Test of garden hunting hypothesis for mammals in La Gran Sabana, Venezuela using occupancy models

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Methods

Model definition

Covariates of probability of detection

dras: distance to animal tracks and trails

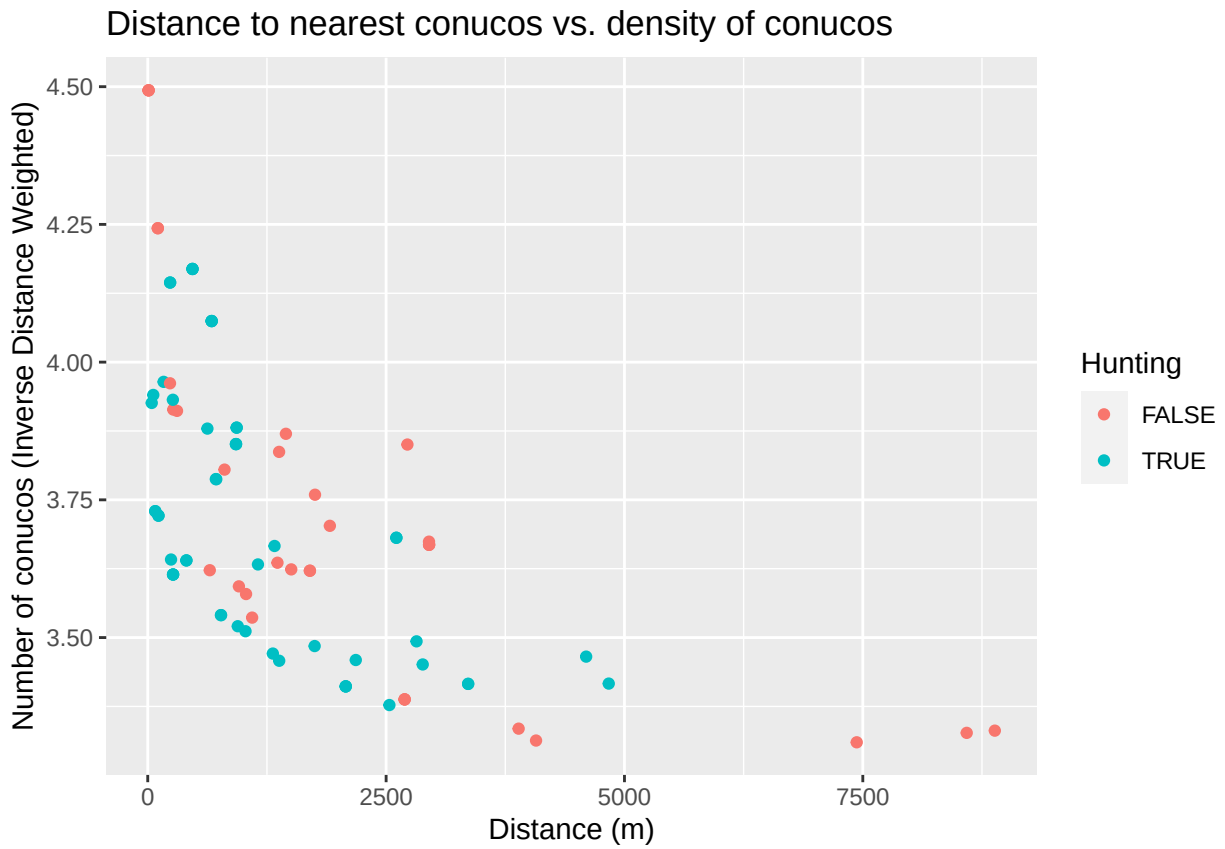
sfrz: sampling effort (nr. of days camera was active)

date: date of sampling

Covariates of probability of occupancy - frecuency of use

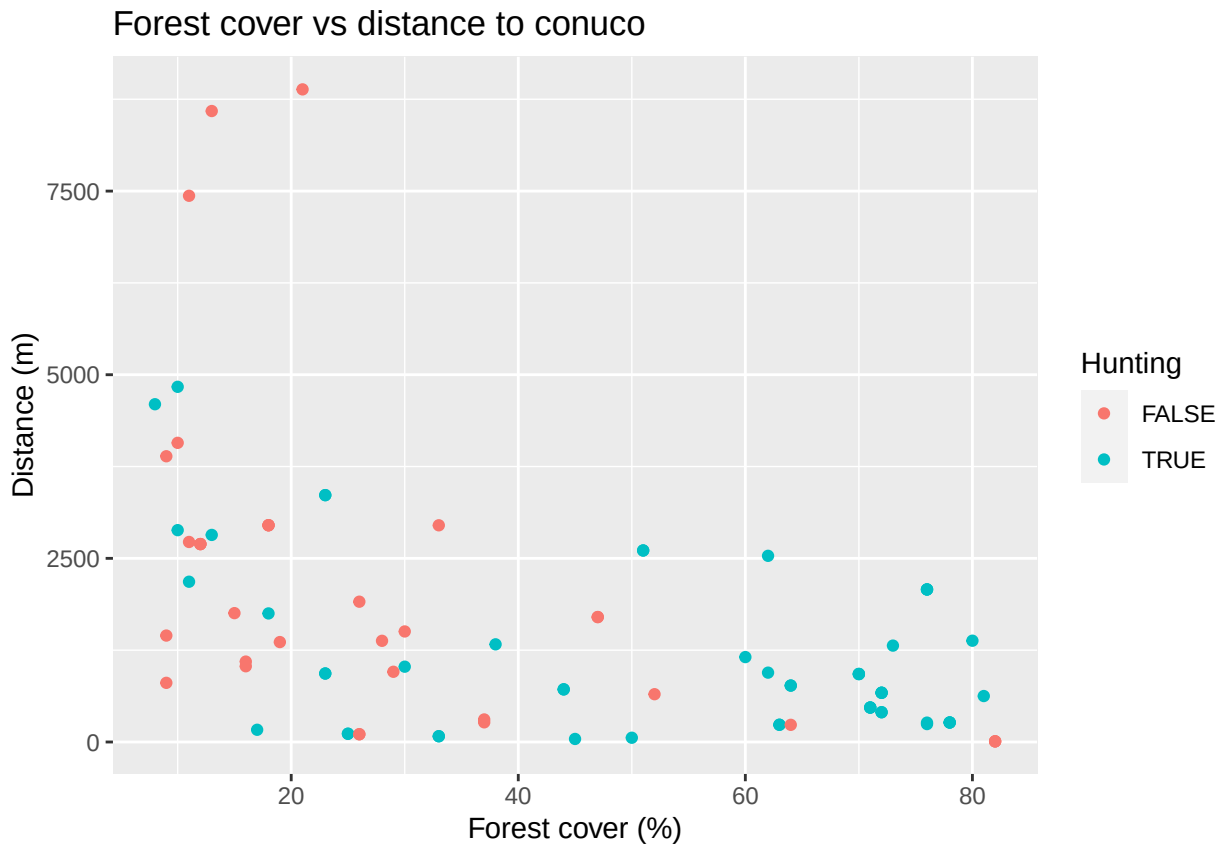
buf.fragmen: 1 km buffer of forest cover derived from LandSat time series (Hansen et al. 2013)

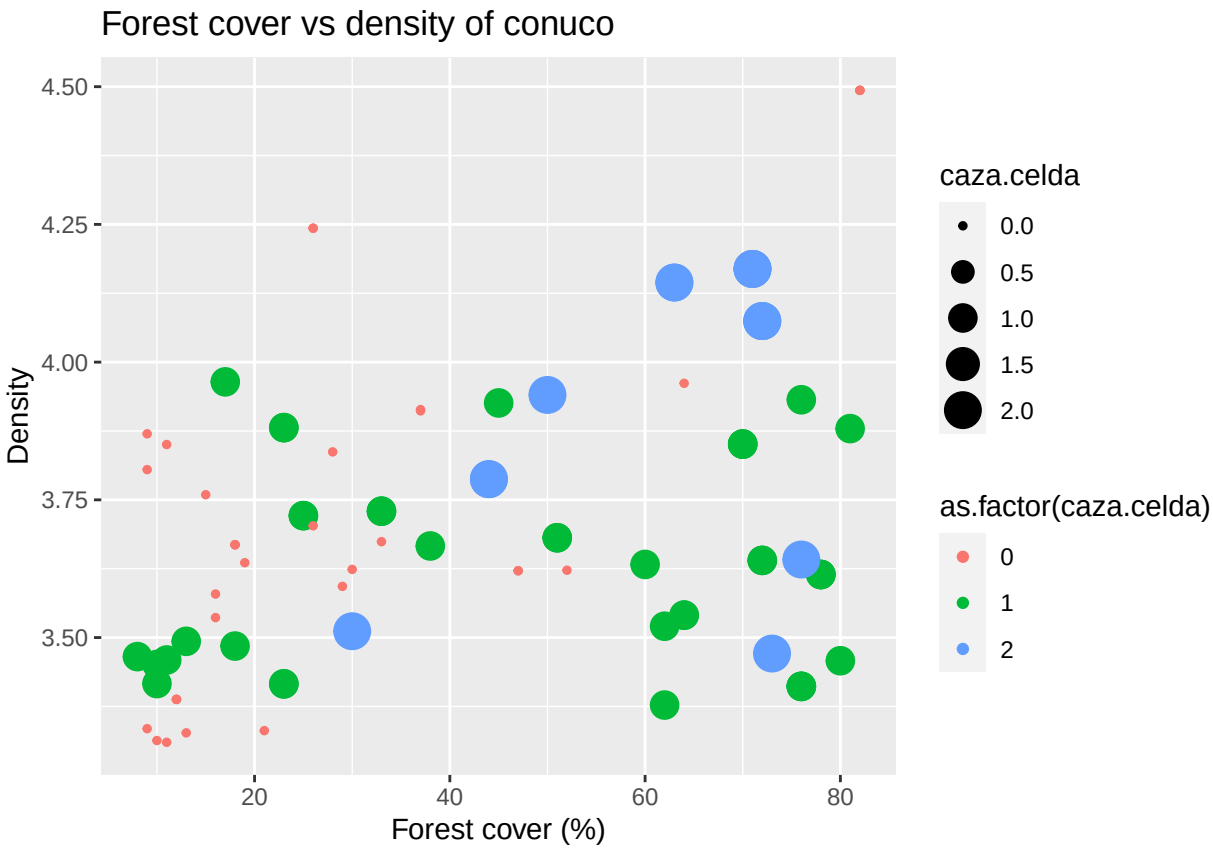
dcon: distance to nearest conuco




```
##    bloque period camera charact_SBOF ID.original      lat       lon  fecha.act
## 5     B01     P1   IS12           S0        Is12 5.506299 -61.27376 2015-09-26
## 8     B01     P1   IS13           S0        Is13 5.522092 -61.27197 2015-09-26
## 10    B01     P1   IS14           s0        Is14 5.525936 -61.27128 2015-09-26
##    hora.act fecha.desact hora.desact fecha.desact.real hora.desact.real
## 5  14:00:00   2015-11-29       08:00        2015-09-27         11:18:32
## 8  12:20:00   2015-11-29       08:55        2015-11-14         13:07:40
## 10 11:30:00   2015-11-29       09:30        2015-10-07         13:07:33
##    dias.de.trabajo nombre.del.lugar   habitat si.se.quema quema.celda
## 5                1 salto Golondrina arbustros          si           1
## 8               49 salto Golondrina arbustros          si           1
## 10              11 salto Golondrina arbustros          si           1
##    Si.se.caza.aqui caza.celda caza.celda2 caza.bloque fuego.bloque fuego.celda
## 5               no          0           0           7           21           0
## 8               no          0           0           7           21           0
## 10              no          0           0           7           21           3
##       H   h conuco.dist.m conuco.bloque ln.conuco.dis buf.fragmen ln.buf.frag
## 5  1.69 0.4        7436.2             0           8.9          11    2.397895
## 8  1.69 0.4        8589.9             0           9.1          13    2.564949
## 10 1.69 0.4        8884.6             0           9.1          21    3.044522
##    dist.comun ln.comun grid     wcon     dcon     dras   ndvi.mu    ndvi.sg
## 5  0.04521308 1.508801  103 3.309860 7436.168 14.81159 0.4395308 0.04890698
## 8  0.05973024 1.787253  104 3.326975 8589.872 14.77075 0.4464546 0.05861526
## 10 0.06330868 1.845437  105 3.331018 8884.596 14.67116 0.5321356 0.06574358
##        grp bsq     dcom
## 5  savanna   0 6778.644
```

```
## 8  savanna   0 5383.827
## 10 savanna  39 4830.923
```





Eliminar tres puntos mas remotos (> 5km del conuco)

```
ggplot(data=subset(camaras,bloque %in% sprintf("B%02s",1:6)), aes(y=idw.conucos,x=min.conucos,colour=as
geom_point()
```

Results

Goodness of fit

MacKenzie and Bailey Goodness-of-fit Test for Royle-Nichols Occupancy Models.

Symptoms of lack of fit for most species: Six models with extreme p-value or c-hat values, 19 models with large coeficients or standard errors.

```
##
##         FALSE TRUE
##   FALSE     9   15
##   TRUE      2    3
```

These species show one or more signs of lack of fit, probably due to the low number of detections:

```
##             spp n.detect chi.square p.value c.hat.est large.coefs   large.SE
## 1   C.unicinctus        2  295.57332  0.0131 8.9818653    7.156396  3.9716471
## 2 H.hydrochaeris        2   16.96172  0.0480 4.9969525    3.767419  3.2320432
## 3  O.virginianus        2   58.61963  0.0499 4.4910481   23.414910 75.3879204
## 4       P.tajacu        2   46.01469  0.0286 7.1870034   51.502116 66.9805063
## 5        T.major       18  375.72547  0.8924 0.2113723    1.644769  0.9518685
```

These species appear to have a good fit but might have problems with large coeficients and standard errors

```
##              spp n.detect  chi.square p.value c.hat.est large.coefs  large.SE
## 1     M.americana       17  215.630624  0.7603 0.3077924    7.141062  2.475551
## 2       P.maximus        6   67.556379  0.6891 0.3269414    6.876107  1.891950
## 3    D.imperfecta       11  266.242563  0.5142 0.3740693    4.446067  1.580859
## 4    T.terrestris        8  158.392738  0.5462 0.3848758    5.585400  2.428738
## 5  T.tetradactyla        5   65.861667  0.5483 0.4423534    6.979181  2.404985
## 6       E.barbara       16  388.492688  0.5144 0.5312218    5.544847  1.210115
## 7      P.jacquacu        6   70.880976  0.6209 0.5742682   36.681849 29.316316
## 8   M.gouazoubira       33 1143.958440  0.5370 0.6427835    4.043555  1.087427
## 9         N.nasua        5  105.845653  0.4251 0.6557039    6.548515  2.810143
## 10  D.marsupialis        2    8.049689  0.4087 0.7351781   83.880796 52.160632
## 11       T.pecari        2    8.467779  0.3456 0.9762264   22.068872 20.108545
## 12    C.olivaceus        7  157.745065  0.1936 1.2799237    8.785329  2.173164
## 13   M.tridactyla       13  588.334992  0.1333 1.4256654    6.504142  7.917420
## 14       L.wiedii        2   27.247286  0.2473 1.4886742   18.308557 26.751637
## 15     P.concolor        9  184.909653  0.1093 1.6532555   46.086062 25.611133
```

For this species, the over-dispersion might be accounted for by using quasi-AICc

```
##          spp n.detect chi.square p.value c.hat.est large.coefs large.SE
## 1 L.pardalis       14   1087.697  0.2283  1.048253     2.27783 1.017033
```

These species seem to have a good fit and no signs of over-dispersion:

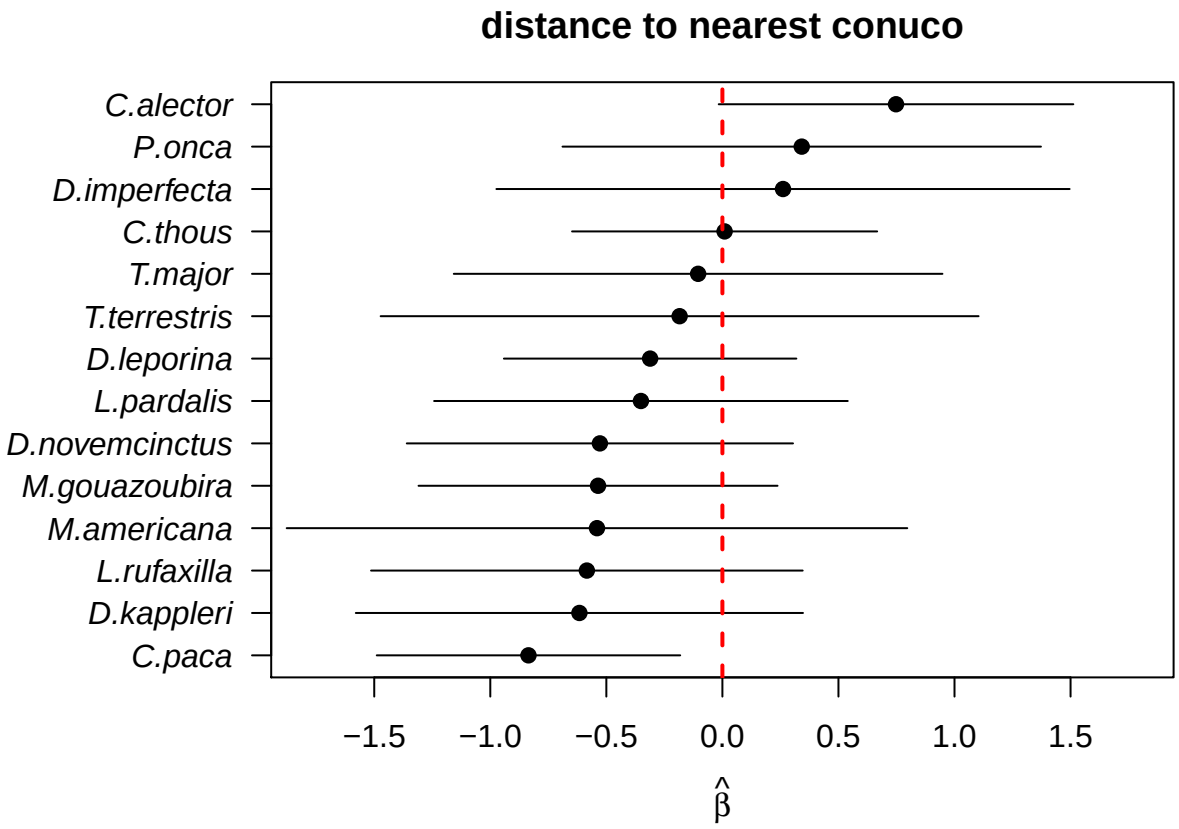
```
##              spp n.detect chi.square p.value c.hat.est large.coefs  large.SE
## 1    L.rufaxilla       33   648.8711  0.6126 0.3477600    3.585723 1.0655492
## 2         C.paca       71  1005.5193  0.7977 0.4725236    2.211739 0.5907354
## 3     D.leporina       66  1015.1183  0.8638 0.4867037    2.534105 0.5920308
## 4         P.onca       12   796.8473  0.6108 0.5095565    1.819757 1.1192098
## 5     D.kappleri       25   852.6055  0.5624 0.5428643    3.995530 1.3686605
## 6      C.alector       31  1749.5578  0.3784 0.8625295    2.868594 0.8601191
## 7        C.thous       22  1260.6534  0.3340 0.9300244    1.735545 1.0697172
## 8 D.novemcinctus       17   883.2924  0.1735 0.9886462    2.698998 1.1437302
```

Model averaging

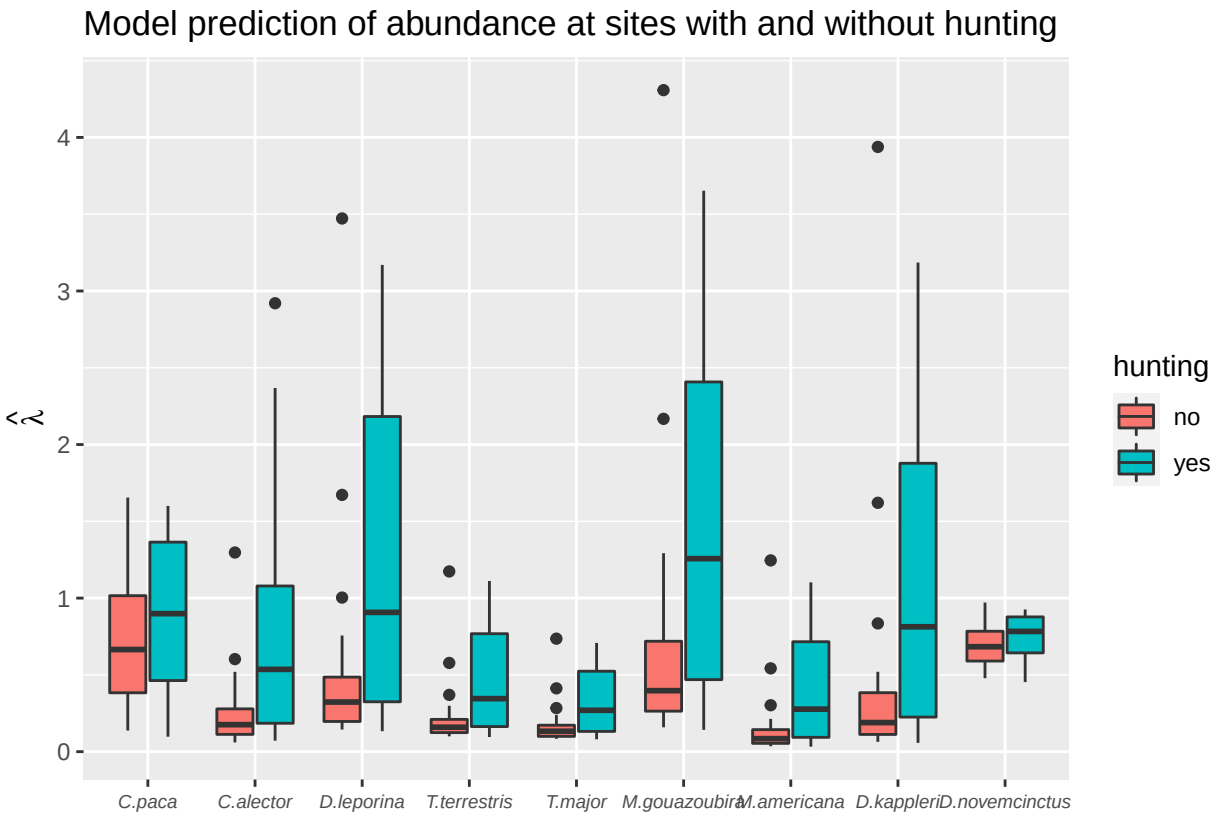
Variable importance

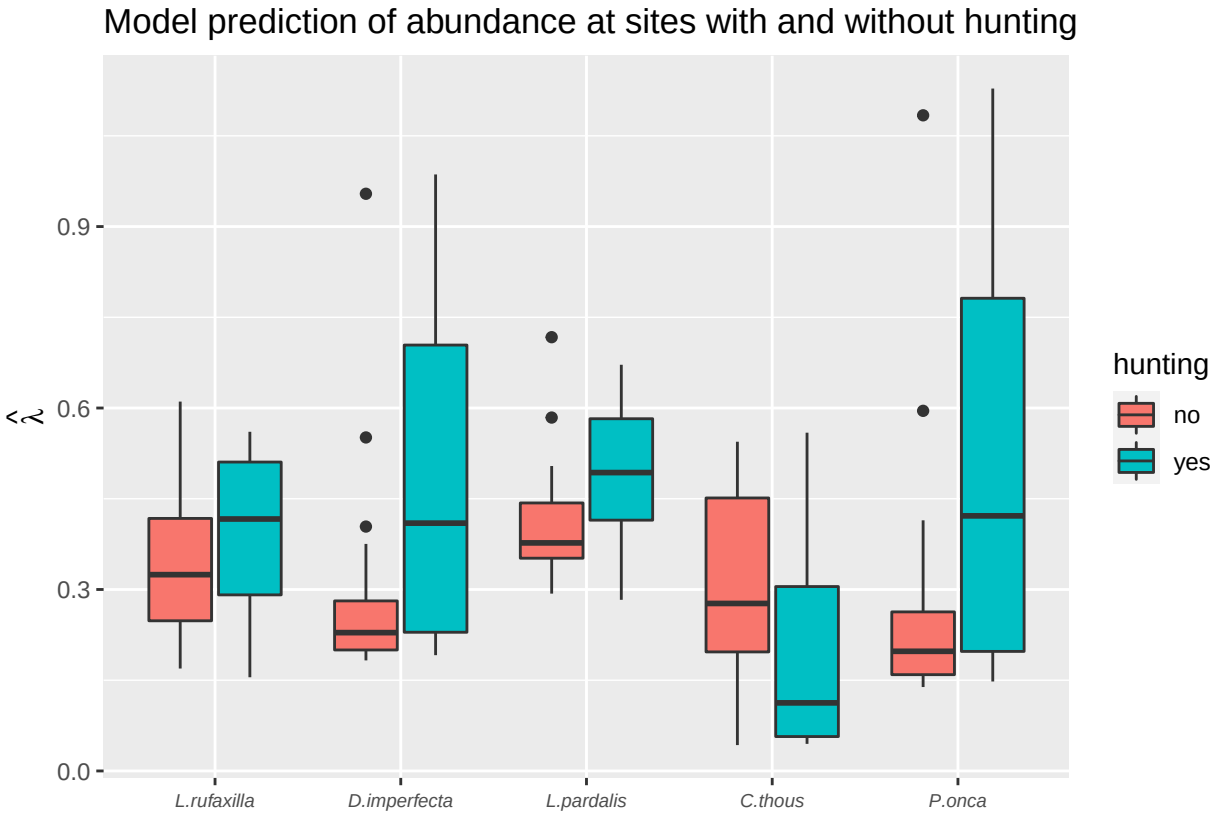
```
## [1] "C.paca"
##                      p(sfrz) lam(dcon) p(dras) p(date) lam(buf.fragmen)
## Sum of weights:      0.97    0.95      0.92    0.26    0.23
## N containing models:   16      16        16      16      16
## [1] "C.alector"
##                      lam(buf.fragmen) lam(I(buf.fragmen^2)) p(sfrz) lam(dcon)
## Sum of weights:      1.00             0.93                  0.77    0.59
## N containing models:   32               16                    24      24
##                      p(dras) p(date)
## Sum of weights:      0.30    0.25
## N containing models:   24      24
## [1] "D.leporina"
##                      lam(buf.fragmen) p(sfrz) p(dras) p(date) lam(dcon)
## Sum of weights:      1.00             0.98    0.39    0.35    0.33
## N containing models:   16               16      16      16      16
## [1] "M.gouazoubira"
##                      lam(buf.fragmen) p(sfrz) lam(dcon) p(date) p(dras)
## Sum of weights:      0.98             0.95    0.46      0.23    0.23
## N containing models:   16               16      16        16      16
```

```
## [1] "D.kappleri"
##                       lam(buf.fragmen) p(sfrz) lam(dcon) p(dras) p(date)
## Sum of weights:       0.99             0.68    0.42      0.41    0.34
## N containing models:   16               16      16        16      16
## [1] "D.novemcinctus"
##                       p(date) lam(dcon) lam(buf.fragmen) p(dras) p(sfrz)
## Sum of weights:       0.93    0.43      0.25             0.25    0.23
## N containing models:   16      16        16               16      16
## [1] "L.rufaxilla"
##                       p(sfrz) lam(buf.fragmen) lam(I(buf.fragmen^2)) lam(dcon)
## Sum of weights:       1.00    0.66             0.52                   0.44
## N containing models:   24      32               16                     24
##                       p(date) p(dras)
## Sum of weights:       0.31    0.23
## N containing models:   24      24
## [1] "L.pardalis"
##                       lam(buf.fragmen) lam(dcon) p(dras) p(sfrz) p(date)
## Sum of weights:       0.43             0.30      0.27    0.23    0.23
## N containing models:   16               16        16      16      16
## [1] "C.thous"
##                       lam(buf.fragmen) p(sfrz) p(dras) lam(dcon) p(date)
## Sum of weights:       0.90             0.38    0.27    0.25      0.23
## N containing models:   16               16      16      16        16
## [1] "P.onca"
##                       lam(buf.fragmen) lam(dcon) p(dras) p(date) p(sfrz)
## Sum of weights:       0.87             0.29      0.26    0.25    0.23
## N containing models:   16               16        16      16      16
## [1] "D.imperfecta"
##                       p(dras) lam(buf.fragmen) p(sfrz) lam(dcon) p(date)
## Sum of weights:       0.96    0.67             0.45    0.25      0.23
## N containing models:   16      16               16      16        16
## [1] "T.terrestris"
##                       lam(buf.fragmen) p(sfrz) p(date) lam(dcon) p(dras)
## Sum of weights:       0.78             0.66    0.27    0.25      0.24
## N containing models:   16               16      16      16        16
## [1] "T.major"
##                       lam(buf.fragmen) p(date) lam(dcon) p(dras) p(sfrz)
## Sum of weights:       0.85             0.26    0.26      0.25    0.24
## N containing models:   16               16      16        16      16
## [1] "M.americana"
##                       p(sfrz) lam(buf.fragmen) p(date) lam(dcon) p(dras)
## Sum of weights:       1.00    0.95             0.80    0.30      0.23
## N containing models:   16      16               16      16        16
```


distance to nearest conuco
C.alector
P.onca
D.imperfecta
C.thous
T.major
T.terrestris
D.leporina
L.pardalis
D.novemcinctus
M.gouazoubira
M.americana
L.rufaxilla
D.kappleri
C.paca
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
β̂

Hunting


Model prediction of abundance at sites with and without hunting
λ
0
1
2
3
4
C.paca
C.alector
D.leporina
T.terrestris
T.major
M.gouazoubira
M.americana
D.kappleri
D.novemcinctus
hunting
no
yes



results per species

C. paca

Sum of AICc weights indicate a clear effect of p(sfrz) p(dras) and lam(dcon)

```
##
## Call:
## model.avg(object = get.models(object = oms01, subset = delta <
##     10))
##
## Component model call:
## occuRN(formula = ~<15 unique rhs>, data = UMF, K = 50)
##
## Component models:
##       df  logLik   AICc delta weight
## 245    5 -114.87 240.92  0.00   0.49
## 2345   6 -114.71 243.11  2.19   0.17
## 1245   6 -114.87 243.42  2.50   0.14
## 12345  7 -114.71 245.70  4.78   0.05
## 25     4 -118.58 245.94  5.02   0.04
## 45     4 -119.27 247.31  6.39   0.02
## 235    5 -118.16 247.50  6.58   0.02
## 24     4 -119.43 247.63  6.71   0.02
## 145    5 -118.26 247.69  6.77   0.02
## 125    5 -118.57 248.32  7.40   0.01
## 345    5 -119.05 249.28  8.36   0.01
```

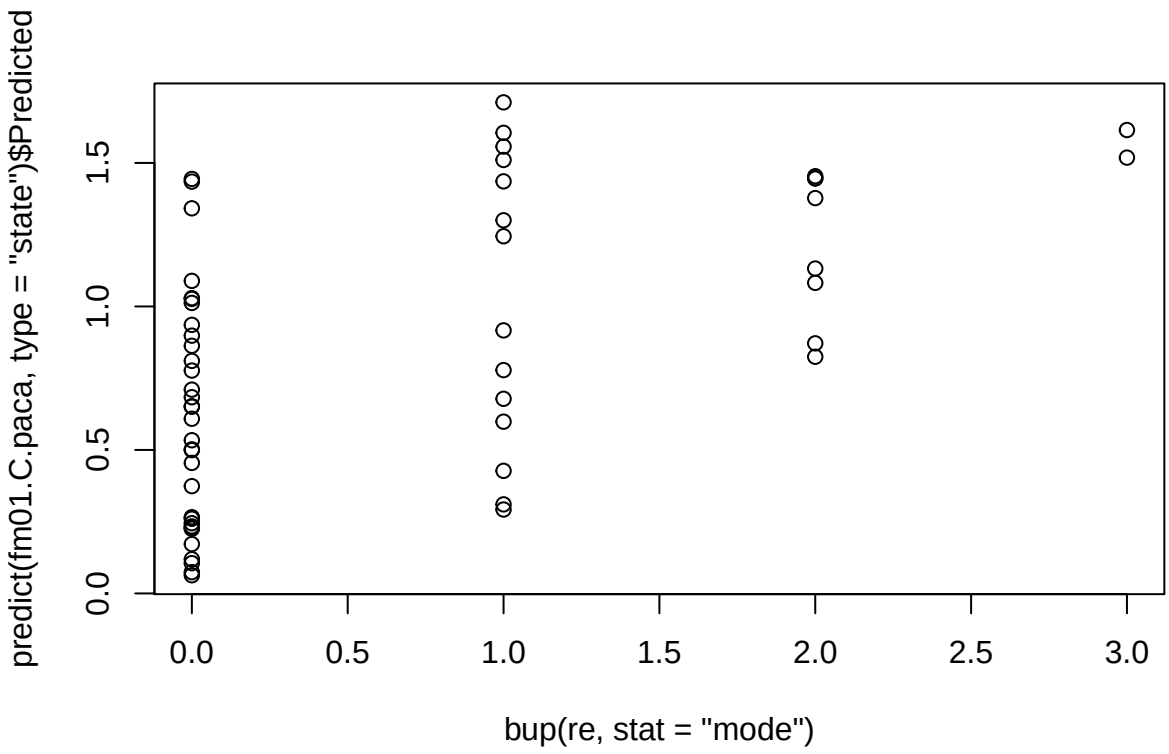
```
## 234    5 -119.14 249.45  8.53   0.01
## 1345   6 -117.97 249.61  8.69   0.01
## 1235   6 -118.13 249.94  9.02   0.01
## 124    5 -119.42 250.02  9.10   0.01
##
## Term codes:
## lam(buf.fragmen)        lam(dcon)          p(date)          p(dras)
##                1                2               3                4
##          p(sfrz)
##                5
##
## Model-averaged coefficients:
## (full average)
##                   Estimate Std. Error z value Pr(>|z|)
## lam(Int)         -0.424940   0.306055   1.388 0.165002
## lam(dcon)        -0.793038   0.373171   2.125 0.033576 *
## p(Int)           -2.165035   0.600345   3.606 0.000311 ***
## p(dras)           0.695810   0.340866   2.041 0.041221 *
## p(sfrz)           1.661080   0.650877   2.552 0.010709 *
## p(date)          -0.033247   0.122467   0.271 0.786023
## lam(buf.fragmen)  0.009867   0.108986   0.091 0.927860
##
## (conditional average)
##                  Estimate Std. Error z value Pr(>|z|)
## lam(Int)         -0.42494    0.30605   1.388 0.165002
## lam(dcon)        -0.83547    0.33356   2.505 0.012255 *
## p(Int)           -2.16504    0.60034   3.606 0.000311 ***
## p(dras)           0.75300    0.28753   2.619 0.008823 **
## p(sfrz)           1.71122    0.59214   2.890 0.003854 **
## p(date)          -0.13046    0.21487   0.607 0.543739
## lam(buf.fragmen)  0.04251    0.22312   0.191 0.848903
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##  [1] 1.166640e-01 4.405910e-02 3.826281e-02 2.413086e-01 2.158814e-01
##  [6] 3.506477e-02 1.065452e-01 9.490079e-02 5.653759e-02 1.076837e+00
## [11] 4.630793e-01 1.618851e+00 6.608202e-05 1.005642e-01 3.733142e-01
## [16] 2.324501e+00 1.648376e-01 2.565822e-02 1.056415e+00 2.829915e-03
## [21] 1.016917e-01 1.032206e+00 1.257792e+00 2.541251e-01 1.331141e+00
## [26] 2.035533e+00 1.090669e+00 3.718037e+00 3.305073e-01 7.152277e-02
## [31] 1.696291e-01 2.228379e+00 1.206640e+00 1.247375e+00 2.041598e+00
## [36] 1.490473e+00 3.537541e-02 1.084266e+00 3.535307e-01 8.125661e-02
## [41] 3.301978e+00 1.333207e+00 9.958126e-02 1.288939e-01 5.342731e-01
## [46] 1.634728e+00 4.352548e-01 1.161937e+00 2.088141e+00 4.957631e-02
## [51] 4.702575e-01 7.217319e-02 2.628099e-01 1.995088e+00 1.961539e+00
## [56] 2.358128e+00 2.499279e-01
```

```
##  [1] 0 0 0 0 0 0 0 0 0 1 0 1 0 0 0 2 0 0 1 0 0 1 1 0 1 2 1 3 0 0 0 2 1 1 2 1 0 1
## [39] 0 0 3 1 0 0 0 1 0 1 2 0 0 0 0 2 2 2 0
```

```
##       5% 95%
##  [1,]  0   1
##  [2,]  0   0
##  [3,]  0   0
##  [4,]  0   1
```

```
##  [5,]  0   1
##  [6,]  0   0
##  [7,]  0   1
##  [8,]  0   1
##  [9,]  0   1
## [10,]  1   2
## [11,]  0   2
## [12,]  1   3
## [13,]  0   0
## [14,]  0   1
## [15,]  0   2
## [16,]  1   4
## [17,]  0   1
## [18,]  0   0
## [19,]  1   2
## [20,]  0   0
## [21,]  0   1
## [22,]  1   1
## [23,]  1   2
## [24,]  0   1
## [25,]  1   2
## [26,]  1   4
## [27,]  1   2
## [28,]  2   6
## [29,]  0   1
## [30,]  0   1
## [31,]  0   1
## [32,]  1   4
## [33,]  1   2
## [34,]  1   2
## [35,]  1   4
## [36,]  1   3
## [37,]  0   0
## [38,]  1   2
## [39,]  0   1
## [40,]  0   1
## [41,]  2   5
## [42,]  1   2
## [43,]  0   1
## [44,]  0   1
## [45,]  0   2
## [46,]  1   3
## [47,]  0   2
## [48,]  1   2
## [49,]  1   4
## [50,]  0   0
## [51,]  0   2
## [52,]  0   1
## [53,]  0   1
## [54,]  1   4
## [55,]  1   3
## [56,]  1   4
## [57,]  0   1
```




```
##  5% 95%
##  26 102
```

```
## Predicted        SE     lower     upper
##  47.45551  16.29697  24.67063  95.69269
```

```
##   Group.1       V1 5% 95%
## 1   FALSE 16.11608  7  38
## 2    TRUE 31.33934 19  64
```

```
##   Group.1 Predicted        SE     lower    upper
## 1   FALSE  17.06625  6.142024  8.597986 35.54244
## 2    TRUE  30.38926 10.154941 16.072647 60.15024
```

Significant conditional coeficients for those parameters. Negative relationship with distance to conuco ("atracted") of conucos

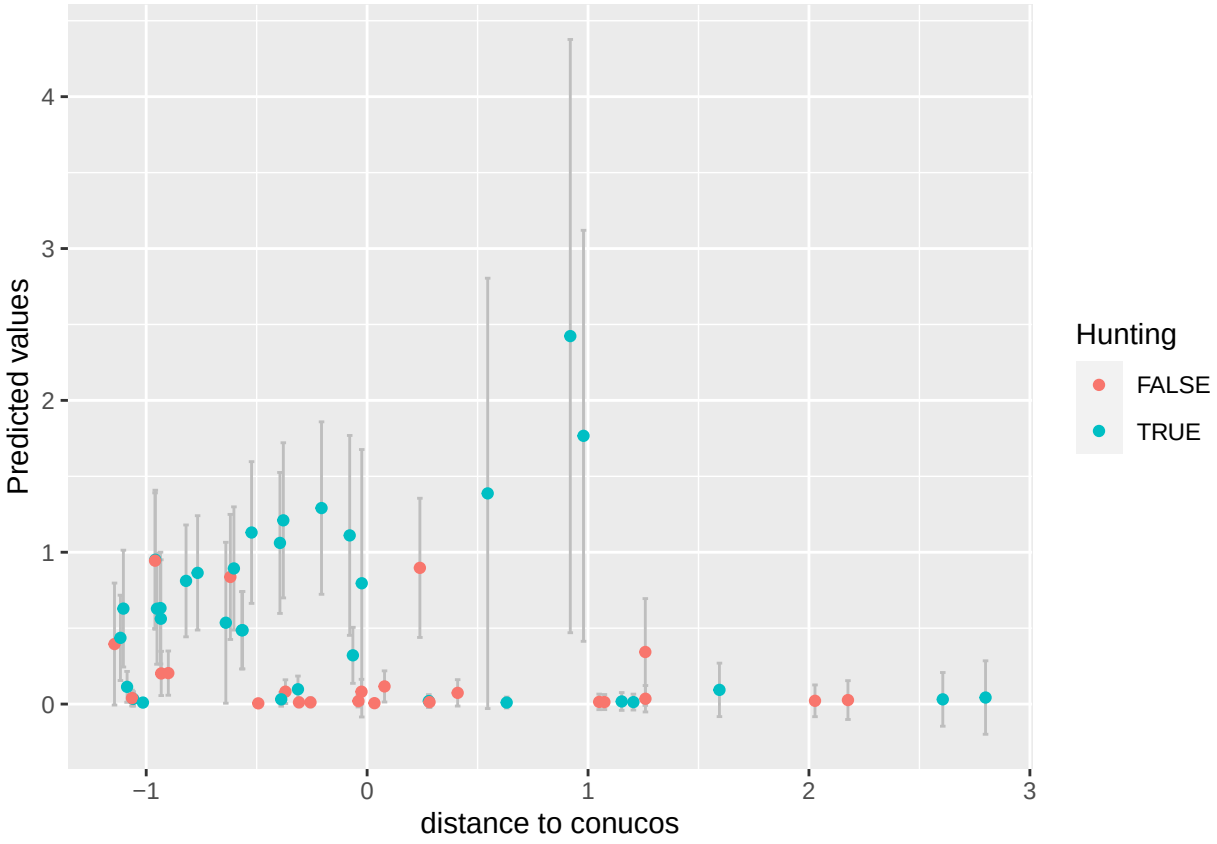
C. alector

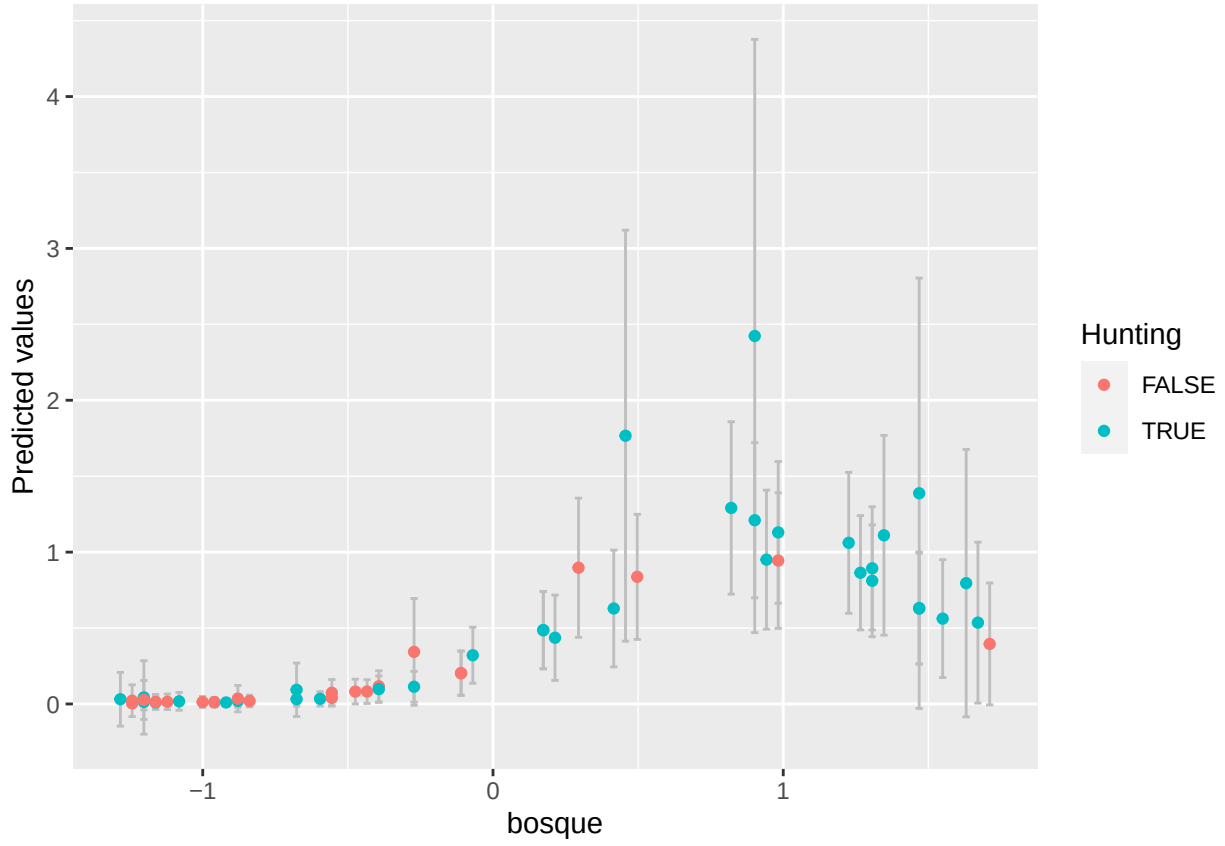
Most support for p(dras)+p(sfrz)+lam(evi.mu)+lam(wcon), significant conditional coeficients for those parameters. Strong negative significative effect of conucos.

```
##
## Call:
## model.avg(object = get.models(object = oms03, subset = delta <
##     10))
##
## Component model call:
## occuRN(formula = ~<29 unique rhs>, data = UMF, K = 50)
```

```
##
## Component models:
##        df logLik   AICc delta weight
## 1236    6 -64.54 142.76  0.00   0.22
## 136     5 -66.08 143.33  0.57   0.17
## 12356   7 -64.11 144.50  1.74   0.09
## 12346   7 -64.23 144.74  1.98   0.08
## 1346    6 -65.85 145.39  2.63   0.06
## 123     5 -67.14 145.45  2.69   0.06
## 1356    6 -65.91 145.49  2.74   0.06
## 13      4 -68.57 145.91  3.15   0.05
## 1235    6 -66.42 146.53  3.77   0.03
## 123456  8 -64.03 147.06  4.31   0.03
## 1234    6 -66.85 147.38  4.62   0.02
## 135     5 -68.27 147.71  4.95   0.02
## 134     5 -68.34 147.85  5.10   0.02
## 1256    6 -67.10 147.88  5.12   0.02
## 13456   7 -65.82 147.92  5.16   0.02
## 16      4 -70.12 149.02  6.26   0.01
## 12345   7 -66.39 149.07  6.31   0.01
## 125     5 -69.01 149.20  6.44   0.01
## 126     5 -69.23 149.64  6.89   0.01
## 156     5 -69.44 150.05  7.30   0.01
## 1345    6 -68.21 150.09  7.34   0.01
## 12456   7 -67.10 150.48  7.72   0.00
## 146     5 -69.96 151.09  8.33   0.00
## 1       3 -72.56 151.57  8.81   0.00
## 1246    6 -68.98 151.65  8.89   0.00
## 1245    6 -69.01 151.69  8.94   0.00
## 15      4 -71.58 151.93  9.18   0.00
## 12      4 -71.67 152.11  9.35   0.00
## 1456    6 -69.44 152.56  9.80   0.00
##
## Term codes:
##      lam(buf.fragmen)             lam(dcon) lam(I(buf.fragmen^2))
##                     1                     2                     3
##               p(date)               p(dras)               p(sfrz)
##                     4                     5                     6
##
## Model-averaged coefficients:
## (full average)
##                        Estimate Std. Error z value Pr(>|z|)
## lam(Int)               -0.91462    0.53739   1.702   0.0888 .
## lam(buf.fragmen)        2.71014    1.11976   2.420   0.0155 *
## lam(I(buf.fragmen^2)) -1.45280    0.78929   1.841   0.0657 .
## lam(dcon)               0.44050    0.47427   0.929   0.3530
## p(Int)                 -2.22450    0.96926   2.295   0.0217 *
## p(sfrz)                 1.36974    1.05639   1.297   0.1948
## p(dras)                 0.13166    0.33962   0.388   0.6983
## p(date)                -0.04353    0.16174   0.269   0.7878
##
## (conditional average)
##                        Estimate Std. Error z value Pr(>|z|)
## lam(Int)                -0.9146     0.5374   1.702   0.0888 .
```

```
## lam(buf.fragmen)         2.7101     1.1198   2.420   0.0155 *
## lam(I(buf.fragmen^2))   -1.5626     0.7060   2.213   0.0269 *
## lam(dcon)                0.7481     0.3897   1.919   0.0549 .
## p(Int)                  -2.2245     0.9693   2.295   0.0217 *
## p(sfrz)                  1.7746     0.8529   2.081   0.0375 *
## p(dras)                  0.4371     0.4994   0.875   0.3814
## p(date)                 -0.1721     0.2851   0.604   0.5462
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```





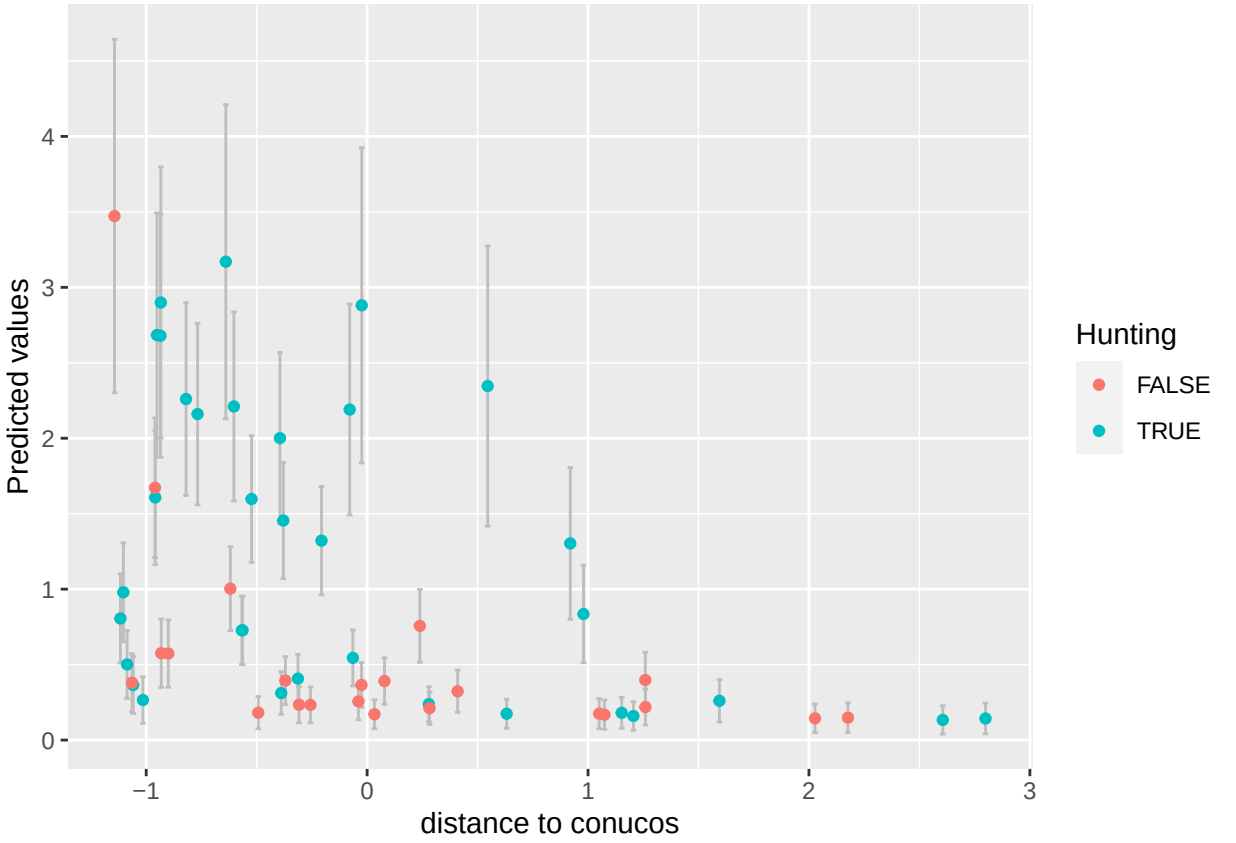
‘

D. leporina

Used linear model for EVI. Most support for p(sfrz)+lam(evi.mu), significant conditional coefficients for those parameters. Weak negative (“avoids”) non-significant effect of conucos

```
##
## Call:
## model.avg(object = get.models(object = oms01, subset = delta <
##     10))
##
## Component model call:
## occuRN(formula = ~<12 unique rhs>, data = UMF, K = 50)
##
## Component models:
##       df  logLik   AICc delta weight
## 15     4 -107.73 224.22  0.00   0.27
## 145    5 -107.03 225.24  1.01   0.16
## 125    5 -107.17 225.51  1.29   0.14
## 135    5 -107.30 225.78  1.56   0.12
## 1345   6 -106.18 226.04  1.81   0.11
## 1235   6 -106.59 226.86  2.64   0.07
## 1245   6 -106.71 227.10  2.88   0.06
## 12345  7 -105.77 227.82  3.60   0.04
## 1      3 -112.93 232.32  8.10   0.00
## 14     4 -111.98 232.74  8.51   0.00
```

```
## 12     4 -112.29 233.35  9.13   0.00
## 134    5 -111.47 234.11  9.88   0.00
##
## Term codes:
## lam(buf.fragmen)        lam(dcon)          p(date)          p(dras)
##                1                2               3                4
##          p(sfrz)
##                5
##
## Model-averaged coefficients:
## (full average)
##                   Estimate Std. Error z value Pr(>|z|)
## lam(Int)         -0.54637    0.33340   1.639  0.10126
## lam(buf.fragmen)  0.97845    0.24994   3.915 9.05e-05 ***
## p(Int)           -2.43296    0.58575   4.154 3.27e-05 ***
## p(sfrz)           1.72679    0.61448   2.810  0.00495 **
## p(dras)           0.14973    0.27180   0.551  0.58170
## lam(dcon)        -0.10119    0.23421   0.432  0.66569
## p(date)           0.07988    0.16422   0.486  0.62669
##
## (conditional average)
##                   Estimate Std. Error z value Pr(>|z|)
## lam(Int)          -0.5464     0.3334   1.639  0.10126
## lam(buf.fragmen)   0.9785     0.2499   3.915 9.05e-05 ***
## p(Int)            -2.4330     0.5858   4.154 3.27e-05 ***
## p(sfrz)            1.7500     0.5849   2.992  0.00277 **
## p(dras)            0.3884     0.3145   1.235  0.21682
## lam(dcon)         -0.3113     0.3215   0.968  0.33280
## p(date)            0.2276     0.2079   1.095  0.27366
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```



L. rufaxilla

Sum of AICc weights indicate a clear effect of p(sfrz) and large support for lam(buf.fragmen). Almost half of the models support lam(dcon)

```
##
## Call:
## model.avg(object = get.models(object = oms03, subset = delta <
##     10))
##
## Component model call:
## occuRN(formula = ~<24 unique rhs>, data = UMF, K = 50)
##
## Component models:
##        df logLik   AICc delta weight
## 136     5 -70.65 152.48  0.00   0.20
## 26      4 -72.38 153.53  1.05   0.12
## 1346    6 -70.20 154.09  1.61   0.09
## 1236    6 -70.29 154.26  1.78   0.08
## 1356    6 -70.56 154.81  2.33   0.06
## 6       3 -74.22 154.90  2.42   0.06
## 246     5 -71.89 154.95  2.47   0.06
## 16      4 -73.54 155.86  3.38   0.04
## 126     5 -72.34 155.86  3.38   0.04
## 256     5 -72.38 155.94  3.46   0.04
## 12346   7 -69.84 155.97  3.49   0.03
```

```
## 46      4 -73.78 156.33  3.85   0.03
## 13456   7 -70.18 156.65  4.17   0.02
## 12356   7 -70.25 156.79  4.31   0.02
## 56      4 -74.22 157.21  4.73   0.02
## 2456    6 -71.85 157.37  4.89   0.02
## 1246    6 -71.87 157.42  4.94   0.02
## 146     5 -73.16 157.50  5.02   0.02
## 156     5 -73.54 158.26  5.78   0.01
## 1256    6 -72.34 158.36  5.88   0.01
## 123456  8 -69.84 158.68  6.20   0.01
## 456     5 -73.76 158.70  6.22   0.01
## 12456   7 -71.83 159.94  7.46   0.00
## 1456    6 -73.15 159.98  7.50   0.00
##
## Term codes:
##      lam(buf.fragmen)             lam(dcon) lam(I(buf.fragmen^2))
##                     1                     2                     3
##               p(date)               p(dras)               p(sfrz)
##                     4                     5                     6
##
## Model-averaged coefficients:
## (full average)
##                         Estimate Std. Error z value Pr(>|z|)
## lam(Int)               -0.673599   0.580681   1.160 0.246043
## lam(buf.fragmen)        0.460518   0.533966   0.862 0.388441
## lam(I(buf.fragmen^2)) -0.533173   0.620679   0.859 0.390332
## p(Int)                 -3.571490   0.985874   3.623 0.000292 ***
## p(sfrz)                 3.301146   1.046853   3.153 0.001614 **
## lam(dcon)              -0.258732   0.428810   0.603 0.546261
## p(date)                 0.109299   0.264914   0.413 0.679913
## p(dras)                -0.008177   0.154863   0.053 0.957890
##
## (conditional average)
##                        Estimate Std. Error z value Pr(>|z|)
## lam(Int)               -0.67360    0.58068   1.160 0.246043
## lam(buf.fragmen)        0.69998    0.51552   1.358 0.174520
## lam(I(buf.fragmen^2)) -1.02343    0.48758   2.099 0.035815 *
## p(Int)                 -3.57149    0.98587   3.623 0.000292 ***
## p(sfrz)                 3.30115    1.04685   3.153 0.001614 **
## lam(dcon)              -0.58396    0.47444   1.231 0.218382
## p(date)                 0.35097    0.37488   0.936 0.349161
## p(dras)                -0.03572    0.32215   0.111 0.911713
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Significant conditional coeficients for p(sfrz). Negative relationship with distance to conuco ("atracted") but non-significant effect of conucos

C.thous

Used linear model for EVI. Most support for p(sfrz)+lam(evi.mu), significant conditional coefficients for lam(evi.mu) (negative association). Weak negative ("avoids") non-significant effect of conucos

```
##
## Call:
```

```
## model.avg(object = get.models(object = oms01, subset = delta <
##     10))
##
## Component model call:
## occuRN(formula = ~<30 unique rhs>, data = UMF, K = 50)
##
## Component models:
##        df logLik   AICc delta weight
## 1       3 -50.82 108.09  0.00   0.24
## 15      4 -50.11 108.98  0.90   0.15
## 14      4 -50.65 110.07  1.98   0.09
## 12      4 -50.80 110.37  2.29   0.07
## 13      4 -50.81 110.40  2.31   0.07
## 145     5 -49.91 110.99  2.91   0.05
## 125     5 -50.10 111.37  3.28   0.05
## 135     5 -50.11 111.39  3.30   0.05
## 124     5 -50.61 112.40  4.31   0.03
## 134     5 -50.61 112.40  4.31   0.03
## 123     5 -50.80 112.78  4.69   0.02
## (Null)  2 -54.43 113.08  4.99   0.02
## 1245    6 -49.88 113.43  5.34   0.02
## 1345    6 -49.88 113.44  5.35   0.02
## 2       3 -53.58 113.61  5.53   0.01
## 1235    6 -50.10 113.87  5.78   0.01
## 5       3 -53.87 114.18  6.10   0.01
## 4       3 -54.11 114.68  6.59   0.01
## 25      4 -52.97 114.72  6.63   0.01
## 1234    6 -50.57 114.83  6.74   0.01
## 3       3 -54.43 115.31  7.22   0.01
## 24      4 -53.40 115.57  7.48   0.01
## 45      4 -53.52 115.82  7.73   0.00
## 23      4 -53.57 115.91  7.83   0.00
## 12345   7 -49.84 115.98  7.89   0.00
## 35      4 -53.87 116.50  8.41   0.00
## 245     5 -52.77 116.71  8.62   0.00
## 34      4 -54.06 116.90  8.81   0.00
## 235     5 -52.97 117.12  9.03   0.00
## 234     5 -53.35 117.87  9.79   0.00
##
## Term codes:
## lam(buf.fragmen)        lam(dcon)          p(date)          p(dras)
##                1                2               3                4
##          p(sfrz)
##                5
##
## Model-averaged coefficients:
## (full average)
##                   Estimate Std. Error z value Pr(>|z|)
## lam(Int)         -1.812159   0.455716   3.977 6.99e-05 ***
## lam(buf.fragmen) -0.937801   0.546396   1.716   0.0861 .
## p(Int)           -0.543627   0.767700   0.708   0.4789
## p(sfrz)           0.467602   0.879895   0.531   0.5951
## p(dras)          -0.052751   0.183726   0.287   0.7740
## lam(dcon)         0.002415   0.168819   0.014   0.9886
```

```
## p(date)          -0.011753   0.213727   0.055   0.9561
##
## (conditional average)
##                   Estimate Std. Error z value Pr(>|z|)
## lam(Int)         -1.812159   0.455716   3.977 6.99e-05 ***
## lam(buf.fragmen) -1.039690   0.474396   2.192   0.0284 *
## p(Int)           -0.543627   0.767700   0.708   0.4789
## p(sfrz)           1.231731   1.047947   1.175   0.2398
## p(dras)          -0.196390   0.312189   0.629   0.5293
## lam(dcon)         0.009536   0.335366   0.028   0.9773
## p(date)          -0.050557   0.441064   0.115   0.9087
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

L. pardalis

Most support for null model.

```
##
## Call:
## model.avg(object = get.models(object = oms01, subset = delta <
##     10))
##
## Component model call:
## occuRN(formula = ~<32 unique rhs>, data = UMF, K = 50)
##
## Component models:
##        df logLik  QAICc delta weight
## (Null)  2 -52.70 107.01  0.00   0.15
## 1       3 -51.58 107.18  0.17   0.14
## 2       3 -52.09 108.15  1.14   0.09
## 4       3 -52.40 108.75  1.74   0.06
## 14      4 -51.34 109.13  2.13   0.05
## 5       3 -52.67 109.27  2.26   0.05
## 3       3 -52.70 109.33  2.32   0.05
## 12      4 -51.46 109.35  2.34   0.05
## 15      4 -51.56 109.56  2.55   0.04
## 13      4 -51.57 109.57  2.56   0.04
## 24      4 -51.93 110.26  3.25   0.03
## 25      4 -52.07 110.52  3.51   0.03
## 23      4 -52.08 110.54  3.53   0.03
## 45      4 -52.38 111.12  4.11   0.02
## 34      4 -52.39 111.14  4.13   0.02
## 124     5 -51.26 111.48  4.47   0.02
## 145     5 -51.33 111.62  4.61   0.02
## 134     5 -51.34 111.64  4.63   0.02
## 35      4 -52.67 111.67  4.67   0.01
## 125     5 -51.44 111.83  4.82   0.01
## 123     5 -51.46 111.85  4.84   0.01
## 135     5 -51.56 112.06  5.05   0.01
## 234     5 -51.90 112.71  5.70   0.01
## 245     5 -51.92 112.73  5.72   0.01
## 235     5 -52.06 113.00  5.99   0.01
## 345     5 -52.37 113.60  6.59   0.01
## 1245    6 -51.25 114.07  7.06   0.00
```

```
## 1234    6 -51.26 114.08  7.07   0.00
## 1345    6 -51.33 114.23  7.22   0.00
## 1235    6 -51.44 114.44  7.43   0.00
## 2345    6 -51.88 115.28  8.27   0.00
## 12345   7 -51.25 116.78  9.77   0.00
##
## Term codes:
## lam(buf.fragmen)        lam(dcon)          p(date)          p(dras)
##                1                2               3                4
##          p(sfrz)
##                5
##
## Model-averaged coefficients:
## (full average)
##                    Estimate Std. Error z value Pr(>|z|)
## lam(Int)         -0.858991   0.660973   1.300  0.19374
## p(Int)           -2.237339   0.773975   2.891  0.00384 **
## lam(buf.fragmen)  0.210622   0.342073   0.616  0.53808
## lam(dcon)        -0.105731   0.296983   0.356  0.72183
## p(dras)           0.070765   0.224718   0.315  0.75283
## p(sfrz)           0.042010   0.464386   0.090  0.92792
## p(date)           0.002567   0.174895   0.015  0.98829
##
## (conditional average)
##                   Estimate Std. Error z value Pr(>|z|)
## lam(Int)         -0.85899    0.66097   1.300  0.19374
## p(Int)           -2.23734    0.77398   2.891  0.00384 **
## lam(buf.fragmen)  0.48997    0.36788   1.332  0.18291
## lam(dcon)        -0.35104    0.45466   0.772  0.44006
## p(dras)           0.25979    0.36916   0.704  0.48160
## p(sfrz)           0.18106    0.95093   0.190  0.84900
## p(date)           0.01118    0.36481   0.031  0.97556
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

D. kappleri

Most support for p(sfrz)+lam(evi.mu) but no significant conditional coefficients . Very weak non-significant effect of conucos.

```
##
## Call:
## model.avg(object = get.models(object = oms01, subset = delta <
##     10))
##
## Component model call:
## occuRN(formula = ~<20 unique rhs>, data = UMF, K = 50)
##
## Component models:
##       df logLik   AICc delta weight
## 15     4 -66.20 141.18  0.00   0.15
## 145    5 -65.30 141.77  0.59   0.11
## 125    5 -65.31 141.80  0.63   0.11
## 135    5 -65.47 142.11  0.94   0.09
## 1245   6 -64.30 142.29  1.11   0.08
```

```
## 1      3 -68.19 142.84  1.67   0.06
## 14     4 -67.19 143.15  1.97   0.05
## 1235   6 -64.75 143.18  2.01   0.05
## 12     4 -67.28 143.33  2.15   0.05
## 1345   6 -64.83 143.34  2.16   0.05
## 13     4 -67.45 143.66  2.49   0.04
## 124    5 -66.25 143.68  2.50   0.04
## 12345  7 -64.01 144.30  3.13   0.03
## 123    5 -66.71 144.59  3.42   0.03
## 134    5 -66.72 144.62  3.44   0.03
## 1234   6 -65.94 145.55  4.38   0.02
## 25     4 -70.13 149.04  7.86   0.00
## 235    5 -69.83 150.84  9.67   0.00
## 245    5 -69.84 150.85  9.68   0.00
## 2      3 -72.27 150.99  9.82   0.00
##
## Term codes:
## lam(buf.fragmen)        lam(dcon)          p(date)          p(dras)
##                1                2               3                4
##          p(sfrz)
##                5
##
## Model-averaged coefficients:
## (full average)
##                   Estimate Std. Error z value Pr(>|z|)
## lam(Int)         -0.94045    0.77919   1.207  0.22745
## lam(buf.fragmen)  1.12987    0.38300   2.950  0.00318 **
## p(Int)           -3.18170    1.25512   2.535  0.01125 *
## p(sfrz)           1.07677    1.04274   1.033  0.30177
## p(dras)           0.21725    0.35695   0.609  0.54276
## lam(dcon)        -0.25668    0.43921   0.584  0.55894
## p(date)          -0.09419    0.20403   0.462  0.64434
##
## (conditional average)
##                   Estimate Std. Error z value Pr(>|z|)
## lam(Int)          -0.9404     0.7792   1.207  0.22745
## lam(buf.fragmen)   1.1370     0.3735   3.044  0.00233 **
## p(Int)            -3.1817     1.2551   2.535  0.01125 *
## p(sfrz)            1.5898     0.8887   1.789  0.07363 .
## p(dras)            0.5254     0.3824   1.374  0.16945
## lam(dcon)         -0.6161     0.4915   1.253  0.21004
## p(date)           -0.2784     0.2679   1.039  0.29861
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

D. novemcinctus

```
##
## Call:
## model.avg(object = get.models(object = oms01, subset = delta <
##     10))
##
## Component model call:
## occuRN(formula = ~<30 unique rhs>, data = UMF, K = 50)
```

```
##
## Component models:
##        df logLik   AICc delta weight
## 3       3 -56.78 120.02  0.00   0.22
## 23      4 -55.81 120.40  0.38   0.18
## 13      4 -56.56 121.89  1.87   0.09
## 34      4 -56.65 122.07  2.05   0.08
## 35      4 -56.78 122.32  2.31   0.07
## 235     5 -55.80 122.78  2.76   0.05
## 234     5 -55.80 122.78  2.76   0.05
## 123     5 -55.81 122.80  2.78   0.05
## 134     5 -56.49 124.16  4.14   0.03
## 135     5 -56.55 124.27  4.25   0.03
## 345     5 -56.64 124.45  4.43   0.02
## 2       3 -59.37 125.19  5.17   0.02
## 2345    6 -55.79 125.25  5.23   0.02
## 1235    6 -55.80 125.28  5.26   0.02
## 1234    6 -55.80 125.28  5.26   0.02
## (Null)  2 -60.74 125.69  5.67   0.01
## 1345    6 -56.48 126.63  6.61   0.01
## 4       3 -60.31 127.06  7.05   0.01
## 24      4 -59.28 127.32  7.30   0.01
## 25      4 -59.30 127.38  7.36   0.01
## 12      4 -59.34 127.44  7.42   0.01
## 1       3 -60.57 127.60  7.58   0.00
## 5       3 -60.68 127.82  7.80   0.00
## 12345   7 -55.79 127.86  7.84   0.00
## 14      4 -60.23 129.24  9.22   0.00
## 45      4 -60.24 129.24  9.22   0.00
## 245     5 -59.21 129.59  9.57   0.00
## 124     5 -59.24 129.66  9.64   0.00
## 125     5 -59.28 129.73  9.71   0.00
## 15      4 -60.51 129.79  9.77   0.00
##
## Term codes:
## lam(buf.fragmen)        lam(dcon)          p(date)          p(dras)
##                1                2               3                4
##          p(sfrz)
##                5
##
## Model-averaged coefficients:
## (full average)
##                  Estimate Std. Error z value Pr(>|z|)
## lam(Int)         -0.37164    0.68252   0.545  0.58609
## p(Int)           -2.72856    0.87914   3.104  0.00191 **
## p(date)          -0.87787    0.42974   2.043  0.04107 *
## lam(dcon)        -0.22817    0.38246   0.597  0.55078
## lam(buf.fragmen)  0.02984    0.16909   0.176  0.85991
## p(dras)           0.04179    0.24306   0.172  0.86349
## p(sfrz)          -0.03269    0.43764   0.075  0.94046
##
## (conditional average)
##                  Estimate Std. Error z value Pr(>|z|)
## lam(Int)          -0.3716     0.6825   0.545  0.58609
```

```
## p(Int)            -2.7286     0.8791   3.104  0.00191 **
## p(date)           -0.9463     0.3664   2.583  0.00981 **
## lam(dcon)         -0.5278     0.4245   1.243  0.21374
## lam(buf.fragmen)   0.1177     0.3201   0.368  0.71301
## p(dras)            0.1691     0.4664   0.363  0.71693
## p(sfrz)           -0.1400     0.8974   0.156  0.87602
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

P.onca

```
##
## Call:
## model.avg(object = get.models(object = oms01, subset = delta <
##     10))
##
## Component model call:
## occuRN(formula = ~<27 unique rhs>, data = UMF, K = 50)
##
## Component models:
##        df logLik   AICc delta weight
## 1       3 -45.10  96.64  0.00   0.27
## 12      4 -44.86  98.50  1.85   0.11
## 13      4 -45.09  98.94  2.30   0.08
## 15      4 -45.09  98.95  2.31   0.08
## 14      4 -45.10  98.96  2.32   0.08
## 124     5 -44.50 100.17  3.53   0.05
## (Null)  2 -48.08 100.38  3.74   0.04
## 134     5 -44.86 100.89  4.25   0.03
## 125     5 -44.86 100.90  4.25   0.03
## 123     5 -44.86 100.90  4.26   0.03
## 135     5 -45.08 101.34  4.70   0.03
## 145     5 -45.09 101.36  4.72   0.03
## 1234    6 -44.20 102.08  5.44   0.02
## 2       3 -47.90 102.25  5.60   0.02
## 3       3 -48.04 102.54  5.90   0.01
## 4       3 -48.07 102.59  5.94   0.01
## 5       3 -48.08 102.61  5.97   0.01
## 1245    6 -44.50 102.67  6.03   0.01
## 1345    6 -44.85 103.38  6.74   0.01
## 1235    6 -44.86 103.40  6.76   0.01
## 23      4 -47.83 104.44  7.79   0.01
## 24      4 -47.88 104.54  7.90   0.01
## 25      4 -47.90 104.56  7.92   0.01
## 34      4 -47.91 104.60  7.95   0.01
## 12345   7 -44.20 104.68  8.04   0.00
## 35      4 -48.04 104.86  8.21   0.00
## 45      4 -48.07 104.90  8.26   0.00
##
## Term codes:
## lam(buf.fragmen)        lam(dcon)          p(date)          p(dras)
##                1                2               3                4
##          p(sfrz)
##                5
```

```
##
## Model-averaged coefficients:
## (full average)
##                  Estimate Std. Error z value Pr(>|z|)
## lam(Int)         -1.25663    0.84129   1.494   0.1353
## lam(buf.fragmen)  0.82152    0.52188   1.574   0.1155
## p(Int)           -2.16221    0.87364   2.475   0.0133 *
## lam(dcon)         0.09975    0.32381   0.308   0.7581
## p(date)           0.03125    0.20600   0.152   0.8794
## p(sfrz)          -0.01317    0.48566   0.027   0.9784
## p(dras)           0.17576    0.62559   0.281   0.7787
##
## (conditional average)
##                  Estimate Std. Error z value Pr(>|z|)
## lam(Int)         -1.25663    0.84129   1.494   0.1353
## lam(buf.fragmen)  0.94217    0.44574   2.114   0.0345 *
## p(Int)           -2.16221    0.87364   2.475   0.0133 *
## lam(dcon)         0.34181    0.52590   0.650   0.5157
## p(date)           0.12838    0.40234   0.319   0.7497
## p(sfrz)          -0.05715    1.01052   0.057   0.9549
## p(dras)           0.67642    1.08051   0.626   0.5313
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

M.gouazoubira

```
##
## Call:
## model.avg(object = get.models(object = oms01, subset = delta <
##     10))
##
## Component model call:
## occuRN(formula = ~<17 unique rhs>, data = UMF, K = 50)
##
## Component models:
##       df logLik   AICc delta weight
## 15     4 -83.85 176.48  0.00   0.30
## 125    5 -82.83 176.85  0.37   0.25
## 135    5 -83.85 178.87  2.40   0.09
## 145    5 -83.85 178.88  2.40   0.09
## 1235   6 -82.78 179.24  2.76   0.08
## 1245   6 -82.82 179.33  2.85   0.07
## 1345   6 -83.85 181.37  4.89   0.03
## 12345  7 -82.77 181.83  5.35   0.02
## 1      3 -87.96 182.38  5.90   0.02
## 12     4 -86.94 182.64  6.17   0.01
## 25     4 -87.18 183.13  6.66   0.01
## 14     4 -87.95 184.67  8.19   0.01
## 13     4 -87.96 184.68  8.21   0.01
## 235    5 -86.80 184.78  8.30   0.00
## 123    5 -86.93 185.04  8.56   0.00
## 124    5 -86.93 185.04  8.57   0.00
## 245    5 -87.10 185.38  8.90   0.00
##
```

```
## Term codes:
## lam(buf.fragmen)        lam(dcon)          p(date)          p(dras)
##                1                2               3                4
##          p(sfrz)
##                5
##
## Model-averaged coefficients:
## (full average)
##                    Estimate Std. Error z value Pr(>|z|)
## lam(Int)         -0.337886   0.806956   0.419 0.675423
## lam(buf.fragmen)  0.876760   0.314766   2.785 0.005346 **
## p(Int)           -3.962150   1.122507   3.530 0.000416 ***
## p(sfrz)           1.995965   0.939034   2.126 0.033541 *
## lam(dcon)        -0.248069   0.378764   0.655 0.512505
## p(date)           0.012462   0.124593   0.100 0.920324
## p(dras)          -0.002294   0.165530   0.014 0.988942
##
## (conditional average)
##                  Estimate Std. Error z value Pr(>|z|)
## lam(Int)         -0.33789    0.80696   0.419 0.675423
## lam(buf.fragmen)  0.89387    0.29278   3.053 0.002265 **
## p(Int)           -3.96215    1.12251   3.530 0.000416 ***
## p(sfrz)           2.09684    0.84548   2.480 0.013136 *
## lam(dcon)        -0.53580    0.39458   1.358 0.174495
## p(date)           0.05454    0.25620   0.213 0.831428
## p(dras)          -0.01026    0.34994   0.029 0.976611
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

TO BE TESTED

```
##
## Call:
## model.avg(object = get.models(object = oms01, subset = delta <
##     10))
##
## Component model call:
## occuRN(formula = ~<26 unique rhs>, data = UMF, K = 50)
##
## Component models:
##        df logLik  AICc delta weight
## 14      4 -33.87 76.51  0.00   0.20
## 145     5 -32.89 76.96  0.45   0.16
## 4       3 -35.77 77.99  1.49   0.10
## 45      4 -34.68 78.12  1.62   0.09
## 124     5 -33.65 78.49  1.98   0.08
## 134     5 -33.87 78.91  2.40   0.06
## 1245    6 -32.69 79.05  2.55   0.06
## 1345    6 -32.89 79.46  2.95   0.05
## 24      4 -35.76 80.29  3.79   0.03
## 34      4 -35.77 80.30  3.80   0.03
## 245     5 -34.67 80.52  4.01   0.03
## 345     5 -34.68 80.53  4.02   0.03
## 1234    6 -33.65 80.99  4.48   0.02
```

```
## 12345   7 -32.69 81.66  5.15   0.02
## 1       3 -38.11 82.67  6.17   0.01
## 234     5 -35.76 82.69  6.18   0.01
## 15      4 -37.12 83.02  6.51   0.01
## 2345    6 -34.67 83.02  6.51   0.01
## (Null)  2 -40.13 84.48  7.97   0.00
## 5       3 -39.04 84.54  8.03   0.00
## 13      4 -37.97 84.70  8.20   0.00
## 12      4 -37.98 84.73  8.23   0.00
## 135     5 -36.95 85.07  8.57   0.00
## 125     5 -36.99 85.15  8.64   0.00
## 2       3 -40.00 86.46  9.95   0.00
## 3       3 -40.01 86.48  9.97   0.00
##
## Term codes:
## lam(buf.fragmen)        lam(dcon)          p(date)          p(dras)
##                1                2               3                4
##          p(sfrz)
##                5
##
## Model-averaged coefficients:
## (full average)
##                   Estimate Std. Error z value Pr(>|z|)
## lam(Int)         -1.190953   0.803318   1.483   0.1382
## lam(buf.fragmen)  0.634659   0.629832   1.008   0.3136
## p(Int)           -3.727194   1.534611   2.429   0.0152 *
## p(dras)           1.239916   0.522744   2.372   0.0177 *
## p(sfrz)           0.848767   1.358482   0.625   0.5321
## lam(dcon)         0.065672   0.335638   0.196   0.8449
## p(date)           0.002543   0.237454   0.011   0.9915
##
## (conditional average)
##                  Estimate Std. Error z value Pr(>|z|)
## lam(Int)         -1.19095    0.80332   1.483  0.13820
## lam(buf.fragmen)  0.94640    0.54452   1.738  0.08220 .
## p(Int)           -3.72719    1.53461   2.429  0.01515 *
## p(dras)           1.29091    0.46763   2.761  0.00577 **
## p(sfrz)           1.88592    1.46443   1.288  0.19781
## lam(dcon)         0.26117    0.63004   0.415  0.67849
## p(date)           0.01123    0.49885   0.023  0.98204
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Call:
## model.avg(object = get.models(object = oms01, subset = delta <
##     10))
##
## Component model call:
## occuRN(formula = ~<32 unique rhs>, data = UMF, K = 50)
##
## Component models:
##        df logLik  AICc delta weight
## 15      4 -30.33 69.44  0.00   0.22
```

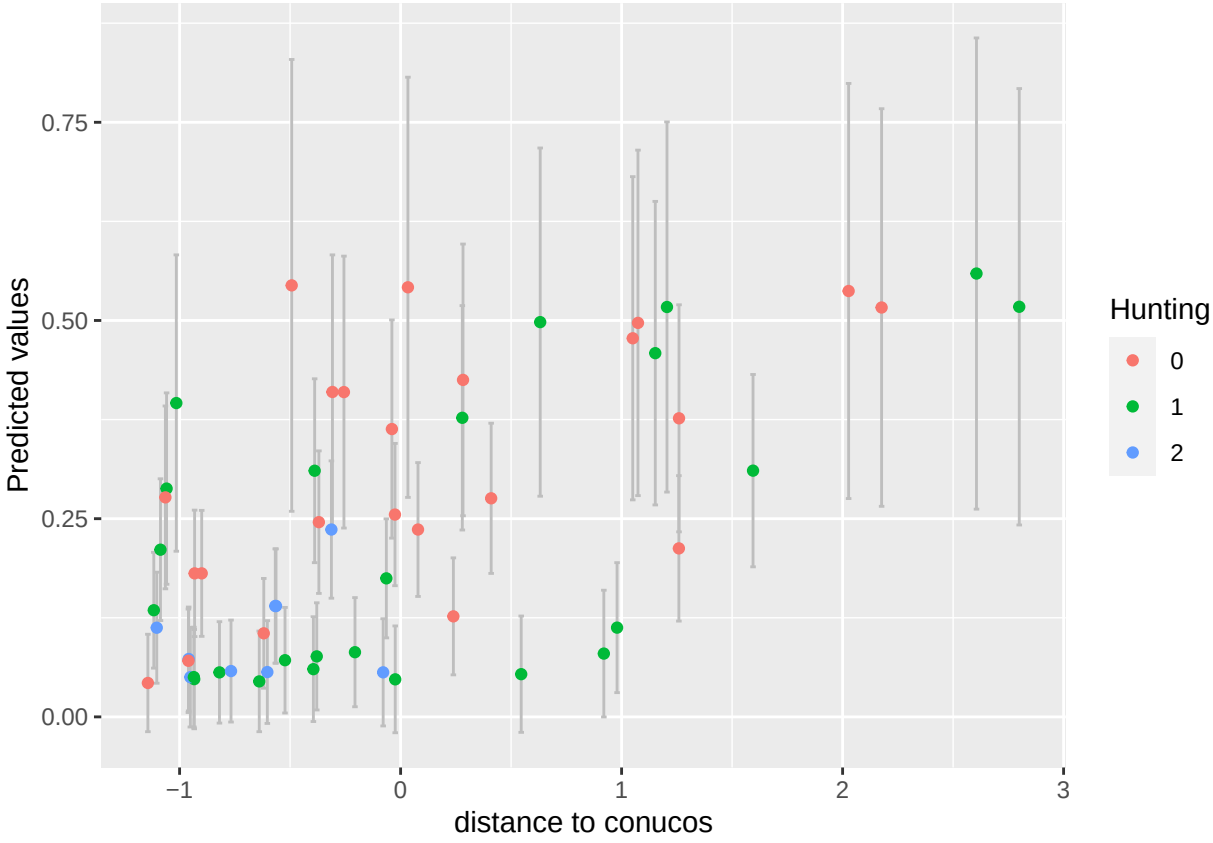
```
## 1       3 -32.11 70.68  1.24   0.12
## 135     5 -30.11 71.39  1.95   0.08
## 145     5 -30.32 71.82  2.39   0.07
## 125     5 -30.33 71.84  2.40   0.07
## 5       3 -32.92 72.29  2.86   0.05
## 13      4 -32.04 72.85  3.42   0.04
## 14      4 -32.06 72.88  3.44   0.04
## 12      4 -32.11 72.99  3.55   0.04
## 25      4 -32.44 73.64  4.20   0.03
## 1345    6 -30.06 73.79  4.35   0.02
## 35      4 -32.54 73.86  4.42   0.02
## 1235    6 -30.10 73.88  4.44   0.02
## (Null)  2 -34.97 74.17  4.73   0.02
## 1245    6 -30.32 74.33  4.89   0.02
## 45      4 -32.89 74.55  5.11   0.02
## 235     5 -31.92 75.01  5.57   0.01
## 134     5 -31.94 75.05  5.61   0.01
## 123     5 -32.03 75.24  5.81   0.01
## 124     5 -32.05 75.28  5.85   0.01
## 2       3 -34.43 75.31  5.88   0.01
## 345     5 -32.43 76.03  6.60   0.01
## 245     5 -32.44 76.05  6.61   0.01
## 3       3 -34.81 76.08  6.64   0.01
## 4       3 -34.86 76.18  6.74   0.01
## 12345   7 -30.05 76.38  6.95   0.01
## 23      4 -34.18 77.13  7.69   0.00
## 2345    6 -31.89 77.47  8.03   0.00
## 1234    6 -31.93 77.54  8.10   0.00
## 24      4 -34.41 77.60  8.16   0.00
## 34      4 -34.61 77.98  8.55   0.00
## 234     5 -34.12 79.41  9.97   0.00
##
## Term codes:
## lam(buf.fragmen)        lam(dcon)          p(date)          p(dras)
##                1                2               3                4
##          p(sfrz)
##                5
##
## Model-averaged coefficients:
## (full average)
##                  Estimate Std. Error z value Pr(>|z|)
## lam(Int)         -1.45039    1.24227   1.168    0.243
## lam(buf.fragmen)  0.84803    0.66892   1.268    0.205
## p(Int)           -4.60348    2.56765   1.793    0.073 .
## p(sfrz)           2.27797    2.51442   0.906    0.365
## p(date)           0.09546    0.32626   0.293    0.770
## p(dras)           0.03941    0.31958   0.123    0.902
## lam(dcon)        -0.04693    0.34119   0.138    0.891
##
## (conditional average)
##                  Estimate Std. Error z value Pr(>|z|)
## lam(Int)          -1.4504     1.2423   1.168   0.2430
## lam(buf.fragmen)   1.0804     0.5648   1.913   0.0558 .
## p(Int)            -4.6035     2.5677   1.793   0.0730 .
```

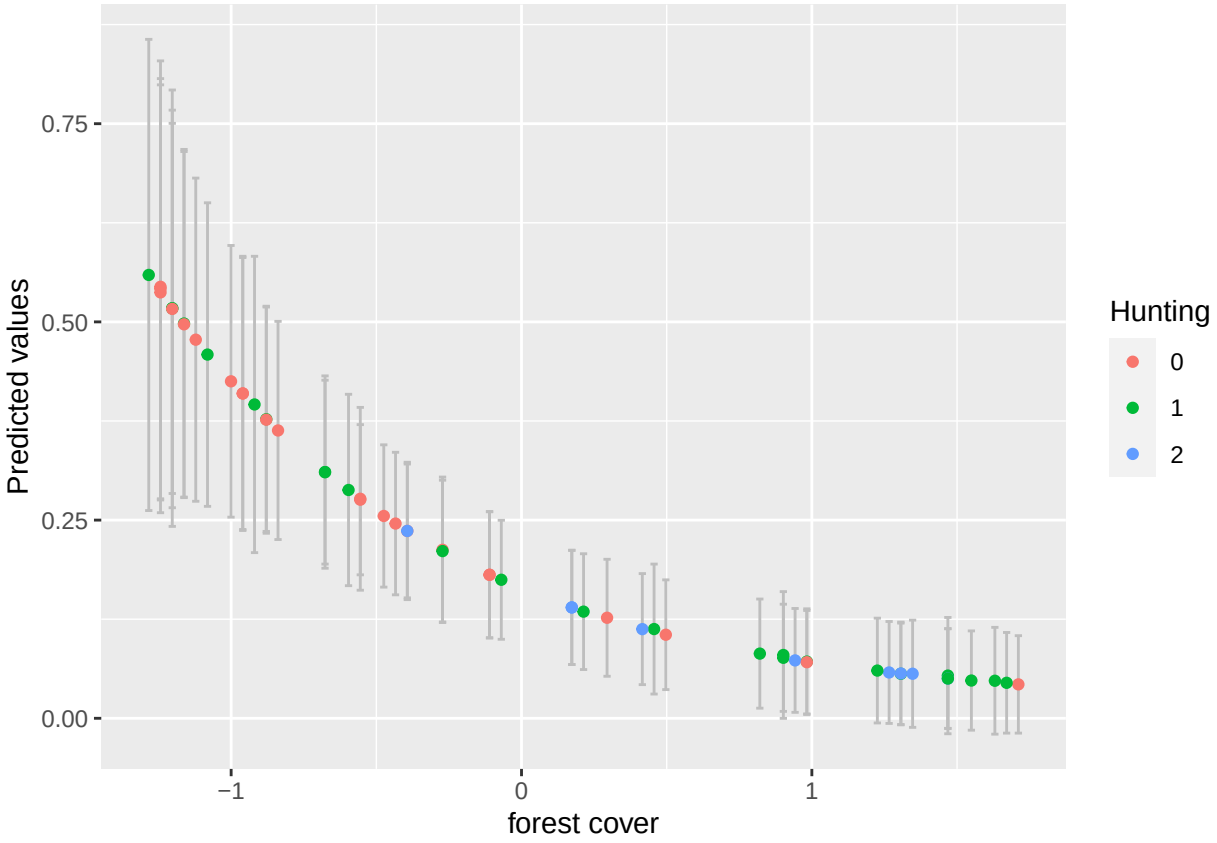
```
## p(sfrz)            3.4302     2.3596   1.454   0.1460
## p(date)            0.3482     0.5479   0.635   0.5252
## p(dras)            0.1652     0.6382   0.259   0.7958
## lam(dcon)         -0.1843     0.6572   0.280   0.7791
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Call:
## model.avg(object = get.models(object = oms01, subset = delta <
##     10))
##
## Component model call:
## occuRN(formula = ~<32 unique rhs>, data = UMF, K = 50)
##
## Component models:
##        df logLik QAICc delta weight
## (Null)  2 -52.26 79.76  0.00   0.15
## 5       3 -50.85 80.10  0.34   0.13
## 1       3 -51.60 81.15  1.39   0.08
## 4       3 -51.73 81.34  1.57   0.07
## 15      4 -50.30 81.74  1.98   0.06
## 45      4 -50.37 81.84  2.08   0.05
## 2       3 -52.22 82.02  2.26   0.05
## 3       3 -52.26 82.08  2.32   0.05
## 25      4 -50.81 82.46  2.70   0.04
## 35      4 -50.84 82.50  2.74   0.04
## 14      4 -51.19 82.99  3.23   0.03
## 12      4 -51.42 83.31  3.55   0.03
## 13      4 -51.60 83.56  3.80   0.02
## 34      4 -51.70 83.71  3.95   0.02
## 145     5 -49.92 83.72  3.96   0.02
## 24      4 -51.73 83.74  3.98   0.02
## 125     5 -50.16 84.05  4.29   0.02
## 135     5 -50.29 84.23  4.47   0.02
## 345     5 -50.32 84.27  4.51   0.02
## 245     5 -50.37 84.34  4.58   0.02
## 23      4 -52.21 84.42  4.66   0.01
## 235     5 -50.79 84.94  5.18   0.01
## 124     5 -50.93 85.12  5.36   0.01
## 134     5 -51.17 85.47  5.71   0.01
## 123     5 -51.41 85.80  6.04   0.01
## 1245    6 -49.73 86.05  6.29   0.01
## 234     5 -51.70 86.21  6.45   0.01
## 1345    6 -49.89 86.27  6.51   0.01
## 1235    6 -50.16 86.65  6.89   0.00
## 2345    6 -50.32 86.87  7.11   0.00
## 1234    6 -50.92 87.73  7.96   0.00
## 12345   7 -49.72 88.74  8.98   0.00
##
## Term codes:
## lam(buf.fragmen)        lam(dcon)          p(date)          p(dras)
##                1                2                3                4
##          p(sfrz)
```

```
##               5
##
## Model-averaged coefficients:
## (full average)
##                   Estimate Std. Error z value Pr(>|z|)
## lam(Int)          0.886635   2.429928   0.365   0.7152
## p(Int)           -4.642893   2.672397   1.737   0.0823 .
## p(sfrz)           0.802524   1.239691   0.647   0.5174
## lam(buf.fragmen)  0.112270   0.244711   0.459   0.6464
## p(dras)           0.098203   0.245201   0.400   0.6888
## lam(dcon)         0.008359   0.181471   0.046   0.9633
## p(date)           0.009714   0.164031   0.059   0.9528
##
## (conditional average)
##                  Estimate Std. Error z value Pr(>|z|)
## lam(Int)          0.88664    2.42993   0.365   0.7152
## p(Int)           -4.64289    2.67240   1.737   0.0823 .
## p(sfrz)           1.83803    1.27143   1.446   0.1483
## lam(buf.fragmen)  0.35761    0.32095   1.114   0.2652
## p(dras)           0.33482    0.35463   0.944   0.3451
## lam(dcon)         0.03514    0.37078   0.095   0.9245
## p(date)           0.04224    0.34002   0.124   0.9011
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Call:
## model.avg(object = get.models(object = oms03, subset = delta <
##     10))
##
## Component model call:
## occuRN(formula = ~<47 unique rhs>, data = UMF, K = 50)
##
## Component models:
##        df logLik  AICc delta weight
## 1       3 -22.69 51.83  0.00   0.10
## 12      4 -21.66 52.09  0.25   0.09
## 13      4 -21.72 52.20  0.37   0.08
## 123     5 -20.67 52.52  0.69   0.07
## 16      4 -22.18 53.13  1.30   0.05
## 136     5 -21.17 53.51  1.68   0.04
## 126     5 -21.18 53.53  1.70   0.04
## 1236    6 -20.14 53.96  2.13   0.04
## 15      4 -22.68 54.12  2.29   0.03
## 14      4 -22.69 54.14  2.31   0.03
## (Null)  2 -25.06 54.33  2.50   0.03
## 125     5 -21.59 54.36  2.53   0.03
## 124     5 -21.64 54.46  2.63   0.03
## 135     5 -21.68 54.54  2.71   0.03
## 134     5 -21.71 54.60  2.77   0.03
## 1235    6 -20.65 54.99  3.16   0.02
## 1234    6 -20.66 55.00  3.17   0.02
## 6       3 -24.41 55.27  3.44   0.02
## 146     5 -22.17 55.52  3.69   0.02
```

```
## 156     5 -22.18 55.53  3.70   0.02
## 1356    6 -21.10 55.88  4.05   0.01
## 1256    6 -21.13 55.95  4.12   0.01
## 1346    6 -21.15 55.97  4.14   0.01
## 1246    6 -21.17 56.02  4.19   0.01
## 12356   7 -20.08 56.44  4.61   0.01
## 5       3 -25.03 56.51  4.68   0.01
## 4       3 -25.03 56.51  4.68   0.01
## 145     5 -22.67 56.52  4.69   0.01
## 2       3 -25.05 56.56  4.72   0.01
## 12346   7 -20.14 56.57  4.73   0.01
## 1245    6 -21.59 56.86  5.03   0.01
## 1345    6 -21.68 57.04  5.21   0.01
## 46      4 -24.36 57.49  5.66   0.01
## 12345   7 -20.63 57.55  5.72   0.01
## 56      4 -24.39 57.55  5.72   0.01
## 26      4 -24.40 57.58  5.74   0.01
## 1456    6 -22.16 58.00  6.17   0.00
## 13456   7 -21.09 58.47  6.64   0.00
## 12456   7 -21.13 58.55  6.72   0.00
## 45      4 -24.99 58.76  6.93   0.00
## 25      4 -25.02 58.80  6.97   0.00
## 24      4 -25.03 58.83  7.00   0.00
## 123456  8 -20.07 59.13  7.30   0.00
## 456     5 -24.33 59.84  8.01   0.00
## 246     5 -24.36 59.90  8.07   0.00
## 256     5 -24.38 59.94  8.11   0.00
## 245     5 -24.98 61.15  9.32   0.00
##
## Term codes:
##      lam(buf.fragmen)             lam(dcon) lam(I(buf.fragmen^2))
##                     1                     2                     3
##               p(date)               p(dras)               p(sfrz)
##                     4                     5                     6
##
## Model-averaged coefficients:
## (full average)
##                         Estimate Std. Error z value Pr(>|z|)
## lam(Int)                1.175417   2.301893   0.511  0.60961
## lam(buf.fragmen)        2.350953   2.875480   0.818  0.41359
## p(Int)                 -6.663903   2.196635   3.034  0.00242 **
## lam(dcon)               0.390918   0.632732   0.618  0.53669
## lam(I(buf.fragmen^2)) -0.757507   1.538932   0.492  0.62256
## p(sfrz)                 0.632632   1.514236   0.418  0.67610
## p(dras)                 0.002544   0.280645   0.009  0.99277
## p(date)                 0.004548   0.254374   0.018  0.98573
##
## (conditional average)
##                        Estimate Std. Error z value Pr(>|z|)
## lam(Int)                1.17542    2.30189   0.511  0.60961
## lam(buf.fragmen)        2.64230    2.91946   0.905  0.36543
## p(Int)                 -6.66390    2.19664   3.034  0.00242 **
## lam(dcon)               0.90678    0.67889   1.336  0.18165
## lam(I(buf.fragmen^2)) -1.91279    1.94176   0.985  0.32459
```

```
## p(sfrz)                1.88348    2.11436   0.891  0.37304
## p(dras)                0.01087    0.57997   0.019  0.98505
## p(date)                0.01978    0.53022   0.037  0.97024
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```





M. americana

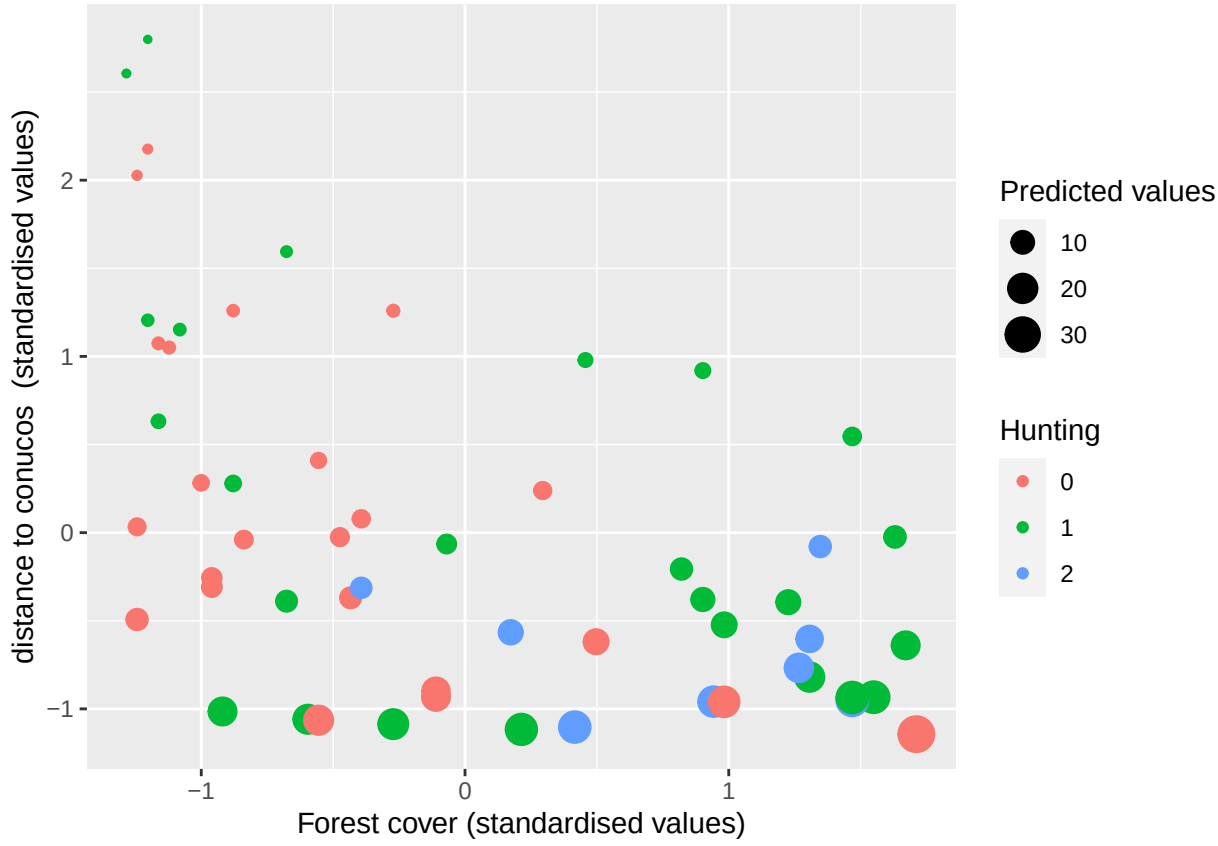
T.tetradactyla

E.barbara

Large coefficients lead to large, unrealistic abundance predictions

```
##
## Call:
## model.avg(object = get.models(object = oms01, subset = delta <
##     10))
##
## Component model call:
## occuRN(formula = ~<24 unique rhs>, data = UMF, K = 50)
##
## Component models:
##        df logLik   AICc delta weight
## 2       3 -55.49 117.42  0.00   0.20
## 12      4 -54.35 117.47  0.04   0.19
## 25      4 -55.24 119.26  1.83   0.08
## 125     5 -54.15 119.48  2.05   0.07
## 23      4 -55.38 119.53  2.10   0.07
## 24      4 -55.48 119.74  2.31   0.06
## 123     5 -54.33 119.83  2.41   0.06
## 124     5 -54.34 119.86  2.43   0.06
## 235     5 -55.10 121.37  3.94   0.03
```

```
## 1       3 -57.59 121.64  4.21   0.02
## 245     5 -55.24 121.66  4.24   0.02
## 1235    6 -54.11 121.90  4.48   0.02
## 234     5 -55.38 121.94  4.51   0.02
## 1245    6 -54.14 121.96  4.53   0.02
## 1234    6 -54.31 122.30  4.88   0.02
## 15      4 -57.39 123.55  6.13   0.01
## 14      4 -57.54 123.86  6.43   0.01
## 2345    6 -55.10 123.87  6.45   0.01
## 13      4 -57.57 123.91  6.49   0.01
## 12345   7 -54.09 124.47  7.05   0.01
## 145     5 -57.35 125.87  8.45   0.00
## 135     5 -57.38 125.94  8.51   0.00
## 134     5 -57.53 126.25  8.82   0.00
## (Null)  2 -61.21 126.64  9.22   0.00
##
## Term codes:
## lam(buf.fragmen)        lam(dcon)          p(date)          p(dras)
##                1                2               3               4
##          p(sfrz)
##                5
##
## Model-averaged coefficients:
## (full average)
##                    Estimate Std. Error z value Pr(>|z|)
## lam(Int)           1.635910   1.346377   1.215   0.2243
## lam(dcon)         -1.278469   0.658241   1.942   0.0521 .
## p(Int)            -5.363862   1.283862   4.178 2.94e-05 ***
## lam(buf.fragmen)   0.238270   0.326834   0.729   0.4660
## p(sfrz)            0.160072   0.536796   0.298   0.7656
## p(date)            0.024751   0.154982   0.160   0.8731
## p(dras)            0.005716   0.178758   0.032   0.9745
##
## (conditional average)
##                   Estimate Std. Error z value Pr(>|z|)
## lam(Int)           1.63591    1.34638   1.215   0.2243
## lam(dcon)         -1.35917    0.59240   2.294   0.0218 *
## p(Int)            -5.36386    1.28386   4.178 2.94e-05 ***
## lam(buf.fragmen)   0.46986    0.31911   1.472   0.1409
## p(sfrz)            0.58601    0.89738   0.653   0.5137
## p(date)            0.10183    0.30161   0.338   0.7357
## p(dras)            0.02471    0.37104   0.067   0.9469
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```



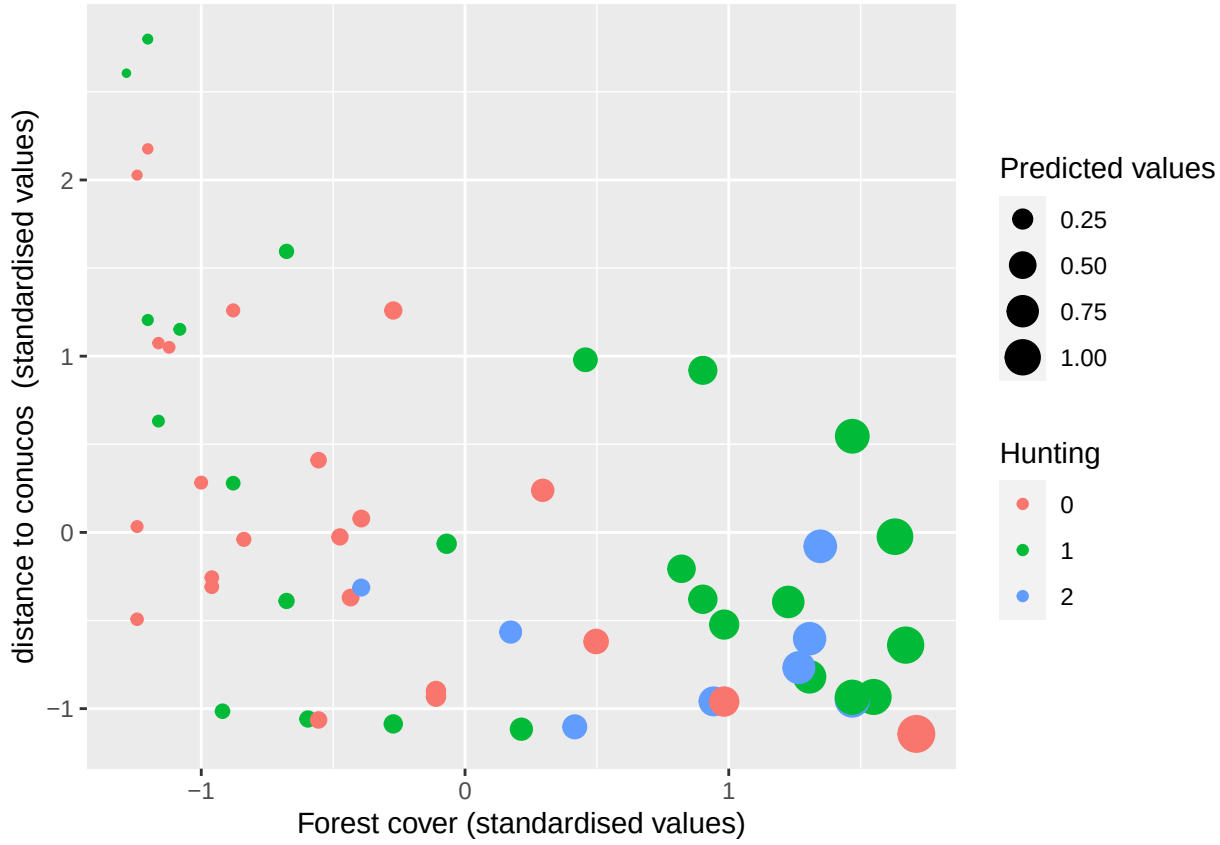
T.terrestris

Very large standard errors

```
##
## Call:
## model.avg(object = get.models(object = oms03, subset = delta <
##     10))
##
## Component model call:
## occuRN(formula = ~<47 unique rhs>, data = UMF, K = 50)
##
## Component models:
##        df logLik  AICc delta weight
## 16      4 -30.33 69.44  0.00   0.17
## 1       3 -32.11 70.68  1.24   0.09
## 136     5 -30.03 71.24  1.80   0.07
## 146     5 -30.11 71.39  1.95   0.06
## 156     5 -30.32 71.82  2.39   0.05
## 126     5 -30.33 71.84  2.40   0.05
## 6       3 -32.92 72.29  2.86   0.04
## 13      4 -31.84 72.45  3.01   0.04
## 14      4 -32.04 72.85  3.42   0.03
## 15      4 -32.06 72.88  3.44   0.03
## 12      4 -32.11 72.99  3.55   0.03
## 1346    6 -29.78 73.23  3.80   0.03
```

```
## 26      4 -32.44 73.64  4.20   0.02
## 1356    6 -30.02 73.71  4.28   0.02
## 1236    6 -30.03 73.74  4.30   0.02
## 1456    6 -30.06 73.79  4.35   0.02
## 46      4 -32.54 73.86  4.42   0.02
## 1246    6 -30.10 73.88  4.44   0.02
## (Null)  2 -34.97 74.17  4.73   0.02
## 1256    6 -30.32 74.33  4.89   0.01
## 56      4 -32.89 74.55  5.11   0.01
## 134     5 -31.75 74.69  5.25   0.01
## 135     5 -31.84 74.85  5.42   0.01
## 123     5 -31.84 74.86  5.42   0.01
## 246     5 -31.92 75.01  5.57   0.01
## 145     5 -31.94 75.05  5.61   0.01
## 124     5 -32.03 75.24  5.81   0.01
## 125     5 -32.05 75.28  5.85   0.01
## 2       3 -34.43 75.31  5.88   0.01
## 12346   7 -29.77 75.83  6.39   0.01
## 13456   7 -29.78 75.84  6.40   0.01
## 456     5 -32.43 76.03  6.60   0.01
## 256     5 -32.44 76.05  6.61   0.01
## 4       3 -34.81 76.08  6.64   0.01
## 5       3 -34.86 76.18  6.74   0.01
## 12356   7 -30.02 76.32  6.88   0.01
## 12456   7 -30.05 76.38  6.95   0.01
## 24      4 -34.18 77.13  7.69   0.00
## 1345    6 -31.73 77.15  7.71   0.00
## 1234    6 -31.75 77.18  7.74   0.00
## 1235    6 -31.84 77.35  7.92   0.00
## 2456    6 -31.89 77.47  8.03   0.00
## 1245    6 -31.93 77.54  8.10   0.00
## 25      4 -34.41 77.60  8.16   0.00
## 45      4 -34.61 77.98  8.55   0.00
## 123456  8 -29.77 78.54  9.11   0.00
## 245     5 -34.12 79.41  9.97   0.00
##
## Term codes:
##      lam(buf.fragmen)             lam(dcon) lam(I(buf.fragmen^2))
##                     1                     2                     3
##               p(date)               p(dras)               p(sfrz)
##                     4                     5                     6
##
## Model-averaged coefficients:
## (full average)
##                        Estimate Std. Error z value Pr(>|z|)
## lam(Int)               -1.43198    1.25621   1.140   0.2543
## lam(buf.fragmen)        1.06802    0.94951   1.125   0.2607
## p(Int)                 -4.59206    2.56433   1.791   0.0733 .
## p(sfrz)                 2.26333    2.50836   0.902   0.3669
## lam(I(buf.fragmen^2)) -0.14393    0.49480   0.291   0.7711
## p(date)                 0.09238    0.32190   0.287   0.7741
## p(dras)                 0.02872    0.32098   0.089   0.9287
## lam(dcon)              -0.03760    0.33565   0.112   0.9108
##
```

```
## (conditional average)
##                         Estimate Std. Error z value Pr(>|z|)
## lam(Int)                 -1.4320     1.2562   1.140   0.2543
## lam(buf.fragmen)          1.2781     0.9002   1.420   0.1557
## p(Int)                   -4.5921     2.5643   1.791   0.0733 .
## p(sfrz)                   3.4229     2.3551   1.453   0.1461
## lam(I(buf.fragmen^2))    -0.6108     0.8682   0.703   0.4818
## p(date)                   0.3429     0.5465   0.627   0.5304
## p(dras)                   0.1227     0.6546   0.187   0.8514
## lam(dcon)                -0.1528     0.6635   0.230   0.8178
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```



D.imperfecta

M.gouazoubira

N.nasua

M.tridactyla

P. onca