RestoreNet GLMMs, Tables S3 through S10

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## Description of variables

Response variables: - Count: Number of individuals per 0.0625 m2, the size of the subplots. - Cover: Percent cover.

## Table S3. Density of Sonoran Desert desirable species

## Family: nbinom2 ( log )  
## Formula:   
## Count ~ Perc\_dev\_cum\_abs + AridityIndex + Treatment + PlantSource2 +   
## PlotMix\_Climate + Duration + Lifeform + MAT + Since\_last\_precip +   
## Days\_elapsed + (1 | Site/Plot)  
## Data: sonoran.des  
##   
## AIC BIC logLik deviance df.resid   
## 14425.1 14544.5 -7192.6 14385.1 2869   
##   
## Random effects:  
##   
## Conditional model:  
## Groups Name Variance Std.Dev.  
## Plot:Site (Intercept) 0.03578 0.1892   
## Site (Intercept) 0.01636 0.1279   
## Number of obs: 2889, groups: Plot:Site, 216; Site, 6  
##   
## Dispersion parameter for nbinom2 family (): 1.05   
##   
## Conditional model:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) -6.492e+00 1.965e+00 -3.304 0.000953 \*\*\*  
## Perc\_dev\_cum\_abs 3.253e-01 2.180e-01 1.492 0.135658   
## AridityIndex 1.471e+01 3.433e+00 4.284 1.83e-05 \*\*\*  
## TreatmentConMod 9.704e-02 8.108e-02 1.197 0.231364   
## TreatmentControl -1.706e-01 1.097e-01 -1.555 0.119887   
## TreatmentMulch -2.862e-02 8.233e-02 -0.348 0.728127   
## TreatmentPits 2.570e-01 7.899e-02 3.253 0.001140 \*\*   
## PlantSource20 -1.352e+01 3.100e+01 -0.436 0.662704   
## PlantSource2Seeded -1.555e-01 7.521e-02 -2.067 0.038732 \*   
## PlotMix\_ClimateNone NA NA NA NA   
## PlotMix\_ClimateProjected 1.650e-02 5.624e-02 0.293 0.769183   
## Duration0 NA NA NA NA   
## DurationPerennial -4.051e-01 7.437e-02 -5.447 5.12e-08 \*\*\*  
## DurationUnknown 4.362e-01 5.783e-02 7.543 4.59e-14 \*\*\*  
## Lifeform0 NA NA NA NA   
## LifeformGrass -3.386e-02 6.424e-02 -0.527 0.598108   
## LifeformShrub -6.544e-01 6.171e-01 -1.060 0.288989   
## MAT 2.595e-01 7.095e-02 3.657 0.000255 \*\*\*  
## Since\_last\_precip 1.714e-04 2.067e-04 0.829 0.406823   
## Days\_elapsed 1.175e-04 8.826e-05 1.331 0.183265   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

## # R2 for Mixed Models  
##   
## Conditional R2: 0.950  
## Marginal R2: 0.947

## Table S4. Density of Sonoran Desert weedy species

## Family: nbinom2 ( log )  
## Formula:   
## Count ~ Perc\_dev\_cum\_abs + AridityIndex + Treatment + PlantSource2 +   
## PlotMix\_Climate + Duration + Lifeform + MAT + Since\_last\_precip +   
## Days\_elapsed + (1 | Site/Plot)  
## Data: sonoran.weed  
##   
## AIC BIC logLik deviance df.resid   
## 7607.8 7714.5 -3783.9 7567.8 1512   
##   
## Random effects:  
##   
## Conditional model:  
## Groups Name Variance Std.Dev.  
## Plot:Site (Intercept) 0.03767 0.1941   
## Site (Intercept) 0.17329 0.4163   
## Number of obs: 1532, groups: Plot:Site, 216; Site, 6  
##   
## Dispersion parameter for nbinom2 family (): 1.14   
##   
## Conditional model:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) -2.760e+00 5.483e+00 -0.503 0.614673   
## Perc\_dev\_cum\_abs 2.241e+00 2.490e-01 9.001 < 2e-16 \*\*\*  
## AridityIndex 1.079e+01 9.295e+00 1.161 0.245500   
## TreatmentConMod -1.916e-02 9.525e-02 -0.201 0.840581   
## TreatmentControl 3.880e-02 1.247e-01 0.311 0.755694   
## TreatmentMulch -5.992e-02 9.863e-02 -0.608 0.543468   
## TreatmentPits 2.242e-01 9.736e-02 2.303 0.021265 \*   
## PlantSource20 -1.869e+01 4.077e+02 -0.046 0.963431   
## PlantSource2Introduced/Invasive 5.297e-01 2.236e-01 2.369 0.017820 \*   
## PlotMix\_ClimateNone NA NA NA NA   
## PlotMix\_ClimateProjected 5.486e-03 6.876e-02 0.080 0.936415   
## Duration0 NA NA NA NA   
## DurationPerennial -4.904e-01 2.125e-01 -2.308 0.021006 \*   
## DurationUnknown 3.529e-01 1.898e-01 1.859 0.062980 .   
## Lifeform0 NA NA NA NA   
## LifeformGrass 2.766e-01 7.701e-02 3.591 0.000329 \*\*\*  
## LifeformUnknown -9.756e-01 8.769e-01 -1.113 0.265880   
## MAT 9.265e-02 2.022e-01 0.458 0.646857   
## Since\_last\_precip -1.627e-03 2.918e-04 -5.575 2.47e-08 \*\*\*  
## Days\_elapsed -7.492e-06 1.290e-04 -0.058 0.953684   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

## # R2 for Mixed Models  
##   
## Conditional R2: 0.986  
## Marginal R2: 0.982

## Table S5. Density of Sonoran Desert seeded species

## Family: nbinom2 ( log )  
## Formula:   
## Count ~ Perc\_dev\_cum\_abs + Treatment + PlotMix\_Climate + Duration +   
## Lifeform + MAT + Since\_last\_precip + Days\_elapsed + (1 | Site/Plot)  
## Data: sonoran.seed  
##   
## AIC BIC logLik deviance df.resid   
## 1680.6 1744.9 -824.3 1648.6 394   
##   
## Random effects:  
##   
## Conditional model:  
## Groups Name Variance Std.Dev.  
## Plot:Site (Intercept) 0.074042 0.2721   
## Site (Intercept) 0.009235 0.0961   
## Number of obs: 410, groups: Plot:Site, 132; Site, 6  
##   
## Dispersion parameter for nbinom2 family (): 4.41   
##   
## Conditional model:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) 0.3947546 0.7892047 0.500 0.616939   
## Perc\_dev\_cum\_abs -0.3877575 0.2707698 -1.432 0.152128   
## TreatmentConMod -0.0946512 0.1410636 -0.671 0.502232   
## TreatmentMulch -0.1180542 0.1379143 -0.856 0.392000   
## TreatmentPits 0.1193101 0.1308002 0.912 0.361687   
## PlotMix\_ClimateProjected 0.3892982 0.1016482 3.830 0.000128 \*\*\*  
## DurationPerennial -0.7407386 0.1424693 -5.199 2.00e-07 \*\*\*  
## DurationUnknown -0.3312622 0.1886781 -1.756 0.079140 .   
## LifeformGrass 0.3027246 0.1450088 2.088 0.036831 \*   
## LifeformShrub -0.0651090 0.8374143 -0.078 0.938027   
## MAT 0.0424975 0.0374815 1.134 0.256867   
## Since\_last\_precip 0.0013493 0.0005395 2.501 0.012380 \*   
## Days\_elapsed -0.0011372 0.0001729 -6.579 4.75e-11 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

## Warning: Can't calculate model's distribution-specific variance. Results are not  
## reliable.  
## A reason can be that the null model could not be computed manually. Try  
## to fit the null model manually and pass it to `null\_model`.

## # R2 for Mixed Models  
##   
## Conditional R2: 1.000  
## Marginal R2: 0.754

Table S6. Cover of Sonoran Desert seeded species

## Family: genpois ( log )  
## Formula: Seeded\_Cover ~ Perc\_dev\_cum\_abs + AridityIndex + Treatment +   
## PlotMix\_Climate + MAT + Since\_last\_precip + Days\_elapsed +   
## (1 | Site/Plot)  
## Data: sonoran.seed  
##   
## AIC BIC logLik deviance df.resid   
## 3035.5 3099.6 -1504.8 3009.5 1011   
##   
## Random effects:  
##   
## Conditional model:  
## Groups Name Variance Std.Dev.  
## Plot:Site (Intercept) 0.4907 0.7005   
## Site (Intercept) 0.5434 0.7371   
## Number of obs: 1024, groups: Plot:Site, 192; Site, 6  
##   
## Dispersion parameter for genpois family (): 26.1   
##   
## Conditional model:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) -2.7070317 9.6961180 -0.279 0.780101   
## Perc\_dev\_cum\_abs -1.5738712 0.4097882 -3.841 0.000123 \*\*\*  
## AridityIndex 1.5230424 16.6240495 0.092 0.927002   
## TreatmentConMod 0.3006108 0.2251973 1.335 0.181916   
## TreatmentMulch 0.3247954 0.2261894 1.436 0.151018   
## TreatmentPits 0.6402406 0.2190769 2.922 0.003473 \*\*   
## PlotMix\_ClimateProjected 0.5489705 0.1571736 3.493 0.000478 \*\*\*  
## MAT 0.0912093 0.3556596 0.256 0.797603   
## Since\_last\_precip 0.0052250 0.0005002 10.445 < 2e-16 \*\*\*  
## Days\_elapsed -0.0002576 0.0002132 -1.208 0.226964   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

## # R2 for Mixed Models  
##   
## Conditional R2: 0.834  
## Marginal R2: 0.285

## Table S7. Density of Northern Arizona desirable species

## Family: nbinom2 ( log )  
## Formula:   
## Count ~ Perc\_dev\_cum\_abs + AridityIndex + Treatment + PlantSource2 +   
## PlotMix\_Climate + Duration + Lifeform + MAT + MAP + Sand\_content +   
## Since\_last\_precip + Days\_elapsed + (1 | Site/Plot)  
## Data: naz.des  
##   
## AIC BIC logLik deviance df.resid   
## 18977.0 19123.1 -9466.5 18933.0 5643   
##   
## Random effects:  
##   
## Conditional model:  
## Groups Name Variance Std.Dev.  
## Plot:Site (Intercept) 0.15790 0.3974   
## Site (Intercept) 0.01289 0.1135   
## Number of obs: 5665, groups: Plot:Site, 288; Site, 8  
##   
## Dispersion parameter for nbinom2 family (): 2.46   
##   
## Conditional model:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) 3.466e-01 4.297e-01 0.806 0.419970   
## Perc\_dev\_cum\_abs 2.995e-01 5.163e-02 5.801 6.60e-09 \*\*\*  
## AridityIndex -1.135e-01 2.467e+00 -0.046 0.963286   
## TreatmentConMod -1.073e-02 9.234e-02 -0.116 0.907506   
## TreatmentControl -1.791e-01 1.266e-01 -1.415 0.156959   
## TreatmentMulch -6.683e-02 9.019e-02 -0.741 0.458698   
## TreatmentPits 1.065e-02 9.223e-02 0.115 0.908060   
## PlantSource20 -2.189e+01 7.709e+02 -0.028 0.977348   
## PlantSource2Seeded -3.482e-01 4.121e-02 -8.449 < 2e-16 \*\*\*  
## PlotMix\_ClimateNone NA NA NA NA   
## PlotMix\_ClimateProjected -1.193e-01 6.396e-02 -1.865 0.062157 .   
## Duration0 NA NA NA NA   
## DurationPerennial -5.910e-01 5.466e-02 -10.813 < 2e-16 \*\*\*  
## DurationUnknown -2.731e-01 4.573e-02 -5.973 2.33e-09 \*\*\*  
## Lifeform0 NA NA NA NA   
## LifeformGrass 2.495e-01 3.673e-02 6.795 1.09e-11 \*\*\*  
## LifeformShrub -1.436e-01 7.912e-02 -1.815 0.069498 .   
## MAT 6.584e-02 2.155e-02 3.055 0.002248 \*\*   
## MAP -2.582e-04 1.337e-03 -0.193 0.846904   
## Sand\_contentlow 4.456e-01 1.629e-01 2.736 0.006226 \*\*   
## Since\_last\_precip 9.084e-04 2.340e-04 3.882 0.000104 \*\*\*  
## Days\_elapsed 6.602e-05 1.412e-04 0.468 0.640086   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

## # R2 for Mixed Models  
##   
## Conditional R2: 0.993  
## Marginal R2: 0.991

## Table S8. Density of Northern Arizona weedy species

## Family: nbinom2 ( log )  
## Formula:   
## Count ~ Perc\_dev\_cum\_abs + AridityIndex + Treatment + PlantSource2 +   
## PlotMix\_Climate + Lifeform + MAT + MAP + Sand\_content + Since\_last\_precip +   
## Days\_elapsed + (1 | Site/Plot)  
## Data: naz.weed  
##   
## AIC BIC logLik deviance df.resid   
## 19300.7 19436.4 -9629.4 19258.7 4697   
##   
## Random effects:  
##   
## Conditional model:  
## Groups Name Variance Std.Dev.  
## Plot:Site (Intercept) 0.2753 0.5247   
## Site (Intercept) 0.1235 0.3515   
## Number of obs: 4718, groups: Plot:Site, 287; Site, 8  
##   
## Dispersion parameter for nbinom2 family (): 1.23   
##   
## Conditional model:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) -2.440e+00 1.077e+00 -2.266 0.023451 \*   
## Perc\_dev\_cum\_abs 2.343e-01 7.461e-02 3.140 0.001688 \*\*   
## AridityIndex 1.577e+01 6.663e+00 2.367 0.017919 \*   
## TreatmentConMod 2.454e-01 1.204e-01 2.039 0.041496 \*   
## TreatmentControl -5.720e-02 1.648e-01 -0.347 0.728523   
## TreatmentMulch 2.654e-01 1.205e-01 2.202 0.027676 \*   
## TreatmentPits 4.236e-01 1.233e-01 3.435 0.000592 \*\*\*  
## PlantSource20 -1.645e+01 3.887e+01 -0.423 0.672145   
## PlantSource2Introduced/Invasive -6.011e-01 5.657e-02 -10.626 < 2e-16 \*\*\*  
## PlotMix\_ClimateNone NA NA NA NA   
## PlotMix\_ClimateProjected 2.430e-01 8.458e-02 2.873 0.004060 \*\*   
## Lifeform0 NA NA NA NA   
## LifeformGrass -6.485e-01 5.189e-02 -12.497 < 2e-16 \*\*\*  
## LifeformShrub -1.037e+00 1.367e+00 -0.758 0.448182   
## LifeformUnknown -8.022e-01 4.700e-01 -1.707 0.087861 .   
## MAT 1.475e-01 6.042e-02 2.442 0.014613 \*   
## MAP -2.534e-03 3.597e-03 -0.705 0.481082   
## Sand\_contentlow -5.228e-01 4.235e-01 -1.234 0.217046   
## Since\_last\_precip 1.482e-03 3.377e-04 4.389 1.14e-05 \*\*\*  
## Days\_elapsed 7.168e-04 1.852e-04 3.871 0.000108 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

## # R2 for Mixed Models  
##   
## Conditional R2: 0.987  
## Marginal R2: 0.979

## Table S9. Density of Northern Arizona seeded species

## Family: nbinom2 ( log )  
## Formula:   
## Count ~ Perc\_dev\_cum\_abs + AridityIndex + Treatment + PlotMix\_Climate +   
## Duration + Lifeform + MAT + MAP + Sand\_content + Since\_last\_precip +   
## Days\_elapsed + (1 | Site/Plot)  
## Data: naz.seed  
##   
## AIC BIC logLik deviance df.resid   
## 5579.6 5681.3 -2770.8 5541.6 1538   
##   
## Random effects:  
##   
## Conditional model:  
## Groups Name Variance Std.Dev.  
## Plot:Site (Intercept) 0.2030 0.4505   
## Site (Intercept) 0.0162 0.1273   
## Number of obs: 1557, groups: Plot:Site, 164; Site, 8  
##   
## Dispersion parameter for nbinom2 family (): 8.36   
##   
## Conditional model:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) -0.0299530 0.6613934 -0.045 0.963878   
## Perc\_dev\_cum\_abs -0.0263233 0.1060834 -0.248 0.804028   
## AridityIndex 1.7924927 3.3001396 0.543 0.587022   
## TreatmentConMod 0.0086737 0.1479078 0.059 0.953237   
## TreatmentMulch -0.0570680 0.1367960 -0.417 0.676550   
## TreatmentPits 0.1554701 0.1365557 1.139 0.254907   
## PlotMix\_ClimateProjected -0.3009293 0.0988008 -3.046 0.002320 \*\*   
## DurationPerennial 0.7179422 0.2900133 2.476 0.013303 \*   
## DurationUnknown 0.9986855 0.2898778 3.445 0.000571 \*\*\*  
## LifeformGrass 0.1867239 0.0541684 3.447 0.000567 \*\*\*  
## LifeformShrub -0.5107799 0.3308319 -1.544 0.122606   
## MAT 0.0028075 0.0286121 0.098 0.921834   
## MAP -0.0013619 0.0016473 -0.827 0.408386   
## Sand\_contentlow 0.0916028 0.2045098 0.448 0.654215   
## Since\_last\_precip 0.0006740 0.0003694 1.825 0.068066 .   
## Days\_elapsed -0.0006285 0.0002517 -2.497 0.012511 \*   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

## Warning: Can't calculate model's distribution-specific variance. Results are not  
## reliable.  
## A reason can be that the null model could not be computed manually. Try  
## to fit the null model manually and pass it to `null\_model`.

## # R2 for Mixed Models  
##   
## Conditional R2: 1.000  
## Marginal R2: 0.244

## Table S10. Cover of Northern Arizona seeded species

## Family: genpois ( log )  
## Formula: Seeded\_Cover ~ Perc\_dev\_cum\_abs + AridityIndex + Treatment +   
## PlotMix\_Climate + MAT + Sand\_content + Since\_last\_precip +   
## Days\_elapsed + (1 | Site/Plot)  
## Data: naz.seed  
##   
## AIC BIC logLik deviance df.resid   
## 3498.9 3583.5 -1735.5 3470.9 3089   
##   
## Random effects:  
##   
## Conditional model:  
## Groups Name Variance Std.Dev.  
## Plot:Site (Intercept) 0.9647 0.9822   
## Site (Intercept) 0.6276 0.7922   
## Number of obs: 3103, groups: Plot:Site, 256; Site, 8  
##   
## Dispersion parameter for genpois family (): 4.14   
##   
## Conditional model:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) -1.017e+01 2.669e+00 -3.810 0.000139 \*\*\*  
## Perc\_dev\_cum\_abs -1.873e+00 2.341e-01 -8.000 1.25e-15 \*\*\*  
## AridityIndex 3.918e+01 1.061e+01 3.692 0.000223 \*\*\*  
## TreatmentConMod 3.597e-01 3.216e-01 1.119 0.263297   
## TreatmentMulch 1.459e+00 2.991e-01 4.877 1.08e-06 \*\*\*  
## TreatmentPits 1.560e+00 2.985e-01 5.226 1.73e-07 \*\*\*  
## PlotMix\_ClimateProjected 2.436e-03 2.031e-01 0.012 0.990429   
## MAT 8.850e-02 1.190e-01 0.744 0.457048   
## Sand\_contentlow -7.509e-01 9.237e-01 -0.813 0.416282   
## Since\_last\_precip 8.054e-04 6.177e-04 1.304 0.192318   
## Days\_elapsed 9.604e-05 3.479e-04 0.276 0.782537   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

## # R2 for Mixed Models  
##   
## Conditional R2: 0.823  
## Marginal R2: 0.562