**# Model Summary Domestic cattle**

Call:

colext(psiformula = ~1, gammaformula = ~scale(OakForest),

epsilonformula = ~scale(CostDist\_road) + scale(OakForest) + scale(HighShrub)

+ scale(LowShrub),

pformula = ~scale(Sensitivity) + scale(Rad\_max) + scale(HighShrub)

+ scale(LowShrub), data = umfm\_cattle)

Initial (logit-scale):

Estimate SE z P(>|z|)

1.7 0.783 2.17 0.03

Colonization (logit-scale):

Estimate SE z P(>|z|)

(Intercept) -0.415 0.428 -0.971 0.3316

scale(OakForest) 0.914 0.432 2.114 0.0345

Extinction (logit-scale):

Estimate SE z P(>|z|)

(Intercept) -0.711 0.386 -1.84 0.06508

scale(CostDist\_road) -1.519 0.633 -2.40 0.01638

scale(OakForest) -1.282 0.683 -1.88 0.06069

scale(HighShrub) -1.262 0.683 -1.85 0.06453

scale(LowShrub) -2.307 0.763 -3.03 0.00249

Detection (logit-scale):

Estimate SE z P(>|z|)

(Intercept) -0.933 0.0810 -11.52 1.08e-30

scale(Sensitivity) 0.325 0.0701 4.64 3.47e-06

scale(Rad\_max) 0.135 0.0682 1.98 4.81e-02

scale(HighShrub) -0.119 0.0616 -1.93 5.36e-02

scale(LowShrub) 0.557 0.0739 7.54 4.57e-14

AIC: 1469.056

Number of sites: 16

optim convergence code: 0

optim iterations: 54

Bootstrap iterations: 0

**# Year Model Domestic cattle**

Call:

lm(formula = smoothed\_occ ~ year, data = occ\_pred\_cattle\_best\_QAIC)

Residuals:

Min 1Q Median 3Q Max

-0.176553 -0.031897 -0.009987 0.044314 0.150347

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 65.44747 33.52533 1.952 0.0988 .

year -0.03211 0.01661 -1.933 0.1014

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.1076 on 6 degrees of freedom

Multiple R-squared: 0.3839, Adjusted R-squared: 0.2812

F-statistic: 3.738 on 1 and 6 DF, p-value: 0.1014

**# Interaction Model Domestic cattle**

Call:

lm(formula = Cattle ~ Horse + Wolf, data = occ\_all\_grid)

Residuals:

Min 1Q Median 3Q Max

-0.7402 -0.4507 0.2596 0.3264 0.6381

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 0.3336 0.1156 2.886 0.0046 \*\*

Horse 0.2483 0.1102 2.254 0.0260 \*

Wolf 0.1585 0.1079 1.469 0.1443

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.443 on 125 degrees of freedom

Multiple R-squared: 0.05613, Adjusted R-squared: 0.04103

F-statistic: 3.717 on 2 and 125 DF, p-value: 0.02703

**# Model Summary Domestic horse**

Call:

colext(psiformula = ~1, gammaformula = ~scale(OakForest),

epsilonformula = ~scale(LowShrub) + scale(Urban),

pformula = ~scale(Sensitivity) + scale(Rad\_max) + scale(Temp\_min)

+ scale(OakForest) + scale(HighShrub) + scale(LowShrub),

data = umfm\_horse)

Initial (logit-scale):

Estimate SE z P(>|z|)

1.98 0.782 2.54 0.0112

Colonization (logit-scale):

Estimate SE z P(>|z|)

(Intercept) 0.313 0.647 0.483 0.629

scale(OakForest) -0.900 0.597 -1.507 0.132

Extinction (logit-scale):

Estimate SE z P(>|z|)

(Intercept) -2.041 0.473 -4.32 1.57e-05

scale(LowShrub) -0.756 0.541 -1.40 1.63e-01

scale(Urban) 0.674 0.320 2.11 3.51e-02

Detection (logit-scale):

Estimate SE z P(>|z|)

(Intercept) -0.827 0.0738 -11.21 3.80e-29

scale(Sensitivity) 0.157 0.0637 2.47 1.36e-02

scale(Rad\_max) 0.243 0.0623 3.90 9.50e-05

scale(Temp\_min) -0.169 0.0623 -2.72 6.60e-03

scale(OakForest) -1.012 0.0922 -10.98 4.90e-28

scale(HighShrub) -0.174 0.0573 -3.04 2.40e-03

scale(LowShrub) -0.214 0.0754 -2.83 4.60e-03

AIC: 1765.824

Number of sites: 16

optim convergence code: 0

optim iterations: 56

Bootstrap iterations: 0

**# Year Model Domestic horse**

Call:

lm(formula = smoothed\_occ ~ year, data = occ\_pred\_horse\_best\_AIC)

Residuals:

Min 1Q Median 3Q Max

-0.11599 -0.03717 -0.02617 0.03766 0.12362

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 61.81439 27.30463 2.264 0.0642 .

year -0.03023 0.01353 -2.235 0.0668 .

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.08767 on 6 degrees of freedom

Multiple R-squared: 0.4542, Adjusted R-squared: 0.3632

F-statistic: 4.993 on 1 and 6 DF, p-value: 0.06685

**# Interaction Model Domestic horse**

Call:

lm(formula = Horse ~ Cattle + Ibex, data = occ\_all\_grid)

Residuals:

Min 1Q Median 3Q Max

-0.93285 -0.01117 0.06605 0.22300 0.44152

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 0.77708 0.05707 13.615 < 2e-16 \*\*\*

Cattle 0.15703 0.06664 2.356 0.02001 \*

Ibex -0.21927 0.07085 -3.095 0.00243 \*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.3397 on 125 degrees of freedom

Multiple R-squared: 0.1082, Adjusted R-squared: 0.09389

F-statistic: 7.58 on 2 and 125 DF, p-value: 0.0007813

**# Model Summary European roe deer**

Call:

colext(psiformula = ~1, gammaformula = ~1, epsilonformula = ~scale(HighShrub),

pformula = ~scale(Sensitivity) + scale(Rad\_max) + scale(OakForest) +

scale(LowShrub), data = umfm\_deer)

Initial (logit-scale):

Estimate SE z P(>|z|)

8.65 18.8 0.459 0.646

Colonization (logit-scale):

Estimate SE z P(>|z|)

0.114 0.857 0.132 0.895

Extinction (logit-scale):

Estimate SE z P(>|z|)

(Intercept) -4.14 0.891 -4.64 3.44e-06

scale(HighShrub) 1.58 0.542 2.91 3.60e-03

Detection (logit-scale):

Estimate SE z P(>|z|)

(Intercept) -0.463 0.0526 -8.79 1.53e-18

scale(Sensitivity) 0.429 0.0541 7.93 2.19e-15

scale(Rad\_max) 0.112 0.0494 2.26 2.36e-02

scale(OakForest) 0.227 0.0618 3.68 2.38e-04

scale(LowShrub) 0.163 0.0613 2.66 7.77e-03

AIC: 2214.088

Number of sites: 16

optim convergence code: 0

optim iterations: 44

Bootstrap iterations: 0

**# Year Model European roe deer**

Call:

lm(formula = smoothed\_occ ~ year, data = occ\_pred\_deer\_best\_QAIC)

Residuals:

Min 1Q Median 3Q Max

-0.078769 -0.015720 0.007491 0.037073 0.055379

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 10.800433 16.750435 0.645 0.543

year -0.004882 0.008298 -0.588 0.578

Residual standard error: 0.05378 on 6 degrees of freedom

Multiple R-squared: 0.05453, Adjusted R-squared: -0.1031

F-statistic: 0.346 on 1 and 6 DF, p-value: 0.5778

**# Interaction Model European roe deer**

Call:

lm(formula = RoeDeer ~ WildBoar + Wolf + Ibex, data = occ\_all\_grid)

Residuals:

Min 1Q Median 3Q Max

-0.94256 -0.00849 0.03630 0.10980 0.24603

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 0.88249 0.06996 12.613 <2e-16 \*\*\*

WildBoar 0.13857 0.06359 2.179 0.0312 \*

Wolf -0.13222 0.05292 -2.499 0.0138 \*

Ibex 0.06891 0.04524 1.523 0.1303

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.211 on 124 degrees of freedom

Multiple R-squared: 0.09221, Adjusted R-squared: 0.07025

F-statistic: 4.198 on 3 and 124 DF, p-value: 0.007235

**# Model Summary Wild boar**

Call:

colext(psiformula = ~scale(HighShrub), gammaformula = ~1, epsilonformula = ~1,

pformula = ~scale(Sensitivity) + scale(OakForest), data = umfm\_boar)

Initial (logit-scale):

Estimate SE z P(>|z|)

(Intercept) 2.36 1.15 2.05 0.0403

scale(HighShrub) -2.53 1.52 -1.66 0.0960

Colonization (logit-scale):

Estimate SE z P(>|z|)

1.63 0.852 1.92 0.0551

Extinction (logit-scale):

Estimate SE z P(>|z|)

-2.18 0.382 -5.7 1.17e-08

Detection (logit-scale):

Estimate SE z P(>|z|)

(Intercept) -0.902 0.0633 -14.24 5.02e-46

scale(Sensitivity) 0.302 0.0675 4.47 7.69e-06

scale(OakForest) 0.263 0.0576 4.56 5.14e-06

AIC: 1934.536

Number of sites: 16

optim convergence code: 0

optim iterations: 33

Bootstrap iterations: 0

**# Year Model Wild boar**

Call:

lm(formula = smoothed\_occ ~ year, data = occ\_pred\_boar\_best\_QAIC)

Residuals:

Min 1Q Median 3Q Max

-0.171553 -0.057482 0.003474 0.054669 0.152509

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) -26.39479 35.42208 -0.745 0.484

year 0.01351 0.01755 0.770 0.471

Residual standard error: 0.1137 on 6 degrees of freedom

Multiple R-squared: 0.08994, Adjusted R-squared: -0.06174

F-statistic: 0.5929 on 1 and 6 DF, p-value: 0.4705

**# Interaction Model Wild boar**

Call:

lm(formula = WildBoar ~ RoeDeer, data = occ\_all\_grid)

Residuals:

Min 1Q Median 3Q Max

-0.8954 0.1045 0.1045 0.1045 0.3729

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 0.6271 0.1147 5.469 2.34e-07 \*\*\*

RoeDeer 0.2684 0.1180 2.274 0.0246 \*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.291 on 126 degrees of freedom

Multiple R-squared: 0.03943, Adjusted R-squared: 0.03181

F-statistic: 5.172 on 1 and 126 DF, p-value: 0.02464

**# Model Summary Red fox**

Call:

colext(psiformula = ~1, gammaformula = ~1, epsilonformula = ~1,

pformula = ~scale(Sensitivity) + scale(LowShrub), data = umfm\_fox)

Initial (logit-scale):

Estimate SE z P(>|z|)

-0.133 0.531 -0.251 0.802

Colonization (logit-scale):

Estimate SE z P(>|z|)

1.96 1.63 1.2 0.229

Extinction (logit-scale):

Estimate SE z P(>|z|)

-0.332 0.41 -0.808 0.419

Detection (logit-scale):

Estimate SE z P(>|z|)

(Intercept) -2.049 0.1596 -12.84 9.86e-38

scale(Sensitivity) 0.716 0.1410 5.07 3.88e-07

scale(LowShrub) 0.363 0.0994 3.65 2.60e-04

AIC: 1012.409

Number of sites: 16

optim convergence code: 0

optim iterations: 58

Bootstrap iterations: 0

**# Year Model Red fox**

Call:

lm(formula = smoothed\_occ ~ year, data = occ\_pred\_fox\_best\_QAIC)

Residuals:

Min 1Q Median 3Q Max

-0.17040 -0.09110 -0.01132 0.05358 0.31386

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) -9.938138 51.739716 -0.192 0.854

year 0.005248 0.025633 0.205 0.845

Residual standard error: 0.1661 on 6 degrees of freedom

Multiple R-squared: 0.006938, Adjusted R-squared: -0.1586

F-statistic: 0.04192 on 1 and 6 DF, p-value: 0.8445

**# Interaction Model Red fox**

Call:

lm(formula = Fox ~ 1, data = occ\_all\_grid)

Residuals:

Min 1Q Median 3Q Max

-0.64964 -0.26223 0.03667 0.34453 0.34453

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 0.6555 0.0313 20.94 <2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.3542 on 127 degrees of freedom

**# Model Summary Gray wolf**

Call:

colext(psiformula = ~1, gammaformula = ~1, epsilonformula = ~scale(CostDist\_water)

+ scale(OakForest) + scale(HighShrub) + scale(LowShrub),

pformula = ~scale(Sensitivity) + scale(Rad\_max) + scale(Temp\_min)

+ scale(HighShrub) + scale(LowShrub), data = umfm\_wolf)

Initial (logit-scale):

Estimate SE z P(>|z|)

0.147 0.631 0.232 0.816

Colonization (logit-scale):

Estimate SE z P(>|z|)

-0.706 0.56 -1.26 0.207

Extinction (logit-scale):

Estimate SE z P(>|z|)

(Intercept) -2.358 1.522 -1.550 0.1212

scale(CostDist\_water) -0.653 1.260 -0.518 0.6044

scale(OakForest) 0.277 0.875 0.317 0.7514

scale(HighShrub) -2.120 1.616 -1.312 0.1896

scale(LowShrub) 2.277 1.247 1.826 0.0678

Detection (logit-scale):

Estimate SE z P(>|z|)

(Intercept) -3.117 0.235 -13.25 4.63e-40

scale(Sensitivity) 0.318 0.145 2.18 2.89e-02

scale(Rad\_max) 0.853 0.239 3.56 3.69e-04

scale(Temp\_min) -0.309 0.142 -2.17 3.00e-02

scale(HighShrub) -0.812 0.210 -3.86 1.14e-04

scale(LowShrub) 0.514 0.180 2.85 4.32e-03

AIC: 499.8066

Number of sites: 16

optim convergence code: 0

optim iterations: 58

Bootstrap iterations: 0

**# Year Model Gray wolf**

Call:

lm(formula = smoothed\_occ ~ year, data = occ\_pred\_wolf\_best\_AIC)

Residuals:

Min 1Q Median 3Q Max

-0.026436 -0.013527 -0.002342 0.005648 0.051463

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) -47.261831 8.183752 -5.775 0.00118 \*\*

year 0.023718 0.004054 5.850 0.00110 \*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.02628 on 6 degrees of freedom

Multiple R-squared: 0.8508, Adjusted R-squared: 0.826

F-statistic: 34.22 on 1 and 6 DF, p-value: 0.001101

**# Interaction Model Gray wolf**

Call:

lm(formula = Wolf ~ RoeDeer + Ibex, data = occ\_all\_grid)

Residuals:

Min 1Q Median 3Q Max

-0.70934 -0.31386 0.00263 0.27693 0.47816

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 0.89413 0.13803 6.478 1.93e-09 \*\*\*

RoeDeer -0.37229 0.14155 -2.630 0.00961 \*\*

Ibex 0.21100 0.07279 2.899 0.00443 \*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.3481 on 125 degrees of freedom

Multiple R-squared: 0.1026, Adjusted R-squared: 0.08821

F-statistic: 7.143 on 2 and 125 DF, p-value: 0.001155

**# Model Summary Iberian ibex**

Call:

colext(psiformula = ~1, gammaformula = ~scale(OakForest), epsilonformula = ~1,

pformula = ~scale(Sensitivity) + scale(Rad\_max) + scale(LowShrub) +

scale(OakForest), data = umfm\_ibex)

Initial (logit-scale):

Estimate SE z P(>|z|)

-7.24 13.9 -0.521 0.602

Colonization (logit-scale):

Estimate SE z P(>|z|)

(Intercept) -2.27 0.672 -3.37 0.000745

scale(OakForest) 1.67 0.888 1.88 0.059944

Extinction (logit-scale):

Estimate SE z P(>|z|)

-8.19 18 -0.455 0.649

Detection (logit-scale):

Estimate SE z P(>|z|)

(Intercept) -4.075 0.677 -6.02 1.74e-09

scale(Sensitivity) 0.457 0.308 1.48 1.38e-01

scale(Rad\_max) -0.724 0.185 -3.92 8.94e-05

scale(LowShrub) 3.945 1.038 3.80 1.44e-04

scale(OakForest) -1.099 0.437 -2.52 1.18e-02

AIC: 201.0143

Number of sites: 16

optim convergence code: 0

optim iterations: 52

Bootstrap iterations: 0

**# Year Model Iberian ibex**

Call:

lm(formula = smoothed\_occ ~ year, data = occ\_pred\_ibex\_best\_AIC)

Residuals:

Min 1Q Median 3Q Max

-0.12740 -0.03439 0.02268 0.05605 0.06181

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) -123.62957 23.36752 -5.291 0.00185 \*\*

year 0.06142 0.01158 5.305 0.00182 \*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.07503 on 6 degrees of freedom

Multiple R-squared: 0.8243, Adjusted R-squared: 0.795

F-statistic: 28.15 on 1 and 6 DF, p-value: 0.001821

**# Interaction Model Iberian ibex**

Call:

lm(formula = Ibex ~ Horse + Wolf, data = occ\_all\_grid)

Residuals:

Min 1Q Median 3Q Max

-0.6777 -0.3789 -0.1259 0.3589 0.8309

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 0.42890 0.10471 4.096 7.49e-05 \*\*\*

Horse -0.32028 0.09978 -3.210 0.00169 \*\*

Wolf 0.27747 0.09769 2.840 0.00526 \*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.4012 on 125 degrees of freedom

Multiple R-squared: 0.125, Adjusted R-squared: 0.111

F-statistic: 8.93 on 2 and 125 DF, p-value: 0.000237