

Vegetation Data Analyses

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1. Data Description

Instructions for interpreting column names:

“**SR**” = species count

The prefix “**d**” = “delta” (i.e. change), and there is usually a suffix indicating years compared, e.g. dSR66_10 is the change in species numbers between 1966 and 2010

The suffix “**r**” indicates “resprouter” while the suffix “**s**” indicates “seeder”, so SR66s is the seeder species numbers in 1966

“**lshrub**”, “**tshrub**”, “**gram**”, “**herb**”, “**geo**” represent the different growth forms (see paper)

“**Age**” is the age of the plot in a particular year (e.g. “Age66”) or change in age between years (e.g. dAge66_10), while “**dAge66_96_std**” and “**dAge66_10_std**” are standardized for use in the models

“**cdd**” is a factor for the maximum count of consecutive dry days experienced in the first year after a fire between 1966 and 2010 (“**cdd66_96**” is the same but for the period 1966 to 1996) binned into 0-49 days or 50-200 days (see paper)

“**chd**” is a factor for the maximum count of consecutive hot and dry days experienced in the first year after a fire between 1966 and 2010 (“**chd66_96**” is the same but for the period 1966 to 1996) binned into 0-5 days or 6-9 days (see paper)

“**Aliens**” is the maximum density of woody alien shrubs previously recorded in the plot binned into the classes 0, 1-49, 50-199, >200 (see paper)

A quick look at the data

##	Plot	Moisture_class	Age1996	Age2010	Age1966	Aliens_max	firecount66_10
## 1	CP_1		5	10	10	8	3
## 2	CP_10		5	10	24	2	0
## 3	CP_12		4	10	3	3	1
## 4	CP_13		3	10	24	5	1
## 5	CP_14		2	10	5	3	2
## 6	CP_15		4	10	3	3	3
##	firecount66_96	firecount96_10	Consecutive_Hot_and_Dry_Days_66_96				
## 1	1		2				2
## 2	1		1				2
## 3	1		1				2
## 4	1		0				2
## 5	2		1				3
## 6	1		1				2
##	Consecutive_Hot_and_Dry_Days	chd66_96	chd66_10	SR66	SR96	SR10	SR66r
## 1		5	(0,5]	(0,5]	50	44	50
## 2		5	(0,5]	(0,5]	48	51	46
## 3		6	(0,5]	(5,11]	63	44	48
## 4		2	(0,5]	(0,5]	43	34	25

## 5				4	(0,5]	(0,5]	43	32	26	22
## 6				6	(0,5]	(5,11]	63	26	48	26
##	SR96r	SR10r	SR66s	SR96s	SR10s	lshrub66	tshrub66	gram66	herb66	geo66
## 1	16	23	28	28	27	25	10	8	2	4
## 2	21	21	25	30	25	19	6	12	4	6
## 3	21	20	36	23	28	32	12	13	1	4
## 4	15	9	27	19	16	18	8	15	0	1
## 5	21	11	21	11	15	14	5	18	3	3
## 6	12	20	37	14	28	34	3	18	4	4
##	lshrub96	tshrub96	gram96	herb96	geo96	lshrub10	tshrub10	gram10	herb10	
## 1		22	10	7	1	3	26	8	8	3
## 2		22	9	11	5	3	22	6	11	3
## 3		16	9	14	2	2	30	6	8	1
## 4		14	6	11	1	1	10	5	9	0
## 5		12	6	11	1	2	8	5	10	2
## 6		12	2	10	1	1	27	2	15	1
##	geo10	dSR66_96	dSR66_10	dSR66_96r	dSR66_10r	dSR66_96s	dSR66_10s			
## 1	4	-6	0	-6	1	0	-1			
## 2	3	3	-2	-2	-2	5	0			
## 3	3	-19	-15	-6	-7	-13	-8			
## 4	0	-9	-18	-1	-7	-8	-11			
## 5	0	-11	-17	-1	-11	-10	-6			
## 6	3	-37	-15	-14	-6	-23	-9			
##	lshrub66_10	tshrub66_10	gram66_10	herb66_10	geo66_10	lshrub66_96				
## 1	1		-2	0	1	0	-3			
## 2	3		0	-1	-1	-3	3			
## 3	-2		-6	-5	0	-1	-16			
## 4	-8		-3	-6	0	-1	-4			
## 5	-6		0	-8	-1	-3	-2			
## 6	-7		-1	-3	-3	-1	-22			
##	tshrub66_96	gram66_96	herb66_96	geo66_96	dAge66_96	dAge66_10				
## 1	0	-1	-1	-1	2	2				
## 2	3	-1	1	-3	8	22				
## 3	-3	1	1	-2	7	0				
## 4	-2	-4	1	0	5	19				
## 5	1	-7	-2	-1	7	2				
## 6	-1	-8	-3	-3	7	0				
##	dAge66_10_std	dAge66_96_std	tss66_96	tss66_10	Moisture					
## 1	0.09905243	0.6127811	0	0	5					
## 2	1.69571842	1.4231528	1	1	5					
## 3	-0.06061417	1.2880909	1	1	4					
## 4	1.45621852	1.0179670	0	0	3					
## 5	0.09905243	1.2880909	-1	-1	2					
## 6	-0.06061417	1.2880909	1	1	4					

The total number of species and per survey and their growth form composition

## Total	1966	1996	2010		
##	381	298	261		
##	herb	geophyte	graminoid	low_shrub	tall_shrub
## Total	26	19	97	184	54
## 1966	19	16	75	145	40
## 1996	14	14	78	136	40

```
## 2010    13      14      62      125      45
```

Spatial turnover between plots within each survey as measured using Sorenson's dissimilarity

```
##      Min. 1st Qu. Median   Mean 3rd Qu. Max.
## 1966 0.2787  0.5931 0.7097 0.7082  0.8313    1
## 1996 0.2773  0.5738 0.6977 0.6966  0.8292    1
## 2010 0.3131  0.6000 0.7273 0.7242  0.8515    1
```

The number and names of the unique species per survey.

```
## $`1966`
## [1] 41
##
## $`1996`
## [1] 29
##
## $`2010`
## [1] 37
##
## $`1966`
## [1] "Agathosma lanceolata"      "Anthochortus laxiflorus"
## [3] "Aristea glauca"           "Aspalathus ericifolia"
## [5] "Aspalathus sericea"        "Bobartia filiformis"
## [7] "Capeobolus brevicaulis"    "Carpacoe spermacoea"
## [9] "Centella affinis"          "Crassula flava"
## [11] "Crassula nudicaulis"       "Crassula subulata"
## [13] "Cynanchum obtusifolium"    "Ehrharta bulbosa"
## [15] "Erica parviflora"          "Euphorbia silenifolia"
## [17] "Ficinia anceps"            "Ficinia paradoxa"
## [19] "Helichrysum cymosum"       "Helichrysum patulum"
## [21] "Hypodiscus albo-aristatus" "Indigofera sarmentosa"
## [23] "Linum africanum"           "Linum thunbergii"
## [25] "Lobostemon fruticosus"     "Manulea tomentosa"
## [27] "Muraltia filiformis"       "Oedera imbricata"
## [29] "Osteospermum moniliferum"  "Pentameris aurea"
## [31] "Psoralea imbricata"        "Rafnia crassifolia"
## [33] "Roella prostrata"          "Salvia africana-lutea"
## [35] "Searsia rosmarinifolia"    "Selago luxurians"
## [37] "Stoebe rosea"              "Syncarpha canescens"
## [39] "Tetraria ustulata"         "Thesium carinatum"
## [41] "Willdenowia humilis"
##
## $`1996`
## [1] "Agathosma bifida"          "Agathosma capensis"
## [3] "Arctotis acaulis"          "Arctotis aspera"
## [5] "Arctotis stoechadifolia"   "Aspalathus laricifolia"
## [7] "Asparagus rubicundus"     "Ehrharta setacea"
## [9] "Elegia thyrsoifera"        "Erica spumosa"
## [11] "Erica subdivaricata"       "Ficinia indica"
## [13] "Helichrysum crispum"       "Hermas villosa"
## [15] "Indigofera candolleana"    "Lampranthus falciformis"
## [17] "Muraltia spinosa"          "Othonna digitata"
```

```

## [19] "Pelargonium myrrhifolium" "Pentameris acinosa"
## [21] "Phylica dodii"           "Restio leptostachyus"
## [23] "Stoebe fusca"           "Tetraria fimbriolata"
## [25] "Tetraria ligulata"       "Thamnochortus gracilis"
## [27] "Thesium schumannianum"   "Vellereophyton dealbatum"
## [29] "Wahlenbergia pyrophila"
##
## $`2010`
## [1] "Aspalathus ciliaris"      "Bolusaфра bituminosa"
## [3] "Bulbine alooides"         "Caesia contorta"
## [5] "Chironia baccifera"       "Drosera trinervia"
## [7] "Elegia persistens"        "Eragrostis capensis"
## [9] "Erica hirtiflora"         "Erica lasciva"
## [11] "Erica muscosa"            "Erica obliqua"
## [13] "Erica subcapitata"        "Erica tristis"
## [15] "Euclea racemosa"          "Euphorbia erythrina"
## [17] "Ficinia nigrescens"        "Ficinia trichodes"
## [19] "Gnidia juniperifolia"     "Helichrysum dasyanthum"
## [21] "Indigofera ionii"         "Lampranthus elegans"
## [23] "Lampranthus emarginatus"   "Metalasia densa"
## [25] "Muraltia alopecuroides"    "Muraltia ericoides"
## [27] "Olea exasperata"          "Othonna quinquedentata"
## [29] "Phylica ericoides"         "Prismatocarpus sessilis"
## [31] "Psoralea aphylla"         "Pterocelastrus tricuspidatus"
## [33] "Searsia glauca"           "Struthiola dodecandra"
## [35] "Tetraria bromoides"        "Thamnochortus insignis"
## [37] "Thesium nigromontanum"

```

2. Testing for change in species number within sites between surveys (Table 1 in the manuscript)

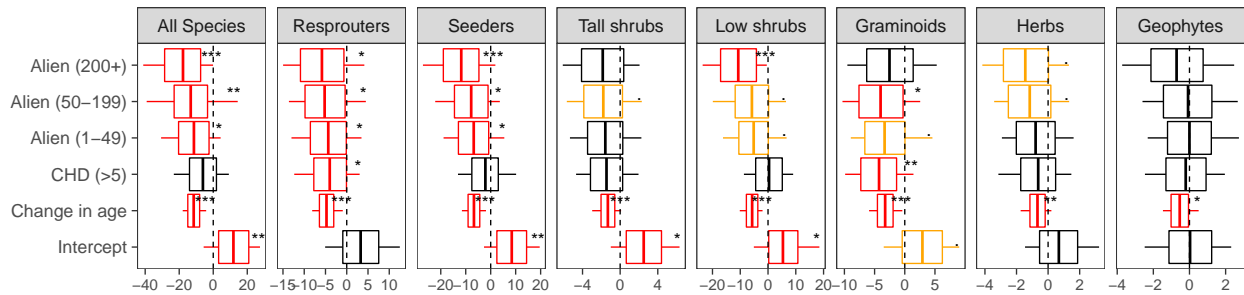
Here we explore the effects of vegetation age and survey year on species counts within plots for all species, then seeders, resprouters and each of the growth forms separately (see Table 1 of the paper). Analyses are done with MCMCglmm. Age and year are fixed effects while plot is a random effect, creating a repeated measures design.

Set	Statistic	Intercept	Age	1996	2010
All species	post.mean	3.859	-0.022	-0.087	-0.091
	pMCMC	***	***	**	*
Resprouters	post.mean	3.078	-0.016	-0.088	-0.226
	pMCMC	***	***	.	***
Seeders	post.mean	3.259	-0.027	-0.095	0.007
	pMCMC	***	***	*	NS
Tall shrubs	post.mean	1.63	-0.011	0.055	-0.006
	pMCMC	***	*	NS	NS
Low shrubs	post.mean	3.05	-0.032	-0.095	0.027
	pMCMC	***	***	*	NS
Herbs	post.mean	0.634	-0.028	-0.207	-0.507
	pMCMC	***	*	NS	***
Graminoids	post.mean	2.749	-0.014	-0.106	-0.251
	pMCMC	***	***	*	***
Geophytes	post.mean	0.921	-0.015	-0.098	-0.111
	pMCMC	***	*	NS	NS

Note that results may differ slightly from the published tables and figures due to the MCMC sampling process!

3. Testing for differences in the drivers of change in species number within sites between surveys across plots (Figure 2 in the manuscript)

Here we perform the analysis of drivers of change in species numbers through time as described in the paper. The output is presented as boxplots on their side indicating the posterior mean, 95% HPD interval (box) and maximum and minimum values. pMCMC <0.1, <0.05, <0.005, <0.001 are indicated by ., *, **, ***. Each individual model's results are printed below.



```
## $`All Species`
##
## Iterations = 3001:52991
## Thinning interval = 10
## Sample size = 5000
##
## DIC: 411.0407
##
## R-structure: ~units
##
##      post.mean l-95% CI u-95% CI eff.samp
## units      106.8    66.34    151.9     5000
```

```

##
## Location effects: dSR66_10 ~ dAge66_10_std + chd66_10 + Aliens_max
##
##          post.mean l-95% CI u-95% CI eff.samp  pMCMC
## (Intercept)      11.860    2.783   20.480     5000 0.0084 **
## dAge66_10_std    -11.484   -14.858   -7.969     5000 <2e-04 ***
## chd66_10(5,11]   -6.073   -13.649    2.093     5000 0.1344
## Aliens_max1      -11.356   -20.428   -2.613     5000 0.0112 *
## Aliens_max2      -13.229   -22.755   -3.125     4202 0.0084 **
## Aliens_max3      -17.777   -28.962   -7.891     5000 <2e-04 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## $Resprouters
##
## Iterations = 3001:52991
## Thinning interval = 10
## Sample size = 5000
##
## DIC: 332.7535
##
## R-structure: ~units
##
##          post.mean l-95% CI u-95% CI eff.samp
## units      24.88    15.51    34.95     4622
##
## Location effects: dSR66_10r ~ dAge66_10_std + chd66_10 + Aliens_max
##
##          post.mean l-95% CI u-95% CI eff.samp  pMCMC
## (Intercept)      3.27050   -0.66464    7.67908     5000 0.1248
## dAge66_10_std    -4.75914   -6.42809   -3.06531     5000 <2e-04 ***
## chd66_10(5,11]   -3.99795   -7.77126   -0.10982     5000 0.0484 *
## Aliens_max1      -4.34469   -8.50475   -0.07507     5000 0.0464 *
## Aliens_max2      -5.20067   -9.85485   -0.43762     5000 0.0376 *
## Aliens_max3      -5.83792  -10.66913   -0.53478     5000 0.0224 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## $Seeders
##
## Iterations = 3001:52991
## Thinning interval = 10
## Sample size = 5000
##
## DIC: 370.2936
##
## R-structure: ~units
##
##          post.mean l-95% CI u-95% CI eff.samp
## units      49.93    32.08    71.77     5313
##
## Location effects: dSR66_10s ~ dAge66_10_std + chd66_10 + Aliens_max
##
##          post.mean l-95% CI u-95% CI eff.samp  pMCMC

```

```

## (Intercept)      8.4347   2.4668  14.3152    5000 0.0080 **
## dAge66_10_std    -6.7113  -8.9310  -4.2570    5000 <2e-04 ***
## chd66_10(5,11]   -2.1297  -7.5536   3.0437    4632 0.4412
## Aliens_max1      -6.7971 -12.5833  -0.5681    5000 0.0256 *
## Aliens_max2      -7.8137 -14.5652  -1.1968    4934 0.0280 *
## Aliens_max3     -11.7944 -19.0444  -4.8720    4722 0.0012 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## $`Tall shrubs`
##
## Iterations = 3001:52991
## Thinning interval = 10
## Sample size = 5000
##
## DIC: 243.3486
##
## R-structure: ~units
##
##      post.mean l-95% CI u-95% CI eff.samp
## units      4.777    2.951    6.689    6024
##
## Location effects: tshrub66_10 ~ dAge66_10_std + chd66_10 + Aliens_max
##
##      post.mean l-95% CI u-95% CI eff.samp pMCMC
## (Intercept)    2.5050    0.7685    4.4928    5000 0.0120 *
## dAge66_10_std  -1.3069   -2.0602   -0.6039    5000 0.0016 **
## chd66_10(5,11] -1.4509   -3.2096    0.2051    5000 0.1024
## Aliens_max1    -1.5766   -3.4501    0.2862    5000 0.1008
## Aliens_max2    -1.7910   -3.8656    0.2464    5000 0.0820 .
## Aliens_max3    -1.8505   -4.1781    0.2715    5000 0.1052
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## $`Low shrubs`
##
## Iterations = 3001:52991
## Thinning interval = 10
## Sample size = 5000
##
## DIC: 357.9061
##
## R-structure: ~units
##
##      post.mean l-95% CI u-95% CI eff.samp
## units      39.81    25.12    57.49    4754
##
## Location effects: lshrub66_10 ~ dAge66_10_std + chd66_10 + Aliens_max
##
##      post.mean l-95% CI u-95% CI eff.samp pMCMC
## (Intercept)    5.36394    0.24312  10.71944    5000 0.0384 *
## dAge66_10_std  -5.72166   -7.79702  -3.67713    5000 <2e-04 ***
## chd66_10(5,11]  0.36858   -4.29919   5.22303    5000 0.8712
## Aliens_max1    -5.16495  -10.61423  -0.04139    5000 0.0556 .

```

```

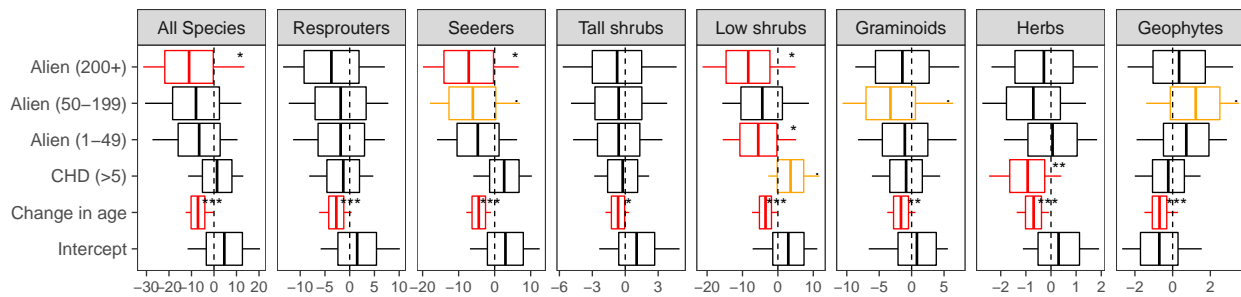
## Aliens_max2      -5.80689 -11.77154   0.23840    5000 0.0600 .
## Aliens_max3     -10.71818 -16.75530  -3.91608    5211 <2e-04 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## $Graminoids
##
## Iterations = 3001:52991
## Thinning interval = 10
## Sample size = 5000
##
## DIC: 304.1245
##
## R-structure: ~units
##
##      post.mean l-95% CI u-95% CI eff.samp
## units      14.71    9.279    20.8    5906
##
## Location effects: gram66_10 ~ dAge66_10_std + chd66_10 + Aliens_max
##
##      post.mean l-95% CI u-95% CI eff.samp pMCMC
## (Intercept)    2.92435 -0.53614  6.06464    6187 0.0852 .
## dAge66_10_std  -3.25100 -4.53552 -1.94748    5000 <2e-04 ***
## chd66_10(5,11] -4.25976 -7.10519 -1.23588    5000 0.0052 **
## Aliens_max1    -3.34164 -6.64509 -0.02797    5282 0.0508 .
## Aliens_max2    -4.00696 -7.63356 -0.36615    5222 0.0304 *
## Aliens_max3    -2.53017 -6.30530  1.39460    5000 0.1988
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## $Herbs
##
## Iterations = 3001:52991
## Thinning interval = 10
## Sample size = 5000
##
## DIC: 197.5528
##
## R-structure: ~units
##
##      post.mean l-95% CI u-95% CI eff.samp
## units      2.046    1.22    2.883    5000
##
## Location effects: herb66_10 ~ dAge66_10_std + chd66_10 + Aliens_max
##
##      post.mean l-95% CI u-95% CI eff.samp pMCMC
## (Intercept)    0.68151 -0.55174  1.85548    4677 0.2716
## dAge66_10_std  -0.67191 -1.16234 -0.20601    5267 0.0064 **
## chd66_10(5,11] -0.62696 -1.70357  0.49567    5000 0.2600
## Aliens_max1    -0.79120 -1.98095  0.45973    4886 0.1976
## Aliens_max2    -1.16249 -2.48029  0.19810    5084 0.0928 .
## Aliens_max3    -1.44375 -2.89397 -0.05774    5000 0.0520 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```



```
##
## $Geophytes
##
## Iterations = 3001:52991
## Thinning interval = 10
## Sample size = 5000
##
## DIC: 197.8163
##
## R-structure: ~units
##
##      post.mean l-95% CI u-95% CI eff.samp
## units      2.055      1.29      2.923      5000
##
## Location effects: geo66_10 ~ dAge66_10_std + chd66_10 + Aliens_max
##
##      post.mean  l-95% CI  u-95% CI  eff.samp  pMCMC
## (Intercept)    0.032169 -1.135289  1.228516    5000  0.960
## dAge66_10_std  -0.539463 -1.022537 -0.060092    5000  0.034 *
## chd66_10(5,11] -0.207878 -1.306494  0.906624    5000  0.707
## Aliens_max1    -0.001126 -1.197948  1.224256    5000  0.998
## Aliens_max2    -0.078490 -1.377375  1.270526    5000  0.909
## Aliens_max3    -0.713170 -2.184106  0.662119    5000  0.319
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

And the period 1966 to 1996 (Fig. S1)



```
## $`All Species`
##
## Iterations = 3001:52991
## Thinning interval = 10
## Sample size = 5000
##
## DIC: 414.0423
##
## R-structure: ~units
##
##      post.mean l-95% CI u-95% CI eff.samp
## units      112.7      72.18      160.9      5000
##
## Location effects: dSR66_96 ~ dAge66_96_std + chd66_96 + Aliens_max
```

```

##
##               post.mean l-95% CI u-95% CI eff.samp  pMCMC
## (Intercept)      4.5914  -3.3669  12.6431     5224 0.2584
## dAge66_96_std    -7.1269 -10.0965  -4.0013     5000 <2e-04 ***
## chd66_96(5,11]    1.3605  -5.1143   7.9978     5000 0.6876
## Aliens_max1      -6.5906 -15.3450   3.1537     5691 0.1536
## Aliens_max2      -7.9979 -18.8502   1.8982     5000 0.1260
## Aliens_max3     -11.0643 -22.0475  -0.5504     5622 0.0448 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## $Resprouters
##
## Iterations = 3001:52991
## Thinning interval = 10
## Sample size = 5000
##
## DIC: 340.0175
##
## R-structure: ~units
##
##               post.mean l-95% CI u-95% CI eff.samp
## units          28.55    18.35    40.74    5831
##
## Location effects: dSR66_96r ~ dAge66_96_std + chd66_96 + Aliens_max
##
##               post.mean l-95% CI u-95% CI eff.samp  pMCMC
## (Intercept)      1.514   -2.465   5.333     5000 0.4604
## dAge66_96_std    -2.706   -4.312  -1.283     5000 0.0012 **
## chd66_96(5,11]   -1.297   -4.630   1.951     5000 0.4336
## Aliens_max1      -1.830   -6.541   2.762     5000 0.4600
## Aliens_max2      -1.820   -7.007   3.317     5000 0.4888
## Aliens_max3      -3.700   -9.191   1.905     5000 0.2000
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## $Seeders
##
## Iterations = 3001:52991
## Thinning interval = 10
## Sample size = 5000
##
## DIC: 361.6669
##
## R-structure: ~units
##
##               post.mean l-95% CI u-95% CI eff.samp
## units          42.97    26.35    61.39    5000
##
## Location effects: dSR66_96s ~ dAge66_96_std + chd66_96 + Aliens_max
##
##               post.mean l-95% CI u-95% CI eff.samp  pMCMC
## (Intercept)      2.9921  -2.1425   7.8258     4771 0.2352
## dAge66_96_std    -4.4139  -6.2587  -2.5326     5000 <2e-04 ***

```

```

## chd66_96(5,11]      2.6410  -1.3694   6.7973      5000 0.1968
## Aliens_max1        -4.6804 -10.4558   1.1943      4392 0.1208
## Aliens_max2        -6.0626 -12.7043   0.2953      4240 0.0668 .
## Aliens_max3        -7.1991 -14.3174  -0.6537      5000 0.0396 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## $`Tall shrubs`
##
## Iterations = 3001:52991
## Thinning interval = 10
## Sample size = 5000
##
## DIC: 242.0081
##
## R-structure: ~units
##
##      post.mean l-95% CI u-95% CI eff.samp
## units      4.658      2.979      6.702      4705
##
## Location effects: tshrub66_96 ~ dAge66_96_std + chd66_96 + Aliens_max
##
##      post.mean l-95% CI u-95% CI eff.samp pMCMC
## (Intercept)      1.0375  -0.5769   2.6953      5000 0.2072
## dAge66_96_std    -0.6517  -1.2674  -0.0583      5000 0.0364 *
## chd66_96(5,11]   -0.2299  -1.5410   1.1631      5000 0.7240
## Aliens_max1      -0.5978  -2.5155   1.3439      5000 0.5340
## Aliens_max2      -0.5995  -2.7943   1.4609      5000 0.5912
## Aliens_max3      -0.7391  -2.9423   1.5371      5000 0.5192
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## $`Low shrubs`
##
## Iterations = 3001:52991
## Thinning interval = 10
## Sample size = 5000
##
## DIC: 350.8701
##
## R-structure: ~units
##
##      post.mean l-95% CI u-95% CI eff.samp
## units      35.04      22.06      50.04      5458
##
## Location effects: lshrub66_96 ~ dAge66_96_std + chd66_96 + Aliens_max
##
##      post.mean l-95% CI u-95% CI eff.samp pMCMC
## (Intercept)      2.9473  -1.2156   7.5723      5000 0.1844
## dAge66_96_std    -3.4871  -5.2293  -1.8261      5000 <2e-04 ***
## chd66_96(5,11]   3.5877  -0.2153   7.2508      4789 0.0632 .
## Aliens_max1      -5.5488 -10.7571  -0.3458      5000 0.0416 *
## Aliens_max2      -4.3983 -10.1822   1.4129      5000 0.1348
## Aliens_max3      -8.3767 -14.5906  -2.2305      5000 0.0120 *

```

```

## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## $Graminoids
##
## Iterations = 3001:52991
## Thinning interval = 10
## Sample size = 5000
##
## DIC: 308.8513
##
## R-structure: ~units
##
##      post.mean l-95% CI u-95% CI eff.samp
## units      15.98      10.11      22.86      5000
##
## Location effects: gram66_96 ~ dAge66_96_std + chd66_96 + Aliens_max
##
##      post.mean l-95% CI u-95% CI eff.samp pMCMC
## (Intercept)      0.8158  -2.2743   3.5322    4291 0.5844
## dAge66_96_std    -1.6443  -2.7842  -0.4804    5000 0.0076 **
## chd66_96(5,11]   -0.8495  -3.2232   1.7487    4595 0.5080
## Aliens_max1      -1.0491  -4.5405   2.4642    5000 0.5680
## Aliens_max2      -3.2711  -7.1821   0.4216    4313 0.0980 .
## Aliens_max3      -1.4264  -5.4679   2.8014    4576 0.4912
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## $Herbs
##
## Iterations = 3001:52991
## Thinning interval = 10
## Sample size = 5000
##
## DIC: 169.8687
##
## R-structure: ~units
##
##      post.mean l-95% CI u-95% CI eff.samp
## units      1.226      0.7731      1.743      5301
##
## Location effects: herb66_96 ~ dAge66_96_std + chd66_96 + Aliens_max
##
##      post.mean l-95% CI u-95% CI eff.samp pMCMC
## (Intercept)      0.30239 -0.49260  1.15339    6025 0.469
## dAge66_96_std    -0.69125 -1.00446  -0.36908    5000 <2e-04 ***
## chd66_96(5,11]   -0.92887 -1.62445  -0.24000    5000 0.006 **
## Aliens_max1      0.06176 -0.95879  0.99471    5000 0.893
## Aliens_max2     -0.70351 -1.71747  0.42832    5000 0.205
## Aliens_max3     -0.28372 -1.44621  0.85599    5000 0.618
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## $Geophytes

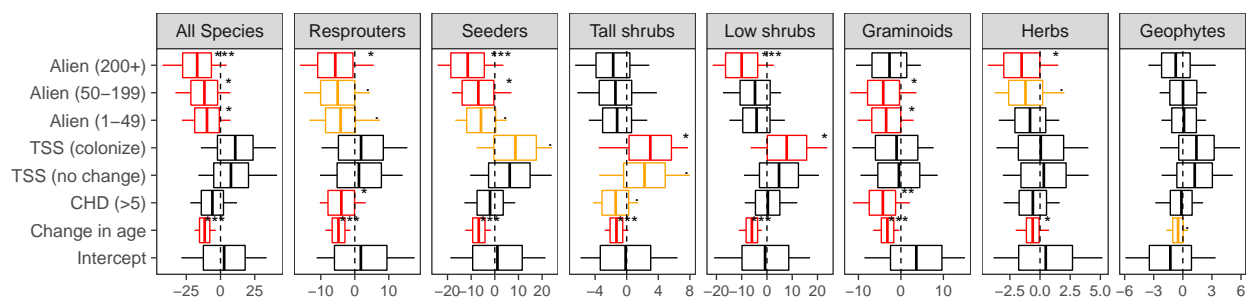
```

```
##
## Iterations = 3001:52991
## Thinning interval = 10
## Sample size = 5000
##
## DIC: 191.3897
##
## R-structure: ~units
##
##      post.mean l-95% CI u-95% CI eff.samp
## units      1.828    1.142    2.628    5000
##
## Location effects: geo66_96 ~ dAge66_96_std + chd66_96 + Aliens_max
##
##      post.mean l-95% CI u-95% CI eff.samp pMCMC
## (Intercept)   -0.7051  -1.6914   0.2957   5000 0.1656
## dAge66_96_std -0.6947  -1.0699  -0.3044   5000 0.0012 **
## chd66_96(5,11] -0.2313  -1.1073   0.5700   5000 0.5756
## Aliens_max1    0.7259  -0.5732   1.8236   5000 0.2372
## Aliens_max2    1.2235  -0.1277   2.4940   4610 0.0764 .
## Aliens_max3    0.3435  -1.0736   1.6921   5000 0.6152
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

4. Include testing the impact of changes in the presence of serotinous tall shrubs

Cowling and Gxaba (1990) found evidence that serotinous overstorey shrub species in our study area are highly variable in distribution and density between fire events and that their density alters understorey community structure and diversity. We tested for this by rerunning our models exploring the drivers of change in species numbers, including the change in presence/absence of serotinous overstorey shrub species as a co-variate.

Cowling RM, Gxaba T (1990) Effects of a fynbos overstorey shrub on understorey community structure: implications for the maintenance of community-wide species richness. South African Journal of Ecology 1: 1–7.



The results show that the additional co-variate affects only response variables with which it is auto-correlated (i.e. positive effects on the diversity of tall shrubs, seeder species and the sum of all species), and a weak positive effect on low shrubs. No groups were negatively affected by the colonization of plots by serotinous tall shrubs. Serotinous tall shrubs showed no change across most plots (37) through time, while they were lost from 3 plots and gained in 14.