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

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | TMB | R sim | Description |
| Overall |  |  |  |
|  |  |  | Mean abundance at time *t* and site *s* |
|  |  |  | Random log-normal variation beyond Poisson expectation (also termed overdispersion or nugget) |
|  |  |  | sigmaIID |
|  |  |  | Offset: relative length of stream sampled to standardize abundance to fish per 100 m |
|  |  |  | Vector of fixed-effect coefficients for |
| Alpha? | log\_meanN |  | Overall intercept (grand mean, potentially part of gamma) |
| Detection |  |  |  |
|  |  |  | Capture probability per fish for pass *p* in year *t* dependent on the number captured in previous passes |
|  |  |  | Mean probability of capturing and individual given that it is present at site *s* and time *t* |
|  |  |  | Extra\_detectrate |
|  |  |  | extradetectionSD |
| Spatial |  |  |  |
|  |  |  | Spatial contribution (component?, variation?) to abundance following an Ornstein-Uhlenbeck process |
|  |  |  | Spatially-explicit variance between each parent and child node following an OU process |
|  |  |  | Exponential spatial decay rate in the correlation between parent and child nodes |
|  |  |  | Variation in the spatial OU process |
|  |  |  | Spatial correlation between each parent and child node, resulting from an OU process |
| Temporal |  |  |  |
|  |  |  | Temporal variation in abundance resulting from AR1 autoregressive process |
|  |  |  | Temporal correlation in the annual AR1 process |
|  |  |  | Variance describing the temporal AR1 process |
| Spatio-temporal |  |  |  |
|  |  |  | Spatio-temporal variation in abundance resulting from OU process |
|  |  |  | Spatio-temporal covariance matrix |
|  |  |  | Spatio-temporal variance between each parent and child node |
|  |  |  | Off diagonal correlation in the spatio-temporal covariance matrix |
|  |  |  | Spatio-temporal correlation between each parent and child node, resulting from an OU process |
|  |  |  | Exponential decay rate describing the spatio-temporal OU process |
|  |  |  | Variance describing the spatio-temporal OU process |