Supplemental Document

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1 Simulation results

The results from all five simulations are shown in this supplement document:

1.1 Total Hardwood Count Posteriors from BGLGM & BayLog

1.1.1 Simulation 1

![Graphs showing posterior distributions for BGLGM and BayLog](image)

(a) BGLGM

(b) BayLog

Figure 1: Comparing BGLGM posterior distributions of total number of hardwood trees to the BayLog posterior distribution - simulation 1.
1.1.2 Simulation 2

Figure 2: Comparing BGLGM posterior distributions of total number of hardwood trees to the BayLog posterior distribution - simulation 2.
1.1.3 Simulation 3

Figure 3: Comparing BGLGM posterior distributions of total number of hardwood trees to the BayLog posterior distribution - simulation 3.
1.1.4 Simulation 4

Figure 4: Comparing BGLGM posterior distributions of total number of hardwood trees to the BayLog posterior distribution - simulation 4.
1.1.5 Simulation 5

Figure 5: Comparing BGLGM posterior distributions of total number of hardwood trees to the BayLog posterior distribution - simulation 5.
1.2 Total Hardwood Count Posteriors from BGLGM Random vs Stratified

1.2.1 Simulation 1 - Random & Stratified Comparisons

Figure 6: Comparing BGLGM posterior distributions of total number of hardwood trees from random sampling vs stratified sampling - simulation 1.
1.2.2 Simulation 2 - Random & Stratified Comparisons

Figure 7: Comparing BGLGM posterior distributions of total number of hardwood trees from random sampling vs stratified sampling - simulation 2.
1.2.3 Simulation 3 - Random & Stratified Comparisons

(a) BGLGM / Random

(b) BGLGM / Stratified

Figure 8: Comparing BGLGM posterior distributions of total number of hardwood trees from random sampling vs stratified sampling - simulation 3.
1.2.4 Simulation 4 - Random & Stratified Comparisons

Figure 9: Comparing BGLGM posterior distributions of total number of hardwood trees from random sampling vs stratified sampling - simulation 4.
1.2.5 Simulation 5 - Random & Stratified Comparisons

Figure 10: Comparing BGLGM posterior distributions of total number of hardwood trees from random sampling vs stratified sampling - simulation 5.
1.3 Posterior & Prior of model parameters

1.3.1 Simulation 1 - Stratified sampling

Figure 11: Priors and posteriors of $\beta$'s from simulation 1 - stratified sampling.
Figure 12: Priors and posteriors of $\sigma$, $\tau$, and $\phi$ from simulation 1 - stratified sampling.
1.3.2 Simulation 2 - Random sampling

Figure 13: Priors and posteriors of $\beta$’s from simulation 2 - random sampling.
Figure 14: Priors and posteriors of $\sigma$, $\tau$, and $\phi$ from simulation 2 - random sampling.
1.3.3 Simulation 2 - Stratified sampling

(a) Intercept Posteriors

(b) $\beta_{1,elev}$ Posteriors

(c) $\beta_{2,veg^-}$ Posteriors

(d) $\beta_{3,veg^+}$ Posteriors

Figure 15: Priors and posteriors of $\beta$’s from simulation 2 - stratified sampling.
Figure 16: Priors and posteriors of $\sigma$, $\tau$, and $\phi$ from simulation 2 - stratified sampling.
1.3.4 Simulation 3 - Random sampling

Figure 17: Priors and posteriors of $\beta$'s from simulation 3 - random sampling.
Figure 18: Priors and posteriors of $\sigma$, $\tau$, and $\phi$ from simulation 3 - random sampling.
1.3.5 Simulation 3 - Stratified sampling

Figure 19: Priors and posteriors of $\beta$’s from simulation 3 - stratified sampling.
Figure 20: Priors and posteriors of $\sigma$, $\tau$, and $\phi$ from simulation 3 - stratified sampling.
1.3.6 Simulation 4 - Random sampling

Figure 21: Priors and posteriors of $\beta$’s from simulation 4 - random sampling.
Figure 22: Priors and posteriors of $\sigma$, $\tau$, and $\phi$ from simulation 4 - random sampling.
1.3.7 Simulation 4 - Stratified sampling

(a) Intercept Posteriors

(b) $\beta_{1,elev}$ Posteriors

(c) $\beta_{2,veg^-}$ Posteriors

(d) $\beta_{3,veg^+}$ Posteriors

Figure 23: Priors and posteriors of $\beta$’s from simulation 4 - stratified sampling.
Figure 24: Priors and posteriors of $\sigma$, $\tau$, and $\phi$ from simulation 4 - stratified sampling.
1.3.8 Simulation 5 - Random sampling

(a) Intercept Posteriors

(b) $\beta_{1,\text{elev}}$ Posteriors

(c) $\beta_{2,\text{veg}^-}$ Posteriors

(d) $\beta_{3,\text{veg}^+}$ Posteriors

Figure 25: Priors and posteriors of $\beta$’s from simulation 5 - random sampling.
Figure 26: Priors and posteriors of $\sigma, \tau$, and $\phi$ from simulation 5 - random sampling.
1.3.9 Simulation 5 - Stratified sampling

Figure 27: Priors and posteriors of $\beta$’s from simulation 5 - stratified sampling.
Figure 28: Priors and posteriors of $\sigma$, $\tau$, and $\phi$ from simulation 5 - stratified sampling.
1.4 MCMC Trace Plots

1.4.1 Simulation 1 - Random sampling

Figure 29: MCMC Trace plots of $\beta_0$ and $\beta_1$ from simulation 1 (random sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
Figure 30: MCMC Trace plots of $\beta_2$ and $\beta_3$ from simulation 1 (random sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
Figure 31: MCMC Trace plots of $\sigma$ and $\tau$ from simulation 1 (random sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
Figure 32: MCMC Trace plots of $\phi$ from simulation 1 (random sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
1.4.2 Simulation 1 - Stratified sampling

![MCMC Trace plots of β₀ and β₁ from simulation 1 (stratified sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.](image)

Figure 33: MCMC Trace plots of $\beta_0$ and $\beta_1$ from simulation 1 (stratified sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
Figure 34: MCMC Trace plots of $\beta_2$ and $\beta_3$ from simulation 1 (stratified sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
Figure 35: MCMC Trace plots of $\sigma, \tau$ and $\phi$ from simulation 1 (stratified sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
1.4.3 Simulation 2 - Random sampling

Figure 36: MCMC Trace plots of $\beta_0$ and $\beta_1$ from simulation 2 (random sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
Figure 37: MCMC Trace plots of $\beta_2$ and $\beta_3$ from simulation 2 (random sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
Figure 38: MCMC Trace plots of $\sigma$ and $\tau$ from simulation 2 (random sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
Figure 39: MCMC Trace plots of $\phi$ from simulation 2 (random sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
1.4.4 Simulation 2 - Stratified sampling

Figure 40: MCMC Trace plots of $\beta_0$ and $\beta_1$ from simulation 2 (stratified sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
Figure 41: MCMC Trace plots of $\beta_2$ and $\beta_3$ from simulation 2 (stratified sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
Figure 42: MCMC Trace plots of $\sigma$, $\tau$ and $\phi$ from simulation 2 (stratified sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
1.4.5 Simulation 3 - Random sampling

Figure 43: MCMC Trace plots of $\beta_0$ and $\beta_1$ from simulation 3 (random sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
Figure 44: MCMC Trace plots of $\beta_2$ and $\beta_3$ from simulation 3 (random sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
Figure 45: MCMC Trace plots of $\sigma$ and $\tau$ from simulation 3 (random sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
Figure 46: MCMC Trace plots of $\phi$ from simulation 3 (random sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
1.4.6 Simulation 3 - Stratified sampling

Figure 47: MCMC Trace plots of $\beta_0$ and $\beta_1$ from simulation 3 (stratified sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
Figure 48: MCMC Trace plots of $\beta_2$ and $\beta_3$ from simulation 3 (stratified sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
Figure 49: MCMC Trace plots of $\sigma, \tau$ and $\phi$ from simulation 3 (stratified sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
1.4.7 Simulation 4 - Random sampling

![Graphs](image.png)

(a) 100 training sites — Intercept
(b) 100 training sites — $\beta_1$

(c) 25 training sites — Intercept
(d) 25 training sites — $\beta_1$

(e) 10 training sites — Intercept
(f) 10 training sites — $\beta_1$

Figure 50: MCMC Trace plots of $\beta_0$ and $\beta_1$ from simulation 4 (random sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
Figure 51: MCMC Trace plots of $\beta_2$ and $\beta_3$ from simulation 4 (random sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
Figure 52: MCMC Trace plots of $\sigma$ and $\tau$ from simulation 4 (random sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
Figure 53: MCMC Trace plots of $\phi$ from simulation 4 (random sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
1.4.8 Simulation 4 - Stratified sampling

Figure 54: MCMC Trace plots of $\beta_0$ and $\beta_1$ from simulation 4 (stratified sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
Figure 55: MCMC Trace plots of $\beta_2$ and $\beta_3$ from simulation 4 (stratified sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
Figure 56: MCMC Trace plots of $\sigma$, $\tau$ and $\phi$ from simulation 4 (stratified sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
1.4.9 Simulation 5 - Random sampling

Figure 57: MCMC Trace plots of $\beta_0$ and $\beta_1$ from simulation 5 (random sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
Figure 58: MCMC Trace plots of $\beta_2$ and $\beta_3$ from simulation 5 (random sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
Figure 59: MCMC Trace plots of $\sigma$ and $\tau$ from simulation 5 (random sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
Figure 60: MCMC Trace plots of $\phi$ from simulation 5 (random sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
1.4.10 Simulation 5 - Stratified sampling

(a) 25 training sites — Intercept

(b) 10 training sites — Intercept

(c) 25 training sites — $\beta_1$

(d) 10 training sites — $\beta_1$

Figure 61: MCMC Trace plots of $\beta_0$ and $\beta_1$ from simulation 5 (stratified sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
Figure 62: MCMC Trace plots of $\beta_2$ and $\beta_3$ from simulation 5 (stratified sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.
Figure 63: MCMC Trace plots of $\sigma$, $\tau$ and $\phi$ from simulation 5 (stratified sampling), with their corresponding mean, 2.5%, and 97.5% quantiles.