Table 1a. Description of parameters used in the model. See Materials and Methods for relevant equations and detailed descriptions.

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| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Code** | **Name** | | **Description** | |
| Overall |  |  | |  | |
|  | lambda\_dt(d,t) | Mean abundance | | Mean abundance at time *t* and site *s* | |
|  | gamma\_j.matrix() | Coefficients | | Vector of fixed-effect coefficients on abundance | |
| Detection |  |  | |  | |
|  | detectrate | Detection rate | | Mean probability of capturing and individual given that it is present at site *s* and time *t* | |
|  | extradetectrate\_i(i) | Variation in detection | | Variation in detection probability among sites and years | |
|  | extradetectionSD | Detection variance | | Variance of | |
| Spatial |  |  | |  | |
|  | Epsiloninput\_d(child\_b(b) | Spatial contribution | | Spatial contribution (component?, variation?) to abundance following an Ornstein-Uhlenbeck process | |
|  | SDinput\_b(b) | Spatial variance | | Variance between site and its parent-site following an OU process | |
|  | theta | Spatial decay rate | | Exponential spatial decay rate in the correlation between parent and child nodes | |
|  | SDinput | Asymptotic spatial variation | | Parameter governing asymptotic variation in the spatial OU process for two sites that are far apart | |
|  | rho\_b(b) | Spatial correlation | | Spatial correlation for site and its parent-site , resulting from an OU process | |
| Temporal |  |  | |  | |
|  | Deltainput\_t | Temporal variation | | Temporal variation in abundance resulting from AR1 autoregressive process | |
|  | rhot | Temporal correlation | | Temporal correlation in the annual AR1 process | |
|  | sigmat | Temporal variance | | Variance describing the temporal AR1 process | |
| Spatio-temporal |  |  | |  | |
|  | Nu\_dt(d,t) | Spatio-temporal variation | | Spatio-temporal variation in abundance resulting from OU process | |
|  | | |  | |  |  |
|  | SDinput\_t\_b(b) | Spatio-temporal variance | | Spatio-temporal variance between site and its parent-site | |
|  | rho\_st | Temporal decay | | Temporal decay rate of spatio-temporal variation, representing correlation for a given site in year and year | |
|  | rho\_t\_b(b) | Spatio-temporal correlation | | Spatio-temporal correlation between site and its parent-site , resulting from an OU process | |
|  | theta\_st | Spatio-temporal decay | | Spatial decay rate for spatio-temporal variation | |
|  | SDinput\_st | Asymptotic spatio-temporal variance | | Parameter governing asymptotic variance describing the spatio-temporal OU process for two sites that are far apart | |
| Independent |  |  | |  | |
|  | lognormal\_overdispersed\_i(i) | Overdispersion | | Random log-normal variation beyond Poisson expectation (also termed overdispersion or nugget) | |
|  | sigmaIID | Overdispersion variance | | Variance term for the Poisson log-normal overdispersion term [] | |
|  |  |  | |  | |
|  |  |  | |  | |

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| --- | --- | --- | --- |
| Variable | Mean | Min | Max |
| Percent forest cover (%) | 79.15 | 0 | 100 |
| Percent surficial coarseness (AB?) | 6.62 | 0 | 100 |
| Previous summer mean temperature (C) | 17.74 | 15.21 | 21.66 |
| Previous fall mean temperature (C) | 3.49 | -0.09 | 7.3 |
| Winter mean temperature (C) | -1.77 | -7.99 | 2.87 |
| Spring mean temperature (C) | 14.63 | 10.31 | 17.31 |
| Previous summer mean precipitation (mm) | 3.78 | 1.59 | 8.92 |
| Previous fall mean precipitation (mm) | 2.99 | 1.29 | 5.01 |
| Winter mean precipitation (mm) | 2.58 | 1.1 | 4.73 |
| Spring mean precipitation (mm) | 2.91 | 1.42 | 6.9 |