Results 3 February 2017

Question 1: How does species richness change over time?

Q1.1. Looking at all the data together

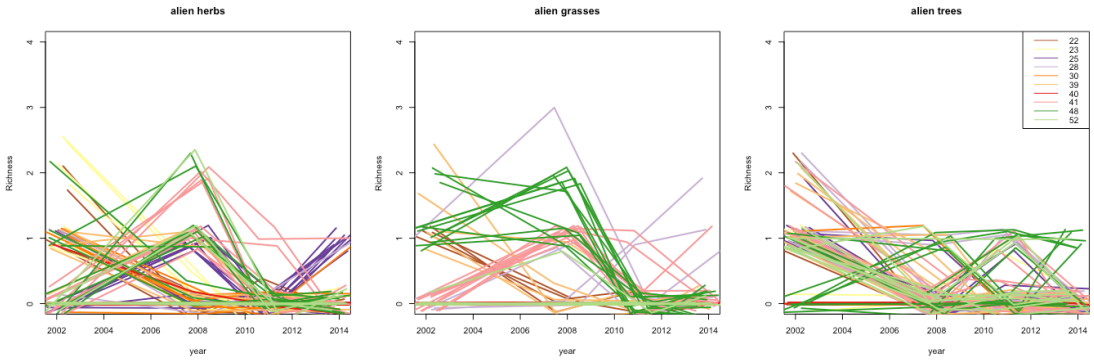


Fig. 1.1. Changes in alien species richness over time, coloured by site ID.

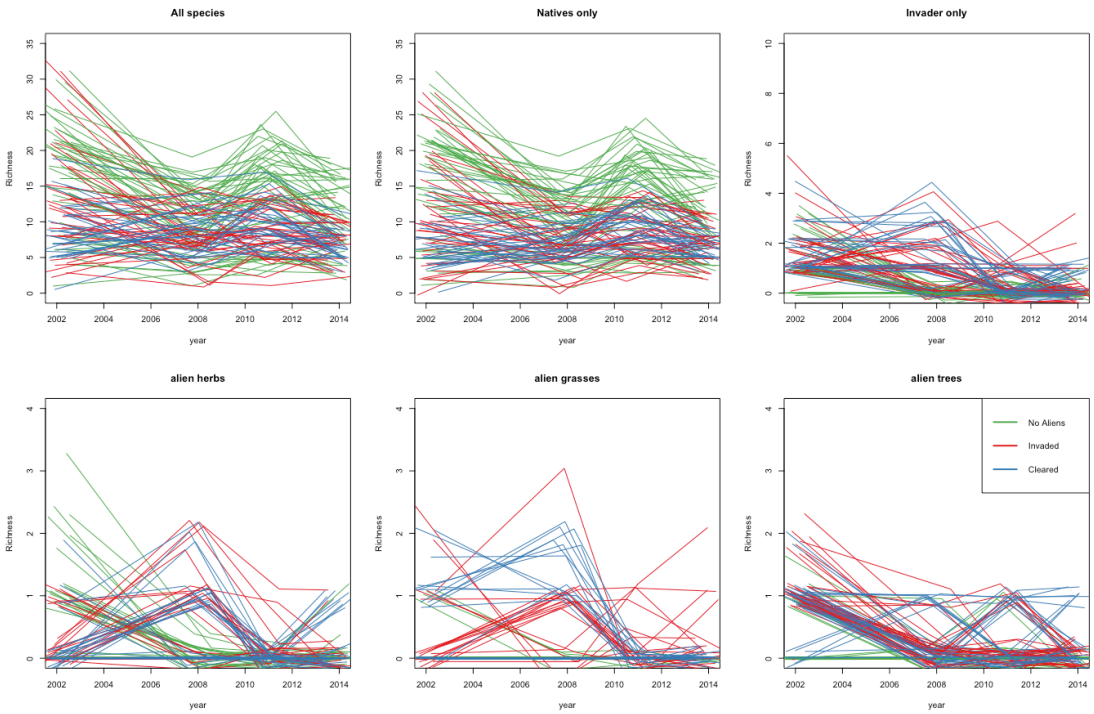


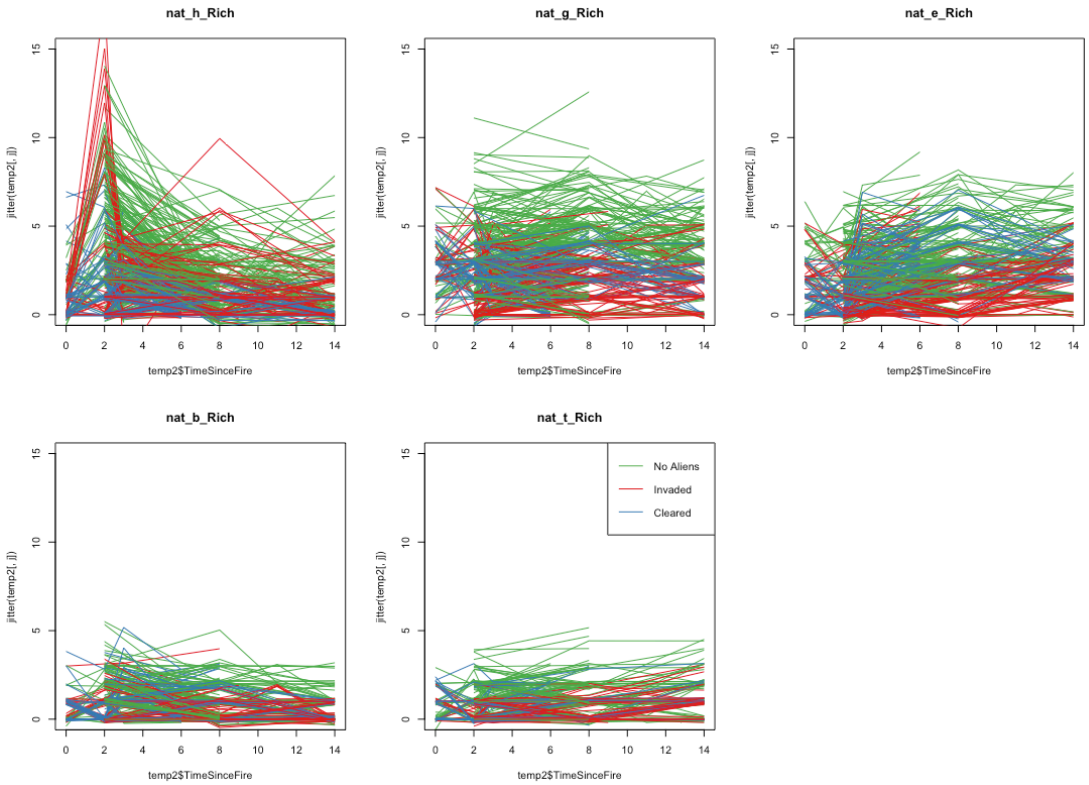
Fig. 1.2. Changes in native and alien species richness over time, coloured by treatment.

➔ See tests in the next section.

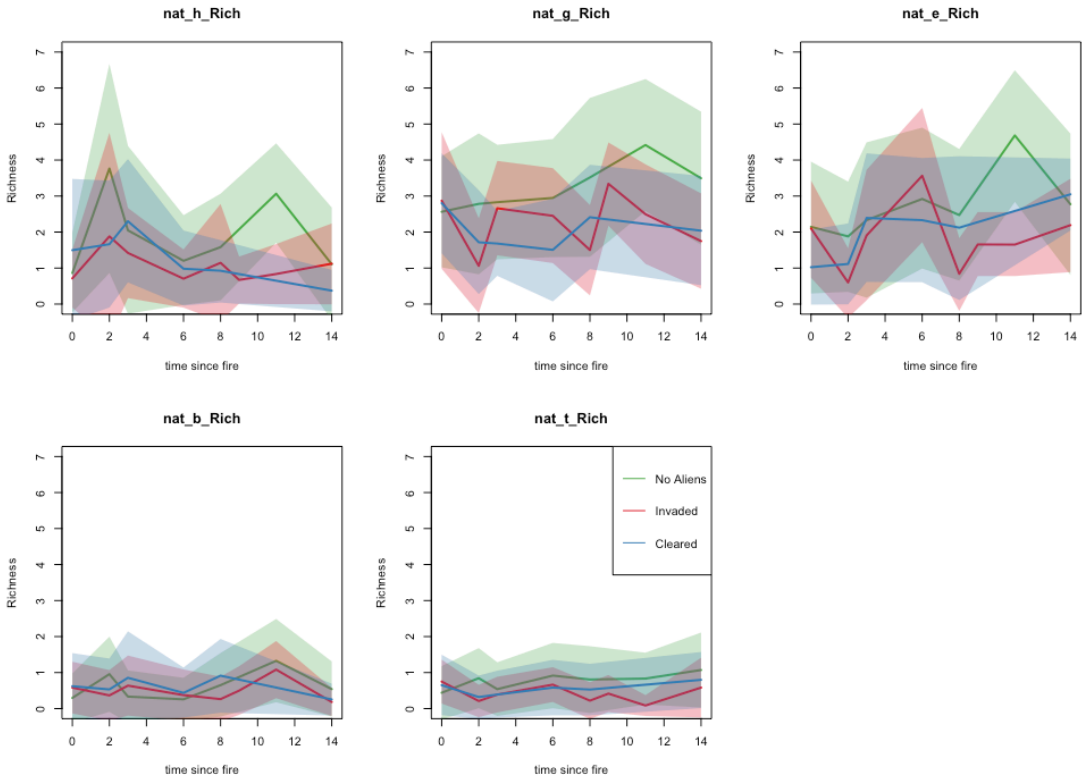
CONCLUSION: Native and alien richness generally decrease over time

Q1.2. Using the time since the last fire instead of time series

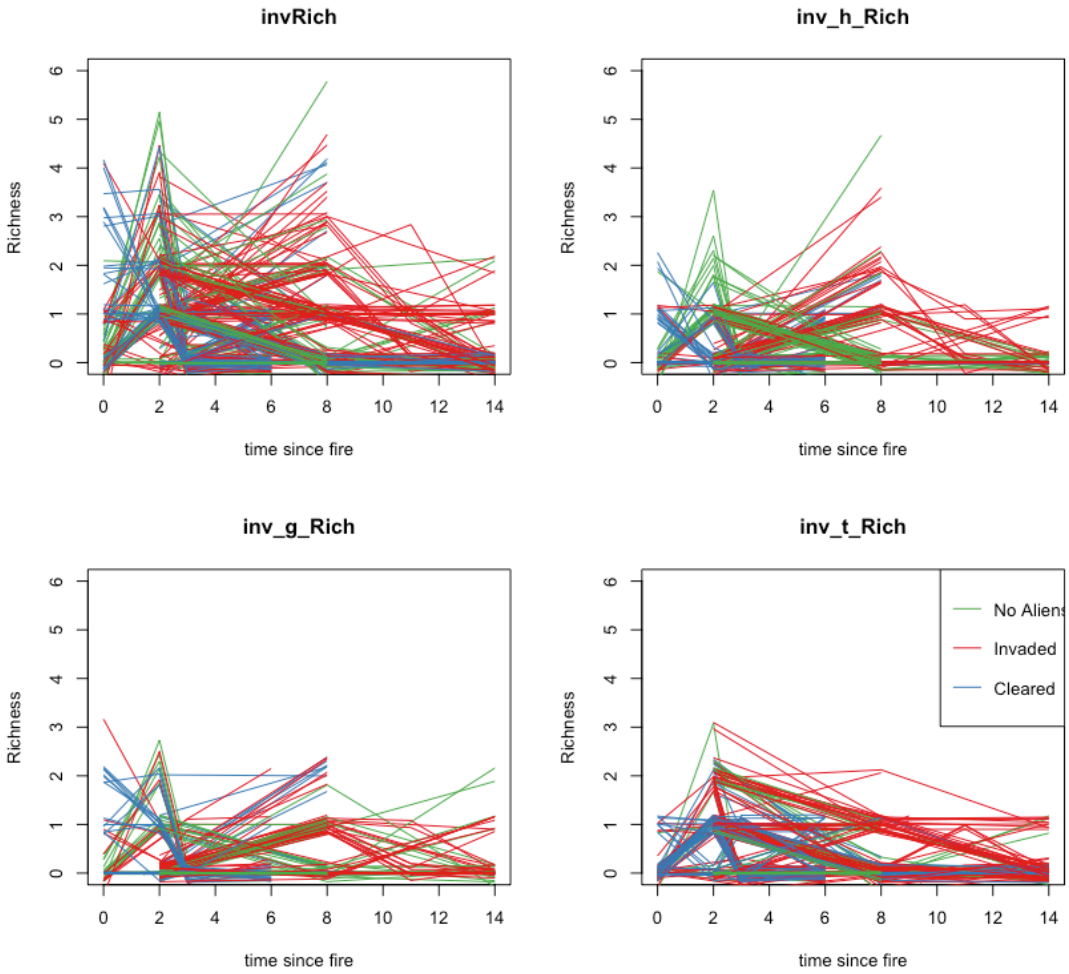
Native species richness



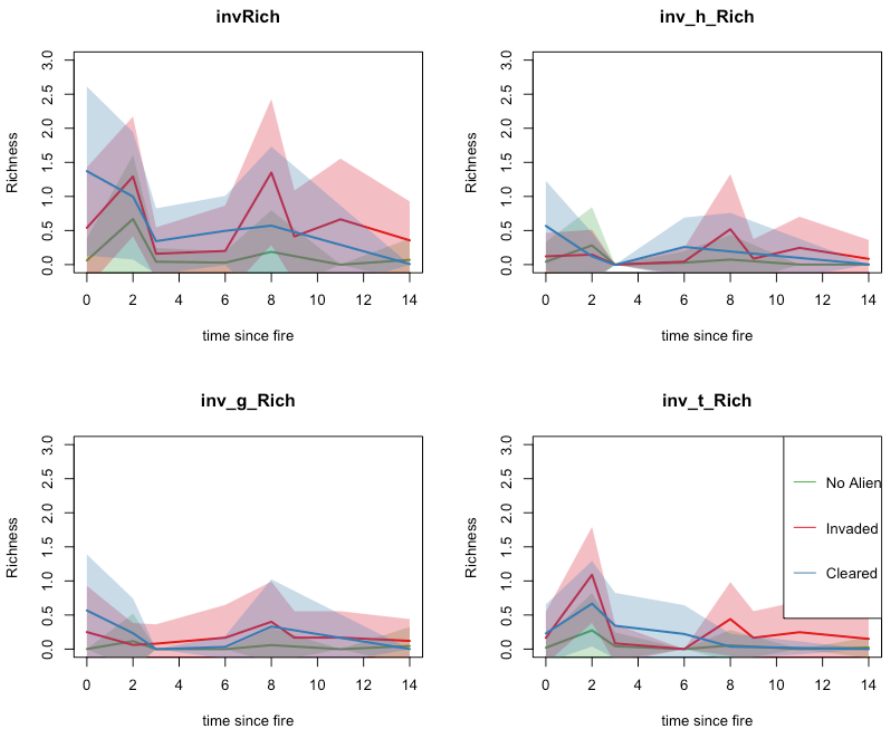
or similar, but the mean + sd only



Invasive species richness



only mean and sd trends



Location effects: natRich ~ Aliens + TimeSinceFire

	post.mean	l-95% CI	u-95% CI	eff.samp	pMCMC	
(Intercept)	1.780550	1.668968	1.896558	162.96	<0.001	***
AliensInvaded	-0.359443	-0.507146	-0.219056	52.54	<0.001	***
AliensNo Aliens	0.410151	0.265791	0.528060	134.39	<0.001	***
TimeSinceFire	-0.005715	-0.011374	-0.002255	38.10	0.018	*

R^2=0.16

Location effects: nat_h_Rich ~ Aliens + TimeSinceFire

	post.mean	l-95% CI	u-95% CI	eff.samp	pMCMC	
(Intercept)	0.34684	0.16072	0.52373	607.5	<0.001	***
AliensInvaded	0.02559	-0.19147	0.26165	638.2	0.844	
AliensNo Aliens	0.66651	0.48506	0.87772	623.3	<0.001	***
TimeSinceFire	-0.08395	-0.09737	-0.07201	477.4	<0.001	***

R^2=0.11

Location effects: nat_g_Rich ~ Aliens + TimeSinceFire

	post.mean	l-95% CI	u-95% CI	eff.samp	pMCMC	
(Intercept)	0.47988	0.35001	0.62066	10.982	<0.001	***
AliensInvaded	-0.26024	-0.41357	-0.09860	10.508	<0.001	***
AliensNo Aliens	0.40629	0.27666	0.54624	47.237	<0.001	***
TimeSinceFire	0.01816	0.01061	0.02507	7.721	<0.001	***

R^2=0.15

Location effects: nat_e_Rich ~ Aliens + TimeSinceFire

	post.mean	l-95% CI	u-95% CI	eff.samp	pMCMC	
(Intercept)	0.10157	-0.05658	0.27114	48.26	0.224	
AliensInvaded	-0.38932	-0.62660	-0.17403	16.39	<0.001	***
AliensNo Aliens	0.24682	0.05276	0.43823	26.07	0.026	*
TimeSinceFire	0.04274	0.03575	0.05134	16.09	<0.001	***

R^2=0.11

Location effects: nat_b_Rich ~ Aliens + TimeSinceFire

	post.mean	l-95% CI	u-95% CI	eff.samp	pMCMC	
(Intercept)	-0.61113	-0.85904	-0.37664	14.310	<0.001	***
AliensInvaded	-0.53695	-0.84932	-0.21754	4.983	<0.001	***
AliensNo Aliens	0.14258	-0.10832	0.38623	26.152	0.256	
TimeSinceFire	-0.04079	-0.05163	-0.03200	13.703	<0.001	***

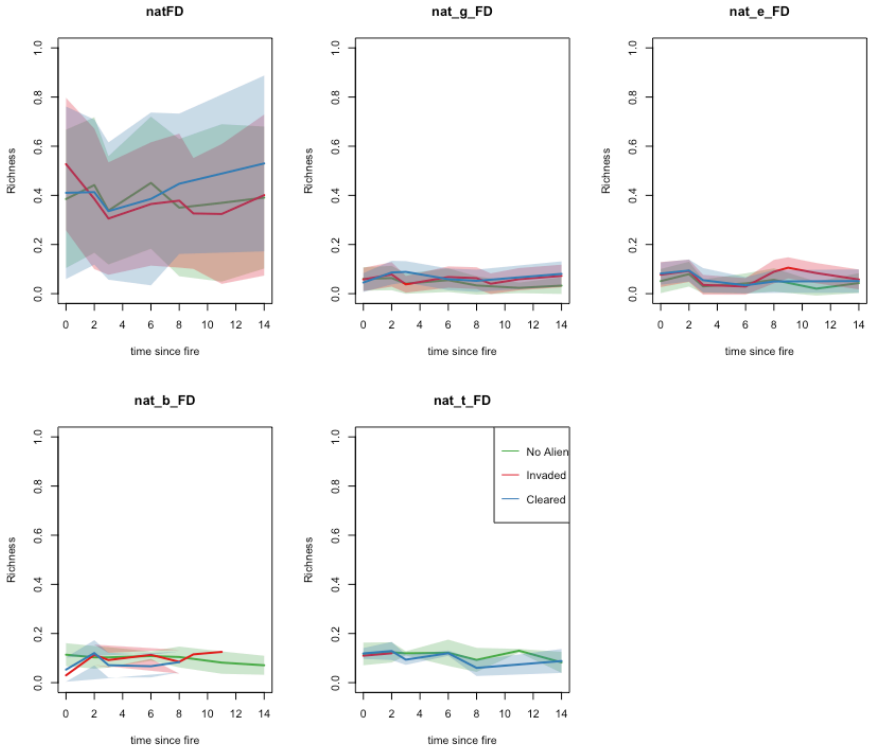
R^2=0.03

Location effects: nat_t_Rich ~ Aliens + TimeSinceFire

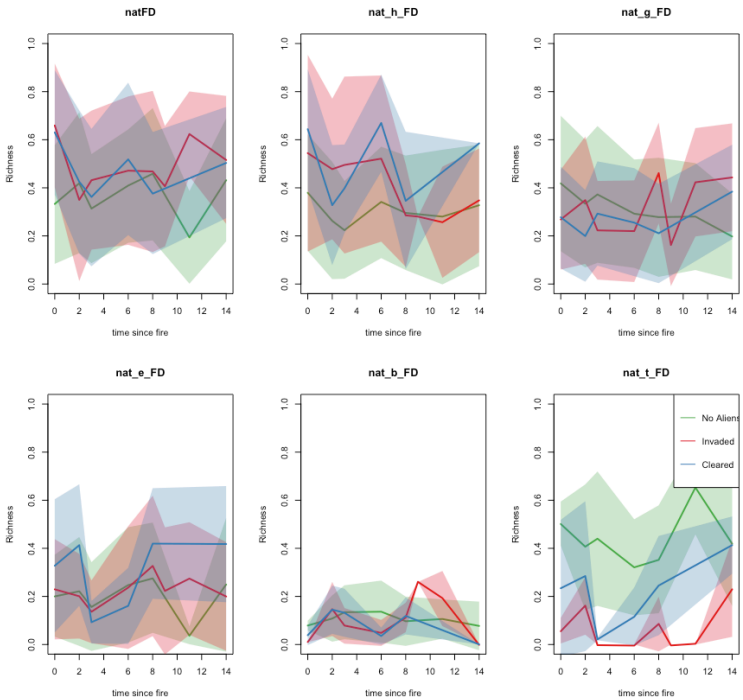
	post.mean	l-95% CI	u-95% CI	eff.samp	pMCMC	
(Intercept)	-1.15522	-1.42744	-0.90819	8.807	<0.001	***
AliensInvaded	-0.39733	-0.70288	-0.15146	10.298	<0.001	***
AliensNo Aliens	0.56794	0.26694	0.80138	9.997	<0.001	***
TimeSinceFire	0.02632	0.01169	0.04567	3.635	<0.001	***

R^2=0.09

Native species diversity (all traits included)



native diversity (all traits but growth form)



R2=0.01

Question 2: What are invasive species impacts on native species

2.A. Effects on native richness

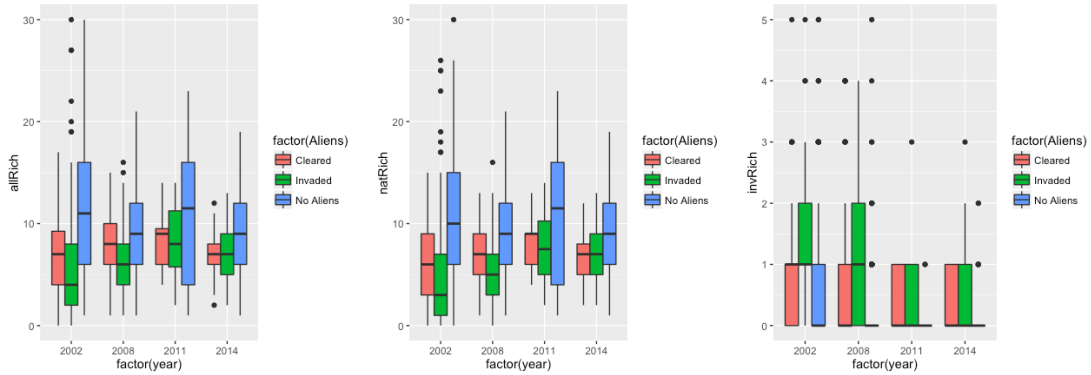


Fig. 2.1. Richness over time per treatment

Location effects: natRich ~ Aliens + year

	post.mean	l-95% CI	u-95% CI	eff.samp	pMCMC	
(Intercept)	18.214914	8.562264	27.494061	64.38	0.004	**
AliensInvaded	-0.377455	-0.529765	-0.231296	181.20	<0.001	***
AliensNo Aliens	0.387002	0.239750	0.527864	201.20	<0.001	***
year	-0.008196	-0.012849	-0.003405	64.23	0.004	**

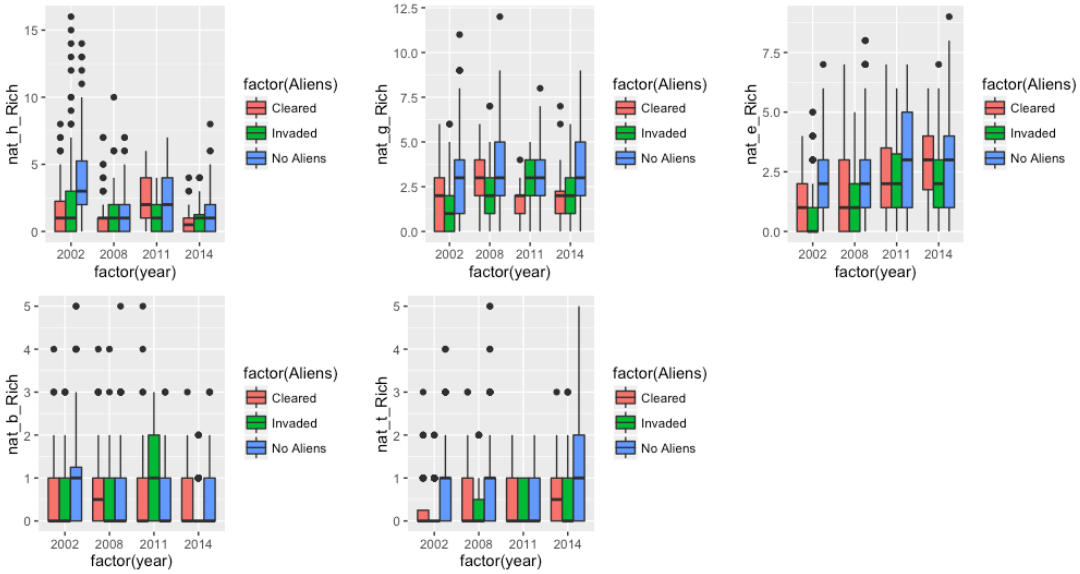
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

R2=0.15

➔ Native richness: generally decreases over time. + is highest when there is no alien / is medium in cleared sites / is lowest in invaded sites.
➔ I.e. the decrease is normal, as species grow larger over time + lower richness with aliens as space is limited.

Questions: why are there alien species in the "no alien" and cleared treatments? How to deal with it?

→ Add the type of native species



Location effects: nat_h_Rich ~ Aliens + year

	post.mean	l-95% CI	u-95% CI	eff.samp	pMCMC	
(Intercept)	186.43589	163.99808	207.51742	352.9	<0.001	***
AliensInvaded	-0.07481	-0.29613	0.12747	514.6	0.528	
AliensNo Aliens	0.51617	0.32819	0.71205	576.9	<0.001	***
year	-0.09289	-0.10379	-0.08211	353.0	<0.001	***

R^2=0.17

Location effects: nat_g_Rich ~ Aliens + year

	post.mean	l-95% CI	u-95% CI	eff.samp	pMCMC	
(Intercept)	-35.30975	-49.66475	-20.59395	20.57	<0.001	***
AliensInvaded	-0.24586	-0.41098	-0.08865	25.48	<0.001	***
AliensNo Aliens	0.46237	0.31184	0.60903	32.86	<0.001	***
year	0.01786	0.01094	0.02543	20.57	<0.001	***

R^2=0.14

Location effects: nat_e_Rich ~ Aliens + year

	post.mean	l-95% CI	u-95% CI	eff.samp	pMCMC	
(Intercept)	-94.71115	-105.80887	-83.47364	37.214	<0.001	***
AliensInvaded	-0.40766	-0.60323	-0.17933	22.414	<0.001	***
AliensNo Aliens	0.25437	0.04291	0.45696	9.364	0.034	*
year	0.04736	0.04181	0.05291	23.969	<0.001	***

R^2=0.13

Location effects: nat_b_Rich ~ Aliens + year

	post.mean	l-95% CI	u-95% CI	eff.samp	pMCMC	
(Intercept)	86.02884	54.19806	113.32631	14.60	<0.001	***
AliensInvaded	-0.56658	-0.88754	-0.27765	27.12	<0.001	***
AliensNo Aliens	0.15148	-0.08744	0.40300	60.13	0.248	
year	-0.04327	-0.05698	-0.02748	14.59	<0.001	***

R^2=0.04

Location effects: nat_t_Rich ~ Aliens + year

	post.mean	l-95% CI	u-95% CI	eff.samp	pMCMC	
(Intercept)	-63.67086	-94.31792	-35.16345	5.361	<0.001	***
AliensInvaded	-0.42809	-0.74186	-0.17160	5.940	<0.001	***
AliensNo Aliens	0.57089	0.39508	0.77225	60.225	<0.001	***
year	0.03124	0.01713	0.04653	5.367	<0.001	***

R^2=0.08

2.B. Effect on native functional diversity

→ Based on species growth form only

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Location effects: natFD ~ Aliens + year

                  post.mean   l-95% CI   u-95% CI eff.samp pMCMC
(Intercept)       2.666e-01 -5.378e+00  5.720e+00     1324 0.918
AliensInvaded    -3.380e-02 -9.373e-02  1.976e-02     1000 0.242
AliensNo Aliens  -1.336e-02 -6.205e-02  3.971e-02     1000 0.626
year              7.522e-05 -2.661e-03  2.859e-03     1326 0.956
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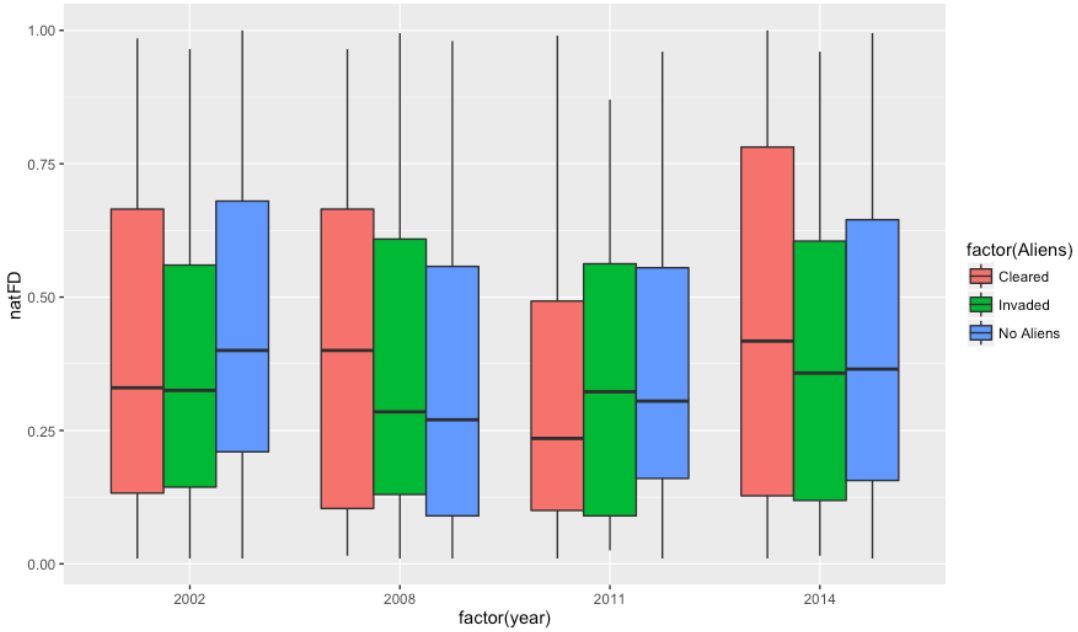
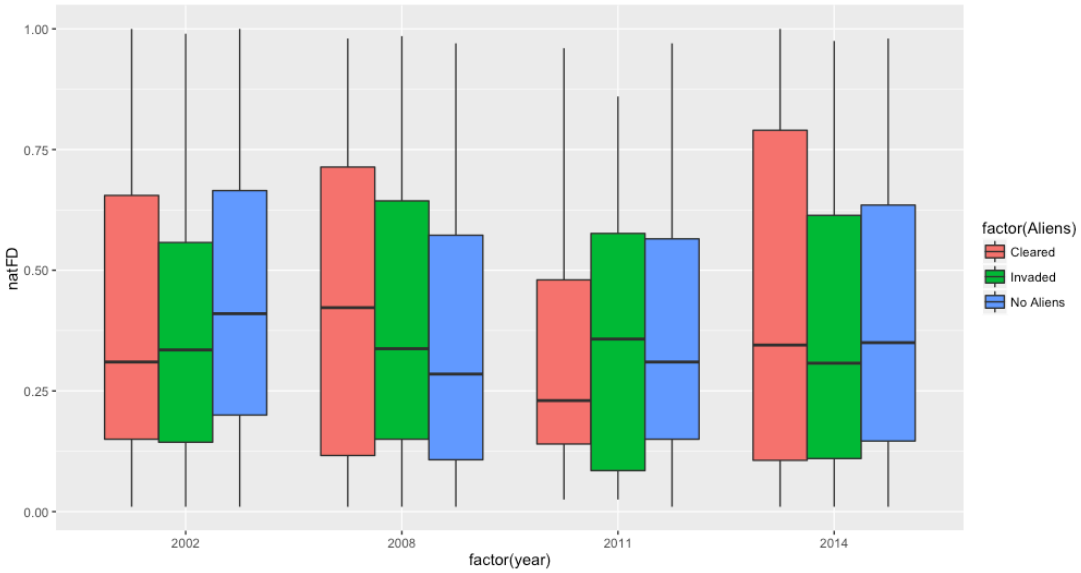


Fig. 2.2. Native species functional diversity (diversity based on growth form only) over time per treatment.

→ Based on all available traits (Growth_Form, Life_span_, Dispersal, Seed_size, Regeneration, plant_height, time_to_first_flower)



non-significant.