Appendix: Statistical model description and estimates

All models were run in R using brms and Hamiltonian Monte Carlo with two chains with each 5000 iteration from which 2000 were warmup

Model 1: Population spread depending on connectedness treatment

a) Model representation

edge ~ 0 + Intercept + treatment*day + (1 + day|mesoc)

prior = c(prior(normal(0,4), class = b),

       prior(cauchy(0,2), class = sd),

       prior(lkj(2), class = cor)

With *edge* the furthest occupied patch in a population spread test of a sample originating from an experimental mesocosm (*mesoc*) of a certain connectedness *treatment* spreading recorded at a certain point in time (in number of *day*s since the start). We modelled edge with a normally distributed error distribution and estimated it depending on *treatment*, time (*day*) and their interaction. We also modelled a varying intercept and slope in time for each tested mesocosm (*mesoc*). We used priors that are weakly regularizing. Of note, the used LKJ distribution is a Lewandowski-Kurowicka-Joe distribution that is regularly used a prior for a correlation matrix.

b) Model parameter estimates

	mean	se_mean	sd	2.5%	97.5%	n_eff	Rhat
b_Int	1.49	0.01	0.31	0.88	2.12	3492	1
b_treatment8	0.48	0.01	0.45	-0.39	1.34	4291	1
b_treatment16	0.51	0.01	0.49	-0.48	1.42	3963	1
b_day	0.12	0.00	0.05	0.02	0.21	2173	1
b_treatment8:day	0.02	0.00	0.07	-0.12	0.15	2434	1
b_treatment16:day	0.05	0.00	0.07	-0.08	0.19	2566	1
sd_mesoc__Int	0.38	0.01	0.24	0.02	0.94	2151	1
sd_mesoc__day	0.10	0.00	0.02	0.06	0.16	1947	1
cor_mesoc_Int_day	-0.41	0.01	0.38	-0.91	0.52	931	1
sigma	1.74	0.00	0.05	1.64	1.85	10190	1
r_mesoc[16.1,Int]	-0.02	0.00	0.35	-0.79	0.67	6434	1
r_mesoc[16.2,Int]	0.30	0.01	0.40	-0.28	1.29	3808	1
r_mesoc[16.3,Int]	-0.03	0.00	0.36	-0.78	0.74	5675	1
r_mesoc[16.4,Int]	-0.12	0.01	0.39	-1.05	0.56	5146	1

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r_mesoc[16.5,Int] -0.12     0.00 0.37    -0.95     0.57  6040    1
r_mesoc[4.1,Int]  -0.19     0.01 0.35    -1.03     0.42  3459    1
r_mesoc[4.2,Int]  -0.20     0.01 0.36    -1.07     0.40  3686    1
r_mesoc[4.3,Int]  -0.02     0.01 0.34    -0.72     0.73  4025    1
r_mesoc[4.4,Int]   0.08     0.00 0.33    -0.58     0.79  4367    1
r_mesoc[4.5,Int]   0.32     0.01 0.42    -0.31     1.33  3326    1
r_mesoc[8.1,Int]  -0.40     0.01 0.44    -1.38     0.25  2575    1
r_mesoc[8.2,Int]   0.22     0.01 0.41    -0.44     1.23  4728    1
r_mesoc[8.3,Int]   0.03     0.00 0.33    -0.65     0.72  6780    1
r_mesoc[8.4,Int]   0.18     0.00 0.34    -0.42     0.99  5345    1
r_mesoc[8.5,Int]  -0.02     0.00 0.33    -0.74     0.64  6535    1
r_mesoc[16.1,day] -0.05     0.00 0.05    -0.15     0.05  4165    1
r_mesoc[16.2,day] -0.03     0.00 0.05    -0.13     0.07  3799    1
r_mesoc[16.3,day]  0.07     0.00 0.05    -0.03     0.18  4427    1
r_mesoc[16.4,day] -0.03     0.00 0.05    -0.14     0.07  4278    1
r_mesoc[16.5,day]  0.04     0.00 0.05    -0.07     0.15  4464    1
r_mesoc[4.1,day]   0.08     0.00 0.05    -0.02     0.18  2449    1
r_mesoc[4.2,day]   0.01     0.00 0.05    -0.09     0.11  2439    1
r_mesoc[4.3,day]   0.09     0.00 0.05    -0.01     0.19  2473    1
r_mesoc[4.4,day]  -0.07     0.00 0.05    -0.17     0.03  2473    1
r_mesoc[4.5,day]  -0.10     0.00 0.05    -0.21    -0.01  2650    1
r_mesoc[8.1,day]   0.17     0.00 0.05     0.08     0.28  3401    1
r_mesoc[8.2,day]  -0.07     0.00 0.05    -0.19     0.03  3882    1
r_mesoc[8.3,day]  -0.03     0.00 0.05    -0.13     0.06  4027    1
r_mesoc[8.4,day]  -0.03     0.00 0.05    -0.13     0.07  4047    1
r_mesoc[8.5,day]  -0.04     0.00 0.05    -0.13     0.06  4064    1
```

Model 2: Population spread variance

a) Model representation

edge ~ edge ~ 0 + Intercept + repr*day + (1+day|mesoc)

prior = c(prior(normal(0,4), class = b),

   prior(cauchy(0,2), class = sd),

   prior(lkj(2), class = cor)

With *edge* the furthest occupied patch in a population spread test of a sample originating from an experimental

mesocosm (*mesoc*) that exhibited a certain reproductive success (*repr*) recorded at a certain point in time (in

number of *day*s since the start). We modelled edge with a normally distributed error distribution and estimated

it depending on *repr*oductive success, time (*day*) and their interaction. We also modelled a varying intercept and

slope in time for each tested mesocosm (*mesoc*). We used priors that are weakly regularizing. Of note, the used

LKJ distribution is a Lewandowski-Kurowicka-Joe distribution that is regularly used a prior for a correlation

matrix.

b) Model parameter estimates

	mean	se_mean	sd	2.5%	97.5%	n_eff	Rhat
b_Int	1.39	0.02	0.86	-0.37	3.06	3023	1
b_repr	0.01	0.00	0.02	-0.03	0.05	3067	1
b_day	0.19	0.00	0.13	-0.08	0.46	2304	1
b_repr:day	0.00	0.00	0.00	-0.01	0.00	2229	1
sd_mesoc__Int	0.39	0.01	0.27	0.02	0.99	2015	1
sd_mesoc__day	0.10	0.00	0.03	0.06	0.17	1722	1
cor_mesoc_Int_day	-0.20	0.01	0.40	-0.83	0.65	832	1
sigma	1.81	0.00	0.06	1.70	1.93	6092	1
r_mesoc[16.1,Int]	-0.03	0.00	0.32	-0.70	0.64	6130	1
r_mesoc[16.2,Int]	0.32	0.01	0.41	-0.24	1.33	3071	1
r_mesoc[16.3,Int]	0.05	0.01	0.37	-0.66	0.92	4343	1
r_mesoc[16.4,Int]	-0.18	0.01	0.41	-1.19	0.52	4290	1
r_mesoc[4.2,Int]	-0.25	0.01	0.40	-1.22	0.38	3609	1
r_mesoc[4.3,Int]	-0.07	0.00	0.33	-0.85	0.56	4510	1
r_mesoc[4.4,Int]	-0.06	0.01	0.34	-0.85	0.63	4295	1
r_mesoc[4.5,Int]	0.16	0.01	0.39	-0.53	1.12	3056	1
r_mesoc[8.1,Int]	-0.25	0.01	0.40	-1.17	0.41	2592	1
r_mesoc[8.2,Int]	0.17	0.01	0.42	-0.55	1.19	4230	1
r_mesoc[8.3,Int]	0.00	0.00	0.33	-0.74	0.71	5642	1
r_mesoc[8.4,Int]	0.27	0.01	0.43	-0.35	1.35	2636	1
r_mesoc[8.5,Int]	-0.08	0.01	0.35	-0.86	0.62	4466	1
r_mesoc[16.1,day]	0.00	0.00	0.04	-0.08	0.07	4052	1
r_mesoc[16.2,day]	0.02	0.00	0.04	-0.06	0.09	3312	1
r_mesoc[16.3,day]	0.11	0.00	0.04	0.03	0.20	4053	1
r_mesoc[16.4,day]	0.02	0.00	0.05	-0.08	0.12	3815	1
r_mesoc[4.2,day]	-0.03	0.00	0.06	-0.15	0.09	2723	1
r_mesoc[4.3,day]	0.06	0.00	0.04	-0.02	0.14	3436	1
r_mesoc[4.4,day]	-0.10	0.00	0.04	-0.19	-0.02	3199	1
r_mesoc[4.5,day]	-0.12	0.00	0.04	-0.22	-0.04	3489	1
r_mesoc[8.1,day]	0.17	0.00	0.04	0.10	0.26	3422	1
r_mesoc[8.2,day]	-0.05	0.00	0.06	-0.17	0.05	3022	1
r_mesoc[8.3,day]	-0.02	0.00	0.05	-0.11	0.07	3135	1
r_mesoc[8.4,day]	-0.04	0.00	0.07	-0.19	0.10	2494	1
r_mesoc[8.5,day]	-0.01	0.00	0.06	-0.13	0.10	2726	1

Model 3: Total population size

a) Model representation

edge ~ edge ~ 0 + Intercept + disp*day + (1+day|mesoc)

prior = c(prior(normal(0,4), class = b),

          prior(cauchy(0,2), class = sd),

          prior(lkj(2), class = cor)

With edge the furthest occupied patch in a population spread test of a sample originating from an experimental mesocosm (*mesoc*) that exhibited a certain dispersal propensity (*disp*) recorded at a certain point in time (in number of *day*s since the start). We modelled edge with a normally distributed error distribution and estimated it depending on *disp*ersal propensity, time (day) and their interaction. We also modelled a varying intercept and slope in time for each tested mesocosm (*mesoc*). We used priors that are weakly regularizing. Of note, the used LKJ distribution is a Lewandowski-Kurowicka-Joe distribution that is regularly used a prior for a correlation matrix.

b) Model estimates

	mean	se_mean	sd	2.5%	97.5%	n_eff	Rhat
b_Int	1.44	0.01	0.59	0.28	2.60	3348	1
b_disp	1.14	0.03	1.58	-1.98	4.29	3301	1
b_day	0.27	0.00	0.08	0.12	0.42	2472	1
b_disp:day	-0.36	0.00	0.20	-0.78	0.05	2471	1
sd_mesoc_Int	0.42	0.01	0.27	0.02	1.01	2015	1
sd_mesoc_day	0.08	0.00	0.02	0.05	0.14	1674	1
cor_mesoc_Int_day	-0.27	0.01	0.39	-0.85	0.64	908	1
sigma	1.79	0.00	0.06	1.67	1.91	6491	1
r_mesoc[16.1,Int]	-0.06	0.00	0.34	-0.80	0.62	6241	1
r_mesoc[16.2,Int]	0.40	0.01	0.45	-0.18	1.46	3128	1
r_mesoc[16.3,Int]	0.10	0.01	0.40	-0.64	1.02	4696	1
r_mesoc[16.4,Int]	-0.16	0.01	0.41	-1.13	0.53	5122	1
r_mesoc[4.1,Int]	-0.30	0.01	0.41	-1.24	0.34	3206	1
r_mesoc[4.2,Int]	-0.24	0.01	0.43	-1.30	0.46	3261	1
r_mesoc[4.3,Int]	0.02	0.01	0.36	-0.75	0.81	5038	1
r_mesoc[4.5,Int]	0.13	0.01	0.41	-0.66	1.10	4222	1
r_mesoc[8.1,Int]	-0.28	0.01	0.43	-1.25	0.46	2233	1
r_mesoc[8.2,Int]	0.21	0.01	0.43	-0.50	1.30	4049	1
r_mesoc[8.3,Int]	0.05	0.00	0.33	-0.63	0.78	6463	1
r_mesoc[8.4,Int]	0.20	0.01	0.36	-0.40	1.09	4528	1
r_mesoc[8.5,Int]	-0.05	0.00	0.34	-0.80	0.61	6011	1
r_mesoc[16.1,day]	0.01	0.00	0.04	-0.07	0.08	4392	1
r_mesoc[16.2,day]	-0.03	0.00	0.04	-0.11	0.05	3626	1
r_mesoc[16.3,day]	0.05	0.00	0.05	-0.04	0.15	3116	1
r_mesoc[16.4,day]	0.00	0.00	0.04	-0.08	0.08	5085	1
r_mesoc[4.1,day]	0.07	0.00	0.04	-0.01	0.16	3139	1
r_mesoc[4.2,day]	-0.08	0.00	0.05	-0.19	0.02	3052	1
r_mesoc[4.3,day]	-0.01	0.00	0.05	-0.10	0.08	3115	1
r_mesoc[4.5,day]	-0.07	0.00	0.06	-0.19	0.04	3233	1
r_mesoc[8.1,day]	0.16	0.00	0.04	0.10	0.24	2822	1
r_mesoc[8.2,day]	-0.05	0.00	0.05	-0.15	0.04	4371	1
r_mesoc[8.3,day]	-0.04	0.00	0.03	-0.10	0.03	5204	1
r_mesoc[8.4,day]	-0.01	0.00	0.04	-0.09	0.06	4290	1
r_mesoc[8.5,day]	-0.01	0.00	0.04	-0.08	0.07	4271	1