19.365300458 20.207270044
##
## [[2]]$CountPerDayMarg
##                Diet
## Habitat         Specialized predator Other diet types          sum
##   Hay meadow            0.0007243147     0.1283708491 0.1290951638
##   Other habitat         0.0039741870     0.0657849339 0.0697591208
##   sum                   0.0046985016     0.1941557830 0.1988542846
##
## [[2]]$CountPerDay
##                Diet
## Habitat         Specialized predator Other diet types
##   Hay meadow            0.0007243147     0.1283708491
##   Other habitat         0.0039741870     0.0657849339
##
## [[2]]$CountTrait
## Specialized predator     Other diet types                total
##          0.003367878          0.077461202          0.080829080
##
## [[2]]$EffortPerEnvClass
##    Hay meadow Other habitat
##         17948         78255
##
## [[2]]$CountsPerEnvClass
##    Hay meadow Other habitat
##    0.12909516    0.06975912
##
## [[2]]$tabCounts
##                Diet
## Habitat         Other diet types Specialized predator
##   Hay meadow               2304                   13
##   Other habitat            5148                  311
##
##
## [[3]]
## [[3]]$CountPerDayRowwise
##                bodylength
## Habitat                 <7       7-10        >10 250d-total
##   Hay meadow     0.1260250  0.4108761  0.4630988 32.2737910
##   Other habitat  0.1773219  0.1676131  0.6550650 17.4397802
##   250day-total   3.2743262  4.8517198 12.0812241 20.2072700
##
## [[3]]$CountPerDayMarg
##                bodylength
## Habitat                 <7       7-10        >10        sum
##   Hay meadow    0.01626922 0.05304212 0.05978382 0.12909516
```

```
##   Other habitat 0.01236982 0.01169254 0.04569676 0.06975912
##   sum           0.02863904 0.06473467 0.10548058 0.19885428
##
## [[3]]$CountPerDay
##                bodylength
## Habitat                 <7       7-10        >10
##   Hay meadow    0.01626922 0.05304212 0.05978382
##   Other habitat 0.01236982 0.01169254 0.04569676
##
## [[3]]$CountTrait
##         <7       7-10        >10      total
## 0.01309730 0.01940688 0.04832490 0.08082908
##
## [[3]]$EffortPerEnvClass
##    Hay meadow Other habitat
##         17948         78255
##
## [[3]]$CountsPerEnvClass
##    Hay meadow Other habitat
##    0.12909516    0.06975912
##
## [[3]]$tabCounts
##                bodylength
## Habitat           <7  >10 7-10
##   Hay meadow     292 1073  952
##   Other habitat  968 3576  915
```

```
tab.list
```

```
## $Wing
##               Brachypterous Other wing types 250d-total
## Hay meadow        0.2688822        0.7311178  32.273791
## Other habitat     0.8109544        0.1890456  17.439780
## <4                0.7963989        0.2036011  18.062644
## 4-5               0.8137763        0.1862237  18.744287
## 5-6               0.6080402        0.3919598  22.965072
## >6                0.3612513        0.6387487  21.587592
## <1500             0.4774222        0.5225778  29.089935
## 1500-2000         0.6545394        0.3454606  20.026203
## 2000-2500         0.8037919        0.1962081  17.620187
## >2500             0.7662338        0.2337662   8.226496
## Canopy            0.8348745        0.1651255  20.530484
## No canopy         0.5311710        0.4688290  20.006405
## 250day-total     13.1232914        7.0839787  20.207270
##
## $Diet
##               Specialized predator Other diet types 250d-total
## Hay meadow             0.005610703        0.9943893  32.273791
## Other habitat          0.056970141        0.9430299  17.439780
## <4                     0.119113573        0.8808864  18.062644
```

```
## 4-5                    0.042365133        0.9576349  18.744287
## 5-6                    0.034059185        0.9659408  22.965072
## >6                     0.019172553        0.9808274  21.587592
## <1500                  0.021043402        0.9789566  29.089935
## 1500-2000              0.057409880        0.9425901  20.026203
## 2000-2500              0.041887125        0.9581129  17.620187
## >2500                  0.038961039        0.9610390   8.226496
## Canopy                 0.082892999        0.9171070  20.530484
## No canopy              0.015374895        0.9846251  20.006405
## 250day-total           0.841969585       19.3653005  20.207270
##
## $bodylength
##                       <7      7-10        >10 250d-total
## Hay meadow    0.12602503 0.4108761  0.4630988  32.273791
## Other habitat 0.17732185 0.1676131  0.6550650  17.439780
## <4            0.23822715 0.1218837  0.6398892  18.062644
## 4-5           0.17829930 0.1517830  0.6699177  18.744287
## 5-6           0.13847013 0.2752652  0.5862647  22.965072
## >6            0.12865792 0.3975782  0.4737639  21.587592
## <1500         0.14291977 0.2994301  0.5576502  29.089935
## 1500-2000     0.17590120 0.2263017  0.5977971  20.026203
## 2000-2500     0.17504409 0.1984127  0.6265432  17.620187
## >2500         0.04329004 0.2424242  0.7142857   8.226496
## Canopy        0.23282695 0.1192206  0.6479524  20.530484
## No canopy     0.11689132 0.3171862  0.5659225  20.006405
## 250day-total  3.27432616 4.8517198 12.0812241  20.207270
```