**Supporting Information:** Macroscale climate change predictions have little influence on landscape-scale habitat suitability

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**Methods**

*Estimating bird dispersal ability*

Because the dispersal ability of most neotropical birds is unknown, we estimated the median dispersal ability relying on an allometric model for birds from Sutherland et al., (2000):

Where *M* is body mass (kg), and the values represent the means of the two parameters of the scaling equation. The median dispersal ability is estimated in kilometers. Considering that the Sutherland et al.’s model is the best model available for birds, but has a relatively low explanatory power for individual species (adjusted coefficient of determination r2 = 0.32), we adopted a group-based method to increase the robustness of the analysis. First, we compiled a list of 107 bird species that are forest-dependent and endemic to the Atlantic Forest from Vale et al. (2018). From that list, we selected 11 species that differ in phylogenetic history, functional traits (body mass and diet), and conservation status (Table S1). The species were then grouped into six functional groups for dispersal ability allocation purposes, based on body mass and diet (from Vale et al. 2018). These traits are important for dispersal ability (Crouzeilles et al., 2014; Sutherland et al., 2000). Species were categorized as light (≤ 22 g) or medium-to-heavy (> 22 g), and as herbivorous (frugivorous and/or nectarivorous), invertivorous or omnivorous, considering the most common feeding habits. The six functional groups were: 1) light omnivores (*N. chrysolophum* and *C. cristata*), 2) light invertivores (*D. genei* and *J. tridactyla*), 3) light herbivores (*P. eurynome* and *G. dohrnii*), 4) medium-to-heavy invertivores (*C. robustus* and *B. ruficapillus*), 5) medium-to-heavy omnivores (*A. brasiliensis* and *P. cruentata*) and 6) medium-to-heavy herbivores (*O. capueira*). We calculated the dispersal ability for all 107 forest dependent bird’s endemic to the Atlantic Forest (Table S2), and calculated the average for each of the six functional group. We used this functional group dispersal ability for the 11 target species in the study.

Sutherland et al. (2000) defined dispersal as “the movement of an individual out of an area larger than its home range, with no predictable returns, i.e., excluding migrations”. They also justify the natal dispersal as a relevant pattern as it is important for interpopulation genetic structure and local population dynamics, being “the single largest (and often only) long-distance movement made by individual animals and is generally accepted as the major agent of gene flow among populations”. The model generated by Sutherland et al. (2000) was based on a review in which they used a series of studies that estimated the natal dispersal of several species, in several different locations, consequently, at different time periods. The model went through several parameterizations and normalizations, and is not directly based on a distance-time relationship.

**Table S1**: Target bird species used in this study. Body mass and diet from Vale et al. (2018). Conservation status from (IUCN, 2019) (NT = Near threatened, LC = least concern, VU = vulnerable, EN= endangered). Taxonomic order following the Brazilian Committee on Ornithological Records (CBRO) (Piacentini et al. 2015). Here we consider herbivorous as nectivorous and frugivorous.

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| --- | --- | --- | --- | --- | --- |
| **Species** | **Author** | **Body  mass (g)** | **Diet** | **Occurrence records** | **Status** |
| *GALLIFORMES* |  |  |  |  |  |
| *Odontophorus capueira* (Odontophoridae) | Spix 1825 | 426.5 | herbivorous | 63 | LC |
| *APODIFORMES* |  |  |  |  |  |
| *Phaethornis eurynome* (Trochilidae) | Lesson 1832 | 5.3 | herbivorous | 89 | LC |
| *Glaucis dohrnii* (Trochilidae) | (Bourcierand Mulsant 1852) | 5.8 | herbivorous | 15 | EN |
| *CORACIIFORMES* |  |  |  |  |  |
| *Baryphthengus ruficapillus* (Momotidae) | Vieillot 1818 | 147.7 | invertivore | 51 | LC |
| *GALBULIFORMES* |  | 18.3 | invertivore |  | VU |
| *Jacamaralcyon tridactyla* (Galbulidae) | (Vieillot 1817) | 18.3 | invertivore | 28 | VU |
| *PICIFORMES* |  | 200 | invertivore |  | LC |
| *Campephilus robustus* (Picidae) | Lichtenstein 1819 | 200 | invertivore | 27 | LC |
| *PSITTACIFORMES* |  |  |  |  |  |
| *Pyrrhura cruentata* (Psittacidae) | (Wied 1820) | 152.8 | omnivore | 32 | VU |
| *Amazona brasiliensis* (Psittacidae) | (Linnaeus 1758) | 227 | omnivore | 22 | NT |
| *PASSERIFORMES* |  |  |  |  |  |
| *Drymophila genei* (Thamnophilidae) | Fillipi 1847 | 18.7 | invertivore | 26 | LC |
| *Neopelma chrysolophum* (Pipridae) | Pinto 1944 | 19.2 | omnivore | 30 | LC |
| *Mionectes rufiventris* (Rhynchocyclidae) | Cabanis 1846 | 13.3 | omnivore | 86 | LC |
|  |  |  |  |  |  |

**Table S2**: Dispersal ability for all 107 forest dependent birds, endemic to the Atlantic Forest, within six functional groups. The mean dispersal ability per group (µ) is shown. The 11 target species in the study are depicted with an asterisk (\*).

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| --- | --- |
| **Species** | **Dispersal ability (m)** |
| **Light invertivores** (µ = 845.3 m) | |
| *Anabacerthia amaurotis* | 1085.8 |
| *Anabacerthia lichtensteini* | 1148.9 |
| *Automolus lammi* | 1114.1 |
| *Conopophaga cearae* | 986.9 |
| *Cranioleuca pallida* | 786.2 |
| *Drymophila ferruginea* | 746.8 |
| *Drymophila genei \** | 1067.9 |
| *Drymophila malura* | 849.3 |
| *Drymophila ochropyga* | 742.4 |
| *Drymophila rubricollis* | 719.9 |
| *Dysithamnus plumbeus* | 1131.6 |
| *Dysithamnus xanthopterus* | 901.8 |
| *Eleoscytalopus psychopompus* | 1035.2 |
| *Heliobletus contaminatus* | 889.9 |
| *Hemitriccus diops* | 719.9 |
| *Hemitriccus obsoletus* | 790.5 |
| *Hemitriccus orbitatus* | 706.2 |
| *Jacamaralcyon tridactyla \** | 1053.5 |
| *Myrmoderus loricatus* | 1179.6 |
| *Myrmotherula minor* | 543.5 |
| *Myrmotherula snowi* | 710.8 |
| *Myrmotherula unicolor* | 786.2 |
| *Myrmotherula urosticta* | 645.0 |
| *Nemosia rourei* | 1183.0 |
| *Onychorhynchus swainsoni* | 889.9 |
| *Philydor atricapillus* | 1189.8 |
| *Phyllomyias virescens* | 635.3 |
| *Phylloscartes beckeri* | 659.4 |
| *Phylloscartes ceciliae* | 605.6 |
| *Phylloscartes difficilis* | 569.8 |
| *Phylloscartes oustaleti* | 719.9 |
| *Phylloscartes paulista* | 600.6 |
| *Phylloscartes sylviolus* | 625.5 |
| *Picumnus temminckii* | 786.2 |
| *Piprites pileata* | 929.4 |
| *Platyrinchus leucoryphus* | 968.0 |
| *Pogonotriccus eximius* | 600.6 |
| *Rhopias gularis* | 777.5 |
| *Scytalopus gonzagai* | 948.8 |
| *Scytalopus pachecoi* | 933.3 |
| *Scytalopus speluncae* | 849.3 |
| *Terenura maculata* | 548.8 |
| *Terenura sicki* | 543.5 |
| *Thamnophilus ambiguus* | 1179.6 |
| *Thlypopsis pyrrhocoma* | 952.7 |
| **Light omnivores** (µ = 815.3m) | |
| *Calyptura cristata* | 476.8 |
| *Ilicura militaris* | 836.9 |
| *Mionectes rufiventris \** | 861.6 |
| *Neopelma chrysolophum \** | 1085.8 |
| **Light herbivores** (µ = 657.5m) | |
| *Antilophia bokermanni* | 1107.1 |
| *Glaucis dohrnii \** | 510.8 |
| *Haplospiza unicolor* | 941.1 |
| *Machaeropterus regulus* | 692.4 |
| *Neopelma aurifrons* | 889.9 |
| *Phaethornis eurynome \** | 482.6 |
| *Phaethornis idaliae* | 308.1 |
| *Phaethornis squalidus* | 364.8 |
| *Ramphodon naevius* | 620.5 |
| **Medium to heavy invertivores** (µ = 2,826.6m) | |
| *Anabazenops fuscus* | 1619.0 |
| *Automolus leucophthalmus* | 1570.7 |
| *Baryphthengus ruficapillus\** | 3926.3 |
| *Buteogallus lacernulatus* | 8671.4 |
| *Campephilus robustus\** | 4752.5 |
| *Celeus tinnunculus* | 3692.7 |
| *Cichlocolaptes leucophrus* | 1677.6 |
| *Cichlocolaptes mazarbarnetti* | 1777.9 |
| *Glaucidium minutissimum* | 1984.4 |
| *Glaucidium mooreorum* | 2009.3 |
| *Hylatomus galeatus* | 3516.6 |
| *Hypoedaleus guttatus* | 1691.4 |
| *Merulaxis ater* | 1587.9 |
| *Notharchus swainsoni* | 2485.9 |
| *Phacellodomus erythrophthalmus* | 1266.0 |
| *Philydor novaesi* | 1669.3 |
| *Piculus aurulentus* | 2561.9 |
| *Pseudastur polionotus* | 9957.3 |
| *Pyriglena atra* | 1498.0 |
| *Saltator fuliginosus* | 2225.9 |
| *Saltator maxillosus* | 2004.3 |
| *Sclerurus cearensis* | 1527.3 |
| *Sclerurus scansor* | 1638.7 |
| *Trogon aurantius* | 2525.1 |
| **Medium to heavy omnivores** (µ = 5,120.9m) | |
| *Amazona brasiliensis\** | 5147.2 |
| *Arremon semitorquatus* | 1282.3 |
| *Chiroxiphia caudata* | 1301.6 |
| *Cyanocorax coeruleus* | 5768.3 |
| *Laniisoma elegans* | 1888.0 |
| *Leptodon forbesi* | 9264.3 |
| *Pyrrhura cruentata\** | 4011.2 |
| *Schiffornis virescens* | 1301.6 |
| *Tinamus solitarius* | 16123.9 |
| **Medium to heavy herbivores** (µ = 5,132.7m) | |
| *Amazona rhodocorytha* | 8195.7 |
| *Amazona vinacea* | 5524.8 |
| *Carpornis cucullata* | 2544.6 |
| *Cotinga maculata* | 2341.0 |
| *Lipaugus ater* | 3575.3 |
| *Lipaugus conditus* | 2668.2 |
| *Lipaugus lanioides* | 2969.3 |
| *Mitu mitu* | 25355.0 |
| *Odontophorus capueira\** | 7658.1 |
| *Procnias nudicollis* | 4353.3 |
| *Pteroglossus bailloni* | 3897.7 |
| *Pyrrhura griseipectus* | 2925.7 |
| *Selenidera maculirostris* | 4193.9 |
| *Touit melanonotus* | 1759.2 |
| *Touit surdus* | 1900.8 |
| *Xipholena atropurpurea* | 2260.8 |

**Table S3**: Coefficients of determination (R2) of Generalized Least Square (GLS) models controlling spatial autocorrelation, considering each landscape as sampling unit.

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| --- | --- |
| **Species** | ***R2*** |
| *Amazona brasiliensis* | 0.9993 |
| *Baryphthengus ruficapillus* | 0.9969 |
| *Campephilus robustus* | 0.9964 |
| *Drymophila genei* | 0.9996 |
| *Glaucis dohrnii* | 0.9993 |
| *Jacamaralcyon tridactyla* | 0.9998 |
| *Mionectes rufiventris* | 0.9972 |
| *Neopelma chrysolophum* | 0.9996 |
| *Odontophorus capueira* | 0.9983 |
| *Phaethornis eurynome* | 0.9978 |
| *Pyrrhura cruentata* | 0.9932 |

**Table S4.** Number of landscapes (50,000-ha hexagons) greater and smaller than the 30% and 50% forest cover thresholds suggested by Banks-Leite et al., (2014), and their corresponding percentages within the species’ distribution range. The 30% forest cover represents a threshold for population persistence and the 50% represents a threshold for the maintenance of community’ integrity.

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| --- | --- | --- | --- | --- | --- |
| **Species** | **≤ 30%**  **forest cover** | **> 30%**  **forest cover** | **≤ 50%**  **forest cover** | **> 50%**  **forest cover** | **Number of landscapes within the distribution** |
| *Amazona brasiliensis* | 25 (43%) | 33 (57%) | 43 (74%) | 15 (26%) | 58 |
| *Baryphthengus ruficapillus* | 2295 (93%) | 170 (7%) | 2398 (97%) | 67 (3%) | 2465 |
| *Campephilus robustus* | 2244 (93%) | 165 (7%) | 2341 (97%) | 68 (3%) | 2409 |
| *Drymophila genei* | 371 (78%) | 102 (22%) | 426 (90%) | 47 (10%) | 473 |
| *Glaucis dohrnii* | 343 (94%) | 21 (6%) | 362 (99%) | 2 (1%) | 364 |
| *Jacamaralcyon tridactyla* | 1077 (94%) | 73 (6%) | 1121 (98%) | 29 (2%) | 1150 |
| *Mionectes rufiventris* | 1377 (90%) | 150 (10%) | 1461 (96%) | 66 (4%) | 1527 |
| *Neopelma chrysolophum* | 582 (84%) | 108 (16%) | 640 (93%) | 50 (7%) | 690 |
| *Odontophorus capueira* | 1962 (93%) | 159 (7%) | 2054 (97%) | 67 (3%) | 2121 |
| *Phaethornis eurynome* | 1222 (89%) | 148 (11%) | 1305 (95%) | 65 (5%) | 1370 |
| *Pyrrhura cruentata* | 541 (91%) | 53 (9%) | 577 (97%) | 17 (3%) | 594 |

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Fig. S1. The Brazilian Atlantic Forest remaining (in green) from Fundação SOS Mata Atlântica and Instituto Nacional de Pesquisas Espaciais INPE (2013), and the original Atlantic Forest extension in the small overview (in gray).

Mapa

Descrição gerada automaticamente

Fig. S2. Maps of Combined Landscape Suitability (CLS, ranging from 0 to 1) inside of the distribution range area of the 11 target species (small maps on the left). As current and future results were highly correlated, i.e. there was little change in the future, we show only the maps under current conditions. Each unit of the map is a “landscape” within the Brazilian Atlantic Forest biome, represented by a 50,000 ha hexagon).”

Mapa

Descrição gerada automaticamente

Fig. S3. Pie-charts refer to forest cover proportion. Dark green represents the proportion of landscapes with ≤50% forest cover and light green represents the proportion of landscapes with >50% forest cover.

Forma

Descrição gerada automaticamente