We used the effective number of samples to compare precision of models with and without empirical data-derived priors. We describe the uncertainty around our estimates using a beta distribution. Using moment matching, we estimated the effective number of binomial samples (i.e., tree stems monitored), $\hat{n}$, it would take to achieve a given level of certainty with, $\hat{n} = \tau\mu(1-\mu) - 1$, where μ and τ are the mean and precision of the estimated mortality rate parameter. When comparing models with and without informative priors, models with larger effective sample sizes are those with greater precision. This measure of precision was preferred over simply using the posterior variance (or some transformation) as it can be directly interpreted as a measure of sampling effort.

To assess the accuracy of each single-species model with and without empirical data-derived priors, we compared the observed proportion of dead stems in the validation data set, q^{val}, to the expected proportion of dead individuals predicted by the models given the covariate data, $\bar{q}|\phi$. We calculated $\bar{q}|\phi$ by averaging over each individual stem's (in the validation set) posterior predictive probability of death, conditional on the covariate data. Then for each species we could compare the magnitude of the difference between, q^{val} and $\bar{q}|\phi$ for both models, with and without informative priors. More accurate models would have lower absolute error, $|(\bar{q}|\phi) - q^{val}|$.