**Supplementary data**

Figure S1. Study area and location of 15 study localities in Cajas National Park, Ecuador. Each locality is a single patch of *Polylepis* woodland surrounded by páramo grassland.

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Table S1. Eigenvectors of the principal component analysis of the habitat variables of surrounding páramo in 15 localities in Cajas National Park, Ecuador. The variance of PCI accounted for 39.95% and PCII 27.77%.

|  |  |  |
| --- | --- | --- |
| Habitat variable | PCI | PCII |
| Polylepis forest plants (%) | 0.71 | 0.15 |
| Native woody plants (%) | 0.88 | -0.14 |
| Cushion páramo (%) | -0.56 | -0.66 |
| Páramo grassland (%) | -0.49 | 0.83 |
| Water bodies (%) | -0.39 | -0.59 |
| Rocky substrates (%) | 0.59 | -0.45 |
| Shannon plant diversity | -0.29 | 0.29 |
| Shannon vertical complexity | 0.87 | 0.18 |

Table S2. Detailed information on the GLM and GLMM models across 15 localities in Cajas National Park, Ecuador. The GLMs were used to model the total number of observed bird movements as well as total numbers per habitat guild (forest specialist and generalist) with a quasi-Poisson distribution error. The GLMMs were used to model individual movement distance separated by guild with Gaussian distribution error, while the behaviour movements by guild were modelled with binomial distribution error (0 = foraging movement, 1 = stepping stone movement)

|  |  |  |
| --- | --- | --- |
|  | Explanatory parameters | Model parameters |
| Source of variation | Estimate  | SE | Significance | DF  | Deviance | AIC |
| GLMs |  |  |  |  |  |  |
| Total number of observed bird movements |  |  |  | 10 | 29.31 | - |
| Intercept | 2.66 | 0.12 | *T*-value= 22.88; *P=*0.001 |  |  |  |
| PCI | 0.68 | 0.15 | *T*-value= 4.38; *P*=0.001 |  |  |  |
| Patch area | -0.17 | 0.11 | *T*-value= -1.52; *P*=0.16 |  |  |  |
| Nearest patch distance | 0.05 | 0.13 | *T*-value= 0.4; *P*=0.69 |  |  |  |
| Bird abundance of the patch | -0.18 | 0.12 | *T*-value= -1.52; *P*=0.16 |  |  |  |
| Total number of observed forest specialists movements |  |  |  | 10 | 46.02 | - |
| Intercept | 1.07 | 0.37 | *T-*value= 2.86; *P=* 0.01 |  |  |  |
| PCI | 1.19 | 0.34 | *T-*value= 3.55; *P=* 0.005 |  |  |  |
| Patch area | -0.58 | 0.29 | *T-*value= -2.03; *P=* 0.07 |  |  |  |
| Nearest patch distance | 0.31 | 0.34 | *T-*value= 0.94; *P=* 0.37 |  |  |  |
| Bird abundance of the patch | -0.45 | 0.29 | *T-*value= -1.55; *P=* 0.15 |  |  |  |
| Total number of observed generalists movements |  |  |  | 10 | 32.73 | - |
| Intercept | 2.38 | 0.14 | *T-*value= 16.92; *P<* 0.001 |  |  |  |
| PCI | 0.35 | 0.17 | *T-*value= 2; *P=* 0.07 |  |  |  |
| Patch area | 0.01 | 0.14 | *T-*value= 0.08; *P=* 0.94 |  |  |  |
| Nearest patch distance | -0.08 | 0.18 | *T-*value= 0.42; *P=* 0.68 |  |  |  |
| Bird abundance of the patch | 0.01 | 0.16 | *T-*value= 0.03; *P=* 0.98 |  |  |  |
| GLMMs |  |  |  |  |  |  |
| Movements distance between forest specialists and generalists  |  |  |  | 247.86 | 2890.52 | 2885.10 |
| Intercept | 76.12 | 11.76 | *T-*value= 6.47; *P<* 0.001 |  |  |  |
| Forest specialists | -38.22 | 11.49 | *T-*value= -3.33; *P=* 0.001 |  |  |  |
| Movements behaviour between forest specialists and generalists  |  |  |  | 247 | 318.02 | 333.81 |
| Intercept | -0.6 | 0.19 | *T-*value= -3.18; *P=* 0.001 |  |  |  |
| Stepping stone movements of forest specialists | 1.11 | 0.30 | *Z-*value= 3.68; *P<* 0.001 |  |  |  |