**Additional File 5: Table S2.** Akaike information criteria (AIC), differences of AIC from best model (ΔAIC) and Akaike weight for each model of sub-model A, which used a generalized additive model for predicting the distribution of *Lagopus muta japonica*. S(DR, AFPp) shows interaction smoothing term of distance from the ridge (DR) and area fraction of the *Pinus pumila* community (AFPp). S(AFFf) and s(AFSg) indicate the smoothing terms of area fraction of fellfield community and snowbed grassland community. Null means a null model without explanatory variables.

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| --- | --- | --- | --- |
| Models | AIC | ΔAIC | Akaike weight |
| s(DR, AFPp)+s(AFFf)+s(AFSg) | 882.4 | 0.00 | 1.0 |
| s(DR, AFPp)+s(AFFf) | 1242.6 | 360.16 | 0.0 |
| s(AFFf)+s(AFSg) | 1303.3 | 420.84 | 0.0 |
| s(DR, AFPp)+s(AFSg) | 1578.8 | 696.34 | 0.0 |
| s(AFFf) | 1807.2 | 924.79 | 0.0 |
| s(DR, AFPp) | 1823.8 | 941.34 | 0.0 |
| s(AFSg) | 2109.5 | 1227.2 | 0.0 |
| Null | 2628.7 | 1746.3 | 0.0 |