Defaunation precipitates the extinction of evolutionarily distinct interactions in the Anthropocene

Carine Emer1,*, Mauro Galetti1, Marco A. Pizo2, Pedro Jordano3, Miguel Verdú4

Species on Earth are interconnected with each other through ecological interactions. Defaunation can erode those connections, yet we lack evolutionary predictions about the consequences of losing interactions in human-modified ecosystems. We quantified the fate of the evolutionary history of avian–seed dispersal interactions across tropical forest fragments by combining the evolutionary distinctness of the pairwise-partner species, a proxy to their unique functional features. Both large-seeded plant and large-bodied bird species showed the highest evolutionary distinctness. We estimate a loss of $3.5 \times 10^4$ to $4.7 \times 10^4$ million years of cumulative evolutionary history of interactions due to defaunation. Bird-driven local extinctions mainly erode the most evolutionarily distinct interactions. However, the persistence of less evolutionarily distinct bird species in defaunated areas exerts a phylogenetic rescue effect through seed dispersal of evolutionarily distinct plant species.

INTRODUCTION

Biotic interactions form the backbone of biological diversity while delivering the unique ecological functions essential for human and nonhuman well-being (1, 2). Their fate is defined by both the contemporary ecological correlates and the evolutionary trajectories of the interacting species (3, 4). Thus, human activities known to affect species interactions within ecological time frames may likewise affect the evolutionary history of the interaction partners. Among them, defaunation, the worldwide pervasive human-induced extinction of animal populations or entire species, substantially affects large-bodied organisms that often perform interactions whose ecological function cannot be easily replaced by smaller-sized species (5). If these species are highly evolutionarily distinct (e.g., unique lineages in the Tree of Life and those with fewer extant relatives and a longer evolutionary history), then they may harbor greater amounts of evolutionary information than expected by species number alone (6, 7). Aimed at measuring this importance, “evolutionary distinctness” (hereafter ED) estimates the contribution of a given species to the total evolutionary history of its clade while measuring its isolation in the phylogenetic tree (8, 9). We propose to expand this concept by characterizing ecological interactions according to their ED, i.e., how species with different ED values interact with each other (Fig. 1). Thus, we can assess how the contemporary fast-paced defaunation has eroded the evolutionary history embedded in these interactions. Here, we coin the term “evolutionary distinctness of the interaction” (EDI) to refer to the combined ED that both interacting partner species convey to a given interaction, irrespective of how long they have been interacting with one another.

Species interactions entail millions of years of reciprocal effects and a vast amount of the genetic and ecological information that characterize their unique and irreplaceable contribution to support the Earth’s biodiversity (10). Mutualism rarely evolves as a process in which partners have joint, reciprocal evolutionary trajectories involving cospeciation with congruent phylogenetic branching (12, 13). Instead, species with rather different evolutionary trajectories tend to interact in contemporary habitats, showing a marked asymmetry of ED (e.g., the pollination of a basal clade angiosperm species by an insect from a recent clade). For example, the ages of nectar-feeding and fruit-eating bird and mammal families and their core plant families are consistently skewed toward older plant taxa, evidencing that most animal families are younger than their partner plant families (11). In the specific case of tropical forests, avian seed dispersal is mediated by multiple species, with generalized interactions established by the consumption of fruits that do not necessarily require specialized traits (11, 12). Yet, generalist partner species hold distinct evolutionary histories that meet in contemporary time, forming interactions that combine all the evolutionary information that the interacting actors carry.

Because large-bodied animals and large-seeded plants tend to be evolutionarily distinct species owing to both their old age and isolation in the Tree of Life (14, 15), their interactions involve high values of EDI while accounting for the largest amounts of evolutionary history. Therefore, defaunation, by reducing the populations of large-bodied bird species (5) and, consequently, the probability of interactions with large-seeded plant species, would likely extirpate the most evolutionarily distinct interactions. In contrast, lower EDI values are expected for interactions involving small-bodied bird and small-seeded plant species, which conform to be the persisting interactions in fragmented landscapes (16). Thus, both locally extinct and persisting interactions would be characterized by relatively symmetric EDI (i.e., high-ED animal–high-ED plant species for locally extinct and low-ED animal–low-ED plant species for persistent interactions). Otherwise, when the interacting partners have highly divergent ED (e.g., low-ED animal–high-ED plant species), an asymmetric EDI emerges, with unexplored outcomes on the eco-evolutionary functions that support current ecosystems (10). Therefore, defaunation, by selectively pruning species from the Tree of Life (17, 18), is causing the extirpation of interactions with distinct combinations of evolutionary history, with consequences that may go well beyond the current ecological time (19, 20).

We quantify the signature of defaunation in the ED of plant-frugivore interactions in fragmented tropical forests by combining field and

1Instituto de Biotécnicas, Departamento de Ecología, Universidad Estadual Paulista, CP 199, 13506-900 Río Claro, SP, Brazil. 2Instituto de Biotécnicas, Departamento de Zoología, Universidad Estadual Paulista, CP 199, 13506-900 Río Claro, SP, Brazil. 3Integrative Ecology Group, Estación Biológica de Doñana–Consejo Superior de Investigaciones Científicas (EBD-CSIC), Av. América Vespucio 26, E-41092 Sevilla, Spain. 4Centro de Investigaciones sobre Desertiﬁcación (CISIC-UVEG-GV), Apdo Oficial, E-46113 Valencia, Spain. 5Corresponding author. Email: c.emer09@gmail.com
phylogenetic data of the plant and bird species involved in seed dispersal. Here, we take a step forward by considering the effects of defaunation not only on species but also on the current distribution of the EDi of bird–seed dispersal interactions. We compiled 21 studies on seed dispersal by birds in which defaunation was estimated as the difference between the sum of all bird body masses at the regional landscape scale and the summed body masses of the birds that occur at the local, within-fragment scale. As shown in table S1, the studies were carried out in the Atlantic Forest of South America (21), a biodiversity hotspot (22) that has been drastically reduced to ~12% of its original cover in the past few centuries (23). The studied sites vary from small fragments of 0.66 ha to large forest remnants up to 42,000 ha along a disturbance gradient from semipristine-protected areas to secondary forests and restored plantations.

RESULTS
We found that defaunation caused the loss of interactions involving unique lineages of bird and plant species that have faced millions of years of hazards but may not be able to survive human disturbance in the Anthropocene (figs. S1 and S2). The loss of bird clades tends to concentrate on larger-bodied species, which are also the most evolutionarily distinct ($r = 0.21$, $t = 2.78$, $P = 0.007$; fig. S3 and table S2). These include large- and medium-bodied birds, such as guans [e.g., Pipile jacutinga (Cracidae): mean weight, 1250 g; mean ED, 28.99 million years (Ma)] and motmots [e.g., Baryphthengus ruficapillus (Momotidae): mean weight, 142 g; mean ED, 71.54 Ma] that are essential to the dispersal of large-seeded plant species with the highest ED, such as palms [e.g., Euterpe edulis (Arecaceae): mean seed diameter, 12 mm; mean ED, 98.7 Ma] and nutmegs [e.g., Virola bicuhyba (Myristicaceae): mean seed diameter, 16 mm; mean ED, 36.26 Ma] mostly found in less disturbed forests and rarely on disturbed sites. Likewise, the ED of plant species is associated with a larger seed diameter ($r = 0.38$, $t = 5.84$, $P = 0.001$; fig. S3 and table S3). These two effects in combination indicate that interactions involving plant and animal lineages with high ED are selectively lost in more disturbed sites (figs. S1 and S2 and table S4).

Seed dispersal interactions in the Atlantic Forest show significantly asymmetric EDi values, mostly skewed toward plant species although bird-skewed interactions are also present (Fig. 2A and table S4). Bird-plant associations present in a higher number of fragments followed the same trend (Fig. 2B), indicating that most of the persisting interactions involve less evolutionarily distinct bird species dispersing more evolutionarily distinct plants. In contrast, bird-skewed asymmetries, i.e., bird species with a higher ED that disperse plant species with lower ED, often occur in a single or very few fragments (Fig. 2B), revealing their inability to persist in defaunated landscapes.

We observed that the cumulative EDi (i.e., the total EDi per fragment) decreases with increasing defaunation (slope, $-5.44 \pm 2.09, t = -2.63$, $P = 0.02$; Fig. 3) even when fragment area (fig. S4) and interaction richness (fig. S5) are controlled for. Seed dispersal interactions vanishing in the Anthropocene represent a loss of evolutionary history that can be estimated by the cumulative EDi lost along the gradient.
of defaunation, i.e., 3.5 to $4.7 \times 10^4$ Ma of cumulative evolutionary time (Fig. 3). The magnitude of EDi lost in the defaunated fragments of the Atlantic Forest is similar to the marked loss of avian and bees' evolutionary history devastated by agricultural practices worldwide (24, 25), and it is intensified in very small fragments. Furthermore, we identified that the most pristine and less defaunated forests, which are located within State Parks, harbor more cumulative EDi than expected from their interaction richness (fig. S5). On the other hand, all other fragments but two are currently supporting less EDi than expected by the local pool of species performing seed dispersal interactions. These findings show that, while the less defaunated sites within protected areas harbor interactions with irreplaceable evolutionary information and unique ecological functions, defaunation pervasively vanishes evolutionary history from forest fragments.

Although overall seed dispersal interactions are drastically lost with small increases in defaunation, the different combinations of bird and plant species’ ED respond differently to this scenario (Fig. 4 and fig. S6). Interactions with bird-skewed ED values (i.e., higher ED of the avian partner, yellow lines in Fig. 4) are the first to vanish, resulting in the loss of more than 50% of interactions, with increases as small as 6% in the defaunation index. This reduction of EDi is more severe when both interacting partners are highly evolutionarily distinct (EDi from 32 to 381 Ma).

**DISCUSSION**

Our findings show that the extirpated bird–seed dispersal interactions tend to include unique species that contain an irreplaceable set of genetic information that may not survive the challenges imposed by contemporary human-driven disturbances. The impoverishment of EDi in the remnants of the Atlantic Forest translates into non-random local extinctions of ecosystem functions related to seed dispersal by birds, such as the dispersal of large-seeded plant species. The loss of ecological functions due to reduced phylogenetic diversity in mutualistic systems has also been reported recently for agricultural landscapes in which pollination service and crop production are highly affected by the loss of highly evolutionarily distinct bee species (25). Furthermore, because the Atlantic Forest biome is mostly composed of highly defaunated small fragments (23) and because higher EDi values are restricted to a few relatively pristine and large areas, the restoration of evolutionary history would be extremely difficult with the current rates of local extinction (26). However, the reintroduction of species with higher ED can be a way forward to recover the EDi of lost interactions (27). Four of our study sites, for example, are composed of restored forests (table S1) that, similar to the highly defaunated fragments, hold low EDi values (Fig. 3), because large-seeded plant species are poorly represented in the pool of species used for restoration (28). Thus, including highly evolutionarily distinct plant species in active restoration initiatives would maximize the potential for the restoration of EDi at local and regional levels.

Overall, the loss of bird–seed dispersal interactions with plant-skewed EDi is smaller than that of bird-skewed interactions, which are the first to vanish with defaunation (Fig. 3). The fact that many plant species can be dispersed by bird species with a lower ED, which are often habitat and diet generalists (16, 29), allows them to persist longer in the defaunated areas. In this scenario, plant-skewed interactions involving small-bodied, low-ED bird species dispersing large-seeded, high-ED plant species may occur only occasionally. Thus, rare events of propagule movement are important to maintain viable populations across the fragmented landscape (30). Yet, persisting interactions with plant-skewed EDi values such as the common seed dispersal of *Schinus terebinthifolia* (ED, 24.5 Ma) by
Emer indicate that, although small birds can still disperse the smaller seeds, they do not functionally replace the effectiveness of the seed dispersal service provided by the vanished large-bodied frugivores. Therefore, the rescue effect cannot recover the extinction of the unique evolutionary histories of the interactions affected by defaunation. Moreover, the predominance of plant-skewed asymmetries in the Atlantic Forest may be a reflection of the extinction debt of interactions [sensu (19)]. Such a debt means that plants, which have longer life spans than birds, may persist for decades after the interaction has disappeared.

Given the scenario of increasing defaunation in human-altered fragmented landscapes, a marked reshaping of the Tree of Life may be occurring in the Anthropocene. Large-bodied frugivores have been hypothesized to reduce speciation rates of large-fruitied plants as a consequence of high gene flow associated with long-distance dispersal ranges, while small-fruitied plants tend to speciate more owing to restricted dispersal by small-bodied frugivores (35). Therefore, the phylogenetic rescue effect promoted by the persistence of plant-skewed, low-ED interactions would favor higher rates of speciation in small-seeded plant species, which could affect the functioning of tropical forests. Furthermore, local assemblages facing...

Our results suggest that the loss of evolutionary history of plant species in the Atlantic Forest is minimized by the rescuing effect performed by bird species with limited ED dispersing unique plant species. The rescuer bird species represent clades of small-bodied, generalist bird species able to thrive in human-modified environments, which functionally “help” some plant species to persist. The functional role of rescuer species includes the dispersal of plant seeds, they do not functionally replace the effectiveness of the seed dispersal service provided by the vanished large-bodied frugivores. Therefore, the rescue effect cannot recover the extinction of the unique evolutionary histories of the interactions affected by defaunation. Moreover, the predominance of plant-skewed asymmetries in the Atlantic Forest may be a reflection of the extinction debt of interactions [sensu (19)]. Such a debt means that plants, which have longer life spans than birds, may persist for decades after the interaction has disappeared.

Given the scenario of increasing defaunation in human-altered fragmented landscapes, a marked reshaping of the Tree of Life may be occurring in the Anthropocene. Large-bodied frugivores have been hypothesized to reduce speciation rates of large-fruitied plants as a consequence of high gene flow associated with long-distance dispersal ranges, while small-fruitied plants tend to speciate more owing to restricted dispersal by small-bodied frugivores (35). Therefore, the phylogenetic rescue effect promoted by the persistence of plant-skewed, low-ED interactions would favor higher rates of speciation in small-seeded plant species, which could affect the functioning of tropical forests. Furthermore, local assemblages facing...
larger losses of EDi can be expected to be less resilient to disturbance owing to the impoverishment of the functional diversity concomitantly occurring with the loss of phylogenetic history of the partner species (10, 36). This impoverishment is likely to change the niche space occupied by the local assemblage of interacting species (37). New empty niches may create opportunities for the establishment of exotic species (38) and trigger changes in biogeochemical cycles such as CO2 storage by large-seeded plants dispersed by large-bodied frugivores (39). The resultant Anthropocene landscape will most likely consist of a metacommunity of evolutionarily impoverished fragments, phylogenetically structured by the defaunation of specific clades (40). Our approach can be easily extended to other ecological systems from which similar results are expected on the basis of the loss of specific functional groups, such as the global decline of bee pollinators (6, 25). From a conservation point of view, our results show that we are losing unique evolutionary histories of interactions that cannot be replaced by contemporaneous species. However, these losses may be lessened by a few persisting interactions performed by less evolutionarily distinct bird species rescuing the more evolutionarily distinct plant species from the verge of extinction.

MATERIALS AND METHODS

Study area

The Atlantic Forest is a tropical hot spot of biodiversity (22), highly threatened by human activities (such as logging, habitat conversion to commercial monocultures, and increasing urbanization), that has drastically reduced its original cover to ~12% (23). The remaining landscape constitutes a complex mosaic formed mainly by small fragments (<50 ha, ~80% of the remaining area) and clusters of close neighboring fragments (<200 m apart) (23). These fragments function as a metanetwork of interactions connected by small generalist bird species dispersing small-seeded plant species, while large-bodied bird species able to disperse large-seeded plant species are constrained to a few pristine, large area fragments (16).

Dataset

We used the Atlantic-Frugivory dataset, the largest dataset available for tropical plant–frugivore interactions (21), to test how much evolutionary history of bird–seed dispersal interactions is being lost because of the contemporaneous defaunation. Bird and plant species present in the Atlantic-Frugivory dataset comprise our regional pool of species, which was used to build the corresponding phylogenies and to calculate the defaunation index (see details in the next subsections). From that regional pool, we selected 21 studies of bird–seed dispersal interactions sampled in fragments of the Brazilian Atlantic Forest (table S1). The studied fragments vary from 0.66 to 42,000 ha in a gradient of disturbance from semipristine-protected areas to secondary forests, degraded fragments and restored plantations. The studied fragments were distributed among different vegetation types of the biome, including Ombrophilous and Semidecidous forest, Araucaria Forest, rupestrian, and dry vegetation. Our dataset includes all studies with available information designed to collect fruit-eating bird interactions at the community level in the Atlantic Forest (21); yet, they did not necessarily record effective seed dispersal. We carefully checked the dataset and removed any interaction that would not characterize seed dispersal events. Methods to record interactions varied among studies, including direct bird observations and fecal sampling; only community-level studies with at least 12 months of sampling were included in the analyses. We further added available information to each study site based on field observations and expert knowledge about tropical avian seed dispersal.

Phylogenetic trees

Birds

Given the list of species at the regional pool (21), we obtained 100 phylogenetic trees inferred from the BirdTree.org online database using the “Stage2 MayrParSho Ericson” source tree as birds’ master phylogeny (available at http://birdtree.org/methods/). Trees’ topology is resolved with a combination of genetic and taxonomic information and dated with a relaxed molecular clock [see (6, 41) for details]. A few species that were identified at genus level in the field (i.e., Elaenia sp., Myiarchus sp., Patagioenas sp., Penelope sp., and Turdus sp.) therefore could not be found in the master phylogeny. We randomly grafted these species in their correspondent clades using the “add.species.to.genus” function in the phytools package version 0.6-00 in R (42).

Plants

Given the list of plant species at the regional pool (21), we used the megaphylogeny of trees (43) with the “S.PhyloMaker” function (41) to obtain the initial plant tree. The initial tree was based on “scenario 1” in which missing genera and/or species are added as basal polytomies within their higher taxonomic level (44). Then, we simultaneously resolved the polytomies and adjusted the branch lengths using an evolutionary birth-death model with the help of “PolytomyResolver” function (45) and BEAST version 1.5.4 (46). Markov Chain Monte Carlo analyses were run for 108 iterations, and trees were sampled every 107 iterations. After discarding the 25% first trees, we randomly selected 100 trees for subsequent analyses.

ED of bird–seed dispersal interactions

The ED of a given species quantifies how isolated it is in its own phylogenetic tree and the amount of unique evolutionary history that it embodies (8, 9). Similarly, the amount of evolutionary history that an interaction holds can be estimated by the combination of the ED of the interacting partner species. Therefore, the EDi combines the isolation and unique evolutionary history of the partner species in their correspondent phylogenetic trees. We calculated EDi as follows.

First, we calculated the ED for all plant and bird species based on the correspondent phylogenetic trees that we built for the regional pool of species of the Atlantic Forest (see above). ED was estimated using the equal splits metric available in the “evol.distinct” function in the picante package for R (47). Equal splits metric equally divides the phylogenetic distance represented by a branch by the number of lineages originating from the node directly below it (8). It gives higher values of ED for species placed in clades in which the path length is shared among a lower number of species and is considered a robust metric to capture phylogenetic diversity (9). Then, we obtained the mean ED for each bird (EDb) and plant species (EDp) calculated over 100 solved trees and used it as a proxy for its ED. Last, to quantify the EDi, we summed the ED of the interacting bird (EDb) and plant species (EDp) such as EDi = EDb + EDp.

Statistical analyses

To test whether more evolutionarily distinct bird and plant species were associated with larger body mass and seed diameter, respectively, we used nonparametric Spearman correlation tests (48).

Emer et al., Sci. Adv. 2019; 5 : eaav6699 19 June 2019

5 of 8
The extremely large sample size caused an overfit of any modeling attempt to assess the form of these relationships, so we resorted to use nonparametric Spearman correlation tests to highlight any non-random associations between traits and ED. Asymmetries in EDi were calculated as the difference between the ED values of both interacting partners. Bird-skewed asymmetries correspond to interactions in which the bird species has higher ED than the partner plant species, and plant-skewed asymmetries correspond to interactions in which the plant species brings more ED than the partner bird species. We apply a binomial test to estimate which type of asymmetry (bird skewed or plant skewed) is significantly more predominant among the 2668 unique combinations of bird and plant species interactions found in our communities. Then, we used a generalized linear mixed-effects model in the lme4 package (49) to test which type of EDi asymmetry is more persistent in the fragmented landscape. In this model, we fit the number of fragments in which the interaction occurs as a response variable against the asymmetry value of EDi as the independent variable. Bird species and plant species were used as random factors to control for pseudoreplication, given that a single species can perform more than one interaction. We fit the model with a Poisson distribution.

To understand the amount of the cumulative EDi of bird–seed dispersal interactions lost in the gradient of defaunation across tropical forest fragments, we fitted three different linear models. We started by quantifying the cumulative EDi in each fragment by summing up the EDi values of all bird–seed dispersal interactions recorded per fragment. Defaunation was estimated as the difference between the sum of all bird body masses at the regional landscape scale [considering all frugivore bird species present in the Atlantic Forest database (21) as a proxy for the regional pool of species] and the summed body masses of the birds that occur in each fragment. For the first model, we simply used the cumulative EDi as the response variable fitted against the defaunation index to test for the absolute loss of EDi as defaunation increases. For the second model, we used the same approach while controlling for fragment area. We tested for the correlation between fragment area and defaunation using a Pearson correlation test. Then, we used the residuals of a linear regression of defaunation index on fragment area as the independent variable fitted against the cumulative EDi. Last, we used a null model to test whether the cumulative EDi per fragment was significantly different from that expected by the number of bird–seed dispersal interactions recorded in each community. We created an an matrix in which m and n correspond to the study site and the bird–seed dispersal interactions, respectively. The an element of the matrix is filled according to the presence of an interaction n in site m quantified by the corresponding EDi. Therefore, the marginal total of m corresponds to its observed cumulative EDi. We applied the “shuffle.web” method within the “nullmodel” function in the bipartite package (50), which relocates the an element within the matrix while maintaining its dimensionality, i.e., constraining the number of sites and interactions while shuffling the EDi among them. We obtained the mean and SD of the EDi per site over 100 simulations and calculated the corresponding z score based on the observed cumulative EDi. The z scores were fitted against the defaunation index in a linear model. Positive z scores indicate that the site holds more cumulative EDi than expected by the number of interactions that it encompasses. Statistical analyses were performed in R version 3.4.3 (51).

**SUPPLEMENTARY MATERIALS**

Supplementary material for this article is available at http://advances.sciencemag.org/cgi/content/full/5/6/eaav6699/DC1

Fig. S1. Distribution of the ED of the frugivore bird species in the gradient of defaunation.

Fig. S2. Distribution of the ED of the bird-dispersed plant species in the gradient of defaunation.

Fig. S3. Correlation between the ED and the traits of the species involved in seed dispersal interactions in the Atlantic Forest.

Fig. S4. Defaunation leads to a significant impoverishment of the cumulative EDi performed by bird seed dispersal across forest fragments.

Fig. S5. EDi promoted by bird seed dispersal decreases sharply along a gradient of defaunation.

Fig. S6. Defaunation leads to an impoverishment of seed dispersal interactions and their associated asymmetric relationships of EDi.

Table S1. Description of the dataset used in this study.

Table S2. Traits of the bird species recorded in the studied communities of the Atlantic Forest.

Table S3. Traits of the plant species recorded in the studied communities of the Atlantic Forest.

Table S4. The bird–seed dispersal interactions recorded in the studied sites of the Atlantic Forest, followed by their EDi and correspondent asymmetry.

**REFERENCES AND NOTES**

1. G. M. Mace, J. L. Gittleman, A. Purvis, Preserving the tree of life. Science 300, 1707–1709 (2003).

2. B. J. Cardinale, J. E. Duffy, A. Gonzalez, D. U. Hooper, C. Perrings, P. Venail, A. Narwani, G. M. Mace, D. Tilman, D. A. Wardle, A. P. Kinzig, G. C. Daily, M. Loreau, J. B. Grace, A. Larigauderie, D. S. Srivastava, S. Naeem, Biodiversity loss and its impact on humanity. Nature 486, 59–67 (2012).

3. G. E. Hutchinson, The Ecological Theatre and the Evolutionary Play (Yale Univ. Press, 1965).

4. C. C. Labandeira, The history of associations between plants and animals, in Plant-Animal Interactions: An Evolutionary Approach, C. M. Herrera, O. Pellmyr, Eds. (Blackwell Scientific, 2002).

5. R. Drizo, H. S. Young, M. Galetti, C. Gavelos, R. Bokal, M. DeVos, A. Ø. Moeroes, Evolutionarily distinctive species often capture more phylogenetic diversity than expected. J. Theor. Biol. 251, 606–615 (2008).

6. D. S. Srivastava, M. W. Cadotte, A. M. MacDonald, R. G. Marzluff, N. Mirotchnick, Phylogenetic diversity and the functioning of ecosystems. Ecol. Lett. 15, 637–648 (2012).

7. T. H. Fleming, W. J. Kress, The Ornaments of Life: Co- Evolution and Conservation in the Tropics (University of Chicago Press, 2013).

8. P. R. Guimarães Jr., P. Jordano, J. N. Thompson, Evolution and coevolution in mutualistic networks. Ecol. Lett. 14, 877–885 (2011).

9. L. C. Ponisio, L. K. McGonigle, Coevolution leaves a weak signal on ecological networks. Ecosphere 8, e01798 (2017).

10. N. J. B. Isaac, S. T. Turvey, B. Colless, C. Waterman, E. M. Baille, Mammals on the EDGE: Conservation priorities based on threat and phylogeny. PLoS ONE 2, e296 (2007).

11. J. Urgo, E. F. Miller, A. S. T. Papadopoulos, A. J. Tantenzapf, Seed size and its rate of evolution correlate with species diversification across angiosperms. PLoS Biol. 15, e2002792 (2017).

12. C. Emer, M. Galetti, M. A. Pizo, P. R. Guimarães Jr., A. Piratelli, S. Moraes, P. Jordano, Seed-dispersal interactions in fragmented landscapes: A meta-network approach. Ecol. Lett. 21, 484–493 (2018).

13. A. Purvis, P.-M. Agapow, J. L. Gittleman, G. M. Mace, Nonrandom extinction and the loss of evolutionary history. Science 288, 328–330 (2000).

14. E. L. Rezende, J. E. Lavabre, P. R. Guimarães Jr., P. Jordano, J. Bascompte, Non-random cooccurrences in phylogenetically structured mutualistic networks. Nature 448, 925–928 (2007).
Three keys to the radiation of angiosperms into freezing environments. Nature 506, 592–593 (2014).

H. Qian, Y. Jin, An updated megaphylogeny of plants, a tool for generating plant phylogenies and an analysis of phylogenetic community structure. J. Plant Ecol. 9, 233–239 (2016).

T.S. Kuhn, A. Ø. Mooers, G. H. Thomas, A simple polytomy resolver for dated phylogenies. Methods Ecol. Evol. 2, 427–436 (2011).

A. J. Drummond, M. A. Suchard, D. Xie, A. Rambaut, Bayesian phylogenetics with BEAUti and the BEAST 1.7. Mol. Biol. Evol. 29, 1969–1973 (2012).

S. W. Kembel, P. D. Cowan, M. R. Helmus, W. K. Cornwall, H. Morlon, D. D. Ackerly, S. P. Blomberg, C. Q. Webb, Picante: R tools for integrating phylogenies and ecology. Bioinformatics 26, 1463–1464 (2010).

P. Legendre, L. Legendre, Numerical Ecology (Elsevier Science, ed. 2, 1998).

D. Bates, M. Mächler, B. Bolker, S. Walker, Fitting linear mixed-effects models using lme4. J. Stat. Softw. 67, 1–48 (2015).

C. F. Dormann, F. Jochen, N. Blüthgen, B. Gruber, Indices, graphs and null models: Analyzing bipartite ecological networks. The Open Ecol. J. 2, 7–24 (2009).

R Development Core Team, R: A language and environment for statistical computing (2014).

W. R. Silva, D. de Marco, E. Harui, V. S. M. Gomes. Patterns of fruit-frugivores interactions in two Atlantic Forest bird communities of South-eastern Brazil: Implications for conservation, in Seed Dispersal and Frugivory: Ecology, Evolution and Conservation, D. J. Levey, W. R. Silva, M. Galetti, Eds. (CABI International, 2002), pp. 423–435.

S. B. M. Rodrigues, Rede de interações entre aves frugívoras e plantas em uma área de Mata Atlântica no sudeste do Brasil, Master thesis, UFSCAR, Sorocaba, BR (2015).

R. Parini, J. F. Pacheco, F. Mallet-Rodrigues, Frugivíoria em Tangara desmaresti (Passeriformes: Thraupidae) na Floresta Atlântica do Parque Nacional da Serra dos Órgãos e adjacências, Estado do Rio de Janeiro, sudeste do Brasil. Atualidades Ornitológicas 142, 10–13 (2008).

R. Parini, J. F. Pacheco, L. Haefeli, Observação de aves se alimentando dos frutos de Micromar sellowiana (Melastomataceae) na Floresta Atlântica Alto-Montana do Parque Nacional da Serra dos Órgãos e do Parque Nacional do Itatiaia, região sudeste do Brasil. Atualidades Ornitológicas 146, 4–7 (2009).

R. Parini, J. F. Pacheco, Frugivíória por aves em seis espécies arbóreas do gênero Micromar (Melastomataceae) na Mata Atlântica do Parque Nacional da Serra dos Õrgãos, Região Sudeste do Brasil. Atualidades Ornitológicas 159, 51–58 (2011a).

R. Parini, J. F. Pacheco, Frugivíoria por aves em Alchornea triplinervia (Euphorbiaceae) na Mata Atlântica do Parque Estadual dos Três Picos, Estado do Rio de Janeiro, Brasil. Atualidades Ornitológicas 162, 33–41 (2011).

R. Parini, J. F. Pacheco, Aspectos da frugivíória por aves em Cupania oblongifolia (Sapindaceae) na Mata Atlântica do Parque Nacional da Serra dos Órgãos, Estado do Rio de Janeiro, Brasil. Atualidades Ornitológicas 178, 55–62 (2014).

R. Parini, Quatro estações, história natural das aves na Mata Atlântica: Uma abordagem trófica (Technical Books, 2015).

R. Parini, C. S. Pardo, I. F. Pacheco, Conhecendo as plantas cujos frutos e recursos florais são consumidos pelas aves na Mata Atlântica do Parque Nacional da Serra dos Órgãos. Atualidades Ornitológicas 199, 38–136 (2017).

V. S.M. Gomes, Variação espacial e dieta de aves terrestres na Restinga de Jurubatiba, RJ. PhD Thesis, UFRJ, Rio de Janeiro, BR (2006).

E. R. Castro, Fenologia reprodutiva do palmídeo Euterpe edulis (Arecaceae) e sua influência na abundância de aves frugívoras na Floresta Atlântica. PhD Thesis, UNESP Rio Claro, BR (2015).

A. Scherer, F. Marashi-Silva, L. R. M. Baptista, Padrões de interações mutualísticas entre espécies arbóreas e aves frugívoras em uma comunidade de Restinga no Parque Estadual de Itapuã, RS, Brasil. Acta Bot. Bras., 21, 203–212 (2007).

J. M. S. Correia. Utilização de espécies frutíferas da Mata Atlântica na alimentação da avifauna da Reserva Biológica de Poços das Antas, RJ. MSc Dissertation, UNB Brasília, (1999).

M. A. Manhães, Dieta de Traipuns (Passeiformes, Embiidae) no Parque Estadual do Ibitipoca, Minas Gerais, Brasil. Herinini 93, 59–73 (2003).

M. A. de Oliveira, Frugivíória por aves em um fragmento de floresta de restinga no Estado do Espírito Santo, Brasil. PhD Thesis, UNICAMP, Campinas, BR (1999).

K. J. F. Alves. Composição da avifauna e frugivíória por aves em um mosaico sucessional na Mata Atlântica. MSc Dissertation, UNESP Rio Claro, BR (2008).

R. F. Fadini, P. de Marco Jr., Interações entre aves frugívoras e plantas em um fragmento de Mata Atlântica de Minas Gerais, Araucária 12, 97–103 (2004).

A. Kindel. Interações entre plantas ornitófilas e aves frugívoras na Estação Ecológica de Ararú, Muitos Capões, RS. MSc Dissertation, UFRGS Porto Alegre, BR (1996).

M. Galetti, M. A. Pizó, Fruit eating birds in a forest fragment in southeastern Brazil. Ararajuba 4, 71–79 (2018).

M. A. Pizó, Frugivory and habitat use by fruit-eating birds in a fragmented landscape of southeast Brazil. Oecologia 15, 117–126 (2004).
Acknowledgments: We thank V. B. Zipparro for plant taxonomy updates and S. Timotéo, M. A. Mello, and N. Villar for invaluable suggestions to an early draft of this manuscript. Funding: Our study was supported by the São Paulo Research Foundation (FAPESP: 2014/01986-0, 2015/15172-7, 2016/18355-8, and 2017/25605-3); M.A.P. and M.G. received fellowships from the Brazilian Council of Scientific and Technological Development (CNPq). P.J. was supported by the Severo Ochoa Excellence Award (SEV-2012-0262), grant CGL2017-82847P, and the Science Without Borders Program (CNPq, PVE-401258/2012). M.V. was supported by the Ecometas excellence network (CGL2016-81706-REDT). Author contributions: C.E., M.G., P.J., and M.V. designed the study. M.G., P.J., and M.A.P. collected part of the data. C.E. wrote the first draft of the manuscript. All authors contributed to the discussion and reviewed the final text. Competing interests: The authors declare that they have no competing interests. Data and materials availability: All data needed to evaluate the conclusions in the paper are present in the paper and/or the Supplementary Materials. Raw data are available at https://github.com/LEEClab/Atlantic_series and at https://github.com/carineemer/Phylogenies_Seed_Dispersal.

Submitted 9 October 2018
Accepted 10 May 2019
Published 19 June 2019
10.1126/sciadv.aav6699

Citation: C. Emer, M. Galetti, M. A. Pizo, P. Jordano, M. Verdú, Defaunation precipitates the extinction of evolutionarily distinct interactions in the Anthropocene. Sci. Adv. 5, eaav6699 (2019).
Anthropocene
Defaunation precipitates the extinction of evolutionarily distinct interactions in the Anthropocene
Carine Emer, Mauro Galetti, Marco A. Pizo, Pedro Jordano and Miguel Verdú

Sci Adv 5 (6), eaav6699.
DOI: 10.1126/sciadv.aav6699

ARTICLE TOOLS  http://advances.sciencemag.org/content/5/6/eaav6699
SUPPLEMENTARY MATERIALS  http://advances.sciencemag.org/content/suppl/2019/06/17/5.6.eaav6699.DC1
REFERENCES  This article cites 57 articles, 9 of which you can access for free http://advances.sciencemag.org/content/5/6/eaav6699#BIBL
PERMISSIONS  http://www.sciencemag.org/help/reprints-and-permissions

Use of this article is subject to the Terms of Service

Science Advances (ISSN 2375-2548) is published by the American Association for the Advancement of Science, 1200 New York Avenue NW, Washington, DC 20005. 2017 © The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works. The title Science Advances is a registered trademark of AAAS.
Supplementary Materials for

Defaunation precipitates the extinction of evolutionarily distinct interactions in the Anthropocene

Carine Emer*, Mauro Galetti, Marco A. Pizo, Pedro Jordano, Miguel Verdú,

*Corresponding author. Email: c.emer09@gmail.com

Published 19 June 2019, Sci. Adv. 5, eaav6699 (2019)
DOI: 10.1126/sciadv.aav6699

This PDF file includes:

Fig. S1. Distribution of the ED of the frugivore bird species in the gradient of defaunation across the fragments of the Atlantic Forest.
Fig. S2. Distribution of the ED of the bird-dispersed plant species in the gradient of defaunation across the fragments of the Atlantic Forest.
Fig. S3. Correlation between the ED and the traits of the species involved in seed dispersal interactions in the Atlantic Forest.
Fig. S4. Defaunation leads to a significant impoverishment of the cumulative EDi performed by bird seed dispersal across forest fragments.
Fig. S5. EDi promoted by bird seed dispersal decreases sharply along a gradient of defaunation.
Fig. S6. Defaunation leads to an impoverishment of seed dispersal interactions and their associated asymmetric relationships of EDi.
Table S1. Description of the dataset used in this study.
Table S2. Traits of the bird species recorded in the studied communities of the Atlantic Forest.
Table S3. Traits of the plant species recorded in the studied communities of the Atlantic Forest.
Table S4. The bird–seed dispersal interactions recorded in the studied sites of the Atlantic Forest, followed by their EDi and correspondent asymmetry.
References (52–76)
Fig. S1. Distribution of the ED of the frugivore bird species in the gradient of defaunation across the fragments of the Atlantic Forest. The left pane represents the ED of the bird species mapped in their correspondent phylogenetic tree. The right pane indicates in which fragment (columns in grey) a given bird species, and its corresponding ED, was recorded (black rectangles).
Fig. S2. Distribution of the ED of the bird-dispersed plant species in the gradient of defaunation across the fragments of the Atlantic Forest. The left pane represents the ED of the plant species mapped in their correspondent phylogenetic tree. The right pane indicates in which fragment (columns) a given plant species, and its corresponding ED, was recorded.
Fig. S3. Correlation between the ED and the traits of the species involved in seed dispersal interactions in the Atlantic Forest. ED is positively associated to increasing body mass of the frugivore bird species ($r = 0.21$, $t = 0.28$, $p = 0.007$; A) and the seed diameter of the bird-dispersed plant species ($r = 0.38$, $t = 5.84$, $p = 0.001$; B).
Fig. S4. Defaunation leads to a significant impoverishment of the cumulative EDi performed by bird seed dispersal across forest fragments. The sum of EDi each fragment support decreases drastically with defaunation, here estimated by the magnitude of the downsizing in body masses of all frugivorous bird species recorded in each local fragment in comparison to the regional pool of frugivorous bird species. Given that defaunation is negatively correlated with the area of the fragment ($r = -0.63$, $p < 0.001$; A), we tested whether this correlation would influence the patterns seen with the defaunation index by removing the area effects on EDi using the residuals of a linear regression of defaunation index on fragment area as the independent variable fitted against EDi (B). We found that the total EDi each fragment harbors decreases significantly with increasing defaunation even when the area of the fragment is taking into account (slope = $-5.44 \pm 2.09$, $t = -2.63$, $p = 0.02$; B) Numbers within circles are in a decreasing order of fragment area, according to the full description of each site in Table S1. Larger area fragments tend to be less disturbed therefore holding more pristine forests.
Fig. S5. EDi promoted by bird seed dispersal decreases sharply along a gradient of defaunation.

The cumulative EDi a fragment carries corresponds to the sum of the EDis of all interactions recorded in that fragment, here the sum of the EDis of all seed-dispersal interactions by birds. The y-axis represents the z-scores of EDi’s when controlled by null models that consider the bird-seed dispersal interaction richness in each fragment. Therefore, fragments with positive z-scores (shaded points above the zero line) are fragments that hold higher EDi than expected by the interaction richness it holds. Contrarily, negative z-scores are those fragments that carry less EDi than expected by its interaction richness. The most pristine area is the top-left circle (1), which is the largest remnant of the Atlantic Forest and also the least defaunated fragment, used here as the baseline to illustrate the position of a “pristine” forest. Numbers within circles are presented in a decreasing order of fragment area, according to the description of each site in Table S1. Larger fragments tend to be less disturbed, therefore harbouring forests closer to the most “pristine”, best preserved extreme.
Fig. S6. Defaunation leads to an impoverishment of seed dispersal interactions and their associated asymmetric relationships of EDi. The proportion of interactions remaining in each fragment drops drastically as defaunation increases, and this pattern is maintained when controlled for fragment area by using the residuals of a linear regression of defaunation on fragment area as the independent variable. The four types of bird-seed dispersal interaction asymmetries showed similar trend on losing EDi with defaunation, but the loss is faster for bird-skewed interactions while plant-skewed interactions persist longer in the gradient of defaunation. The percentile 50 was used as a threshold to define low and high EDi’s, which corresponds to different combinations of asymmetry as follows: Plant-skewed, low ED (min EDi = 5.73 MY; max EDi = 32.74 MY); Plant-skewed, high ED (32.77-381.22 MY); Bird-skewed, low ED (3.52 -32.71 MY); Bird-skewed, high ED (32.8 - 107.79 MY).
Table S1. Description of the dataset used in this study. All studies were carried out in the domain of the Atlantic Forest. Defaunation is estimated as the difference between the sum of the body mass of all frugivorous bird species at the regional level (using the Atlantic Frugivory dataset as a baseline, 21) and the sum of body mass of frugivorous bird species recorded in each study site (local community). PE = State Park. PARNA = National Park. Rebio = Biological Reserve. Latitude and longitude coordinates are given in decimal degrees (WGS84). Sample focus is defined as: P = plant oriented, interactions based on focal observations; A = animal oriented, interactions based on diet analysis (e.g., faeces sampling). The raw data for the full dataset can be found on GitHub (https://github.com/carineemer/Phylogenies_Seed_Dispersal) and on the Atlantic-Frugivory database (21).

| ID | Ref* | Study site       | Forest type     | Latitude     | Longitude    | Area (ha) | N plant species | N bird species | N interactions | Defaunation index | Sample focus |
|----|------|------------------|-----------------|--------------|--------------|-----------|----------------|----------------|----------------|--------------------|---------------|
| 1  | 52   | PE Intervales    | Ombrophilous    | -24.316965   | -48.387175   | 42000     | 226            | 94             | 1124           | 0.557             | PA            |
| 2  | 53   | PE Carlos Botelho| Ombrophilous    | -24.131389   | -47.949167   | 37644     | 61             | 78             | 286            | 0.615             | PA            |
| 3  | 54-60| PARNA S. Órgãos  | Ombrophilous    | -22.4956     | -43.0736     | 20000     | 12             | 76             | 195            | 0.744             | PA            |
| 4  | 61   | PARNA Jurubatiba | Restinga        | -22.2047     | -41.5005     | 14867     | 15             | 15             | 41             | 0.975             | A             |
| 5  | 62   | PE Ilha do Cardoso| Ombrophilous    | -25.127786   | -47.957463   | 13500     | 52             | 45             | 185            | 0.626             | P             |
| 6  | 63   | Reserva Itapua   | Restinga        | -30.3808     | -51.0081     | 5556      | 10             | 17             | 43             | 0.965             | PA            |
| 7  | 64   | Rebio Poço Antas| Ombrophilous    | -22.53629    | -42.277658   | 5052      | 13             | 43             | 181            | 0.926             | P             |
| 8  | 65   | PE Ibitipoca     | Rupestrian      | -21.709      | -43.884      | 1488      | 19             | 8              | 42             | 0.989             | A             |
| 9  | 66   | Reserva Comboios| Restinga        | -19.774      | -40.0432     | 833       | 13             | 43             | 122            | 0.904             | P             |
| 10 | 67   | PE Ilha Anchieta | Ombrophilous    | -23.548369   | -45.062541   | 828       | 10             | 25             | 104            | 0.958             | P             |
| 11 | 68   | fragment MG      | Semideciduous   | -20.802611   | -42.858746   | 380       | 15             | 26             | 64             | 0.838             | P             |
| 12 | 69   | Araucaria Forest | Araucaria Forest| -28.223141   | -51.166857   | 272       | 13             | 21             | 54             | 0.96              | P             |
| 13 | 70   | Mata Sta Genebra | Semideciduous   | -22.818101   | -47.113757   | 250       | 26             | 44             | 155            | 0.837             | P             |
| 14 | 71   | Itatiba          | Semideciduous   | -22.943263   | -46.749949   | 80        | 13             | 41             | 108            | 0.897             | PA            |
| 15 | 72   | fragment RC      | Semideciduous   | -22.480979   | -47.592293   | 44        | 5              | 24             | 62             | 0.963             | P             |
| 16 | 73   | restored 57      | Restored forest | -22.671644   | -47.204638   | 30        | 6              | 9              | 15             | 0.986             | PA            |
| 17 | 73   | restored 15      | Restored forest | -22.825234   | -47.427761   | 30        | 5              | 12             | 20             | 0.971             | PA            |
| 18 | 73   | restored 25      | Restored forest | -22.568342   | -47.504987   | 20        | 13             | 27             | 88             | 0.95              | PA            |
| 19 | 74   | fragment SP      | Semideciduous   | -23.545856   | -46.721177   | 10        | 22             | 19             | 59             | 0.952             | P             |
| 20 | 75   | restored 8       | Restored forest | -22.708708   | -47.610207   | 6         | 6              | 26             | 48             | 0.956             | P             |
| 21 | 76   | fragment RJ      | Semideciduous   | -22.767379   | -43.694394   | 0.66      | 11             | 13             | 26             | 0.971             | P             |

*Numbers correspond to the references listed in the main text.
Table S2. Traits of the bird species recorded in the studied communities of the Atlantic Forest.
ED = Evolutionary distinctness of the species, estimated in millions of years (MY) and averaged across 100 solved trees. Species are sorted in a decreasing order of ED.

| Bird species               | Body mass (g) | ED (MY) | Fragments present |
|---------------------------|--------------|---------|-------------------|
| *Piaya cayana*            | 102.00       | 71.99   | 1                 |
| *Baryphthengus ruficapillus* | 142.5       | 71.54   | 2                 |
| *Guira guira*             | 141.00       | 51.93   | 1                 |
| *Trogon rufus*            | 53.80        | 48.17   | 3                 |
| *Troglodytes aedon*       | 10.86        | 43.50   | 1                 |
| *Cyclarhis gujanensis*    | 28.80        | 39.18   | 7                 |
| *Crotophaga major*        | 148.50       | 36.21   | 1                 |
| *Crotophaga ani*          | 111.73       | 36.21   | 1                 |
| *Oxyruncus cristatus*     | 42.00        | 35.16   | 3                 |
| *Trogon viridis*          | 89.70        | 30.23   | 3                 |
| *Thamnophilus caerulescens* | 21.10       | 29.56   | 1                 |
| *Pipile jacutinga*        | 1250.00      | 28.99   | 3                 |
| *Cranioleuca pallida*     | 11.50        | 28.82   | 1                 |
| *Vireo olivaceus*         | 16.17        | 26.87   | 12                |
| *Schiiffornis virescens*  | 25.60        | 24.95   | 2                 |
| *Laniisoma elegans*       | 47.40        | 24.86   | 1                 |
| *Selenidera maculirostris*| 164.00       | 23.57   | 4                 |
| *Picumnus cirratus*       | 10.20        | 23.33   | 1                 |
| *Picumnus nebulosus*      | 11.60        | 23.33   | 1                 |
| *Veniliornis spilogaster* | 40.30        | 20.38   | 2                 |
| *Pyroderus scutatus*      | 357.00       | 20.26   | 3                 |
| *Mimus saturninus*        | 63.70        | 20.05   | 6                 |
| *Mimus gilvus*            | 52.35        | 20.05   | 2                 |
| *Conopias trivirgatus*    | NA           | 19.91   | 1                 |
| *Camptostoma obsoletum*   | 8.10         | 19.23   | 4                 |
| *Myiopagis caniceps*      | 10.50        | 18.83   | 1                 |
| *Tityra inquisitor*       | 43.10        | 18.77   | 1                 |
| *Tityra cayana*           | 68.10        | 18.77   | 3                 |
| *Procnias nudicollis*     | 200.00       | 18.15   | 5                 |
| *Habia rubica*            | 34.00        | 17.41   | 3                 |
| *Carpornis cucullata*     | 74.20        | 17.38   | 4                 |
| *Carpornis melanoccephala*| 64.20        | 17.38   | 3                 |
| *Myiophobus fasciatus*    | 9.90         | 17.30   | 2                 |
| *Trogon surrurcua*        | 73.30        | 17.14   | 3                 |
| *Serophaga subcristata*   | 6.60         | 17.09   | 1                 |
| *Ramphastos toco*         | 618.00       | 16.78   | 1                 |
| *Phyllophobus griseicapilla* | 8.00       | 16.39   | 1                 |
| *Phylloscartes ventralis* | 8.30         | 16.31   | 1                 |
| *Phylloscartes oustaleti* | 10.00        | 16.18   | 1                 |
| *Tolmomyias flaviventris* | 12.20        | 16.12   | 3                 |
| *Tolmomyias sulphurescens*| 14.30        | 16.12   | 5                 |
| *Legatus leucophaius*     | 22.20        | 16.06   | 2                 |
| Species                        | Value1 | Value2 | Value3 |
|-------------------------------|--------|--------|--------|
| Neopelma aurifrons            | 140.00 | 15.62  | 1      |
| Geothlypis aequinoctialis     | 13.10  | 15.54  | 1      |
| Pachyramphus viridis          | 21.00  | 15.43  | 1      |
| Pachyramphus validus          | 43.00  | 15.43  | 4      |
| Hylophilus amaurocephalus     | 11.59  | 15.40  | 2      |
| Pachyramphus polychopterus    | 20.80  | 15.37  | 5      |
| Pachyramphus castaneus        | 19.50  | 15.37  | 4      |
| Hylophilus poicilotis         | 10.40  | 15.36  | 3      |
| Melanerpes flavifrons         | 58.00  | 15.33  | 2      |
| Melanerpes candidus           | 108.00 | 15.33  | 2      |
| Zonotrichia capensis          | 20.75  | 15.12  | 10     |
| Turdus subalaris              | 49.50  | 14.99  | 4      |
| Chlorophonia cyanea           | 14.00  | 14.98  | 2      |
| Phibalura flavirostris        | 46.50  | 14.37  | 2      |
| Ilicura militaris             | 12.70  | 14.28  | 3      |
| Manacus manacus               | 16.70  | 14.03  | 3      |
| Phylloscartes sylvilus        | 8.00   | 14.00  | 1      |
| Contopus cinereus             | 11.60  | 13.98  | 1      |
| Icterus cayanensis            | 36.00  | 13.95  | 5      |
| Tijuca atra                   | 80.00  | 13.92  | 1      |
| Celeus flavescens             | 139.00 | 13.12  | 7      |
| Nemosia pileata               | 16.00  | 13.07  | 6      |
| Capsiempis flaveola           | 7.70   | 13.01  | 1      |
| Elaenia obscura               | 23.90  | 13.01  | 4      |
| Fluvicola nengeta             | 21.00  | 12.98  | 1      |
| Pteroglossus baillonii        | 146.00 | 12.96  | 3      |
| Satrapa icterophrys           | 21.50  | 12.73  | 1      |
| Penelope superciliaris        | 895.00 | 12.66  | 2      |
| Pitangus sulphuratus          | 63.33  | 12.60  | 18     |
| Penelope obscura              | 1770.00| 12.21  | 5      |
| Sirystes sibilator            | 32.30  | 12.17  | 1      |
| Mionectes rufiventris         | 13.30  | 12.11  | 4      |
| Mionectes oleagineus          | 11.23  | 12.11  | 1      |
| Euphonia pectoralis           | 14.40  | 12.06  | 3      |
| Parula pitiyayumi             | 6.95   | 11.82  | 3      |
| Euphonia violacea             | 15.00  | 11.60  | 6      |
| Phyllomyias fasciatus         | 10.30  | 11.55  | 4      |
| Turdus amaurochalinus         | 57.90  | 11.52  | 18     |
| Euphonia chalybea             | 19.00  | 11.36  | 3      |
| Volatina jacarina             | 9.95   | 11.35  | 4      |
| Conirostrum speciosum         | 8.80   | 11.33  | 7      |
| Attila phoenicurus            | 32.30  | 11.24  | 2      |
| Attila rufus                  | 42.60  | 11.24  | 2      |
| Pipraeidea melanonota         | 21.00  | 11.01  | 6      |
| Myiodyastes maculatus         | 43.20  | 11.01  | 13     |
| Psarocolius decumanus         | 280.00 | 10.96  | 1      |
| Haplospiza unicolor           | 15.90  | 10.74  | 1      |
| Common Name                  | Scientific Name  | Abundance | HSI | Rarity |
|-----------------------------|------------------|-----------|-----|--------|
| Sicalis flaveola            | Sicalis flaveola | 17.00     | 10.74 | 1      |
| Machaerapterus regulus      | Machaerapterus regulus | 9.60    | 10.37 | 1      |
| Arremon taciturnus          | Arremon taciturnus | 24.80   | 10.32 | 1      |
| Xolmis velatus              | Xolmis velatus   | NA        | 10.18 | 2      |
| Xolmis cinereus             | Xolmis cinereus  | 57.10     | 10.18 | 1      |
| Euphonia chlorotica         | Euphonia chlorotica | 11.00   | 10.12 | 6      |
| Pteroglossus aracari        | Pteroglossus aracari | 251.00 | 10.07 | 1      |
| Cyanerpes cyaneus           | Cyanerpes cyaneus | 14.00     | 10.04 | 3      |
| Lipaugus lanioides          | Lipaugus lanioides | 94.80   | 9.95  | 2      |
| Megarynchus pitangua        | Megarynchus pitangua | 66.70   | 9.93  | 10     |
| Ramphastos sp               | Ramphastos sp    | NA        | 9.87  | 1      |
| Cnemotriccus fuscatus       | Cnemotriccus fuscatus | 13.60  | 9.85  | 1      |
| Lathrotriccus euleri        | Lathrotriccus euleri | 11.35  | 9.85  | 2      |
| Ramphastos dicolorus        | Ramphastos dicolorus | 331.00  | 9.85  | 4      |
| Ramphastos vitellinus       | Ramphastos vitellinus | 343.50 | 9.83  | 3      |
| Euphonia sp                 | Euphonia sp      | NA        | 9.81  | 2      |
| Stephanophorus diadematus   | Stephanophorus diadematus | 35.40 | 9.70  | 4      |
| Coereba flaveola            | Coereba flaveola | 10.34     | 9.68  | 12     |
| Basileuterus flavolus       | Basileuterus flavolus | 13.20  | 9.55  | 1      |
| Basileuterus culcivorus     | Basileuterus culcivorus | 10.50  | 9.55  | 1      |
| Saltator maximus            | Saltator maximus | 46.20     | 9.42  | 2      |
| Orchesticus abeillei        | Orchesticus abeillei | 31.50  | 9.22  | 2      |
| Antilophia galeata          | Antilophia galeata | 20.60  | 9.20  | 1      |
| Tachyphonus cristatus       | Tachyphonus cristatus | 18.80  | 9.14  | 5      |
| Tersina viridis             | Tersina viridis  | 29.00     | 9.03  | 5      |
| Penelope sp                 | Penelope sp      | NA        | 8.85  | 2      |
| Myiozetetes similis         | Myiozetetes similis | 28.00  | 8.85  | 11     |
| Myiozetetes cayenensis      | Myiozetetes cayenensis | 25.90  | 8.85  | 1      |
| Orthogonys chloricterus     | Orthogonys chloricterus | 16.00  | 8.77  | 2      |
| Cacicus haemorrhous         | Cacicus haemorrhous | 102.00 | 8.72  | 4      |
| Cacicus chrysoperterus      | Cacicus chrysoperterus | 41.00  | 8.72  | 4      |
| Poospiza thoracica          | Poospiza thoracica | 11.90  | 8.71  | 1      |
| Thlypopsis sordida          | Thlypopsis sordida | 17.00   | 8.63  | 5      |
| Knipolegus cyanoriostri     | Knipolegus cyanoriostri | 15.40  | 8.62  | 1      |
| Knipolegus nigerrimus       | Knipolegus nigerrimus | 20.30  | 8.62  | 1      |
| Empidonomus varius          | Empidonomus varius | 27.10   | 8.55  | 8      |
| Thraupis bonariensis        | Thraupis bonariensis | 36.00  | 8.40  | 1      |
| Colaptes campestris         | Colaptes campestris | 158.00 | 8.31  | 2      |
| Colaptes melanochloros      | Colaptes melanochloros | 127.27 | 8.31  | 3      |
| Gnornimpsar chopi           | Gnornimpsar chopi | 65.90    | 8.26  | 1      |
| Pseudoleistes guirahuro     | Pseudoleistes guirahuro | 91.20  | 8.26  | 2      |
| Saltator maxillosus         | Saltator maxillosus | 50.80  | 8.15  | 1      |
| Poospiza lateralis          | Poospiza lateralis | 19.20   | 8.06  | 3      |
| Elaenia sp                  | Elaenia sp       | NA        | 7.97  | 11     |
| Elaenia spectabilis         | Elaenia spectabilis | 27.30  | 7.87  | 1      |
| Pipra rubrocapilla          | Pipra rubrocapilla | 12.00  | 7.85  | 2      |
| Pipra pipra                 | Pipra pipra      | 10.30    | 7.85  | 2      |
| Species                     | Value 1 | Value 2 | Value 3 |
|-----------------------------|---------|---------|---------|
| Sporophila leucoptera       | 15.50   | 7.82    | 1       |
| Saltator fuliginosus        | 50.50   | 7.64    | 3       |
| Turdus albicollis           | 54.00   | 7.59    | 8       |
| Elaenia flavogaster         | 24.80   | 7.58    | 15      |
| Turdus flavipes             | 65.33   | 7.46    | 8       |
| Trichothraupis melanops     | 24.30   | 7.19    | 7       |
| Dacnis nigripes             | 14.00   | 7.12    | 1       |
| Dacnis cayana               | 13.00   | 7.12    | 16      |
| Cissopis leverianus         | 76.00   | 6.92    | 1       |
| Tangara cyanoptera          | 20.70   | 6.87    | 1       |
| Elaenia parvirostris        | 13.80   | 6.86    | 1       |
| Myiarchus tyrannulus        | 36.25   | 6.83    | 4       |
| Turdus sp                   | NA      | 6.70    | 2       |
| Tangara mexicana            | 20.50   | 6.57    | 2       |
| Tangara peruviana           | 22.20   | 6.47    | 3       |
| Turdus rufiventris          | 69.50   | 6.23    | 14      |
| Coryphosphingus cucullatus | 14.30   | 6.19    | 2       |
| Coryphosphingus pileatus   | 15.30   | 6.19    | 2       |
| Elaenia mesoleuca           | 17.60   | 5.96    | 3       |
| Chiroxiphia caudata         | 25.60   | 5.85    | 6       |
| Myiarchus swainsoni         | 25.10   | 5.77    | 4       |
| Saltator similis            | 43.30   | 5.75    | 9       |
| Hemithraupis ruficapilla    | 11.00   | 5.61    | 4       |
| Tachyphonus rufus           | 34.40   | 5.55    | 1       |
| Tachyphonus coronatus       | 29.30   | 5.55    | 14      |
| Hemithraupis flavicollis    | 12.80   | 5.44    | 3       |
| Turdus fumigatus            | 75.85   | 5.24    | 2       |
| Myiarchus ferox             | 27.50   | 5.23    | 7       |
| Turdus leucomelas           | 69.10   | 5.22    | 16      |
| Thraupis sp                 | NA      | 5.10    | 1       |
| Tangara cayana              | 18.00   | 5.02    | 14      |
| Tangara preciosa            | 22.80   | 4.98    | 2       |
| Myiarchus sp                | NA      | 4.97    | 2       |
| Tyrannus savana             | 31.90   | 4.84    | 6       |
| Tyrannus melancholicus      | 37.40   | 4.84    | 16      |
| Ramphocelus bresilius       | 32.90   | 4.76    | 5       |
| Ramphocelus carbo           | 26.00   | 4.76    | 5       |
| Tangara sp                  | NA      | 4.69    | 1       |
| Tangara seledon             | 18.70   | 4.59    | 4       |
| Thraupis cyanoptera         | 43.30   | 4.26    | 4       |
| Schistochlamys ruficapillus | 31.20   | 4.19    | 3       |
| Schistochlamys melanopis    | 33.00   | 4.19    | 1       |
| Sporophila caerulescens     | 10.20   | 4.03    | 2       |
| Tangara cyanoccephala       | 18.00   | 3.37    | 5       |
| Thraupis ornata             | 33.00   | 3.26    | 3       |
| Thraupis palmarum           | 39.00   | 3.22    | 10      |
| Thraupis sayaca             | 32.50   | 2.78    | 16      |
| Species                  | Value 1 | Value 2 | Value 3 |
|-------------------------|---------|---------|---------|
| Thraupis episcopus       | 35.00   | 2.77    | 6       |
| Tangara desmaresti      | 20.40   | 2.47    | 4       |
| Tangara cyanoventris    | 16.50   | 2.46    | 1       |
Table S3. Traits of the plant species recorded in the studied communities of the Atlantic Forest.
ED = Evolutionary distinctness of the species, estimated in million of years (MY) averaged across 100 solved trees. Species are sorted in a decreasing order of ED.

| Plant species                          | Seed diameter (mm) | ED (MY) | Fragments present |
|---------------------------------------|--------------------|---------|-------------------|
| Podocarpus sellowii                   | NA                 | 352.23  | 1                 |
| Hedyosmum brasiliense                 | 1.50               | 273.14  | 1                 |
| Meliosma sellowii                    | 11.6               | 153.69  | 1                 |
| Cinnamodendron dinisii                | 7.00               | 134.60  | 4                 |
| Drimys brasiliensis                  | 2.00               | 134.60  | 1                 |
| Dichorisandra thyrsiflora             | NA                 | 120.28  | 1                 |
| Hedychium coronarium                  | NA                 | 113.58  | 1                 |
| Momordica charantia                   | NA                 | 110.30  | 1                 |
| Smilax elastica                       | NA                 | 108.04  | 1                 |
| Smilax rufescens                      | NA                 | 108.04  | 1                 |
| Abuta selloana                        | 13.20              | 106.80  | 1                 |
| Cissampelos andromorpha              | NA                 | 106.80  | 1                 |
| Humiria balsamifera                  | 4.10               | 103.70  | 1                 |
| Fuchsia regia                         | NA                 | 102.89  | 1                 |
| Hyeronima alchorneoides              | 2.0                | 102.73  | 3                 |
| Cassytha filiformis                   | NA                 | 101.35  | 1                 |
| Euterpe edulis                        | 12.00              | 98.70   | 5                 |
| Philodendron appendiculatum           | NA                 | 97.44   | 2                 |
| Margaritaria nobilis                 | 1.75               | 95.07   | 1                 |
| Heisteria perianthomega               | NA                 | 92.26   | 1                 |
| Costus spiralis                       | NA                 | 91.96   | 1                 |
| Samanea tubulosa                      | NA                 | 91.90   | 1                 |
| Pera glabrata                         | 2.60               | 91.62   | 3                 |
| Chamissoa altissima                   | NA                 | 90.34   | 1                 |
| Scutia buxiformia                     | NA                 | 89.66   | 1                 |
| Ilex affinis                          | 5.50               | 85.51   | 1                 |
| Cissus paulliniifolia                 | NA                 | 82.78   | 1                 |
| Vismia brasiiliensis                 | 1.10               | 82.46   | 1                 |
| Merostachys sp                        | NA                 | 81.26   | 1                 |
| Dendropanax cuneatus                  | 2.90               | 80.53   | 1                 |
| Sapium glandulosum                    | 5.00               | 80.45   | 1                 |
| Tetrorchidium rubrivenium             | 4.50               | 80.45   | 1                 |
| Quiina glaziovii                      | 9.00               | 79.72   | 3                 |
| Melastomataceae sp                    | NA                 | 76.37   | 1                 |
| Sloanea guianensis                    | 6.00               | 75.38   | 2                 |
| Sloanea hirsuta                       | 8.50               | 75.38   | 2                 |
| Cybianthus peruvianus                 | NA                 | 74.46   | 1                 |
| Anthurium scandens                    | NA                 | 71.55   | 2                 |
| Magnolia ovata                        | 8.00               | 69.38   | 1                 |
| Michelia champaca                     | NA                 | 69.38   | 1                 |
| Casearia decandra                     | 6.00               | 68.33   | 2                 |
| Casearia sylvestris                   | 1.30               | 68.33   | 7                 |
| Species                     | Value | Percentage | Count |
|-----------------------------|-------|------------|-------|
| **Garcinia gardneriana**    | 14.80 | 65.91      | 1     |
| **Tournefortia sp**         | NA    | 64.29      | 1     |
| **Sorocea bonplandii**      | 9.80  | 64.25      | 2     |
| **Aechmea nudicaulis**      | NA    | 63.58      | 1     |
| **Aureliana fasciculata**   | NA    | 62.42      | 1     |
| **Tapirira guianensis**     | 8.15  | 61.33      | 1     |
| **Cissus striata**          | NA    | 60.78      | 1     |
| **Maclura tinctoria**       | 2.10  | 58.86      | 2     |
| **Schwartzia brasiliensis** | 1.00  | 58.30      | 1     |
| **Prunus myrtifolia**       | 5.40  | 57.13      | 2     |
| **Prunus sellowii**         | NA    | 57.13      | 1     |
| **Coussapoa microcarpa**    | 1.20  | 56.42      | 2     |
| **Phytolacca dioica**       | 3.00  | 55.01      | 1     |
| **Henriettea saldanhae**    | NA    | 54.22      | 1     |
| **Piper corintoanum**       | NA    | 53.86      | 1     |
| **Davilla rugosa**          | NA    | 52.64      | 1     |
| **Heteropsis oblongifolia** | NA    | 52.04      | 1     |
| **Monstera adansonii**      | NA    | 51.68      | 1     |
| **Heteropsis rigidifolia**  | NA    | 51.57      | 1     |
| **Codonanthe cordifolia**   | NA    | 50.33      | 1     |
| **Piper sp**                | NA    | 49.90      | 2     |
| **Peplonia organensis**     | NA    | 48.19      | 1     |
| **Cryptocarya moschata**    | 8.00  | 47.82      | 2     |
| **Styrax leprosus**         | 5.50  | 47.09      | 1     |
| **Loranthaceae sp**         | NA    | 46.89      | 1     |
| **Cryptocarya aschersoniana**| 22.00 | 46.67      | 1     |
| **Cryptocarya mandioccana** | 15.00 | 45.55      | 1     |
| **Urera baccifera**         | 2.00  | 45.09      | 2     |
| **Urera sp**                | NA    | 45.09      | 1     |
| **Rubus brasiliensis**      | NA    | 44.80      | 1     |
| **Rubus sp**                | NA    | 44.13      | 1     |
| **Cordia sellowiana**       | 13.31 | 43.86      | 1     |
| **Curatella americana**     | 2.60  | 43.84      | 1     |
| **Galium hypocarpium**      | NA    | 43.70      | 1     |
| **Cordia ecalyculata**      | 8.00  | 43.57      | 2     |
| **Cordia silvestris**       | 4.00  | 43.43      | 2     |
| **Schefflera angustissima** | 2.00  | 43.27      | 2     |
| **Varronia curassavica**    | NA    | 42.92      | 1     |
| **Myriopus paniculatus**    | NA    | 42.82      | 1     |
| **Pourouma guianensis**     | 10.00 | 42.72      | 2     |
| **Annona neosericea**       | 3.70  | 42.49      | 3     |
| **Rubus rosifolius**        | NA    | 42.38      | 2     |
| **Rubus urticifolius**      | NA    | 42.38      | 2     |
| **Myrtia sp**               | NA    | 42.26      | 1     |
| **Ouratea polygyna**        | NA    | 41.89      | 1     |
| **Ouratea vaccinioides**    | NA    | 41.89      | 1     |
| **Zanthoxylum hyemale**     | 3.00  | 41.59      | 1     |
| Neomitranthes glomerata | 11.00 | 41.31 | 3 |
|-------------------------|-------|-------|---|
| Celtis iguanaea          | 6.50  | 41.20 | 1 |
| Trema micrantha          | 1.70  | 41.20 | 7 |
| Aegiphila integrifolia   | 7.00  | 41.04 | 5 |
| Piper aduncum            | NA    | 41.03 | 2 |
| Piper dilatatum          | NA    | 41.03 | 1 |
| Myrrhinium atropurpureum | NA    | 40.89 | 1 |
| Maytenus littoralis      | 8.00  | 40.56 | 1 |
| Guapira opposita         | 3.84  | 40.10 | 6 |
| Schaefferia argentinensis| NA    | 39.94 | 1 |
| Alchornea triplinervia   | 4.10  | 39.83 | 5 |
| Alchornea glandulosa     | 5.00  | 39.08 | 3 |
| Maytenus brasiliensis    | 8.00  | 39.07 | 1 |
| Maytenus gonoclada       | 5.70  | 38.58 | 3 |
| Citharexylum myrianthum  | 5.50  | 38.57 | 7 |
| Tabernaemontana catherinensis | NA | 38.51 | 1 |
| Maytenus sp              | NA    | 38.43 | 2 |
| Myrtaceae sp             | NA    | 38.00 | 1 |
| Alchornea sidifolia      | 4.00  | 37.60 | 1 |
| Byrsonima ligustrifolia  | NA    | 37.38 | 1 |
| Virola gardneri          | 20.00 | 37.26 | 1 |
| Erythroxylum pulchrurn    | 6.54  | 37.03 | 1 |
| Syagrus romanzoffiana    | 16.60 | 36.95 | 1 |
| Cordiera mycicifolia     | NA    | 36.75 | 1 |
| Virola bicuhyla           | 16.00 | 36.26 | 3 |
| Chiococca alba           | NA    | 36.24 | 1 |
| Coussarea contracta      | 22.43 | 36.13 | 1 |
| Ilex theezans            | 2.70  | 35.95 | 1 |
| Maytenus aquifolia       | 7.00  | 35.91 | 2 |
| Erythroxylum gonocladum  | NA    | 35.35 | 1 |
| Margaritopsis astrellantha | 3.00 | 34.77 | 1 |
| Byrsonima variabilis     | NA    | 34.46 | 1 |
| Marcgravia polyantha     | NA    | 34.03 | 1 |
| Norantea brasiliensis    | NA    | 34.03 | 1 |
| Cupania emarginata       | 6.61  | 33.85 | 1 |
| Cupania oblongifolia     | 9.70  | 33.44 | 5 |
| Erythroxylum argentinum  | 4.00  | 33.36 | 1 |
| Erythroxylum ambiguum    | NA    | 33.26 | 1 |
| Erythroxylum deciduum    | 4.70  | 32.85 | 1 |
| Byrsonima cydoniifolia   | NA    | 32.72 | 1 |
| Erythroxylum ovalifolium | Na    | 32.46 | 1 |
| Inga marginata           | 9.00  | 32.21 | 1 |
| Copaifera langsdorffii   | 11.00 | 31.92 | 1 |
| Copaifera trapezioflia   | 11.53 | 31.92 | 2 |
| Cabralea canjerana       | 9.00  | 30.58 | 3 |
| Guatteria australis      | 7.00  | 30.53 | 2 |
| Symplocos uniflora       | 6.40  | 29.88 | 4 |
| Species                           | Abundance | Height  | Count |
|----------------------------------|-----------|---------|-------|
| *Symplocos* sp                   | NA        | 29.65   | 1     |
| *Gaylussacia brasiliensis*       | 1.79      | 29.37   | 1     |
| *Vitex megapotamica*             | 8.90      | 29.23   | 1     |
| *Vitex polygama*                 | 8.10      | 29.23   | 1     |
| *Gaylussacia pulchra*            | NA        | 28.55   | 1     |
| *Mollinedia schottiana*          | 5.90      | 27.93   | 2     |
| *Symplocos tetrandra*            | NA        | 27.57   | 1     |
| *Geonoma gamiova*                | 6.10      | 27.21   | 2     |
| *Symplocos glandulososmarginata* | NA        | 26.77   | 1     |
| *Geonoma elegans*                | NA        | 26.75   | 1     |
| *Geonoma pauciflora*             | 5.73      | 26.57   | 2     |
| *Protium icicariba*              | NA        | 26.50   | 1     |
| *Diploon sp*                     | NA        | 26.40   | 1     |
| *Mollinedia sp*                  | NA        | 26.37   | 1     |
| *Chrysophyllum viride*           | 10.00     | 26.31   | 1     |
| *Protium heptaphyllum*           | 7.50      | 26.24   | 4     |
| *Symplocos estrellensis*         | NA        | 26.14   | 1     |
| *Symplocos pubescens*            | NA        | 26.12   | 1     |
| *Clusia organensis*              | NA        | 25.73   | 1     |
| *Chrysophyllum flexuosum*        | 7.00      | 25.67   | 2     |
| *Mollinedia triflora*            | 9.00      | 25.34   | 1     |
| *Protium widgrenii*              | 9.00      | 25.31   | 1     |
| *Opuntia monacantha*             | NA        | 25.10   | 1     |
| *Cecropia pachystachya*          | 0.61      | 24.87   | 7     |
| *Lithraea molleoides*            | NA        | 24.51   | 1     |
| *Schinus terebinthifolia*        | 3.50      | 24.51   | 10    |
| *Cecropia glaziiovii*            | 0.62      | 24.44   | 6     |
| *Pereskia aculeata*              | NA        | 24.40   | 1     |
| *Pirosocereus arrabidae*         | NA        | 23.94   | 1     |
| *Xylopia brasiliensis*           | 4.10      | 23.31   | 2     |
| *Xylopia sericea*                | 5.00      | 23.09   | 1     |
| *Xylopia langsdorfiana*          | 6.12      | 22.76   | 1     |
| *Cupania vernalis*               | 7.40      | 22.65   | 2     |
| *Zanthoxylum rhoifolium*         | 2.60      | 22.59   | 1     |
| *Zanthoxylum riedelianum*        | 2.70      | 22.59   | 1     |
| *Mollinedia boracensis*          | NA        | 22.35   | 1     |
| *Persea alba*                    | 9.60      | 21.92   | 1     |
| *Persea major*                   | NA        | 21.63   | 1     |
| *Chomelia parvifolia*            | NA        | 21.61   | 1     |
| *Guettarda viburnoides*          | 13.3      | 21.61   | 1     |
| *Persea willdenovii*             | 7.00      | 21.44   | 2     |
| *Myrsine coriacea*               | NA        | 21.22   | 6     |
| *Coccocypselum geophiloides*     | NA        | 21.20   | 1     |
| *Coccocypselum hasslerianum*     | NA        | 21.20   | 1     |
| *Mollinedia uleana*              | 9.00      | 21.17   | 1     |
| *Ficus* sp                       | NA        | 20.64   | 2     |
| *Nectandra megapotamica*         | 9.00      | 20.09   | 2     |
| Species                    | Abundance | Height | Frequency |
|----------------------------|-----------|--------|-----------|
| Ficus glabra               | NA        | 20.03  | 1         |
| Myrsine lancifolia         | NA        | 19.77  | 1         |
| Matayba elaeagnoides      | 7.50      | 19.57  | 1         |
| Matayba guianensis        | 8.26      | 19.57  | 1         |
| Ficus insipida            | 1.70      | 19.23  | 2         |
| Phoradendron sp           | NA        | 19.00  | 2         |
| Ilex brevicuspis          | 1.50      | 18.97  | 2         |
| Myrsine sp                | NA        | 18.74  | 1         |
| Genipa americana          | 5.20      | 18.59  | 1         |
| Ocotea dispersa           | 7.70      | 18.53  | 1         |
| Ficus enormis             | 10.00     | 18.49  | 2         |
| Myrsine parvifolia        | NA        | 18.05  | 1         |
| Myrsine venosa            | 4.20      | 17.99  | 1         |
| Phoradendron piperoides   | NA        | 17.93  | 1         |
| Aiouea saligna            | 9.00      | 17.88  | 1         |
| Myrsine umbellata         | 3.50      | 17.84  | 5         |
| Guarea kunthiana          | 10.00     | 17.49  | 1         |
| Ocotea catharinensis      | 8.50      | 17.48  | 1         |
| Ficus hirsuta             | NA        | 17.43  | 1         |
| Ficus organensis          | 0.70      | 17.34  | 1         |
| Ocotea corymbosa          | 6.00      | 17.31  | 2         |
| Ocotea sp                 | NA        | 17.08  | 1         |
| Ocotea bicolor            | 10.30     | 16.98  | 1         |
| Cestrum mariquitense      | 2.70      | 16.89  | 4         |
| Cestrum schlechtendalii   | NA        | 16.70  | 1         |
| Myrsine gardneriana       | NA        | 16.60  | 1         |
| Trichilia catigua         | 5.00      | 16.52  | 1         |
| Inga edulis               | 5.84      | 16.13  | 2         |
| Inga laurina              | 10.00     | 16.13  | 1         |
| Ocotea teleiandra         | 16.00     | 15.65  | 1         |
| Ocotea notata             | 4.00      | 15.49  | 1         |
| Trichilia clausseni       | 9.00      | 15.39  | 3         |
| Ixora venulosa            | NA        | 14.81  | 1         |
| Clusia criuva             | 1.80      | 14.80  | 4         |
| Clusia hilariana          | 2.50      | 14.80  | 2         |
| Lantana sp                | NA        | 14.27  | 1         |
| Ixora gardneriana         | 4.00      | 14.19  | 1         |
| Ixora burchelliana        | NA        | 14.16  | 1         |
| Lantana camara            | NA        | 13.68  | 2         |
| Nectandra grandiflora     | 10.00     | 12.52  | 1         |
| Ocotea odorifera          | 13.65     | 12.51  | 1         |
| Allophylus edulis         | 5.74      | 12.37  | 3         |
| Lantana pohliana          | NA        | 12.33  | 1         |
| Nectandra membranacea     | 10.00     | 12.23  | 2         |
| Alibertia sp              | NA        | 12.22  | 1         |
| Nectandra reticulata      | 8.00      | 12.07  | 1         |
| Struthanthus concinnus    | NA        | 12.04  | 1         |
| Species                        | Rating 1 | Rating 2 | Rating 3 |
|-------------------------------|----------|----------|----------|
| Nectandra lanceolata          | 11.40    | 11.99    | 1        |
| Struthanthus martianus        | NA       | 11.99    | 2        |
| Psittacanthus sp              | NA       | 11.42    | 1        |
| Struthanthus sp               | NA       | 11.36    | 1        |
| Ilex microdonta               | NA       | 10.08    | 1        |
| Ilex pseudobuxus              | 2.47     | 10.08    | 1        |
| Acnistus arborescens          | NA       | 9.95     | 1        |
| Vassobia breviflora           | NA       | 9.95     | 1        |
| Guarea guidonia               | 10.00    | 9.41     | 2        |
| Guarea macrophylla            | 8.60     | 9.41     | 5        |
| Psychotria nuda               | NA       | 9.14     | 1        |
| Psychotria vellosiana         | NA       | 9.11     | 2        |
| Psychotria suterella          | 3.00     | 8.95     | 2        |
| Psychotria sp                 | NA       | 8.94     | 1        |
| Psychotria mapourioides       | NA       | 8.83     | 2        |
| Psychotria sessilis           | NA       | 8.71     | 1        |
| Psychotria forsteronioides    | NA       | 8.62     | 1        |
| Psychotria leiocarpa          | 2.30     | 8.45     | 1        |
| Ficus eximia                  | 1.20     | 8.12     | 1        |
| Rudgea Jasminoides            | NA       | 7.64     | 3        |
| Rudgea recurva                | NA       | 7.64     | 1        |
| Amaioua guianensis            | 3.50     | 7.15     | 1        |
| Amaioua intermedia            | 3.61     | 7.15     | 1        |
| Myrica tomentosa              | 4.30     | 6.70     | 1        |
| Psychotria gracilenta         | NA       | 6.14     | 1        |
| Rhipsalis camposportoana      | NA       | 6.02     | 1        |
| Rhipsalis elliptica           | NA       | 6.00     | 1        |
| Rhipsalis teres               | NA       | 5.75     | 1        |
| Solanum americanum            | NA       | 5.72     | 1        |
| Miconia valtheri              | 0.30     | 5.66     | 1        |
| Myrcia palustris              | 0.30     | 5.64     | 1        |
| Myrcia spectabilis            | 11.40    | 5.48     | 3        |
| Rhipsalis sp                  | NA       | 5.45     | 2        |
| Myrciaria cuspidata           | 3.60     | 5.44     | 1        |
| Myrceugenia myrcioides        | 8.00     | 5.40     | 1        |
| Rhipsalis paradoxa            | NA       | 5.34     | 1        |
| Myrcia oblongata              | NA       | 5.30     | 1        |
| Myrcia pulchra                | 3.90     | 5.30     | 1        |
| Myrcia pubipetala             | 0.30     | 5.17     | 2        |
| Miconia theizans              | 0.30     | 5.12     | 1        |
| Miconia inconspicua           | 0.30     | 5.09     | 1        |
| Myrcia ferruginea             | 4.60     | 5.06     | 1        |
| Ficus luschnathiensis         | 0.70     | 5.06     | 2        |
| Ficus pertusa                 | 1.10     | 5.06     | 1        |
| Miconia paniculata            | 0.30     | 4.91     | 1        |
| Miconia rubiginosa            | 0.30     | 4.89     | 1        |
| Myrcia strigipes              | 11.40    | 4.89     | 1        |
| Species                        | Value 1 | Value 2 | Value 3 |
|-------------------------------|---------|---------|---------|
| Miconia tentaculifera         | 0.30    | 4.86    | 1       |
| Myrcia anacardiifolia         | 8.00    | 4.74    | 2       |
| Miconia albicans              | 1.00    | 4.69    | 3       |
| Miconia sp                    | NA      | 4.60    | 1       |
| Myrcia hartwegiana            | 3.46    | 4.58    | 1       |
| Myrcia ilheosensis            | 3.90    | 4.48    | 2       |
| Leandra aurea                 | 0.40    | 4.44    | 1       |
| Miconia latecrenata           | 0.30    | 4.41    | 1       |
| Miconia discolor              | 0.30    | 4.37    | 2       |
| Ossaea sp                     | NA      | 4.35    | 1       |
| Miconia chartacea             | 0.30    | 4.33    | 2       |
| Leandra regnellii             | NA      | 4.29    | 1       |
| Miconia budlejoides           | 1.00    | 4.27    | 3       |
| Miconia brasiliensis          | 1.00    | 4.26    | 1       |
| Leandra australis             | NA      | 4.25    | 2       |
| Miconia racemifera            | 0.30    | 4.23    | 2       |
| Leandra acutiflora            | NA      | 4.22    | 1       |
| Eugenia uruguayensis          | NA      | 4.22    | 1       |
| Miconia tristis               | 0.30    | 4.18    | 3       |
| Miconia pusiliflora           | 1.70    | 4.12    | 3       |
| Solanum inodorum              | NA      | 4.06    | 1       |
| Leandra variabilis            | 1.00    | 4.04    | 1       |
| Eugenia brasiliensis          | 4.45    | 3.99    | 2       |
| Leandra laevigata             | NA      | 3.97    | 1       |
| Leandra sp                    | NA      | 3.95    | 1       |
| Leandra sabiaensis            | NA      | 3.89    | 1       |
| Leandra reflexa               | NA      | 3.88    | 1       |
| Endlicheria paniculata        | 12.50   | 3.84    | 2       |
| Solanum didymum               | NA      | 3.83    | 1       |
| Solanum myrianthum            | NA      | 3.81    | 1       |
| Eugenia astringens            | NA      | 3.80    | 2       |
| Leandra xanthocoma            | NA      | 3.79    | 1       |
| Leandra pilonensis            | 1.00    | 3.77    | 1       |
| Miconia elegans               | 0.30    | 3.76    | 1       |
| Leandra melastomoides         | 1.00    | 3.75    | 1       |
| Solanum bullatum              | NA      | 3.74    | 1       |
| Eugenia melanogyna            | 21.00   | 3.74    | 1       |
| Ossaea amygdaloïdes           | NA      | 3.74    | 1       |
| Eugenia mosenii               | 19.00   | 3.73    | 2       |
| Eugenia neoglomerata          | 14.46   | 3.73    | 2       |
| Solanum variabile             | NA      | 3.72    | 1       |
| Eugenia handro                | 8.34    | 3.72    | 1       |
| Solanum schwartzianum         | NA      | 3.70    | 1       |
| Eugenia hiemalis              | NA      | 3.66    | 1       |
| Eugenia oblongata             | 15.00   | 3.66    | 1       |
| Eugenia involucrata           | 7.00    | 3.63    | 1       |
| Eugenia sp                    | NA      | 3.61    | 1       |
| Species                          | Value 1 | Value 2 | Value 3 |
|---------------------------------|---------|---------|---------|
| *Nectandra cuspidata*           | 10.00   | 3.60    | 1       |
| *Ocotea puberula*               | 5.00    | 3.60    | 1       |
| *Eugenia expansa*               | 9.40    | 3.58    | 1       |
| *Leandra barbinervis*           | 1.00    | 3.51    | 1       |
| *Solanum rufescens*             | NA      | 3.50    | 1       |
| *Solanum granulosoleprosum*     | NA      | 3.47    | 1       |
| *Psidium cattleianum*           | 2.50    | 3.12    | 2       |
| *Siphoneuropa densiflora*       | 5.30    | 3.12    | 1       |
| *Solanum argenteum*             | 3.00    | 2.96    | 1       |
| *Solanum mauritianum*           | NA      | 2.96    | 2       |
| *Myrcia splendidens*            | 4.60    | 2.71    | 4       |
| *Paullinia weinmanniiifolia*     | NA      | 2.62    | 1       |
| *Plinia cauliflora*             | 5.50    | 2.61    | 2       |
| *Calyptranthes concinna*        | 5.00    | 2.59    | 2       |
| *Myrciaria floribunda*          | 4.50    | 2.59    | 1       |
| *Paullinia rhomboidea*          | NA      | 2.50    | 1       |
| *Paullinia uloptera*            | NA      | 2.44    | 1       |
| *Paullinia sp*                  | NA      | 2.37    | 2       |
| *Marlierea obscura*             | 8.40    | 2.30    | 3       |
| *Marlierea reitzii*             | NA      | 2.28    | 1       |
| *Miconia sellowiana*            | 0.30    | 2.26    | 2       |
| *Marlierea suaveolens*          | 10.00   | 2.22    | 1       |
| *Myrcia brasiliensis*           | 5.70    | 2.19    | 1       |
| *Myrcia hebepetala*             | 8.80    | 2.19    | 2       |
| *Ocotea pulchella*              | 5.00    | 2.05    | 3       |
| *Ocotea spixiana*               | 5.40    | 2.05    | 1       |
| *Eugenia cerasiflora*           | 10.00   | 1.95    | 1       |
| *Eugenia uniflora*              | 11.40   | 1.95    | 4       |
| *Campomanesia guaviroba*        | 8.60    | 1.65    | 1       |
| *Campomanesia xanthocarpa*      | 4.90    | 1.65    | 1       |
| *Miconia prasina*               | 0.61    | 1.43    | 1       |
| *Miconia cabucu*                | 1.30    | 1.38    | 2       |
| *Miconia cubatanensis*          | 0.30    | 1.38    | 2       |
| *Miconia cinnamomifolia*        | 0.30    | 1.31    | 6       |
| *Miconia ligustroides*          | 1.00    | 0.74    | 1       |
| *Miconia minutiflora*           | 0.30    | 0.74    | 1       |
Table S4. The bird–seed dispersal interactions recorded in the studied sites of the Atlantic Forest, followed by their EDi and correspondent asymmetry. EDi = Evolutionary distinctness of the interaction, estimated by the sum of the ED of the interacting partners (see Table S2 and S3 for plant and bird species ED) in millions of years (MY). Asymmetries refer to the difference between partners ED. ‘Plant skewed’ asymmetries correspond to interactions in which plant species are more distinct than their partner seed disperser while ‘Bird-skewed’ asymmetries correspond to the opposite. Interactions are sorted in a decreasing order of ED.

| Bird-plant interaction | EDi (MY) | Asymmetry | Asymmetry magnitude | Asymmetry skewness | N fragments present |
|------------------------|----------|-----------|---------------------|--------------------|--------------------|
| Pipile jacutinga Podocarpus sellowii | 381.22 | -0.918 | high | Plant-skewed | 1 |
| Tangara desmaresti Hedyosmum brasiliense | 275.61 | -0.991 | high | Plant-skewed | 1 |
| Pipile jacutinga Meliosma sellowii | 182.67 | -0.811 | high | Plant-skewed | 1 |
| Baryphthengus ruficapillus Euterpe edulis | 170.24 | -0.275 | high | Plant-skewed | 1 |
| Pipile jacutinga Cinnamodendron dinisii | 163.58 | -0.785 | high | Plant-skewed | 2 |
| Pyroderus scutatus Cinnamodendron dinisii | 154.86 | -0.849 | high | Plant-skewed | 2 |
| Procnias nudicollis Cinnamodendron dinisii | 152.74 | -0.865 | high | Plant-skewed | 2 |
| Carponis cucullata Drimys brasiliensis | 151.98 | -0.871 | high | Plant-skewed | 1 |
| Trogon rufus Philodendron appendiculatum | 145.61 | -0.506 | high | Plant-skewed | 1 |
| Ramphastos vitellinus Cinnamodendron dinisii | 144.43 | -0.927 | high | Plant-skewed | 1 |
| Stephanophorus diadematus Drimys brasiliensis | 144.30 | -0.928 | high | Plant-skewed | 1 |
| Tangara preciosa Cinnamodendron dinisii | 139.58 | -0.963 | high | Plant-skewed | 1 |
| Thraupis cyanoptera Drimys brasiliensis | 138.86 | -0.968 | high | Plant-skewed | 1 |
| Oxyruncus cristatus Euterpe edulis | 133.86 | -0.644 | high | Plant-skewed | 1 |
| Pipile jacutinga Hyeronima alchorneoides | 131.72 | -0.718 | high | Plant-skewed | 1 |
| Trogon viridis Euterpe edulis | 128.93 | -0.694 | high | Plant-skewed | 1 |
| Mimus gilvus Smilax rufescens | 128.08 | -0.814 | high | Plant-skewed | 1 |
| Pipile jacutinga Euterpe edulis | 127.69 | -0.706 | high | Plant-skewed | 3 |
| Pyroderus scutatus Abuta selloana | 127.06 | -0.810 | high | Plant-skewed | 1 |
| Selenidera maculirostris Hyeronima alchorneoides | 126.30 | -0.771 | high | Plant-skewed | 1 |
| Tachyphonus coronatus Dichorisandra | 125.83 | -0.954 | high | Plant-skewed | 1 |
| species 1 | species 2        | species 3      | species 4 | species 5     |
|----------|-----------------|---------------|-----------|---------------|
| thyrsiflora          | Carpornis cucullata Smilax elastica | 125.41 | -0.839  | high | Plant-skewed | 1 |
| Carpornis cucullata Euterpe edulis | Selenidera maculirostris Euterpe edulis | 122.27 | -0.761  | high | Plant-skewed | 3 |
| Tityra cayana Hyeronima alchorneoides | Selenidera maculirostris Philodendron appendiculatum | 121.50 | -0.817  | high | Plant-skewed | 1 |
| Selenidera maculirostris | Smilax elastica            | 121.02 | -0.758  | high | Plant-skewed | 1 |
| Guira guira | Casearia sylvestris | 120.26 | -0.240  | high | Plant-skewed | 1 |
| Tachyphonus coronatus Hedychium coronarium | 119.13 | -0.951  | high | Plant-skewed | 1 |
| Pyroderus scutatus Euterpe edulis | 118.96 | -0.795  | high | Plant-skewed | 3 |
| Vireo olivaceus Pera glabrata | 118.49 | -0.707  | high | Plant-skewed | 1 |
| Melanerpes flavifrons Hyeronima alchorneoides | 118.06 | -0.851  | high | Plant-skewed | 1 |
| Myiodynastes maculatus Cissampelos andromorpha | 117.80 | -0.897  | high | Plant-skewed | 1 |
| Tityra cayana Euterpe edulis | 117.47 | -0.810  | high | Plant-skewed | 1 |
| Procnias nudicollis Euterpe edulis | 116.85 | -0.816  | high | Plant-skewed | 1 |
| Pitangus sulphuratus Humiria balsamifera | 116.31 | -0.878  | high | Plant-skewed | 1 |
| Carpornis cucullata Euterpe edulis | 116.08 | -0.824  | high | Plant-skewed | 1 |
| Carpornis melanocephala Euterpe edulis | 116.08 | -0.824  | high | Plant-skewed | 1 |
| Tachyphonus coronatus Momordica charantia | 115.85 | -0.950  | high | Plant-skewed | 1 |
| Trogon surrucura Euterpe edulis | 115.84 | -0.826  | high | Plant-skewed | 1 |
| Pteroglossus bailloni Hyeronima alchorneoides | 115.69 | -0.874  | high | Plant-skewed | 1 |
| Cacicus haemorrhous Abuta selloana | 115.52 | -0.918  | high | Plant-skewed | 1 |
| Euphonia pectoralis Fuchsia regia | 114.95 | -0.883  | high | Plant-skewed | 1 |
| Mionectes rufiventris Hyeronima alchorneoides | 114.84 | -0.882  | high | Plant-skewed | 1 |
| Tangara peruviana Smilax rufescens | 114.50 | -0.940  | high | Plant-skewed | 1 |
| Turdus albicollis Cissampelos andromorpha | 114.38 | -0.929  | high | Plant-skewed | 1 |
| Trichotheaupis melanops Cissampelos andromorpha | 113.99 | -0.933  | high | Plant-skewed | 1 |
| Species                          | Plant            | Impact   | Skewness  |
|---------------------------------|------------------|----------|-----------|
| **Turdus rufiventris Cissampelos andromorpha** | 113.03           | -0.942   | high      |
| **Lipaugus lanioides Hyeronima alchorneoides** | 112.68           | -0.903   | high      |
| **Chiroxiphia caudate Cissampelos andromorpha** | 112.65           | -0.945   | high      |
| **Ramphastos vitellinus Hyeronima alchorneoides** | 112.57           | -0.904   | high      |
| **Stephanophorus diadematus Hyeronima alchorneoides** | 112.43           | -0.906   | high      |
| **Tachyphonus coronatus Cissampelos andromorpha** | 112.35           | -0.948   | high      |
| **Mimus saturninus Heisteria perianthomega** | 112.31           | -0.783   | high      |
| **Celeus flavescens Euterpe edulis** | 111.83           | -0.867   | high      |
| **Pteroglossus bailloni Euterpe edulis** | 111.66           | -0.869   | high      |
| **Pitangus sulphuratus Euterpe edulis** | 111.30           | -0.872   | high      |
| **Penelope obscura Euterpe edulis** | 110.91           | -0.876   | high      |
| **Camptostoma obsoletum Pera glabrata** | 110.85           | -0.790   | high      |
| **Turdus albicollis Fuchsia regia** | 110.47           | -0.926   | high      |
| **Turdus albicollis Hyeronima alchorneoides** | 110.32           | -0.926   | high      |
| **Euphonia violacea Euterpe edulis** | 110.30           | -0.882   | high      |
| **Turdus amaurochalinus Euterpe edulis** | 110.23           | -0.883   | high      |
| **Turdus flavipes Hyeronima alchorneoides** | 110.19           | -0.927   | high      |
| **Trichothraupis melanops Hyeronima alchorneoides** | 109.92           | -0.930   | high      |
| **Dacnis cayana Hyeronima alchorneoides** | 109.85           | -0.931   | high      |
| **Myiodynastes maculatus Euterpe edulis** | 109.71           | -0.888   | high      |
| **Turdus rufiventris Hyeronima alchorneoides** | 108.97           | -0.939   | high      |
| **Myiophobus fasciatus Pera glabrata** | 108.92           | -0.811   | high      |
| **Pteroglossus aracari Euterpe edulis** | 108.78           | -0.898   | high      |
| **Chiroxiphia caudate Fuchsia regia** | 108.74           | -0.943   | high      |
| **Pipile jacutinga Quiina glaziovii** | 108.70           | -0.636   | high      |
| **Lipaugus lanioides Euterpe edulis** | 108.65           | -0.899   | high      |
| Common Name                          | Scientific Name                          | DBH (cm) | Milled Area (%) | Skew | Feeding Habitat |
|-------------------------------------|------------------------------------------|----------|-----------------|------|----------------|
| Ramphastos dicolorus                | Euterpe edulis                           | 108.55   | -0.900          | high | Plant-skewed   |
| Ramphastos vitellinus               | Euterpe edulis                           | 108.54   | -0.900          | high | Plant-skewed   |
| Tachyphonus coronatus               | Fuchsia regia                            | 108.44   | -0.946          | high | Plant-skewed   |
| Hemithraupis ruficapilla Hyeronima   | alchorneoides                            | 108.35   | -0.945          | high | Plant-skewed   |
| Ramphastos vitellinus               | Euterpe edulis                           | 108.54   | -0.900          | high | Plant-skewed   |
| Baryphthengus ruficapillus Virola bicuhyba |                        | 107.79   | 0.493           | high | Bird-skewed    |
| Habia rubica                        | Chamissoa altissima                      | 107.75   | -0.807          | high | Plant-skewed   |
| Cyclarhis gujanensis                | Casearia sylvestris                      | 107.52   | -0.427          | high | Plant-skewed   |
| Orthogonys chloricterus             | Euterpe edulis                           | 107.47   | -0.911          | high | Plant-skewed   |
| Cacicus haemorrhous                 | Euterpe edulis                           | 107.43   | -0.912          | high | Plant-skewed   |
| Vireo olivaceus                     | Dendropanax cuneatus                     | 107.40   | -0.666          | high | Plant-skewed   |
| Vireo olivaceus                     | Sapium glandulosum                      | 107.32   | -0.666          | high | Plant-skewed   |
| Thraupis cyanoptera                 | Fuchsia regia                            | 107.15   | -0.959          | high | Plant-skewed   |
| Tolmomyias flaviventris             | Chamissoa altissima                      | 106.46   | -0.822          | high | Plant-skewed   |
| Tolmomyias sulphurescens            | Chamissoa altissima                      | 106.46   | -0.822          | high | Plant-skewed   |
| Turdus albicollis                   | Euterpe edulis                           | 106.29   | -0.923          | high | Plant-skewed   |
| Turdus flavipes                     | Euterpe edulis                           | 106.16   | -0.924          | high | Plant-skewed   |
| Hylophilus amaurocephalus           | Chamissoa altissima                      | 105.74   | -0.830          | high | Plant-skewed   |
| Thraupis sayaca                     | Fuchsia regia                            | 105.67   | -0.973          | high | Plant-skewed   |
| Manacus manacus                     | Pera glabrata                            | 105.65   | -0.847          | high | Plant-skewed   |
| Schistochlamys ruficapillus         | Cassytha filiformis                      | 105.54   | -0.959          | high | Plant-skewed   |
| Turdus subalaris                    | Chamissoa altissima                      | 105.33   | -0.834          | high | Plant-skewed   |
| Tangara desmaresti                  | Hyeronima alchorneoides                 | 105.21   | -0.976          | high | Plant-skewed   |
| Turdus rufiventris                  | Euterpe edulis                           | 104.94   | -0.937          | high | Plant-skewed   |
| Ramphastos vitellinus               | Margaritaria nobilis                     | 104.90   | -0.897          | high | Plant-skewed   |
| Zonotrichia capensis                | Scutia buxifolia                        | 104.78   | -0.831          | high | Plant-skewed   |
| Trichothraupis melanops             | Philodendron appendiculatum              | 104.63   | -0.926          | high | Plant-skewed   |
| Species                          | Euterpe edulis | high     | Plant-skewed | count |
|---------------------------------|---------------|----------|--------------|-------|
| Trogon rufus Coussapoa microcarpa | 104.59        | -0.146   | high         | 1     |
| Salturn similis Euterpe edulis  | 104.45        | -0.942   | high         | 1     |
| Manacus manacus Chamissoa altissima | 104.37       | -0.845   | high         | 1     |
| Tachyphonus coronatus Euterpe edulis | 104.26     | -0.944   | high         | 2     |
| Turdus leucomes Euterpe edulis  | 103.92        | -0.947   | high         | 3     |
| Sirystes sibilator Pera glabrata | 103.79       | -0.867   | high         | 1     |
| Tangara sp Euterpe edulis       | 103.39        | -0.953   | high         | 1     |
| Elaeenia obscura Chamissoa altissima | 103.34   | -0.856   | high         | 1     |
| Tangara seledon Euterpe edulis  | 103.29        | -0.954   | high         | 2     |
| Selenidera maculirostris Quina glaziovii | 103.29 | -0.704   | high         | 1     |
| Attila rufus Costus spiralis    | 103.20        | -0.878   | high         | 1     |
| Vireo olivaceus Sloanea hirsuta | 102.25        | -0.644   | high         | 1     |
| Tangara cyanoccephala Euterpe edulis | 102.07     | -0.966   | high         | 1     |
| Phyllomyias fasciatus Chamissoa altissima | 101.89 | -0.872   | high         | 1     |
| Turdus amaurochalinus Chamissoa altissima | 101.86 | -0.872   | high         | 1     |
| Conirostrum speciosum Chamissoa altissima | 101.67     | -0.875   | high         | 1     |
| Cyanerpes cyanus Pera glabrata   | 101.66        | -0.890   | high         | 1     |
| Myiodynastes maculatus Chamissoa altissima | 101.35   | -0.878   | high         | 1     |
| Coereba flaveola Pera glabrata   | 101.30        | -0.894   | high         | 1     |
| Cacicus haemorrhous Pera glabrata | 100.34       | -0.905   | high         | 1     |
| Megarynchus pitangua Chamissoa altissima | 100.27   | -0.890   | high         | 1     |
| Pipra pipra Pera glabrata       | 99.47         | -0.914   | high         | 1     |
| Stephanophorus diadematus Scutia buxfolia | 99.35 | -0.892   | high         | 1     |
| Tityra inquisitor Tetrochidium rubrivenium | 99.22 | -0.767   | high         | 1     |
| Tityra cayana Tetrochidium rubrivenium | 99.22 | -0.767   | high         | 1     |
| Tityra cayana Sapium glandulosum | 99.22        | -0.767   | high         | 1     |
| Thlypopsis sordida Chamissoa altissima | 98.97     | -0.904   | high         | 1     |
| Selenidera maculirostris Sloanea guianensis | 98.95 | -0.687   | high         | 1     |
| Trichotheaupis melanops Pera glabrata | 98.81       | -0.922   | high         | 1     |
| Dacnis cayana Pera glabrata      | 98.74         | -0.922   | high         | 2     |
| Pseudoleistes guirahuro Chamissoa altissima | 98.59     | -0.909   | high         | 1     |
| Species                                | Similarity | Score  | Plant Characteristics | Notes |
|----------------------------------------|------------|--------|-----------------------|-------|
| *Cacicus chrysopterus* *Scutia buxifolia* | 98.38      | -0.903 | high                  | Plant-skewed 1 |
| *Saltator fuliginosus* *Chamissoa altissima* | 97.98      | -0.915 | high                  | Plant-skewed 1 |
| *Elaenia flavogaster* *Chamissoa altissima* | 97.91      | -0.916 | high                  | Plant-skewed 1 |
| *Myiophobus fasciatus* *Dendropanax cuneatus* | 97.83      | -0.785 | high                  | Plant-skewed 1 |
| *Coryphospingus pileatus* *Pera glabrata*   | 97.81      | -0.932 | high                  | Plant-skewed 1 |
| *Turdus flavipes* *Chamissoa altissima*     | 97.80      | -0.917 | high                  | Plant-skewed 1 |
| *Poospiza lateralis* *Scutia buxifolia*     | 97.71      | -0.910 | high                  | Plant-skewed 1 |
| *Elaenia sp* *Scutia buxifolia*            | 97.63      | -0.911 | high                  | Plant-skewed 1 |
| *Trogon surrucura* *Tetrorchidium rubrivenium* | 97.59      | -0.787 | high                  | Plant-skewed 1 |
| *Trogon surrucura* *Sapium glandulosum*     | 97.59      | -0.787 | high                  | Plant-skewed 1 |
| *Trichotheura* *melanops* *Chamissoa altissima* | 97.53      | -0.920 | high                  | Plant-skewed 1 |
| *Chiroxiphia caudate* *Pera glabrata*       | 97.47      | -0.936 | high                  | Plant-skewed 1 |
| *Dacnis cayana* *Chamissoa altissima*       | 97.46      | -0.921 | high                  | Plant-skewed 1 |
| *Saltator similis* *Pera glabrata*          | 97.37      | -0.937 | high                  | Plant-skewed 1 |
| *Tachyphonus coronatus* *Pera glabrata*     | 97.17      | -0.939 | high                  | Plant-skewed 1 |
| *Myiarchus tyrannulus* *Chamissoa altissima* | 97.17      | -0.924 | high                  | Plant-skewed 1 |
| *Hemithraupis flavicolis* *Pera glabrata*   | 97.06      | -0.941 | high                  | Plant-skewed 1 |
| *Chiroxiphia caudate* *Chamissoa altissima*  | 96.19      | -0.935 | high                  | Plant-skewed 1 |
| *Saltator similis* *Chamissoa altissima*    | 96.09      | -0.936 | high                  | Plant-skewed 1 |
| *Baryphthengus ruficapillus* *Cecropia glaziovii* | 95.97      | 0.658  | high                  | Bird-skewed 1 |
| *Tachyphonus coronatus* *Chamissoa altissima* | 95.89      | -0.939 | high                  | Plant-skewed 1 |
| *Pachyramphus validus* *Tetrorchidium rubrivenium* | 95.88      | -0.808 | high                  | Plant-skewed 1 |
| *Pteroglossus bailloni* *Cissus paullinifolia* | 95.74      | -0.843 | high                  | Plant-skewed 1 |
| *Turdus fumigatus* *Chamissoa altissima*     | 95.58      | -0.942 | high                  | Plant-skewed 1 |
| *Saltator similis* *Scutia buxifolia*        | 95.41      | -0.936 | high                  | Plant-skewed 1 |
| *Tangara cayana* *Chamissoa altissima*       | 95.36      | -0.944 | high                  | Plant-skewed 1 |
| *Stephanophorus diadematus* *Ilex affinis*   | 95.21      | -0.887 | high                  | Plant-skewed 1 |
| *Vireo olivaceus* *Casearia sylvestris*      | 95.20      | -0.607 | high                  | Plant-skewed 2 |
| *Pipile jacutinga* *Garcinia gardneriana*    | 94.89      | -0.560 | high                  | Plant-skewed 1 |
| *Thraupis episcopus* *Samanea tubulosa*      | 94.67      | -0.970 | high                  | Plant-skewed 1 |
| Species 1                  | Species 2                  | Similarity | Position | Skewness |
|---------------------------|---------------------------|------------|----------|----------|
| Tangara preciosa          | Scutia buxifolia          | 94.63      | -0.944   | high     |
| Manacus manacus           | Dendropanax cuneatus      | 94.56      | -0.826   | high     |
| Schistochlamys melanopsis | Chamissoa altissima       | 94.53      | -0.954   | high     |
| Thraupis sayaca           | Pera glabrata             | 94.40      | -0.970   | high     |
| Tityra cayana             | Sloanea guianensis        | 94.15      | -0.751   | high     |
| Tangara desmaresti        | Pera glabrata             | 94.09      | -0.973   | high     |
| Habia rubica              | Melastomataceae sp        | 93.78      | -0.772   | high     |
| Schiffornis virescens     | Casearia decandra         | 93.28      | -0.635   | high     |
| Pipile jacutinga          | Sorocea bonplandii        | 93.24      | -0.549   | high     |
| Thraupis sayaca           | Chamissoa altissima       | 93.12      | -0.969   | high     |
| Pitangus sulphuratus      | Sapium glandulosum        | 93.05      | -0.843   | high     |
| Habia rubica              | Sloanea guianensis        | 92.79      | -0.769   | high     |
| Mionectes rufiventris     | Tetrochidium rubrivenium  | 92.56      | -0.850   | high     |
| Thraupis sayaca           | Scutia buxifolia          | 92.44      | -0.969   | high     |
| Stephanophorus diadematus | Vismia brasiliensis       | 92.16      | -0.882   | high     |
| Penelope obscura          | Quiina glaziovii          | 91.93      | -0.847   | high     |
| Myiodyastes maculatus     | Sapium glandulosum        | 91.46      | -0.863   | high     |
| Pachyramphus castaneus    | Sloanea guianensis        | 90.75      | -0.796   | high     |
| Trogon rufus              | Rubus rosifolius          | 90.55      | 0.120    | high     |
| Zonotrichia capensis      | Sloanea hirsuta           | 90.50      | -0.799   | high     |
| Turdus subalaris          | Sloanea hirsuta           | 90.37      | -0.801   | high     |
| Pipile jacutinga          | Tapirira guianensis       | 90.31      | -0.527   | high     |
| Piaya cayana              | Myrsine umbellata         | 89.83      | 0.752    | high     |
| Dacnis cayana             | Vismia brasiliensis       | 89.58      | -0.914   | high     |
| Ramphastos vitellinus     | Quiina glaziovii          | 89.55      | -0.877   | high     |
| Cacicus haemorrhous       | Tetrochidium rubrivenium  | 89.17      | -0.892   | high     |
| Cacicus chrysopterus      | Tetrochidium rubrivenium  | 89.17      | -0.892   | high     |
| Species                        | Plant                          | Bird                         | Snipe Ground    |
|--------------------------------|--------------------------------|------------------------------|-----------------|
| Empidonomus varius             | Sapium glandulosum             | 89.00                        | -0.894          | high | Plant-skewed | 1 |
| Turdus flavipes Merostachys sp | Sapium glandulosum             | 88.72                        | -0.908          | high | Plant-skewed | 1 |
| Euphonia pectoralis            | Melastomataceae sp             | 88.43                        | -0.842          | high | Plant-skewed | 1 |
| Pteroglossus bailloni          | Sloanea guianensis             | 88.34                        | -0.828          | high | Plant-skewed | 1 |
| Turdus albicollis              | Tetrochidium rubrivenium       | 88.03                        | -0.906          | high | Plant-skewed | 1 |
| Trogon rufus Alchornea triplinervia |                     | 88.00                        | 0.173           | high | Bird-skewed  | 1 |
| Turdus flavipes Tetrochidium rubrivenium |                        | 87.91                        | -0.907          | high | Plant-skewed | 1 |
| Turdus flavipes Sapium glandulosum |                                | 87.91                        | -0.907          | high | Plant-skewed | 1 |
| Celeus flavescens              | Cybianthus peruvianus          | 87.58                        | -0.824          | high | Plant-skewed | 1 |
| Camptostoma obsolenum          | Casearia sylvestris            | 87.56                        | -0.719          | high | Plant-skewed | 1 |
| Tangara cayana Vismia brasiliensis |                                | 87.49                        | -0.939          | high | Plant-skewed | 1 |
| Euphonia pectoralis Sloanea guianensis |                        | 87.44                        | -0.840          | high | Plant-skewed | 1 |
| Turdus amaurochalinus Sloanea hirsuta |                        | 86.90                        | -0.847          | high | Plant-skewed | 1 |
| Turdus rufiventris Dendropanax cuneatus |                        | 86.77                        | -0.923          | high | Plant-skewed | 1 |
| Trogon rufus Maytenus gonoclada |                                | 86.75                        | 0.199           | high | Bird-skewed  | 1 |
| Turdus rufiventris Sapium glandulosum |                        | 86.68                        | -0.923          | high | Plant-skewed | 1 |
| Trogon viridis Coussapoa microcarpa |                        | 86.65                        | -0.464          | high | Plant-skewed | 1 |
| Schistochlamys ruficapillus Vismia brasiliensis |                      | 86.65                        | -0.949          | high | Plant-skewed | 1 |
| Attila rufus Sloanea guianensis |                                | 86.62                        | -0.851          | high | Plant-skewed | 1 |
| Chiroxiphia caudate Dendropanax cuneatus |                        | 86.39                        | -0.927          | high | Plant-skewed | 1 |
| Lipaugus lanioides Melastomataceae sp |                        | 86.31                        | -0.870          | high | Plant-skewed | 1 |
| Saltator similis Dendropanax cuneatus |                        | 86.28                        | -0.929          | high | Plant-skewed | 1 |
| Myiarchus swainsoni Sapium glandulosum |                        | 86.22                        | -0.928          | high | Plant-skewed | 1 |
| Myiarchus swainsoni Tetrochidium rubrivenium |                        | 86.22                        | -0.928          | high | Plant-skewed | 1 |
| Hemithraupis ruficailla Tetrochidium rubrivenium |                        | 86.06                        | -0.930          | high | Plant-skewed | 1 |
| Pipile jacutinga Coussapoa microcarpa |                                | 85.41                        | -0.486          | high | Plant-skewed | 1 |
| Tyrannus melancholicus Sapium glandulosum |                        | 85.29                        | -0.940          | high | Plant-skewed | 1 |
| Euphonia sp Sloanea guianensis |                                | 85.19                        | -0.870          | high | Plant-skewed | 1 |
| Orthogonys chloricterus Melastomataceae sp |                        | 85.14                        | -0.885          | high | Plant-skewed | 1 |
| Species and Common Name | Percentage Match | Similarity Score | Frequency | Predation Skewness |
|------------------------|------------------|-----------------|-----------|--------------------|
| Melanerpes flavifrons Michelia champaca | 84.71 | 0.779 | high | Plant-skewed |
| Tachyphonus cristatus Sloanea guianensis | 84.52 | 0.779 | high | Plant-skewed |
| Tolmomyias sulphurescens Casearia sylvestris | 84.45 | 0.764 | high | Plant-skewed |
| Orthogonys chloricterus Sloanea guianensis | 84.15 | 0.884 | high | Plant-skewed |
| Cacicus chrysopterus Sloanea hirsuta | 84.10 | 0.764 | high | Plant-skewed |
| Pipile jacutinga Phytolacca dioica | 84.00 | 0.473 | high | Plant-skewed |
| Baryphthengus ruficapillus Nectandra membranacea | 83.76 | 0.829 | high | Bird-skewed |
| Thraupis ornate Tetrorchidium rubrivenium | 83.71 | 0.959 | high | Plant-skewed |
| Mimus gilvus Aechmea nudicaulis | 83.63 | 0.685 | high | Plant-skewed |
| Euphonia pectoralis Anthurium scandens | 83.62 | 0.831 | high | Plant-skewed |
| Zonotrichia capensis Casearia sylvestris | 83.45 | 0.779 | high | Plant-skewed |
| Manacus manacus Magnolia ovata | 83.41 | 0.798 | high | Plant-skewed |
| Cissops leverianus Melastomataceae sp | 83.28 | 0.909 | high | Plant-skewed |
| Euphonia violacea Anthurium scandens | 83.16 | 0.838 | high | Plant-skewed |
| Saltator fuliginosus Sloanea guianensis | 83.02 | 0.899 | high | Plant-skewed |
| Turdus albicollis Sloanea hirsuta | 82.96 | 0.899 | high | Plant-skewed |
| Turdus flavipes Sloanea guianensis | 82.84 | 0.901 | high | Plant-skewed |
| Dacnis cayana Sloanea guianensis | 82.50 | 0.906 | high | Plant-skewed |
| Dacnis cayana Sloanea hirsuta | 82.50 | 0.906 | high | Plant-skewed |
| Procnias nudicollis Sorocea bonplandii | 82.40 | 0.718 | high | Plant-skewed |
| Cissops leverianus Sloanea hirsuta | 82.30 | 0.908 | high | Plant-skewed |
| Chiroxipha caudate Melastomataceae sp | 82.22 | 0.923 | high | Plant-skewed |
| Pitangus sulphuratus Magnolia ovata | 81.98 | 0.818 | high | Plant-skewed |
| Turdus rufiventris Sloanea hirsuta | 81.61 | 0.917 | high | Plant-skewed |
| Pyroderus scutatus Tapirira guianensis | 81.59 | 0.670 | high | Plant-skewed |
| Cyclarhis guianensis Rubus urticifolius | 81.56 | 0.075 | high | Plant-skewed |
| Celeus flavescens Casearia sylvestris | 81.46 | 0.808 | high | Plant-skewed |
| Nemosia pileata Casearia sylvestris | 81.41 | 0.809 | high | Plant-skewed |
| Myiarchus swainsoni Sloanea hirsuta | 81.15 | 0.923 | high | Plant-skewed |
| Saltator similis Sloanea hirsuta | 81.13 | 0.924 | high | Plant-skewed |
| Species 1                | Species 2                | Species 3                | Species 4                | Species 5                | Species 6                | Species 7                |
|------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| Tangara seledon       | Melastomataceae sp      | 80.96                   | -0.940                  | high                    | Plant-skewed            | 1                       |
| Pitangus sulphuratus  | Casearia sylvestris     | 80.94                   | -0.816                  | high                    | Plant-skewed            | 2                       |
| Tachyphonus coronatus | Sloanea guianensis      | 80.93                   | -0.926                  | high                    | Plant-skewed            | 1                       |
| Turdus amaurochalinus | Magnolia ovata          | 80.91                   | -0.834                  | high                    | Plant-skewed            | 1                       |
| Cyclarhis gujanensis  | Zanthoxylum fagara      | 80.78                   | -0.058                  | high                    | Plant-skewed            | 1                       |
| Thraupis cyanoptera   | Melastomataceae sp      | 80.63                   | -0.944                  | high                    | Plant-skewed            | 1                       |
| Turdus leucomelas     | Sloanea guianensis      | 80.60                   | -0.931                  | high                    | Plant-skewed            | 1                       |
| Penelope obscura      | Casearia sylvestris     | 80.55                   | -0.821                  | high                    | Plant-skewed            | 1                       |
| Mionectes rufiventris | Casearia sylvestris     | 80.44                   | -0.823                  | high                    | Plant-skewed            | 1                       |
| Tangara cayana        | Sloanea guianensis      | 80.40                   | -0.933                  | high                    | Plant-skewed            | 1                       |
| Cyclarhis gujanensis  | Trema micrantha         | 80.38                   | -0.049                  | high                    | Plant-skewed            | 1                       |
| Tangara preciosa      | Sloanea hirsuta         | 80.36                   | -0.934                  | high                    | Plant-skewed            | 1                       |
| Tangara sp             | Sloanea guianensis      | 80.07                   | -0.938                  | high                    | Plant-skewed            | 1                       |
| Selenidera maculirostris Coussapoa microcarpa | 80.00 | -0.582 | high | Plant-skewed | 1 |
| Tangara seledon       | Sloanea guianensis      | 79.97                   | -0.939                  | high                    | Plant-skewed            | 1                       |
| Turdus amaurochalinus | Casearia sylvestris     | 79.86                   | -0.831                  | high                    | Plant-skewed            | 1                       |
| Tangara cyanoccephala | Melastomataceae sp      | 79.73                   | -0.956                  | high                    | Plant-skewed            | 1                       |
| Volatinia jacarina    | Casearia sylvestris     | 79.68                   | -0.834                  | high                    | Plant-skewed            | 1                       |
| Thraupis cyanoptera   | Sloanea guianensis      | 79.64                   | -0.943                  | high                    | Plant-skewed            | 1                       |
| Myiodynastes maculatus | Casearia sylvestris     | 79.34                   | -0.839                  | high                    | Plant-skewed            | 3                       |
| Cyclarhis gujanensis  | Guapira opposita       | 79.28                   | -0.023                  | high                    | Plant-skewed            | 1                       |
| Cyclarhis gujanensis  | Alchornea triplinervia  | 79.01                   | -0.016                  | high                    | Plant-skewed            | 1                       |
| Tangara desmaresti    | Melastomataceae sp      | 78.84                   | -0.968                  | high                    | Plant-skewed            | 1                       |
| Trogon rufus           | Cabralea canjerana     | 78.75                   | 0.365                   | high                    | Bird-skewed             | 1                       |
| Tangara cyanoccephala | Sloanea guianensis      | 78.75                   | -0.955                  | high                    | Plant-skewed            | 1                       |
| Thraupis ornate       | Sloanea hirsuta         | 78.64                   | -0.957                  | high                    | Plant-skewed            | 1                       |
| Crotophaga ani        | Rubus urticifolius      | 78.59                   | -0.146                  | high                    | Plant-skewed            | 1                       |
| Xolmis cinereus       | Casearia sylvestris     | 78.51                   | -0.851                  | high                    | Plant-skewed            | 1                       |
| Xolmis velatus        | Casearia sylvestris     | 78.51                   | -0.851                  | high                    | Plant-skewed            | 1                       |
| Mimus gilvus          | Schwartzia brasiliensis | 78.35                   | -0.656                  | high                    | Plant-skewed            | 1                       |
| Coereba flaveola      | Casearia sylvestris     | 78.01                   | -0.858                  | high                    | Plant-skewed            | 1                       |
| Species 1                          | Species 2                          | Similarity | Height | Skewness          | Species 3                          |
|-----------------------------------|------------------------------------|------------|--------|-------------------|------------------------------------|
| Tersina viridis  Casearia sylvestris | 77.36                             | -0.868     | high   | Plant-skewed      | 1                                  |
| Myiozetetes similis  Casearia sylvestris | 77.18                             | -0.871     | high   | Plant-skewed      | 2                                  |
| Thlypopsis sordida  Casearia sylvestris | 76.97                             | -0.874     | high   | Plant-skewed      | 1                                  |
| Elaenia flavogaster  Magnolia ovata | 76.96                             | -0.891     | high   | Plant-skewed      | 1                                  |
| Empidonous varius  Casearia sylvestris | 76.89                             | -0.875     | high   | Plant-skewed      | 1                                  |
| Pitangus sulphuratus  Sorocea bonplandii | 76.86                             | -0.804     | high   | Plant-skewed      | 1                                  |
| Colaptes campestris  Casearia sylvestris | 76.65                             | -0.878     | high   | Plant-skewed      | 1                                  |
| Pseudoleistes guirahuro  Casearia sylvestris | 76.59                             | -0.879     | high   | Plant-skewed      | 1                                  |
| Dacnis cayana  Magnolia ovata | 76.50                             | -0.897     | high   | Plant-skewed      | 1                                  |
| Oxyruncus cristatus  Trema micrantha | 76.36                             | -0.147     | high   | Plant-skewed      | 1                                  |
| Elaenia sp  Casearia sylvestris | 76.31                             | -0.883     | high   | Plant-skewed      | 3                                  |
| Turdus albicollis  Casearia sylvestris | 75.92                             | -0.889     | high   | Plant-skewed      | 2                                  |
| Elaenia flavogaster  Casearia sylvestris | 75.91                             | -0.889     | high   | Plant-skewed      | 2                                  |
| Euphonia violacea  Tournefortia sp | 75.89                             | -0.820     | high   | Plant-skewed      | 1                                  |
| Euphonia violacea  Sorocea bonplandii | 75.86                             | -0.819     | high   | Plant-skewed      | 1                                  |
| Turdus flavipes  Casearia sylvestris | 75.79                             | -0.891     | high   | Plant-skewed      | 1                                  |
| Turdus amaurochalinus  Sorocea bonplandii | 75.78                             | -0.821     | high   | Plant-skewed      | 1                                  |
| Selenidera maculirostris  Heteropsis oblongifolia | 75.61                             | -0.547     | high   | Plant-skewed      | 1                                  |
| Trichotheaupris melanops  Casearia sylvestris | 75.52                             | -0.895     | high   | Plant-skewed      | 2                                  |
| Trichotheaupris melanops  Casearia decandra | 75.52                             | -0.895     | high   | Plant-skewed      | 1                                  |
| Dacnis cayana  Casearia sylvestris | 75.45                             | -0.896     | high   | Plant-skewed      | 4                                  |
| Tityra cayana  Coussapoa microcarpa | 75.19                             | -0.667     | high   | Plant-skewed      | 1                                  |
| Oxyruncus cristatus  Alchornea triplinervia | 74.99                             | -0.117     | high   | Plant-skewed      | 1                                  |
| Turdus rufiventris  Casearia sylvestris | 74.57                             | -0.909     | high   | Plant-skewed      | 2                                  |
| Pipile jacutinga  Cryptocarya mandioccana | 74.54                             | -0.364     | high   | Plant-skewed      | 1                                  |
| Coryphospingus cucullatus  Casearia sylvestris | 74.52                             | -0.909     | high   | Plant-skewed      | 1                                  |
| Trogon viridis  Rubus sp | 74.36                             | -0.315     | high   | Plant-skewed      | 1                                  |
| Tyrannus melancholicus  Magnolia ovata | 74.23                             | -0.930     | high   | Plant-skewed      | 1                                  |
| Megarynchus pitangua  Sorocea bonplandii | 74.19                             | -0.845     | high   | Plant-skewed      | 1                                  |
| Ramphocelus carbo  Magnolia ovata | 74.14                             | -0.931     | high   | Plant-skewed      | 1                                  |
| Species                              | Frequency | Diet  | Plant  | Bird  |
|--------------------------------------|-----------|-------|--------|-------|
| Saltator similis Casearia sylvestris | 74.08     | -0.916 | high   | Plant-skewed |
| Hemithraupis ruficapilla Casearia sylvestris | 73.95     | -0.918 | high   | Plant-skewed |
| Tachyphonus coronatus Casearia sylvestris | 73.89     | -0.919 | high   | Plant-skewed |
| Euphonia chlorotica Aechmea nudicaulis | 73.70     | -0.841 | high   | Plant-skewed |
| Oxyruncus cristatus Tabernaemontana catharinensis | 73.67 | -0.087 | high | Plant-skewed |
| Myiarchus ferox Casearia sylvestris | 73.57     | -0.923 | high   | Plant-skewed |
| Turdus leucomelas Casearia sylvestris | 73.56     | -0.924 | high   | Plant-skewed |
| Tangara cayana Casearia sylvestris | 73.36     | -0.926 | high   | Plant-skewed |
| Tangara preciosa Casearia decandra | 73.31     | -0.927 | high   | Plant-skewed |
| Myiarchus sp Casearia sylvestris | 73.30     | -0.927 | high   | Plant-skewed |
| Tyrannus savana Casearia sylvestris | 73.18     | -0.929 | high   | Plant-skewed |
| Tyrannus melancholicus Casearia sylvestris | 73.18    | -0.929 | high   | Plant-skewed |
| Ramphocelus carbo Casearia sylvestris | 73.09     | -0.930 | high   | Plant-skewed |
| Cacicus haemorrhous Sorocea bonplandii | 72.98     | -0.864 | high   | Plant-skewed |
| Pipile jacutinga Curatella americana | 72.83     | -0.339 | high   | Plant-skewed |
| Trogon viridis Rubus arcticifolius | 72.61     | -0.287 | high   | Plant-skewed |
| Trogon viridis Rubus rosifolius | 72.61     | -0.287 | high   | Plant-skewed |
| Thraupis cyanoptera Casearia decandra | 72.60     | -0.938 | high   | Plant-skewed |
| Pipile jacutinga Cordia silvestris | 72.41     | -0.333 | high   | Plant-skewed |
| Stephanophorus diadematus Aureliana fasciculata | 72.11 | -0.845 | high | Plant-skewed |
| Cyclarhis gujanensis Erythroxylum deciduum | 72.03     | 0.162  | high   | Bird-skewed |
| Turdus flavipes Sorocea bonplandii | 71.71     | -0.884 | high   | Plant-skewed |
| Pipile jacutinga Pourouma guianensis | 71.71     | -0.322 | high   | Plant-skewed |
| Trogon viridis Neomitranches glomerata | 71.54     | -0.268 | high   | Plant-skewed |
| Pipile jacutinga Annona neosericea | 71.47     | -0.318 | high   | Plant-skewed |
| Selenidera maculirostris Cryptocarya moschata | 71.39     | -0.507 | high   | Plant-skewed |
| Lipaugus lanioides Tapirira guianensis | 71.27     | -0.838 | high   | Plant-skewed |
| Ramphastos dicolorus Tapirira guianensis | 71.17     | -0.839 | high   | Plant-skewed |
| Thraupis sayaca Casearia sylvestris | 71.11     | -0.959 | high   | Plant-skewed |
| Scientific Name                        | Percentage | Skewness | Skewedness | Plant Type     | Value  |
|---------------------------------------|------------|----------|------------|----------------|--------|
| Thraupis episcopus Casearia sylvestris| 71.10      | -0.959   | high       | Plant-skewed   | 1      |
| Tangara mexicana Sorocea bonplandii   | 70.82      | -0.898   | high       | Plant-skewed   | 1      |
| Trogon rufus Cupania vernalis         | 70.82      | 0.530    | high       | Bird-skewed    | 1      |
| Tangara cyanovenris Casearia sylvestris| 70.80     | -0.964   | high       | Plant-skewed   | 1      |
| Selenidera maculirostris Cryptocarya aschersoniana | 70.25  | -0.495   | high       | Plant-skewed   | 1      |
| Vireo olivaceus Schefflera angustissima| 70.14     | -0.379   | high       | Plant-skewed   | 1      |
| Pteroglossus bailloni Prunus myrtifolia| 70.09     | -0.773   | high       | Plant-skewed   | 1      |
| Trogon viridis Alchornea triplinervia | 69.90     | -0.241   | high       | Plant-skewed   | 1      |
| Hemithraupis ruficapilla Tournefortia sp| 69.87     | -0.813   | high       | Plant-skewed   | 1      |
| Myiodynastes maculatus Maclura tinctoria | 69.79    | -0.374   | high       | Plant-skewed   | 1      |
| Vireo olivaceus Varronia curassavica | 69.77      | 0.219    | high       | Bird-skewed    | 1      |
| Cyclarhis gujanensis Cabralea canjerana | 69.49     | -0.918   | high       | Plant-skewed   | 1      |
| Turdus fumigatus Sorocea bonplandii   | 69.38      | -0.770   | high       | Plant-skewed   | 1      |
| Pteroglossus bailloni Coussapoa microcarpa | 69.31   | -0.226   | high       | Plant-skewed   | 1      |
| Trogon viridis Alchornea glandulosa   | 69.09      | -0.663   | high       | Plant-skewed   | 1      |
| Habia rubica Monastera adansonii      | 69.06      | 0.237    | high       | Bird-skewed    | 1      |
| Cyclarhis gujanensis Symplocos uniflora| 68.76     | -0.869   | high       | Plant-skewed   | 1      |
| Elaenia sp Cissus striata             | 68.65      | -0.900   | high       | Plant-skewed   | 1      |
| Turdus rufiventris Aureliana fasciculata | 68.64   | -0.784   | high       | Plant-skewed   | 1      |
| Penelope obscura Coussapoa microcarpa  | 68.49      | -0.786   | high       | Plant-skewed   | 1      |
| Euphonia pectoralis Coussapoa microcarpa| 68.46    | -0.354   | high       | Plant-skewed   | 1      |
| Vireo olivaceus Zanthoxylum fagara    | 68.25      | -0.741   | high       | Plant-skewed   | 1      |
| Manacus manacus Henriettea saldanhae  | 68.23      | -0.204   | high       | Plant-skewed   | 1      |
| Trogon viridis Myrtaceae sp           | 68.07      | -0.348   | high       | Plant-skewed   | 3      |
| Vireo olivaceus Trema micrantha      | 68.03      | -0.794   | high       | Plant-skewed   | 1      |
| Euphonia violacea Coussapoa microcarpa| 67.91     | -0.345   | high       | Plant-skewed   | 2      |
| Vireo olivaceus Aegiphila integrifolia| 67.66      | -0.948   | high       | Plant-skewed   | 1      |
| Tangara cyanocela Contournfortia sp   | 67.55      | -0.248   | high       | Plant-skewed   | 1      |
| Pipile jacutinga Citharexylum myriamnthus | 67.43    | -0.805   | high       | Plant-skewed   | 1      |
| Plant Species                          | Bird Species              | Simpson's Index | Skewness | Plant Type   | Frequency |
|---------------------------------------|---------------------------|-----------------|----------|--------------|-----------|
| microcarpa                            | Schizophorus virescens    | 67.33           | -0.411   | high         | Plant-skewed | 1         |
| Schizophorus virescens Rubus rosifolius | Euphonia pectoralis Phytolaccaceae dioica | 67.08           | -0.781   | high         | Plant-skewed | 1         |
| Rubus rosifolius                      | Thraupis sayaca Soroea bonplandii | 67.04           | -0.957   | high         | Plant-skewed | 1         |
| Selenidera maculirostris Cordia silvestris | Ramphastos dicolorus Prunus myrtifolia | 67.00           | -0.457   | high         | Plant-skewed | 1         |
| Selenidera maculirostris Scheffleria angustissima |                      | 66.84           | -0.455   | high         | Plant-skewed | 1         |
| Vireo olivaceus Alchornea triplinervia | Trogon viridis Virola bicuhyba | 66.70           | -0.325   | high         | Plant-skewed | 1         |
| Pipile jacutinga Byrsonima ligustrifolia | Lipaugus lanioides Coussapoa microcarpa | 66.37           | -0.225   | high         | Plant-skewed | 1         |
| Ramphastos dicolorus Coussapoa microcarpa |                               | 66.27           | -0.825   | high         | Plant-skewed | 1         |
| Pipile jacutinga Virola gardneri       | Selenidera maculirostris Annona neosericea | 66.24           | -0.222   | high         | Plant-skewed | 1         |
| Vireo olivaceus Alchornea glandulosa  | Euphonia violacea Henriettea saldanhae | 65.94           | -0.312   | high         | Plant-skewed | 1         |
| Pyroderus scutatus Cryptocarya mandioccana | Oxyruncus cristatus Cabralea canjerana | 65.82           | -0.786   | high         | Plant-skewed | 1         |
| Oxyruncus cristatus Cabralea canjerana | Orchesticus abeilei Coussapoa microcarpa | 65.74           | 0.130    | high         | Bird-skewed  | 1         |
| Selenidera maculirostris Ouratea vaccinioides | Cyclarhis gujanensis Protium heptaphyllum | 65.42           | 0.330    | high         | Bird-skewed  | 1         |
| Vireo olivaceus Alchornea triplinervia | Pipile jacutinga Virola bicuhyba | 65.46           | -0.437   | high         | Plant-skewed | 1         |
| Euphonia violacea Piper corintoonum   | Orthogonys chloricterus Coussapoa microcarpa | 65.19           | -0.845   | high         | Plant-skewed | 1         |
| Vireo olivaceus Citharexylum myrianthum | Cacicus haemorrhous Coussapoa microcarpa | 65.15           | -0.845   | high         | Plant-skewed | 1         |
| Cyclarhis gujanensis Protium heptaphyllum | Ramphastos dicolorus Phytolaccaceae dioica | 64.86           | -0.821   | high         | Plant-skewed | 1         |
| Ramphastos dicolorus Phytolaccaceae dioica | Ramphastos vitellinus Phytolaccaceae dioica | 64.85           | -0.821   | high         | Plant-skewed | 1         |
| Selenidera maculirostris Trema micrantha | Vireo olivaceus Alchornea sidifolia | 64.77           | -0.428   | high         | Plant-skewed | 1         |
| Vireo olivaceus Alchornea sidifolia   |                                         | 64.46           | -0.285   | high         | Plant-skewed | 1         |
| Species A | Species B | Plant-shoot biomass | Plant-shoot skew | Plant-shoot dominance |
|-----------|-----------|---------------------|------------------|----------------------|
| Picumnus cirratus | Aegiphila integrifolia | 64.37 | -0.432 | high  |
| Turdus albicollis | Coussapoa microcarpa | 64.01 | -0.866 | high  |
| Turdus flavipes | Coussapoa microcarpa | 63.88 | -0.868 | high  |
| Selenidera maculirostris | Guapira opposita | 63.67 | -0.412 | high  |
| Saltator maximus | Henrietta saldanhae | 63.64 | -0.826 | high  |
| Trichothraupis melanops | Coussapoa microcarpa | 63.61 | -0.873 | high  |
| Empidonomus varius | Phytolacca dioica | 63.57 | -0.845 | high  |
| Dacnis cayana | Coussapoa microcarpa | 63.54 | -0.874 | high  |
| Turdus rufiventris | Prunus myrtifolia | 63.36 | -0.891 | high  |
| Turdus rufiventris | Prunus sellowii | 63.36 | -0.891 | high  |
| Mimus gilvus | Varronia curassavica | 62.97 | -0.533 | high  |
| Saltator similis | Prunus myrtifolia | 62.88 | -0.899 | high  |
| Turdus rufiventris | Coussapoa microcarpa | 62.66 | -0.890 | high  |
| Selenidera maculirostris | Alchornea glandulosa | 62.65 | -0.397 | high  |
| Selenidera maculirostris | Maytenus brasiliensis | 62.64 | -0.397 | high  |
| Habia rubica | Urella baccifera | 62.49 | -0.614 | high  |
| Pipile jacutinga | Cupania oblongifolia | 62.43 | -0.133 | high  |
| Euphonia pectoralis | Codonanthe cordifolia | 62.39 | -0.760 | high  |
| Chiroxiphia caudate | Coussapoa microcarpa | 62.28 | -0.896 | high  |
| Selenidera maculirostris | Maytenus gonoclad | 62.15 | -0.389 | high  |
| Camptostoma obsoletum | Varronia curassavica | 62.15 | -0.552 | high  |
| Selenidera maculirostris | Citharexylum myrianthum | 62.14 | -0.389 | high  |
| Turdus albigularis | Styrax leprosus | 62.08 | -0.682 | high  |
| Hemitrichaupis ruficapilla | Coussapoa microcarpa | 62.04 | -0.901 | high  |
| Tachyphonus coronatus | Coussapoa microcarpa | 61.98 | -0.902 | high  |
| Pipile jacutinga | Byrsonima cydoniifolia | 61.71 | -0.114 | high  |
| Thraupis sayaca | Maclura tinctoria | 61.64 | -0.953 | high  |
| Trogon surrurus | Rubus sp | 61.27 | -0.612 | high  |
| Turdus rufiventris | Phytolacca dioica | 61.25 | -0.887 | high  |
| Species | Common Name | Distance | Size | Dominance | Plant-skewed | Plant-Total |
|---------|-------------|----------|------|-----------|--------------|-------------|
| *Tangara seledon* | Coussapoa microcarpa | 61.01 | -0.919 | high | Plant-skewed | 1 |
| *Selenidera maculirostris* | Virola gardneri | 60.83 | -0.367 | high | Plant-skewed | 1 |
| *Crotophaga ani* | Schinus terebinthifolia | 60.72 | 0.323 | high | Bird-skewed | 1 |
| *Carpornis cucullata* | Schefflera angustissima | 60.65 | -0.598 | high | Plant-skewed | 1 |
| *Cyclarhis gujanensis* | Persea willdenovii | 60.62 | 0.453 | high | Bird-skewed | 1 |
| *Camptostoma obsoletum* | Trema micrantha | 60.43 | -0.533 | high | Plant-skewed | 1 |
| *Carpornis cucullata* | Schefflera angustissima | 60.65 | -0.598 | high | Plant-skewed | 1 |
| *Selenidera maculirostris* | Virola bicuhyba | 59.83 | -0.350 | high | Plant-skewed | 1 |
| *Tangara cyancephala* | Coussapoa microcarpa | 59.79 | -0.940 | high | Plant-skewed | 1 |
| *Habia rubica* | Rubus rosifolius | 59.79 | -0.589 | high | Plant-skewed | 1 |
| *Dacnis cayana* | Davilla rugosa | 59.76 | -0.865 | high | Plant-skewed | 1 |
| *Carpornis cucullata* | Rubus urticifolius | 59.76 | -0.590 | high | Plant-skewed | 1 |
| *Vireo olivaceus* | Erythroxylum deciduum | 59.72 | -0.182 | high | Plant-skewed | 1 |
| *Chiroxiphia caudata* | Piper corintoanum | 59.71 | -0.891 | high | Plant-skewed | 1 |
| *Selenidera maculirostris* | Coussarea contracta | 59.70 | -0.348 | high | Plant-skewed | 1 |
| *Thraupis ornate* | Coussapoa microcarpa | 59.68 | -0.942 | high | Plant-skewed | 1 |
| *Trogono viridis* | Symplonis sp | 59.88 | 0.019 | high | Bird-skewed | 1 |
| *Selenidera maculirostris* | Virola bicuhyba | 59.83 | -0.350 | high | Plant-skewed | 3 |
| *Tangara cyancephala* | Coussapoa microcarpa | 59.79 | -0.940 | high | Plant-skewed | 1 |
| *Habia rubica* | Rubus rosifolius | 59.79 | -0.589 | high | Plant-skewed | 1 |
| *Dacnis cayana* | Davilla rugosa | 59.76 | -0.865 | high | Plant-skewed | 1 |
| *Carpornis cucullata* | Rubus urticifolius | 59.76 | -0.590 | high | Plant-skewed | 1 |
| *Vireo olivaceus* | Erythroxylum deciduum | 59.72 | -0.182 | high | Plant-skewed | 1 |
| *Chiroxiphia caudata* | Piper corintoanum | 59.71 | -0.891 | high | Plant-skewed | 1 |
| *Selenidera maculirostris* | Coussarea contracta | 59.70 | -0.348 | high | Plant-skewed | 1 |
| *Thraupis ornate* | Coussapoa microcarpa | 59.68 | -0.942 | high | Plant-skewed | 1 |
| *Trogono viridis* | Symplonis sp | 59.88 | 0.019 | high | Bird-skewed | 1 |
| *Selenidera maculirostris* | Maytenus aquifolia | 59.48 | -0.344 | high | Plant-skewed | 1 |
| *Tachyphonus coronatus* | Piper corintoanum | 59.41 | -0.897 | high | Plant-skewed | 1 |
| *Thraupis ornate* | Phytolacca dioica | 59.28 | -0.923 | high | Plant-skewed | 1 |
| *Manacus manacus* | Urera baccifera | 59.12 | -0.689 | high | Plant-skewed | 1 |
| *Tolmomyias flaviventris* | Varronia curassavica | 59.04 | -0.624 | high | Plant-skewed | 1 |
| *Mionectes rufiventris* | Loranthaceae sp | 59.00 | -0.742 | high | Plant-skewed | 1 |
| *Conopias trivirgatus* | Alchornea glandulosa | 58.99 | -0.490 | high | Plant-skewed | 1 |
| *Tangara desmaresti* | Coussapoa microcarpa | 58.90 | -0.956 | high | Plant-skewed | 1 |
| *Pyroderus scutatus* | Maytenus gonocladia | 58.84 | -0.475 | high | Plant-skewed | 1 |
| *Pyroderus scutatus* | Citharexylum myrianthum | 58.83 | -0.475 | high | Plant-skewed | 1 |
| Common Name                      | Scientific Name                   | Value | Skew  | Plant/Animal Skewed | Notes |
|----------------------------------|-----------------------------------|-------|-------|---------------------|-------|
| Trichothraupis melanops          | Heteropsis rigidifolia            | 58.76 | -0.861| high                | Plant-skewed | 1  |
| Carpornis cucullata              | Neomitrantes glomerata            | 58.69 | -0.579| high                | Plant-skewed | 1  |
| Pipile jacutinga                 | Symlocos sp                       | 58.63 | -0.022| high                | Plant-skewed | 1  |
| Habia rubica                    | Trema micrantha                   | 58.61 | -0.577| high                | Plant-skewed | 1  |
| Tityra cayana                   | Alchornea triplinervia            | 58.60 | -0.529| high                | Plant-skewed | 1  |
| Elaenia mesoleuca               | Davilla rugosa                    | 58.59 | -0.887| high                | Plant-skewed | 1  |
| Carpornis cucullata              | Trema micrantha                   | 58.58 | -0.578| high                | Plant-skewed | 1  |
| Selenidera maculirostris        | Margaritopsis astrellantha        | 58.34 | -0.322| high                | Plant-skewed | 1  |
| Seropphaga subcristata          | Trema micrantha                   | 58.29 | -0.585| high                | Plant-skewed | 1  |
| Pachyrampphus polychopterus     | Varronia curassavica              | 58.28 | -0.642| high                | Plant-skewed | 1  |
| Procnias nudicollis             | Guapira opposita                 | 58.25 | -0.547| high                | Plant-skewed | 1  |
| Cyclarhis gujanensis            | Ilex brevicuspis                 | 58.15 | 0.516 | high                | Bird-skewed  | 1  |
| Stephanophorus diadematus       | Peplonia organensis              | 57.89 | -0.799| high                | Plant-skewed | 1  |
| Tityra cayana                   | Alchornea glandulosa             | 57.84 | -0.520| high                | Plant-skewed | 1  |
| Ramphastos dicolorus            | Cryptocarya moschata              | 57.67 | -0.794| high                | Plant-skewed | 1  |
| Ramphastos vitellinus           | Cryptocarya moschata              | 57.65 | -0.794| high                | Plant-skewed | 1  |
| Selenidera maculirostris        | Marcgravia polyantha             | 57.60 | -0.307| high                | Plant-skewed | 1  |
| Pyroderus scutatus              | Virola gardneri                  | 57.52 | -0.456| high                | Plant-skewed | 1  |
| Carpornis cucullata              | Guapira opposita                 | 57.48 | -0.567| high                | Plant-skewed | 1  |
| Vireo olivaceus                 | Cabralea canjerana               | 57.45 | -0.121| high                | Plant-skewed | 2  |
| Tolmomyias sulphurescens        | Trema micrantha                  | 57.32 | -0.609| high                | Plant-skewed | 1  |
| Carpornis cucullata              | Alchornea triplinervia           | 57.21 | -0.564| high                | Plant-skewed | 1  |
| Euphonia pectoralis             | Urera baccifera                  | 57.15 | -0.732| high                | Plant-skewed | 1  |
| Trogon surrucura                | Alchornea triplinervia           | 56.97 | -0.570| high                | Plant-skewed | 2  |
| Geothlypis aequinoctialis       | Trema micrantha                  | 56.74 | -0.623| high                | Plant-skewed | 1  |
| Pachyrampphus validus           | Trema micrantha                  | 56.63 | -0.625| high                | Plant-skewed | 1  |
| Pachyrampphus castaneus         | Trema micrantha                  | 56.57 | -0.627| high                | Plant-skewed | 1  |
| Pyroderus scutatus              | Virola bicuhyba                  | 56.52 | -0.441| high                | Plant-skewed | 1  |
| Species 1                                      | Species 2                                      | Value 1  | Value 2 | Side  |
|-----------------------------------------------|-----------------------------------------------|----------|---------|-------|
| Trogon viridis                                | Protium heptaphyllum                          | 56.47    | 0.132   | high  |
| Hylophilus amaurocephalus                      | Aegiphila integri folia                       | 56.44    | -0.625  | high  |
| Oxyruncus cristatus                           | Myrsine coriacea                              | 56.38    | 0.397   | high  |
| Zonotrichia capensis                          | Trema micrantha                               | 56.21    | -0.561  | high  |
| Phylloscartes ventralis                       | Alchornea triplinervia                        | 56.14    | -0.590  | high  |
| Pipraeidea melanonota                         | Urera baccifera                               | 56.10    | -0.756  | high  |
| Nemosia pileata                               | Varronia curassavica                          | 55.99    | -0.695  | high  |
| Carpornis cucullata                           | Maytenus gonoclada                            | 55.96    | -0.550  | high  |
| Tolmomyias sulphurescens                      | Alchornea triplinervia                        | 55.95    | -0.595  | high  |
| Carpornis melanocephala                       | Citharexylum myrianthum                       | 55.95    | -0.549  | high  |
| Manacus manacus                               | Ouratea polygon                              | 55.92    | -0.665  | high  |
| Carpornis cucullata Tabernaemontana            | catherinensis                                 | 55.89    | -0.549  | high  |
| Chlorophonia cyanea                           | Myrrhinium atropurpureum                      | 55.86    | -0.634  | high  |
| Cacicus chrysopterus                           | Styrax leposus                                | 55.82    | -0.815  | high  |
| Carpornis melanocephala                       | Maytenus sp                                  | 55.81    | -0.548  | high  |
| Carpornis cucullata                           | Maytenus sp                                  | 55.81    | -0.548  | high  |
| Satrapa icterophrys                            | Varronia curassavica                          | 55.65    | -0.703  | high  |
| Schifffornis virescens                        | Cabralea canjerana                            | 55.53    | -0.184  | high  |
| Tachyphonus coronatus                         | Piper sp                                     | 55.45    | -0.889  | high  |
| Elaenia obscura                               | Rubus urticifolius                            | 55.38    | -0.693  | high  |
| Pachyrhamphus viridis                         | Alchornea triplinervia                        | 55.26    | -0.613  | high  |
| Manacus manacus                               | Trema micrantha                              | 55.23    | -0.659  | high  |
| Pachyrhamphus polychopterus                   | Alchornea triplinervia                        | 55.20    | -0.614  | high  |
| Common Name                          | Scientific Name                     | Abundance | Species Skew | Category          | Skewness |
|--------------------------------------|-------------------------------------|-----------|--------------|-------------------|----------|
| Pachyramphus castaneus               | Alchornea triplinervia              | 55.20     | -0.614       | high              | Plant-skewed | 1 |
| Hylophilus poicilotis                | Alchornea triplinervia              | 55.19     | -0.614       | high              | Plant-skewed | 1 |
| Icterus cayanensis                   | Trema micrantha                     | 55.15     | -0.661       | high              | Plant-skewed | 1 |
| Trogon surrucura                     | Myrtaceae sp                        | 55.14     | -0.549       | high              | Plant-skewed | 1 |
| Trogon viridis                       | Cecropia pachystachya               | 55.10     | 0.177        | high              | Bird-skewed  | 1 |
| Manacus manacus                      | Aegiphila integrifolia              | 55.07     | -0.658       | high              | Plant-skewed | 1 |
| Tityra cayana                        | Virola bicuhyba                     | 55.02     | -0.482       | high              | Plant-skewed | 1 |
| Coereba flaveola                     | Ureia baccifera                     | 54.77     | -0.785       | high              | Plant-skewed | 1 |
| Turdus albicollis                    | Styrax leprosus                     | 54.68     | -0.839       | high              | Plant-skewed | 1 |
| Trogon viridis                       | Cecropia glaziovii                  | 54.67     | 0.192        | high              | Bird-skewed  | 1 |
| Legatus leucophaeus                  | Citharexylum myrianthum             | 54.62     | -0.584       | high              | Plant-skewed | 1 |
| Penelope obscura                      | Rubus urticifolius                  | 54.59     | -0.712       | high              | Plant-skewed | 1 |
| Cyclarhis gujanesis                  | Trichilia claussei                  | 54.58     | 0.607        | high              | Bird-skewed  | 1 |
| Euphonia violacea                    | Varronia curassavica                | 54.52     | -0.730       | high              | Plant-skewed | 1 |
| Pachyramphus validus                 | Alchornea glandulosa                | 54.51     | -0.605       | high              | Plant-skewed | 1 |
| Procnias nudicolli                   | Virola bicuhyba                     | 54.40     | -0.500       | high              | Plant-skewed | 1 |
| Pipile jacutinga                     | Protium widgrenii                  | 54.29     | 0.127        | high              | Bird-skewed  | 1 |
| Nemosia pileata                      | Trema micrantha                     | 54.27     | -0.683       | high              | Plant-skewed | 1 |
| Volatina jcarina                     | Varronia curassavica                | 54.27     | -0.736       | high              | Plant-skewed | 1 |
| Trogon rufus                         | Rhipsalis camposportoana            | 54.19     | 0.875        | high              | Bird-skewed  | 1 |
| Pteroglossus bailloni                | Trema micrantha                     | 54.16     | -0.685       | high              | Plant-skewed | 1 |
| Selenidera maculirostris             | Cabralea canjerana                  | 54.16     | -0.229       | high              | Plant-skewed | 1 |
| Ilicura militaris                    | Alchornea triplinervia              | 54.11     | -0.642       | high              | Plant-skewed | 1 |
| Procnias nudicolli                   | Ilex theezans                       | 54.09     | -0.495       | high              | Plant-skewed | 1 |
| Thamnophilus caerulescens            | Schinus terebinthifolia             | 54.07     | 0.171        | high              | Bird-skewed  | 1 |
| Mionectes rufiventris                | Ouratea vaccinioides                | 54.00     | -0.711       | high              | Plant-skewed | 1 |
| Pipraeidea melanonota                | Varronia curassavica                | 53.93     | -0.743       | high              | Plant-skewed | 1 |
| Pipile jacutinga                     | Cecropia pachystachya               | 53.85     | 0.142        | high              | Bird-skewed  | 1 |
| Myiodynastes maculatus               | Myriopus paniculatus                | 53.83     | -0.743       | high              | Plant-skewed | 1 |
| Stephanophorus diadematus            | Rubus sp                           | 53.83     | -0.780       | high              | Plant-skewed | 1 |
| Species                        | Score  | Bias  | Type | Skewness |
|-------------------------------|--------|-------|------|----------|
| Cacicus haemorrhous Urera baccifera | 53.81  | -0.806 | high | Plant-skewed | 1 |
| Pitangus sulphuratus Trema micrantha | 53.80  | -0.694 | high | Plant-skewed | 1 |
| Pitangus sulphuratus Aegiphila integrifolia | 53.65  | -0.693 | high | Plant-skewed | 1 |
| Penelope obscura Neomitranthes glomerata | 53.52  | -0.704 | high | Plant-skewed | 1 |
| Pteroglossus bailloni Maytenus littoralis | 53.52  | -0.681 | high | Plant-skewed | 1 |
| Mimus saturninus Cuptania oblongifolia | 53.49  | -0.401 | high | Plant-skewed | 1 |
| Selenidera maculirostris Symlocos uniflora | 53.45  | -0.211 | high | Plant-skewed | 1 |
| Pipile jacutinga Cecropia glaziovii | 53.42  | 0.157  | high | Bird-skewed  | 2 |
| Penelope obscura Celtis iguanaea | 53.41  | -0.704 | high | Plant-skewed | 1 |
| Trogon surrucura Virola bicuhya | 53.39  | -0.527 | high | Plant-skewed | 1 |
| Mionectes rufiventris Trema micrantha | 53.31  | -0.706 | high | Plant-skewed | 1 |
| Mionectes oleaginous Trema micrantha | 53.31  | -0.706 | high | Plant-skewed | 1 |
| Euphonia pectoralis Trema micrantha | 53.26  | -0.707 | high | Plant-skewed | 1 |
| Penelope obscura Piper aduncum | 53.24  | -0.702 | high | Plant-skewed | 1 |
| Veniliornis spilogaster Erythroxylum deciduum | 53.23  | -0.379 | high | Plant-skewed | 1 |
| Lipaugus lanoides Schefflera angustissima | 53.21  | -0.770 | high | Plant-skewed | 1 |
| Mionectes oleaginous Aegiphila integrifolia | 53.15  | -0.705 | high | Plant-skewed | 1 |
| Oxyruncus cristatus Myrsine umbellata | 53.00  | 0.492  | high | Bird-skewed  | 1 |
| Cyanerpes cyanus Varronia curassavica | 52.96  | -0.766 | high | Plant-skewed | 1 |
| Mimus saturninus Erythroxylum deciduum | 52.90  | -0.390 | high | Plant-skewed | 1 |
| Trogon viridis Cupania vernalis | 52.88  | 0.251  | high | Bird-skewed  | 1 |
| Pteroglossus bailloni Alchornea triplinervia | 52.79  | -0.675 | high | Plant-skewed | 1 |
| Phyllomyias fasciatus Trema micrantha | 52.75  | -0.720 | high | Plant-skewed | 1 |
| Turdus amaurochalinus Trema micrantha | 52.73  | -0.720 | high | Plant-skewed | 1 |
| Pitangus sulphuratus Guapira opposita | 52.70  | -0.686 | high | Plant-skewed | 3 |
| Coereba flaveola Varronia curassavica | 52.60  | -0.774 | high | Plant-skewed | 1 |
| Manacus manacus Citharexylum myrianthum | 52.60  | -0.636 | high | Plant-skewed | 1 |
| Turdus amaurochalinus Aegiphila integrifolia | 52.57  | -0.719 | high | Plant-skewed | 2 |
| lcterus cayanensis Citharexylum myrianthum | 52.52  | -0.638 | high | Plant-skewed | 1 |
| Mimus gilvus Erythroxylum ovalifolium | 52.50  | -0.382 | high | Plant-skewed | 1 |
| Pitangus sulphuratus Alchornea triplinervia | 52.43  | -0.684 | high | Plant-skewed | 1 |
| Species                              | Similarity | Dissimilarity | Skew  | Category            | Frequency |
|--------------------------------------|------------|---------------|-------|---------------------|-----------|
| Myiozetetes similis Cordia ecalyculata | 52.41      | -0.797        | high  | Plant-skewed        | 1         |
| Trogon rufus Miconia tristis         | 52.34      | 0.913         | high  | Bird-skewed         | 1         |
| Saltator maximus Varronia curassavica | 52.34      | -0.781        | high  | Plant-skewed        | 1         |
| Ramphastos vitellinus Annona neosericea | 52.32      | -0.769        | high  | Plant-skewed        | 1         |
| Megarynchus pitangua Rubus urticifolius | 52.31      | -0.766        | high  | Plant-skewed        | 1         |
| Pipile jacutinga Xylopia brasiliensis | 52.30      | 0.196         | high  | Bird-skewed         | 1         |
| Trogon rufus Miconia pusilliflora    | 52.29      | 0.914         | high  | Bird-skewed         | 1         |
| Trichotheapius melanops Urera baccifera | 52.28      | -0.840        | high  | Plant-skewed        | 2         |
| Myiodyastes maculatus Trema micrantha | 52.21      | -0.733        | high  | Plant-skewed        | 2         |
| Oxyruncus cristatus Ocotea bicolor | 52.14      | 0.517         | high  | Bird-skewed         | 1         |
| Camptostoma obsoletum Erythroxylum deciduum | 52.08      | -0.415        | high  | Plant-skewed        | 1         |
| Stephanophorus diadematus Rubus urticifolius | 52.08      | -0.771        | high  | Plant-skewed        | 1         |
| Tangara preciosa Styx leprosus      | 52.07      | -0.894        | high  | Plant-skewed        | 1         |
| Myiodyastes maculatus Aegiphila integrifolia | 52.05      | -0.732        | high  | Plant-skewed        | 1         |
| Pteroglossus bailloni Alchornea glandulosa | 52.03      | -0.668        | high  | Plant-skewed        | 1         |
| Mionectes rufiventeris Alchornea triplinervia | 51.94      | -0.696        | high  | Plant-skewed        | 1         |
| Trogon rufus Ossaea amygdaloides     | 51.90      | 0.922         | high  | Bird-skewed         | 1         |
| Myiozetetes similis Varronia curassavica | 51.76      | -0.794        | high  | Plant-skewed        | 1         |
| Euphonia violacea Guapira opposita  | 51.70      | -0.711        | high  | Plant-skewed        | 1         |
| Trogon viridis Persea willdenovii   | 51.67      | 0.291         | high  | Bird-skewed         | 1         |
| Nemosia pileata Citharexylum myrianthum | 51.64      | -0.661        | high  | Plant-skewed        | 1         |
| Cacicus haemorrhous Varronia curassavica | 51.64      | -0.797        | high  | Plant-skewed        | 1         |
| Pipile jacutinga Cupania vernalis    | 51.64      | 0.218         | high  | Bird-skewed         | 1         |
| Turdus amaurochalinus Guapira opposita | 51.63      | -0.713        | high  | Plant-skewed        | 3         |
| Procnias nudicollis Cupania oblongifolia | 51.59      | -0.457        | high  | Plant-skewed        | 1         |
| Melanerpes flavifrons Virola bicuhyba | 51.59      | -0.577        | high  | Plant-skewed        | 1         |
| Antilophia galeata Rubus rosifolius | 51.58      | -0.783        | high  | Plant-skewed        | 1         |
| Fluvicola nengeta Citharexylum myrianthum | 51.55      | -0.663        | high  | Plant-skewed        | 1         |
| Pteroglossus bailloni Maytenus gonolada | 51.54      | -0.664        | high  | Plant-skewed        | 1         |
| Arremon taciturnus Trema micrantha  | 51.52      | -0.749        | high  | Plant-skewed        | 1         |
| Species 1                     | Species 2                      | Score | Degree | Player Type          | Skewness |
|-----------------------------|-------------------------------|-------|--------|----------------------|----------|
| Orthogonys chloricterus    | Pourouma guianensis           | 51.49 | -0.795 | high                 | Plant-skewed | 1 |
| Turdus amaurochalinus      | Alchornea triplinervia         | 51.35 | -0.711 | high                 | Plant-skewed | 1 |
| Turdus subalaris           | Virola bicuhyba                | 51.25 | -0.587 | high                 | Plant-skewed | 1 |
| Penelope supercilioris     | Maytenus gonoclad             | 51.24 | -0.672 | high                 | Plant-skewed | 1 |
| Penelope sp Rubus urticifoli | Neomitrantes glomerata       | 51.23 | -0.791 | high                 | Plant-skewed | 1 |
| Mionectes rufiverris       | Alchornea glandulosa          | 51.25 | -0.587 | high                 | Plant-skewed | 1 |
| Pitangus sulphuratus       | Citharexylum myrianthum       | 51.17 | -0.673 | high                 | Plant-skewed | 3 |
| Lipaugus lanioides         | Trema micrantha               | 51.15 | -0.759 | high                 | Plant-skewed | 1 |
| Ramphastos vitellinus      | Neomitrantes glomerata        | 51.14 | -0.762 | high                 | Plant-skewed | 1 |
| Megarynchus pitangia       | Trema micrantha               | 51.13 | -0.759 | high                 | Plant-skewed | 1 |
| Pitangus sulphuratus       | Tabernaemontana catharinensis | 51.11 | -0.673 | high                 | Plant-skewed | 1 |
| Cacicus haemorrhous        | Rubus rosifolius              | 51.10 | -0.794 | high                 | Plant-skewed | 1 |
| Cnemotriccus fuscatus      | Trema micrantha               | 51.05 | -0.761 | high                 | Plant-skewed | 1 |
| Cissopis leverianus        | Rubus sp                      | 51.05 | -0.843 | high                 | Plant-skewed | 1 |
| Turdus rufiverris          | Rubus brasiliensis            | 51.03 | -0.861 | high                 | Plant-skewed | 1 |
| Turdus albicollis          | Cordia silvestris             | 51.01 | -0.825 | high                 | Plant-skewed | 1 |
| Cacicus haemorrhous        | Rubus rosifolius              | 51.10 | -0.794 | high                 | Plant-skewed | 1 |
| Cnemotriccus fuscatus      | Trema micrantha               | 51.05 | -0.761 | high                 | Plant-skewed | 1 |
| Cissopis leverianus        | Rubus sp                      | 51.05 | -0.843 | high                 | Plant-skewed | 1 |
| Turdus rufiverris          | Rubus brasiliensis            | 51.03 | -0.861 | high                 | Plant-skewed | 1 |
| Turdus albicollis          | Cordia silvestris             | 51.01 | -0.825 | high                 | Plant-skewed | 1 |
| Cacicus haemorrhous        | Rubus rosifolius              | 51.10 | -0.794 | high                 | Plant-skewed | 1 |
| Cnemotriccus fuscatus      | Trema micrantha               | 51.05 | -0.761 | high                 | Plant-skewed | 1 |
| Cissopis leverianus        | Rubus sp                      | 51.05 | -0.843 | high                 | Plant-skewed | 1 |
| Turdus rufiverris          | Rubus brasiliensis            | 51.03 | -0.861 | high                 | Plant-skewed | 1 |
| Turdus albicollis          | Cordia silvestris             | 51.01 | -0.825 | high                 | Plant-skewed | 1 |
| Cacicus haemorrhous        | Rubus rosifolius              | 51.10 | -0.794 | high                 | Plant-skewed | 1 |
| Cnemotriccus fuscatus      | Trema micrantha               | 51.05 | -0.761 | high                 | Plant-skewed | 1 |
| Cissopis leverianus        | Rubus sp                      | 51.05 | -0.843 | high                 | Plant-skewed | 1 |
| Turdus rufiverris          | Rubus brasiliensis            | 51.03 | -0.861 | high                 | Plant-skewed | 1 |
| Turdus albicollis          | Cordia silvestris             | 51.01 | -0.825 | high                 | Plant-skewed | 1 |
| Cacicus haemorrhous        | Rubus rosifolius              | 51.10 | -0.794 | high                 | Plant-skewed | 1 |
| Cnemotriccus fuscatus      | Trema micrantha               | 51.05 | -0.761 | high                 | Plant-skewed | 1 |
| Cissopis leverianus        | Rubus sp                      | 51.05 | -0.843 | high                 | Plant-skewed | 1 |
| Turdus rufiverris          | Rubus brasiliensis            | 51.03 | -0.861 | high                 | Plant-skewed | 1 |
| Turdus albicollis          | Cordia silvestris             | 51.01 | -0.825 | high                 | Plant-skewed | 1 |
| Cacicus haemorrhous        | Rubus rosifolius              | 51.10 | -0.794 | high                 | Plant-skewed | 1 |
| Cnemotriccus fuscatus      | Trema micrantha               | 51.05 | -0.761 | high                 | Plant-skewed | 1 |
| Cissopis leverianus        | Rubus sp                      | 51.05 | -0.843 | high                 | Plant-skewed | 1 |
| Turdus rufiverris          | Rubus brasiliensis            | 51.03 | -0.861 | high                 | Plant-skewed | 1 |
| Turdus albicollis          | Cordia silvestris             | 51.01 | -0.825 | high                 | Plant-skewed | 1 |
| Cacicus haemorrhous        | Rubus rosifolius              | 51.10 | -0.794 | high                 | Plant-skewed | 1 |
| Cnemotriccus fuscatus      | Trema micrantha               | 51.05 | -0.761 | high                 | Plant-skewed | 1 |
| Cissopis leverianus        | Rubus sp                      | 51.05 | -0.843 | high                 | Plant-skewed | 1 |
| Turdus rufiverris          | Rubus brasiliensis            | 51.03 | -0.861 | high                 | Plant-skewed | 1 |
| Turdus albicollis          | Cordia silvestris             | 51.01 | -0.825 | high                 | Plant-skewed | 1 |
| Cacicus haemorrhous        | Rubus rosifolius              | 51.10 | -0.794 | high                 | Plant-skewed | 1 |
| Cnemotriccus fuscatus      | Trema micrantha               | 51.05 | -0.761 | high                 | Plant-skewed | 1 |
| Cissopis leverianus        | Rubus sp                      | 51.05 | -0.843 | high                 | Plant-skewed | 1 |
| Turdus rufiverris          | Rubus brasiliensis            | 51.03 | -0.861 | high                 | Plant-skewed | 1 |
| Turdus albicollis          | Cordia silvestris             | 51.01 | -0.825 | high                 | Plant-skewed | 1 |
| Cacicus haemorrhous        | Rubus rosifolius              | 51.10 | -0.794 | high                 | Plant-skewed | 1 |
| Cnemotriccus fuscatus      | Trema micrantha               | 51.05 | -0.761 | high                 | Plant-skewed | 1 |
| Cissopis leverianus        | Rubus sp                      | 51.05 | -0.843 | high                 | Plant-skewed | 1 |
| Turdus rufiverris          | Rubus brasiliensis            | 51.03 | -0.861 | high                 | Plant-skewed | 1 |
| Turdus albicollis          | Cordia silvestris             | 51.01 | -0.825 | high                 | Plant-skewed | 1 |
| Cacicus haemorrhous        | Rubus rosifolius              | 51.10 | -0.794 | high                 | Plant-skewed | 1 |
| Cnemotriccus fuscatus      | Trema micrantha               | 51.05 | -0.761 | high                 | Plant-skewed | 1 |
| Cissopis leverianus        | Rubus sp                      | 51.05 | -0.843 | high                 | Plant-skewed | 1 |
| Turdus rufiverris          | Rubus brasiliensis            | 51.03 | -0.861 | high                 | Plant-skewed | 1 |
| Turdus albicollis          | Cordia silvestris             | 51.01 | -0.825 | high                 | Plant-skewed | 1 |
| Cacicus haemorrhous        | Rubus rosifolius              | 51.10 | -0.794 | high                 | Plant-skewed | 1 |
| Cnemotriccus fuscatus      | Trema micrantha               | 51.05 | -0.761 | high                 | Plant-skewed | 1 |
| Cissopis leverianus        | Rubus sp                      | 51.05 | -0.843 | high                 | Plant-skewed | 1 |
| Turdus rufiverris          | Rubus brasiliensis            | 51.03 | -0.861 | high                 | Plant-skewed | 1 |
| Turdus albicollis          | Cordia silvestris             | 51.01 | -0.825 | high                 | Plant-skewed | 1 |
| Species 1                          | Species 2                          | BC       | Diversity | Skew | Type            | Ref |
|-----------------------------------|-----------------------------------|----------|-----------|------|-----------------|-----|
| Selenidera maculirostris          | Geonoma gamiova                   | 50.79    | -0.134    | high | Plant-skewed    | 1   |
| Sporophila leucoptera             | Varronia curassavica               | 50.74    | -0.818    | high | Plant-skewed    | 1   |
| Coereba flaveola                  | Aegiphila integrifolia             | 50.72    | -0.764    | high | Plant-skewed    | 2   |
| Tachyphonus coronatus             | Ureora baccifera                  | 50.64    | -0.877    | high | Plant-skewed    | 2   |
| Saltator maximus                  | Trema micrantha                   | 50.62    | -0.771    | high | Plant-skewed    | 1   |
| Pipile jacutinga                  | Chomelia parvifolia               | 50.60    | 0.254     | high | Bird-skewed     | 1   |
| Elaenia flavogaster               | Varronia curassavica               | 50.49    | -0.823    | high | Plant-skewed    | 1   |
| Elaenia sp                       | Annona neosericea                 | 50.46    | -0.812    | high | Plant-skewed    | 1   |
| Saltator maximus                  | Aegiphila integrifolia             | 50.46    | -0.770    | high | Plant-skewed    | 1   |
| Parula pitiayumi                  | Citharexylum myrianthum           | 50.39    | -0.693    | high | Plant-skewed    | 1   |
| Trogon rufus                      | Myrcia brasiliensis               | 50.35    | 0.955     | high | Bird-skewed     | 1   |
| Selenidera maculirostris          | Symplocos glandulosomarginata     | 50.34    | -0.119    | high | Plant-skewed    | 1   |
| Turdus maximus                    | Varronia curassavica               | 50.33    | -0.119    | high | Plant-skewed    | 1   |
| Turdus flavipes                   | Myiopus paniculatus               | 50.28    | -0.826    | high | Plant-skewed    | 1   |
| Trogon viridis                    | Ficus glabra                      | 50.26    | 0.337     | high | Bird-skewed     | 1   |
| Tersina viridis                   | Trema micrantha                   | 50.23    | -0.781    | high | Plant-skewed    | 1   |
| Thlypopsis sordida                | Zanthoxylum fagara                | 50.23    | -0.792    | high | Plant-skewed    | 1   |
| Pipile jacutinga                  | Myrsine coriacea                  | 50.20    | 0.268     | high | Bird-skewed     | 1   |
| Pitangus sulphuratus              | Alchornea sidifolia               | 50.20    | -0.665    | high | Plant-skewed    | 1   |
| Tachyphonus cristatus             | Aegiphila integrifolia             | 50.18    | -0.777    | high | Plant-skewed    | 1   |
| Euphonia violacea                 | Citharexylum myrianthum           | 50.17    | -0.699    | high | Plant-skewed    | 1   |
| Cyanerpes cyaneus                 | Guapira opposita                  | 50.14    | -0.750    | high | Plant-skewed    | 1   |
| Turdus amaurochalinus             | Citharexylum myrianthum           | 50.09    | -0.701    | high | Plant-skewed    | 2   |
| Pipraeidea melanonota             | Alchornea glandulosa              | 50.09    | -0.718    | high | Plant-skewed    | 1   |
| Myiodynastes maculatus            | Alchornea glandulosa              | 50.08    | -0.718    | high | Plant-skewed    | 1   |
| Myiodytes similis                 | Trema micrantha                   | 50.05    | -0.785    | high | Plant-skewed    | 3   |
| Dacnis cayana                     | Varronia curassavica               | 50.04    | -0.834    | high | Plant-skewed    | 1   |
| Selenidera maculirostris          | Diploon sp                        | 49.97    | -0.107    | high | Plant-skewed    | 1   |
| Oxyruncus cristatus               | Clusia criuva                     | 49.96    | 0.579     | high | Bird-skewed     | 1   |
| Species 1                        | Species 2                        | Proportion | Skew  | Category      | Value |
|--------------------------------|---------------------------------|------------|-------|---------------|-------|
| Vireo olivaceus                 | Xylopia sericea                 | 49.96      | 0.141 | high          | Bird-skewed   | 1     |
| Elaenia flavogaster             | Rubus urticifolius              | 49.95      | -0.821| high          | Plant-skewed  | 1     |
| Manacus manacus                 | Maytenus aquifolia              | 49.94      | -0.609| high          | Plant-skewed  | 1     |
| Conirostrum speciosum           | Citharexylum myrianthum         | 49.90      | -0.706| high          | Plant-skewed  | 1     |
| Myiozetetes similis             | Aegiphila integrifolia          | 49.89      | -0.784| high          | Plant-skewed  | 2     |
| Saltator similis                | Rubus sp                        | 49.88      | -0.870| high          | Plant-skewed  | 1     |
| Thraupis sayaca                 | Styrax leprosus                 | 49.87      | -0.941| high          | Plant-skewed  | 1     |
| Cyanerpes cyaneus               | Alchornea triplinervia          | 49.87      | -0.748| high          | Plant-skewed  | 1     |
| Turdus albicollis               | Myrcia sp                       | 49.85      | -0.821| high          | Plant-skewed  | 1     |
| Ramphocelus carbo               | Urera baccifera                 | 49.84      | -0.894| high          | Plant-skewed  | 1     |
| Thlypopsis sordida              | Trema micrantha                 | 49.83      | -0.790| high          | Plant-skewed  | 1     |
| Turdus rufiventris              | Cordia ecalyculata              | 49.80      | -0.857| high          | Plant-skewed  | 1     |
| Coereba flaveola                | Guapira opposita                | 49.78      | -0.759| high          | Plant-skewed  | 1     |
| Cacicus haemorrhous             | Aegiphila integrifolia          | 49.77      | -0.787| high          | Plant-skewed  | 1     |
| Myiarchus tyrannulus            | Varronia curassavica            | 49.75      | -0.841| high          | Plant-skewed  | 1     |
| Tachyphonus coronatus            | Rubus sp                        | 49.68      | -0.874| high          | Plant-skewed  | 1     |
| Lathrotriccus euleri            | Alchornea triplinervia          | 49.68      | -0.753| high          | Plant-skewed  | 1     |
| Myiodynastes maculatus          | Citharexylum myrianthum         | 49.58      | -0.715| high          | Plant-skewed  | 3     |
| Trichothraupis melanops         | Rubus rosifolius                | 49.57      | -0.830| high          | Plant-skewed  | 1     |
| Trichothraupis melanops         | Rubus urticifolius              | 49.57      | -0.830| high          | Plant-skewed  | 1     |
| Vireo olivaceus                 | Cupania vernalis                | 49.52      | 0.157 | high          | Bird-skewed   | 2     |
| Saltator maximus                | Guapira opposita                | 49.52      | -0.765| high          | Plant-skewed  | 1     |
| Legatus leucophaius             | Cupania oblongifolia            | 49.50      | -0.520| high          | Plant-skewed  | 1     |
| Tangara mexicana                | Varronia curassavica            | 49.49      | -0.847| high          | Plant-skewed  | 1     |
| Gnorimopsar chopi               | Trema micrantha                 | 49.46      | -0.800| high          | Plant-skewed  | 1     |
| Vireo olivaceus                 | Zanthoxylum riedelianum         | 49.45      | 0.159 | high          | Bird-skewed   | 1     |
| Tityra inquisitor               | Cabralea canjerana              | 49.35      | -0.386| high          | Plant-skewed  | 1     |
| Tityra sayaca                   | Cabralea canjerana              | 49.35      | -0.386| high          | Plant-skewed  | 1     |
| Tachyphonus coronatus           | Galium hypocarpium              | 49.25      | -0.873| high          | Plant-skewed  | 1     |
| Species                          | Score | Bias  | Predation | Notes   |
|---------------------------------|-------|-------|-----------|---------|
| Pteroglossus bailloni Virola bicuhyba | 49.21 | -0.643 | high      | Plant-skewed 1 |
| Elaenia sp Trema micrantha     | 49.18 | -0.806 | high      | Plant-skewed 1 |
| Chiroxiphia caudate Schefflera angustissima | 49.12 | -0.865 | high      | Plant-skewed 1 |
| Pipile jacutinga Nectandra megapotamica | 49.08 | 0.307  | high      | Bird-skewed 1 |
| Turdus rufiventris Myiopus paniculatus | 49.06 | -0.854 | high      | Plant-skewed 1 |
| Celeus flavescens Maytenus aquifolia | 49.04 | -0.635 | high      | Plant-skewed 1 |
| Lipaugus lanioides Alchornea glandulosa | 49.02 | -0.745 | high      | Plant-skewed 1 |
| Megarynchus pitangua Alchornea glandulosa | 49.01 | -0.746 | high      | Plant-skewed 1 |
| Penelope obscura Cordiera myricifolia | 48.96 | -0.668 | high      | Plant-skewed 1 |
| Pipra rubrocapilla Aegiphila integrifolia | 48.89 | -0.809 | high      | Plant-skewed 1 |
| Selenidera maculirostris Protium widgrenii | 48.88 | -0.069 | high      | Plant-skewed 1 |
| Pachyramphus validus Cupania oblongifolia | 48.87 | -0.539 | high      | Plant-skewed 1 |
| Pitangus sulphuratus Chiococca alba | 48.84 | -0.652 | high      | Plant-skewed 1 |
| Cacicus haemorrhous Guapira opposita | 48.83 | -0.782 | high      | Plant-skewed 1 |
| Turdus leucomelas Cordia ecalyculata | 48.79 | -0.880 | high      | Plant-skewed 1 |
| Elaenia flavogaster Trema micrantha | 48.78 | -0.816 | high      | Plant-skewed 1 |
| Procnias nubicollis Cabralea canjerana | 48.73 | -0.407 | high      | Plant-skewed 1 |
| Dacnis cayana Zanthoxylum fagara | 48.72 | -0.829 | high      | Plant-skewed 1 |
| Ramphastos toco Copaifera langsdorffii | 48.70 | -0.474 | high      | Plant-skewed 1 |
| Chiroxiphia caudate Myiopus paniculatus | 48.68 | -0.863 | high      | Plant-skewed 1 |
| Turdus albicollis Aegiphila integrifolia | 48.63 | -0.815 | high      | Plant-skewed 1 |
| Elaenia flavogaster Aegiphila integrifolia | 48.62 | -0.815 | high      | Plant-skewed 1 |
| Turdus rufiventris Rubus urticifolius | 48.61 | -0.853 | high      | Plant-skewed 1 |
| Turdus rufiventris Rubus rosifolius | 48.61 | -0.853 | high      | Plant-skewed 1 |
| Penelope superciliaris Ilex theezans | 48.61 | -0.648 | high      | Plant-skewed 1 |
| Cacicus haemorrhous Alchornea triplinervia | 48.55 | -0.781 | high      | Plant-skewed 1 |
| Pipile jacutinga Matayba elaeagnoides | 48.55 | 0.325  | high      | Bird-skewed 1 |
| Megarynchus pitangua Citharexylum myrianthum | 48.50 | -0.742 | high      | Plant-skewed 1 |
| Tangara cyanocephala Urera sp | 48.45 | -0.925 | high      | Plant-skewed 1 |
| Knipolegus nigerrimus Alchornea triplinervia | 48.45 | -0.784 | high      | Plant-skewed 1 |
| Species Name                                      | Percentage | Skew | Plant Type     | Value |
|--------------------------------------------------|------------|------|----------------|-------|
| Selenidera maculirostris Cecropia pachystachya   | 48.44      | high | Plant-skewed   | 0.052 |
| Hemithraupis ruficapilla Myriopus paniculatus    | 48.44      | high | Plant-skewed   | 0.052 |
| Ramphastos dicolorus Maytenus gonoclad          | 48.43      | high | Plant-skewed   | 0.052 |
| Ramphastos dicolorus Citharexylum myrianthum    | 48.42      | high | Plant-skewed   | 0.052 |
| Ramphastos vitellinus Citharexylum myrianthum   | 48.40      | high | Plant-skewed   | 0.052 |
| Trichoepus melanops Trema micrantha             | 48.39      | high | Plant-skewed   | 0.052 |
| Empidonous varius Alchornea triplinervia         | 48.38      | high | Plant-skewed   | 0.052 |
| Lipaugus lanioides Maytenus sp                   | 48.38      | high | Plant-skewed   | 0.052 |
| Penelope obscura Coussarea contracta             | 48.34      | high | Plant-skewed   | 0.052 |
| Dacnis cayana Trema micrantha                   | 48.32      | high | Plant-skewed   | 0.052 |
| Pachyramphus validus Erythroxylum deciduum      | 48.28      | high | Plant-skewed   | 0.052 |
| Coereba flaveola Citharexylum myrianthum        | 48.25      | high | Plant-skewed   | 0.052 |
| Chiroxiphia caudate Rubus rosifolius             | 48.23      | high | Plant-skewed   | 0.052 |
| Pachyramphus polychropterus Erythroxylum deciduum| 48.22      | high | Plant-skewed   | 0.052 |
| Melanerpes candidus Erythroxylum deciduum        | 48.18      | high | Plant-skewed   | 0.052 |
| Dacnis cayana Aegipha integifolia               | 48.16      | high | Plant-skewed   | 0.052 |
| Vireo olivaceus Myrsine coriacea                | 48.08      | high | Bird-skewed    | 0.052 |
| Myiarchus tyrannulus Trema micrantha            | 48.03      | high | Plant-skewed   | 0.052 |
| Procnias nudicollis Symlocos uniflora           | 48.02      | high | Plant-skewed   | 0.052 |
| Selenidera maculirostris Cecropia glaziovii     | 48.01      | high | Plant-skewed   | 0.052 |
| Saltator maximus Citharexylum myrianthum        | 47.99      | high | Plant-skewed   | 0.052 |
| Zonotrichia capensis Erythroxylum deciduum      | 47.97      | high | Plant-skewed   | 0.052 |
| Carpornis melanacephala Cabralea canjerana      | 47.96      | high | Plant-skewed   | 0.052 |
| Carpornis cucullata Cabralea canjerana          | 47.96      | high | Plant-skewed   | 0.052 |
| Myiodyastes maculatus Syagrus romanoffiana      | 47.96      | high | Plant-skewed   | 0.052 |
| Pipra rubrocapilla Guapira opposita             | 47.95      | high | Plant-skewed   | 0.052 |
| Cissopis leverianus Piper dilatatum              | 47.94      | high | Plant-skewed   | 0.052 |
Cissopis leverianus  Piper aduncum  47.94 -0.831 high Plant-skewed 1
Tachyphonus rufus  Rubus rosifolius  47.93 -0.869 high Plant-skewed 1
Tachyphonus coronatus  Rubus rosifolius  47.93 -0.869 high Plant-skewed 2
Tachyphonus coronatus  Rubus urticifolius  47.93 -0.869 high Plant-skewed 2
Orthogonys chloricterus  Alchornea glandulosa  47.85 -0.776 high Plant-skewed 1
Cacicus haemorrhous  Alchornea glandulosa  47.80 -0.777 high Plant-skewed 1
Cacicus chrysopterus  Alchornea glandulosa  47.80 -0.777 high Plant-skewed 1
Antilophia galeata  Citharexylum myrianthum  47.77 -0.761 high Plant-skewed 2
Trogon surrucura  Cabralea canjerana  47.72 -0.440 high Plant-skewed 1
Turdus albicollis  Guapira opposita  47.69 -0.811 high Plant-skewed 3
Ramphocelus bresilius  Varronia curassavica  47.68 -0.889 high Plant-skewed 1
Elaenia flavogaster  Guapira opposita  47.68 -0.811 high Plant-skewed 1
Troglodytes aedon  Miconia tristis  47.67 0.904 high Bird-skewed 1
Tangara mexicana  Aegiphila integrifolia  47.61 -0.840 high Plant-skewed 1
Turdus leucomelas  Rubus urticifolius  47.60 -0.877 high Plant-skewed 1
Turdus leucomelas  Rubus rosifolius  47.60 -0.877 high Plant-skewed 1
Turdus flavipes  Guapira opposita  47.56 -0.814 high Plant-skewed 2
Thraupis cyanoptera  Schefflera angustissima  47.53 -0.901 high Plant-skewed 1
Pipile jacutinga  Ficus enormis  47.48 0.362 high Bird-skewed 1
Turdus amaurochalinus  Ilex theezans  47.47 -0.679 high Plant-skewed 1
Turdus rufiventris  Trema micrantha  47.43 -0.849 high Plant-skewed 1
Turdus albicollis  Alchornea triplinervia  47.41 -0.810 high Plant-skewed 3
Myiozetetes similis  Citharexylum myrianthum  47.41 -0.771 high Plant-skewed 2
Tangara cayana  Rubus rosifolius  47.40 -0.881 high Plant-skewed 1
Oxyruncus cristatus  Nectandra membranacea  47.38 0.652 high Bird-skewed 1
Orthogonys chloricterus  Citharexylum myrianthum  47.34 -0.773 high Plant-skewed 1
Turdus flavipes  Alchornea triplinervia  47.29 -0.813 high Plant-skewed 2
Coereba flaveola  Alchornea sidifolia  47.28 -0.742 high Plant-skewed 1
Turdus rufiventris  Aegiphila integrifolia  47.28 -0.848 high Plant-skewed 3
Dacnis cayana  Guapira opposita  47.22 -0.822 high Plant-skewed 1
| Species 1                                    | Species 2                                    | Index | Position  | Skew   | Group       |
|---------------------------------------------|---------------------------------------------|-------|-----------|--------|-------------|
| Celeus flavescens                           | Marcgravia polyantha                        | 47.16 | -0.614    | high   | Plant-skewed| 1    |
| Oxyruncus cristatus                         | Struthanthus martianus                      | 47.15 | 0.659     | high   | Bird-skewed | 1    |
| Ramphocelus carbo                           | Rubus rosifolius                            | 47.14 | -0.888    | high   | Plant-skewed| 1    |
| Ramphastos vitellinus                       | Virola gardneri                             | 47.09 | -0.736    | high   | Plant-skewed| 1    |
| Thraupis cyanoptera                         | Myriopus paniculatus                        | 47.08 | -0.900    | high   | Plant-skewed| 1    |
| Chiroxipha caudata                          | Trema micrantha                             | 47.06 | -0.858    | high   | Plant-skewed| 2    |
| Pyroderus scutatus                          | Symlocos glandulososmarginata               | 47.03 | -0.243    | high   | Plant-skewed| 1    |
| Trichothraupis melanops                     | Alchornea triplinervia                      | 47.02 | -0.819    | high   | Plant-skewed| 1    |
| Pipile jacutinga                             | Myrsine venosa                              | 46.98 | 0.379     | high   | Bird-skewed | 1    |
| Myiarchus swainsoni                         | Trema micrantha                             | 46.97 | -0.860    | high   | Plant-skewed| 1    |
| Saltator similis                            | Trema micrantha                             | 46.95 | -0.860    | high   | Plant-skewed| 2    |
| Dacnis cayana                               | Alchornea triplinervia                      | 46.95 | -0.821    | high   | Plant-skewed| 2    |
| Sporophila caeruleans                       | Varronia curassavica                        | 46.95 | -0.906    | high   | Plant-skewed| 1    |
| Chiroxipha caudate                          | Aegiphila integrifolia                      | 46.90 | -0.857    | high   | Plant-skewed| 1    |
| Chiroxipha caudate                          | Piper dilatatum                             | 46.88 | -0.857    | high   | Plant-skewed| 1    |
| Pipile jacutinga                            | Myrsine umbellata                           | 46.83 | 0.384     | high   | Bird-skewed | 1    |
| Hemithraupis ruficapilla                    | Trema micrantha                             | 46.81 | -0.864    | high   | Plant-skewed| 1    |
| Saltator similis                            | Aegiphila integrifolia                      | 46.79 | -0.860    | high   | Plant-skewed| 1    |
| Orthogonys chloricterus                     | Myrtaceae sp                                | 46.77 | -0.769    | high   | Plant-skewed| 1    |
| Tachyphonus coronatus                       | Trema micrantha                             | 46.75 | -0.865    | high   | Plant-skewed| 3    |
| Tangara mexicana                            | Guapira opposita                           | 46.67 | -0.836    | high   | Plant-skewed| 1    |
| Turdus albicollis                           | Alchornea glandulosa                        | 46.66 | -0.806    | high   | Plant-skewed| 1    |
| Thraupis sayaca                             | Cordia sellowiana                          | 46.64 | -0.937    | high   | Plant-skewed| 1    |
| Thraupis cyanoptera                         | Rubus urticifolius                          | 46.64 | -0.899    | high   | Plant-skewed| 1    |
| Legatus leucocephalus                       | Cabralea canjerana                         | 46.64 | -0.475    | high   | Plant-skewed| 1    |
| Vireo olivaceus                             | Myrsine lancifolia                         | 46.64 | 0.264     | high   | Bird-skewed | 1    |
| Tangara cayana                              | Zanthoxylum fagara                          | 46.62 | -0.879    | high   | Plant-skewed| 1    |
| Tachyphonus coronatus                       | Aegiphila integrifolia                      | 46.60 | -0.865    | high   | Plant-skewed| 2    |
| Tachyphonus coronatus                       | Piper dilatatum                             | 46.58 | -0.865    | high   | Plant-skewed| 1    |
| Tachyphonus coronatus                       | Piper aduncum                               | 46.58 | -0.865    | high   | Plant-skewed| 1    |
| Species 1                      | Species 2                      | Value 1 | Value 2 | Type          |
|--------------------------------|--------------------------------|---------|---------|---------------|
| Pyroderus scutatus             | Chrysophyllum viride           | 46.57   | -0.230  | high Plant-skewed | 1 |
| Elaenia sp                    | Citharexylum myrianthum        | 46.54   | -0.793  | high Plant-skewed | 1 |
| Turdus flavipes                | Alchornea glandulosa          | 46.53   | -0.809  | high Plant-skewed | 1 |
| Nemosia pileata               | Cupania oblongifolia          | 46.52   | -0.609  | high Plant-skewed | 1 |
| Pipile jacutinga               | Ocotea catharinensis          | 46.47   | 0.397   | high Bird-skewed | 1 |
| Pitangus sulphuratus           | Cupania emarginata            | 46.46   | -0.628  | high Plant-skewed | 1 |
| Myiarchus ferox                | Trema micrantha               | 46.43   | -0.873  | high Plant-skewed | 1 |
| Turdus leucomelas              | Trema micrantha               | 46.42   | -0.873  | high Plant-skewed | 1 |
| Pteroglossus bailloni          | Cupania oblongifolia          | 46.40   | -0.613  | high Plant-skewed | 1 |
| Turdus rufiventris             | Guapira opposita              | 46.33   | -0.845  | high Plant-skewed | 1 |
| Coryphospingus cucullatus      | Guapira opposita              | 46.29   | -0.846  | high Plant-skewed | 1 |
| Myiarchus ferox                | Aegiphila integrifolia        | 46.28   | -0.873  | high Plant-skewed | 2 |
| Turdus leucomelas              | Aegiphila integrifolia        | 46.27   | -0.873  | high Plant-skewed | 2 |
| Thlypopsis sordida             | Alchornea sidifolia           | 46.23   | -0.770  | high Plant-skewed | 1 |
| Tangara cayana                 | Trema micrantha               | 46.22   | -0.878  | high Plant-skewed | 2 |
| Lipaugus lanioides             | Virola bicuhyba               | 46.20   | -0.726  | high Plant-skewed | 1 |
| Dacnis cayana                  | Alchornea glandulosa          | 46.20   | -0.818  | high Plant-skewed | 1 |
| Turdus albicollis              | Maytenus gonoclada            | 46.17   | -0.803  | high Plant-skewed | 3 |
| Selenidera maculirostris       | Zanthoxylum rhoifolium        | 46.16   | 0.042   | high Bird-skewed | 1 |
| Turdus albicollis              | Citharexylum myrianthum       | 46.15   | -0.803  | high Plant-skewed | 1 |
| Elaenia flavogaster            | Citharexylum myrianthum       | 46.14   | -0.804  | high Plant-skewed | 3 |
| Thraupis palmarum              | Varronia curassavica          | 46.14   | -0.925  | high Plant-skewed | 1 |
| Ramphastos sp                  | Virola bicuhyba               | 46.13   | -0.728  | high Plant-skewed | 1 |
| Ramphastos dicolorus           | Virola bicuhyba               | 46.10   | -0.728  | high Plant-skewed | 2 |
| Ramphastos vitellinus          | Virola bicuhyba               | 46.09   | -0.729  | high Plant-skewed | 3 |
| Tangara cayana                 | Aegiphila integrifolia        | 46.07   | -0.878  | high Plant-skewed | 1 |
| Turdus rufiventris             | Alchornea triplinervia        | 46.06   | -0.843  | high Plant-skewed | 2 |
| Tyrannus savana                | Trema micrantha               | 46.04   | -0.882  | high Plant-skewed | 1 |
| Tyrannus melancholicus         | Trema micrantha               | 46.04   | -0.882  | high Plant-skewed | 4 |
| Pitangus sulphuratus           | Cupania oblongifolia          | 46.04   | -0.623  | high Plant-skewed | 2 |
| Species 1                                      | Species 2                                      | Score 1         | Score 2         | Category     | Number |
|------------------------------------------------|------------------------------------------------|-----------------|-----------------|--------------|--------|
| Turdus albicollis                               | Maytenus sp                                    | 46.02           | -0.803          | high Plant-skewed | 1      |
| Pachyramphus validus                            | Cabralea canjerana                             | 46.01           | -0.495          | high Plant-skewed | 2      |
| Cissopis leverianus                             | Alchornea glandulosa                           | 45.99           | -0.823          | high Plant-skewed | 1      |
| Celeus flavescens Erythroxylum decidu         |                                              | 45.97           | -0.600          | high Plant-skewed | 1      |
| Pipile jacutinga                                | Ocotea bicolor                                 | 45.97           | 0.414           | high Bird-skewed  | 1      |
| Ramphocelus bresilius                          | Trema micrantha                               | 45.96           | -0.884          | high Plant-skewed | 1      |
| Ramphocelus carbo                              | Trema micrantha                               | 45.96           | -0.884          | high Plant-skewed | 2      |
| Chiroxiphia caudate                            | Guapira opposita                              | 45.96           | -0.854          | high Plant-skewed | 1      |
| Melanerpes flavifrons                          | Cabralea canjerana                            | 45.91           | -0.499          | high Plant-skewed | 1      |
| Tyrannus melancholicus                         | Aegiphila integifolia                         | 45.89           | -0.882          | high Plant-skewed | 1      |
| Tangara preciosa Myrrhinium atropurpureum     |                                              | 45.86           | -0.878          | high Plant-skewed | 1      |
| Vireo olivaceus llex brevicuspis               |                                              | 45.83           | 0.294           | high Bird-skewed  | 1      |
| Ramphocelus bresilius                          | Aegiphila integifolia                         | 45.80           | -0.884          | high Plant-skewed | 2      |
| Tangara seledon Trema micrantha                |                                              | 45.79           | -0.889          | high Plant-skewed | 1      |
| Elaenia mesoleuca Alchornea triplinervia       |                                              | 45.79           | -0.850          | high Plant-skewed | 1      |
| Thraupis sayaca Varronia curassavica           |                                              | 45.70           | -0.935          | high Plant-skewed | 1      |
| Dacnis cayana Citharexylum myrianthum          |                                              | 45.69           | -0.815          | high Plant-skewed | 1      |
| Chiroxiphia caudate Alchornea triplinervia     |                                              | 45.68           | -0.853          | high Plant-skewed | 2      |
| Vireo olivaceus Myrsine sp                     |                                              | 45.61           | 0.302           | high Bird-skewed  | 1      |
| Myiarchus swainsoni Alchornea triplinervia     |                                              | 45.60           | -0.855          | high Plant-skewed | 1      |
| Saltator similis Alchornea triplinervia        |                                              | 45.58           | -0.856          | high Plant-skewed | 2      |
| Hemithraupis flavicolis Guapira opposita       |                                              | 45.54           | -0.864          | high Plant-skewed | 1      |
| Thraupis cyanoptera Trema micrantha            |                                              | 45.46           | -0.897          | high Plant-skewed | 1      |
| Pitangus sulphuratus Erythroxylum decidu       |                                              | 45.45           | -0.616          | high Plant-skewed | 1      |
| Tachyphonus coronatus Alchornea triplinervia   |                                              | 45.38           | -0.861          | high Plant-skewed | 2      |
| Turdus rufiventris Alchornea glandulosa        |                                              | 45.31           | -0.840          | high Plant-skewed | 1      |
| Tersina viridis Virola bicuhyba                |                                              | 45.29           | -0.751          | high Plant-skewed | 1      |
| Sporophila caerulescens Trema micrantha        |                                              | 45.23           | -0.902          | high Plant-skewed | 1      |
| Elaenia flavogaster Alchornea sidifolia        |                                              | 45.17           | -0.799          | high Plant-skewed | 1      |
| Thraupis sayaca Rubus rosifolius               |                                              | 45.16           | -0.934          | high Plant-skewed | 1      |
| Thraupis episcopus Rubus rosifolius            |                                              | 45.15           | -0.935          | high Plant-skewed | 1      |
| Common Name                        | Scientific Name                  | Score | Skew | Type            | Index |
|-----------------------------------|----------------------------------|-------|------|-----------------|-------|
| Mimus saturninus                  | Opuntia monacantha              | 45.15 | -0.201 | high Plant-skewed | 1     |
| Pitangus sulphuratus              | Erythroxylum ovalifolium         | 45.06 | -0.612 | high Plant-skewed | 1     |
| Thraupis sayaca                   | Myrcia sp                       | 45.05 | -0.934 | high Plant-skewed | 1     |
| Celeus flavescens                 | Copaifera trapezifolia          | 45.04 | -0.589 | high Plant-skewed | 1     |
| Selenidera maculirostris          | Persea willdenovii              | 45.01 | 0.090  | high Bird-skewed | 1     |
| Zonotrichia capensis              | Symphlocos uniflora             | 44.97 | -0.879 | high Plant-skewed | 1     |
| Turdus amaurochalinus             | Cupania oblongifolia            | 44.95 | -0.655 | high Plant-skewed | 1     |
| Carpornis cucullata               | Symphlocos tetrandra            | 44.92 | -0.875 | high Plant-skewed | 1     |
| Tyrannus melancholicus            | Guapira opposita                | 44.91 | -0.881 | high Plant-skewed | 1     |
| Chiroxiphia caudate               | Alchornea glandulosa            | 44.90 | -0.850 | high Plant-skewed | 1     |
| Tangara preciosa                  | Schaefferia argentinensis       | 44.90 | -0.850 | high Plant-skewed | 1     |
| Turdus amaurochalinus             | Erythroxylum argentinum         | 44.88 | -0.654 | high Plant-skewed | 1     |
| Pteroglossus bailloni             | Copaifera trapezifolia          | 44.87 | -0.594 | high Plant-skewed | 1     |
| Ramphocelus bresilius             | Guapira opposita                | 44.86 | -0.881 | high Plant-skewed | 1     |
| Saltator similis                  | Alchornea glandulosa            | 44.83 | -0.853 | high Plant-skewed | 1     |
| Turdus rufiventris                | Citharexylum myrianthum         | 44.80 | -0.838 | high Plant-skewed | 1     |
| Selenidera maculirostris          | Mollinedia uleana               | 44.74 | 0.102  | high Bird-skewed | 1     |
| Dacnis cayana                    | Alchornea sidifolia             | 44.72 | -0.811 | high Plant-skewed | 1     |
| Vireo olivaceus                   | Myrsine umbellata               | 44.71 | 0.336  | high Bird-skewed | 1     |
| Hemithraupis ruficapilla           | Alchornea glandulosa            | 44.69 | -0.856 | high Plant-skewed | 1     |
| Tyrannus melancholicus            | Alchornea triplinervia          | 44.67 | -0.878 | high Plant-skewed | 1     |
| Pipile jacutinga                  | Ocotea teleiandra               | 44.64 | 0.460  | high Bird-skewed | 1     |
| Tachyphonus coronatus             | Alchornea glandulosa            | 44.63 | -0.858 | high Plant-skewed | 1     |
| Habia rubica                     | Geonoma gamiova                 | 44.62 | -0.360 | high Plant-skewed | 1     |
| Manacus manacus                   | Cabralea canjerana              | 44.61 | -0.541 | high Plant-skewed | 1     |
| Carpornis cucullata               | Geonoma gamiova                 | 44.59 | -0.361 | high Plant-skewed | 1     |
| Ramphocelus bresilius             | Alchornea triplinervia          | 44.59 | -0.881 | high Plant-skewed | 1     |
| Tangara cyanocephalus             | Trema micrantha                 | 44.57 | -0.918 | high Plant-skewed | 1     |
| Mimus saturninus                 | Schinus terebinthifolia         | 44.56 | -0.182 | high Plant-skewed | 1     |
| Picumnus nebulosus                | Myrsine coriacea                | 44.55 | 0.091  | high Bird-skewed | 1     |
| Species                          | Plant Height | Plant Skew | Notes     |
|---------------------------------|--------------|------------|-----------|
| Thraupis ornate *Trema micrantha* | 44.46        | -0.921     | high      |
| Pipraeidea melanonota *Cupania oblongifolia* | 44.45        | -0.671     | high      |
| Myiodynastes maculatus *Cupania oblongifolia* | 44.45        | -0.671     | high      |
| Chiroxipha caudate *Maytenus gonooclada* | 44.44        | -0.848     | high      |
| Chiroxipha caudate *Citharexylum myrianthum* | 44.42        | -0.848     | high      |
| Thraupis palmarum *Trema micrantha* | 44.42        | -0.922     | high      |
| Penelope obscura *Inga marginata* | 44.42        | -0.621     | high      |
| Psarocolius decumanus *Cupania oblongifolia* | 44.40        | -0.672     | high      |
| Procnias nudicollis *Protium heptaphyllum* | 44.38        | -0.308     | high      |
| Turdus amaurochalinus *Erythroxylum deciduuum* | 44.37        | -0.649     | high      |
| Thraupis cyanoptera *Guapira opposita* | 44.36        | -0.894     | high      |
| Saltator similis *Citharexylum myrianthum* | 44.32        | -0.851     | high      |
| Thraupis ornate *Piper dilatatum* | 44.29        | -0.921     | high      |
| Thraupis palmarum *Aegiphila integrifolia* | 44.26        | -0.922     | high      |
| Volatinia jacarina *Erythroxylum deciduuum* | 44.20        | -0.654     | high      |
| Carpornis cucullata *Symlocos glandulosomarginata* | 44.15        | -0.351     | high      |
| Thraupis cyanoptera *Alchornea triplinervia* | 44.09        | -0.893     | high      |
| Mimus gilvus *Pilosocereus arrabidae* | 43.99        | -0.163     | high      |
| Thraupis sayaca *Trema micrantha* | 43.98        | -0.932     | high      |
| Thraupis episcopus *Trema micrantha* | 43.97        | -0.933     | high      |
| Carpornis cucullata *Geonoma pauciflora* | 43.95        | -0.346     | high      |
| Tyrannus melancholicus *Alchornea glandulosa* | 43.92        | -0.876     | high      |
| Myiodynastes maculatus *Erythroxylum deciduuum* | 43.86        | -0.665     | high      |
| Chiroxipha caudate *Myrtaceae sp* | 43.85        | -0.846     | high      |
| Turdus albicollis *Virola bicuhyba* | 43.84        | -0.791     | high      |
| Turdus Rufiventris *Alchornea sidifolia* | 43.83        | -0.834     | high      |
| Thraupis sayaca *Aegiphila integrifolia* | 43.82        | -0.932     | high      |
| Myiarchus ferox *Citharexylum myrianthum* | 43.80        | -0.864     | high      |
Turdus leucomelas Citharexylum myrianthum 43.79 -0.865 high Plant-skewed 4
Megarynchus pitangua Cupania emarginata 43.79 -0.707 high Plant-skewed 1
Turdus flavipes Virola bicuhyba 43.71 -0.794 high Plant-skewed 3
Tangara desmaresti Trema micrantha 43.67 -0.940 high Plant-skewed 1
Tangara seledon Alchornea glandulosa 43.67 -0.883 high Plant-skewed 1
Tangara cayana Citharexylum myrianthum 43.59 -0.870 high Plant-skewed 1
Euphonia chlorotica Cupania oblongifolia 43.56 -0.697 high Plant-skewed 1
Pteroglossus bailloni Cabralea canjerana 43.54 -0.576 high Plant-skewed 1
Tyrannus melancholicus Citharexylum 43.41 -0.874 high Plant-skewed 4
Turdus flavipes Ilex theezans 43.40 -0.793 high Plant-skewed 1
Lipaugus lanioides Cupania oblongifolia 43.39 -0.703 high Plant-skewed 1
Megarynchus pitangua Cupania oblongifolia 43.38 -0.703 high Plant-skewed 2
Trogon surrucura Protium heptaphyllum 43.37 -0.347 high Plant-skewed 1
Thraupis ornate Guapira opposita 43.36 -0.919 high Plant-skewed 1
Saltator similis Alchornea sidifolia 43.35 -0.847 high Plant-skewed 1
Ramphocelus bresilius Citharexylum myrianthum 43.33 -0.877 high Plant-skewed 1
Ramphocelus carbo Citharexylum myrianthum 43.33 -0.877 high Plant-skewed 1
Ramphastos dicolorus Cupania oblongifolia 43.29 -0.706 high Plant-skewed 1
Tityra cayana Schinus terebinthifolia 43.27 -0.234 high Plant-skewed 1
Turdus rufiventris Erythroxylum pulchrum 43.27 -0.832 high Plant-skewed 1
Schistochlamys ruficapillus Alchornea glandulosa 43.26 -0.893 high Plant-skewed 1
Orchesticus abeillei Marcgravia polyantha 43.25 -0.729 high Plant-skewed 1
Tityra cayana Cecropia glaziovii 43.20 -0.232 high Plant-skewed 1
Pitangus sulphuratus Cabralea canjerana 43.19 -0.588 high Plant-skewed 2
Icterus cayanensis Vitex megapotamica 43.19 -0.523 high Plant-skewed 1
Ramphastos dicolorus Erythroxylum ambiguum 43.11 -0.704 high Plant-skewed 1
| Species 1                          | Species 2                              | IMC 1 | IMC 2 | Position 1          |
|-----------------------------------|----------------------------------------|-------|-------|---------------------|
| Thraupis ornate                   | Alchornea triplinervia                 | 43.09 | -0.918| high Plant-skewed   |
| Carpornis melanocephala           | Chrysophyllum flexuosum                | 43.05 | -0.323| high Plant-skewed   |
| Veniliornis spilogaster           | Cupania vernalis                      | 43.04 | -0.100| high Plant-skewed   |
| Xolmis velatus                    | Erythroxylum deciduum                 | 43.03 | -0.690| high Plant-skewed   |
| Thraupis sayaca                   | Guapira opposita                      | 42.88 | -0.931| high Plant-skewed   |
| Thraupis cyanoptera               | Maytenus gonoclada                    | 42.84 | -0.890| high Plant-skewed   |
| Turdus leucomelas                 | Alchornea sidifolia                   | 42.82 | -0.861| high Plant-skewed   |
| Orthogonys chloricterus           | Norantea brasiliensis                 | 42.80 | -0.742| high Plant-skewed   |
| Cacicus haemorrhous               | Marcgravia polyantha                  | 42.76 | -0.744| high Plant-skewed   |
| Micacis rufiventris               | Cabralea canjerana                    | 42.69 | -0.604| high Plant-skewed   |
| Tangara cayana                   | Alchornea sidifolia                   | 42.66 | -0.724| high Plant-skewed   |
| Cacicus haemorrhous               | Cupania emarginata                    | 42.58 | -0.742| high Plant-skewed   |
| Turdus rufiventris                | Virola bicuhyba                       | 42.49 | -0.828| high Plant-skewed   |
| Tangara cyanoccephala             | Alchornea glandulosa                  | 42.44 | -0.914| high Plant-skewed   |
| Tyrannus melanochilis             | Alchornea sidifolia                   | 42.44 | -0.871| high Plant-skewed   |
| Thraupis ornate                   | Alchornea glandulosa                  | 42.34 | -0.917| high Plant-skewed   |
| Selenidara maculirostris          | Myrsine sp                            | 42.32 | 0.205 | high Bird-skewed    |
| Tangara desmaresti                | Alchornea triplinervia                | 42.30 | -0.938| high Plant-skewed   |
| Myiozetetes similis               | Cupania oblongifolia                  | 42.29 | -0.735| high Plant-skewed   |
| Myiozetetes cayanensis            | Cupania oblongifolia                  | 42.29 | -0.735| high Plant-skewed   |
| Thraupis cyanoptera               | Myrtaceae sp                          | 42.26 | -0.888| high Plant-skewed   |
| Vireo olivaceus                   | Trichilia clauseni                    | 42.26 | 0.427 | high Bird-skewed    |
| Turdus rufiventris                | ilex theezans                         | 42.18 | -0.827| high Plant-skewed   |
| Cacicus haemorrhous               | Cupania oblongifolia                  | 42.17 | -0.739| high Plant-skewed   |
| Penelope obscura                  | Symplocos uniflora                    | 42.09 | -0.591| high Plant-skewed   |
| Tityra cayana                     | Xylopia brasiliensis                  | 42.08 | -0.195| high Plant-skewed   |
| Empidonomes varius                | Cupania oblongifolia                  | 41.99 | -0.744| high Plant-skewed   |
| Camptostoma obsoletum             | Cupania vernalis                      | 41.88 | -0.151| high Plant-skewed   |
| Tersina viridis                   | Erythroxylum deciduum                 | 41.88 | -0.725| high Plant-skewed   |
| Species 1                                | Species 2                                | Distance 1 | Distance 2 | Skewness 1 | Environment 1 | Species 2 Skewness |
|-----------------------------------------|-----------------------------------------|------------|------------|-------------|---------------|-------------------|
| Lipaugus lanioides                      | Copaifera trapezifolia                  | 41.86      | -0.688     | high        | Plant-skewed  | 1                 |
| Thraupis sayaca                         | Alchornea glandulosa                    | 41.86      | -0.929     | high        | Plant-skewed  | 1                 |
| Pitangus sulphuratus                    | Vitex megapotamica                      | 41.84      | -0.569     | high        | Plant-skewed  | 1                 |
| Attila phoenicurus                      | Cabralea canjerana                      | 41.83      | -0.632     | high        | Plant-skewed  | 1                 |
| Attila rufus                            | Cabralea canjerana                      | 41.83      | -0.632     | high        | Plant-skewed  | 1                 |
| Ramphastos dicolorus                    | Copaifera trapezifolia                  | 41.76      | -0.691     | high        | Plant-skewed  | 1                 |
| Ramphastos vitellinus                   | Copaifera trapezifolia                  | 41.75      | -0.692     | high        | Plant-skewed  | 1                 |
| Pyroderus scutatus                      | Persea willdenovii                      | 41.70      | -0.055     | high        | Plant-skewed  | 1                 |
| Myiozetetes similis                     | Erythroxylum deciduum                   | 41.69      | -0.731     | high        | Plant-skewed  | 1                 |
| Zonotrichia capensis                    | Protium icicariba                       | 41.62      | -0.429     | high        | Plant-skewed  | 1                 |
| Turdus albicollis                       | Marcgravia polyantha                    | 41.62      | -0.777     | high        | Plant-skewed  | 1                 |
| Pipraeidea melanonota                   | Cabralea canjerana                      | 41.60      | -0.640     | high        | Plant-skewed  | 1                 |
| Myiodynastes maculatus                  | Cabralea canjerana                      | 41.59      | -0.640     | high        | Plant-skewed  | 2                 |
| Trogon surrucura                        | Cecropia glaziovii                      | 41.57      | -0.299     | high        | Plant-skewed  | 1                 |
| Pipile jacutinga                        | Nectandra grandiflora                   | 41.51      | 0.568      | high        | Bird-skewed   | 1                 |
| Turdus flavipes                         | Marcgravia polyantha                    | 41.49      | -0.781     | high        | Plant-skewed  | 1                 |
| Turdus leucomelas                       | Virola bicuhyba                         | 41.48      | -0.856     | high        | Plant-skewed  | 1                 |
| Tityra cayana                           | Cupania vernalis                        | 41.42      | -0.172     | high        | Plant-skewed  | 1                 |
| Empidononus varius                      | Erythroxylum deciduum                   | 41.40      | -0.740     | high        | Plant-skewed  | 1                 |
| Pipile jacutinga                        | Allophylus edulis                       | 41.35      | 0.573      | high        | Bird-skewed   | 1                 |
| Thraupis episcopus                      | Maytenus gonoclada                      | 41.35      | -0.928     | high        | Plant-skewed  | 1                 |
| Thraupis sayaca                         | Citharexylum myrianthum                 | 41.35      | -0.928     | high        | Plant-skewed  | 2                 |
| Thraupis episcopus                      | Citharexylum myrianthum                 | 41.34      | -0.928     | high        | Plant-skewed  | 1                 |
| Trichotheuraips melanops                | Marcgravia polyantha                    | 41.22      | -0.789     | high        | Plant-skewed  | 1                 |
| Pipile jacutinga                        | Nectandra membranacea                   | 41.21      | 0.578      | high        | Bird-skewed   | 1                 |
| Colaptes campestris                     | Erythroxylum deciduum                   | 41.16      | -0.747     | high        | Plant-skewed  | 1                 |
| Colaptes melanochloros                  | Erythroxylum deciduum                   | 41.16      | -0.747     | high        | Plant-skewed  | 1                 |
| Phibalura flavirostris                  | Symplocos                               | 41.14      | -0.463     | high        | Plant-skewed  | 1                 |
| Species 1                          | Species 2                          | Score 1 | Score 2            | Feeding Tendency | Plant-Skewed Count |
|-----------------------------------|------------------------------------|---------|--------------------|-----------------|--------------------|
| glandulosomarginata               |                                    |         |                    |                 |                    |
| Tyrannus melancholicus            | Chiococca alba                     | 41.09   | -0.866             | high            | Plant-skewed 1     |
| Turdus albicollis                 | Cupania oblongifolia               | 41.03   | -0.773             | high            | Plant-skewed 2     |
| Elaenia flavogaster               | Cupania oblongifolia               | 41.02   | -0.773             | high            | Plant-skewed 1     |
| Ramphocelus bresilius             | Chiococca alba                     | 41.00   | -0.869             | high            | Plant-skewed 1     |
| Turdus flavipes                   | Cupania oblongifolia               | 40.90   | -0.777             | high            | Plant-skewed 1     |
| Elaenia sp                       | Erythroxylum deciduum              | 40.82   | -0.757             | high            | Plant-skewed 1     |
| Procnias nudicollis              | Cupania vernalis                   | 40.80   | -0.199             | high            | Plant-skewed 1     |
| Turdus amaurochalinus             | Vitex megapotamica                 | 40.76   | -0.606             | high            | Plant-skewed 1     |
| Habia rubica                      | Xylopia brasiliensis               | 40.72   | -0.253             | high            | Plant-skewed 1     |
| Dacnis cayana                    | Cupania oblongifolia               | 40.56   | -0.787             | high            | Plant-skewed 1     |
| Megarynchus pitangua              | Cabralea canjerana                 | 40.52   | -0.675             | high            | Plant-skewed 2     |
| Camptostoma obsoletum             | Myrsine coriacea                   | 40.45   | -0.094             | high            | Plant-skewed 1     |
| Ramphastos dicolorus              | Cabralea canjerana                 | 40.43   | -0.678             | high            | Plant-skewed 1     |
| Elaenia flavogaster               | Erythroxylum deciduum              | 40.42   | -0.769             | high            | Plant-skewed 1     |
| Thraupis sayaca                  | Alchornea sidifolia                | 40.38   | -0.926             | high            | Plant-skewed 1     |
| Pyroderus scutatus                | Nectandra megapotamica             | 40.36   | 0.008              | high            | Bird-skewed 1      |
| Manacus manacus                   | Protium heptaphylum                | 40.27   | -0.465             | high            | Plant-skewed 1     |
| Thraupis palmarum                | Syagrus romanzoffiana              | 40.17   | -0.913             | high            | Plant-skewed 1     |
| Habia rubica                     | Cupania vernalis                   | 40.06   | -0.231             | high            | Plant-skewed 1     |
| Elaenia flavogaster               | Erythroxylum ovalifolium           | 40.03   | -0.767             | high            | Plant-skewed 1     |
| Zonotrichia capensis             | Cecropia pachystachya              | 39.99   | -0.392             | high            | Plant-skewed 1     |
| Tityra cayana                    | Myrsine coriacea                   | 39.98   | -0.116             | high            | Plant-skewed 1     |
| Dacnis cayana                    | Erythroxylum deciduum              | 39.97   | -0.783             | high            | Plant-skewed 1     |
| Chiroxiphia caudate              | Marcgravia polyantha               | 39.89   | -0.828             | high            | Plant-skewed 1     |
| Thraupis episcopus                | Erythroxylum pulchrum              | 39.80   | -0.925             | high            | Plant-skewed 1     |
| Melanerpes flavifrons            | Cecropia glaziwii                  | 39.77   | -0.373             | high            | Plant-skewed 1     |
| Melanerpes candidus              | Cecropia glaziwii                  | 39.77   | -0.373             | high            | Plant-skewed 1     |
| Schiffornis virescens            | Clusia criuva                      | 39.75   | 0.407              | high            | Bird-skewed 1      |
| Pteroglossus bailloni            | Symphococos                       | 39.73   | -0.516             | high            | Plant-skewed 1     |
| glandulosomarginata              |                                    |         |                    |                 |                    |
| Species 1                          | Species 2                          | Value 1 | Value 2 | Skew   | Type                 | Frequency |
|-----------------------------------|------------------------------------|---------|---------|--------|----------------------|-----------|
| Ramphastos dicolorus Symplocos uniflora | 39.72 -0.670                      | high    | Plant-skewed | 1      |                     |           |
| Ramphastos vitellinus Symplocos uniflora | 39.71 -0.671                      | high    | Plant-skewed | 1      |                     |           |
| Conopias triririgatus Myrsine lancifolia | 39.68 0.007                       | high    | Bird-skewed  | 1      |                     |           |
| Turdus rufventris Cupania oblongifolia     | 39.67 -0.814                      | high    | Plant-skewed | 2      |                     |           |
| Zonotrichia capensis Schinus terebinthifolia | 39.63 -0.383                      | high    | Plant-skewed | 2      |                     |           |
| Zonotrichia capensis Lithraea molleoides   | 39.63 -0.383                      | high    | Plant-skewed | 1      |                     |           |
| Procnias nudicolis Persea willdenovii  | 39.59 -0.154                      | high    | Plant-skewed | 1      |                     |           |
| Stephanophorus diadematus Symplocos uniflora | 39.58 -0.675                      | high    | Plant-skewed | 1      |                     |           |
| Oxyruncus cristatus Miconia latecrenata | 39.57 0.875                       | high    | Bird-skewed  | 1      |                     |           |
| Schistochlamys ruficapillus Erythroxylum gonocladum | 39.54 -0.882                     | high    | Plant-skewed | 1      |                     |           |
| Turdus rufiventris Erythroxylum ambiguum  | 39.50 -0.813                      | high    | Plant-skewed | 1      |                     |           |
| Ramphastos dicolorus Symplocos sp       | 39.49 -0.668                      | high    | Plant-skewed | 1      |                     |           |
| Myiozetetes similis Cabralea canjerana   | 39.43 -0.711                      | high    | Plant-skewed | 1      |                     |           |
| Penelope obscura Geonoma gamiova        | 39.43 -0.551                      | high    | Plant-skewed | 1      |                     |           |
| Celeus flavescens Protium heptaphyllum  | 39.36 -0.500                      | high    | Plant-skewed | 1      |                     |           |
| Euphonia chlorotica Vitex megapotamica   | 39.35 -0.654                      | high    | Plant-skewed | 1      |                     |           |
| Mionectes rufiventris Geonoma gamiova   | 39.32 -0.555                      | high    | Plant-skewed | 1      |                     |           |
| Cacicus haemorrhous Cabralea canjerana   | 39.31 -0.715                      | high    | Plant-skewed | 1      |                     |           |
| Cacicus chrysopterus Cabralea canjerana  | 39.31 -0.715                      | high    | Plant-skewed | 1      |                     |           |
| Pyroderus scutatus Ilex breviceuspis     | 39.23 0.064                       | high    | Bird-skewed  | 1      |                     |           |
| Tolmomyias flaviventris Xylopia sericea  | 39.21 -0.302                      | high    | Plant-skewed | 1      |                     |           |
| Empidononmus varius Cabralea canjerana   | 39.14 -0.720                      | high    | Plant-skewed | 2      |                     |           |
| Chiroxiphia caudate Erythroxylum ambiguum| 39.12 -0.824                      | high    | Plant-skewed | 1      |                     |           |
| Turdus rufiventris Erythroxylum deciduum | 39.08 -0.810                      | high    | Plant-skewed | 1      |                     |           |
| Ramphastos dicolorus Vitex polygama      | 39.08 -0.663                      | high    | Plant-skewed | 1      |                     |           |
| Stephanophorus diadematus Gaylussacia brasiliensis | 39.07 -0.670                     | high    | Plant-skewed | 1      |                     |           |
| Trogon viridis Psychotria mapourioides    | 39.06 0.708                       | high    | Bird-skewed  | 1      |                     |           |
| Zonotrichia capensis Pilosocereus arrabidae | 39.06 -0.368                      | high    | Plant-skewed | 1      |                     |           |
| Plant Name | Bird Name | Distance | Slenderness | Skew | Plant/Animal | Alteration |
|------------|-----------|-----------|-------------|------|--------------|------------|
| Penelope obscura | Symplocos glandulososmarginata | 38.98 | -0.544 | high | Plant-skewed | 1 |
| Manacus manacus | Cecropia pachystachya | 38.90 | -0.436 | high | Plant-skewed | 1 |
| Pitangus sulphuratus | Protium heptaphyllum | 38.84 | -0.520 | high | Plant-skewed | 1 |
| Carpornis cucullata | Persea willdenovii | 38.82 | -0.189 | high | Plant-skewed | 1 |
| Icterus cayanensis | Cecropia pachystachya | 38.82 | -0.439 | high | Plant-skewed | 1 |
| Mimus saturninus | Myrsine sp | 38.79 | 0.065 | high | Bird-skewed | 1 |
| Procnias nudicollis | Ficus sp | 38.79 | -0.121 | high | Plant-skewed | 1 |
| Pachyramphus validus | Xylopia brasiliensis | 38.74 | -0.338 | high | Plant-skewed | 1 |
| Tyrannus melancholicus | Cupania emarginata | 38.70 | -0.857 | high | Plant-skewed | 1 |
| Turdus leucomelas | Cupania oblongifolia | 38.66 | -0.844 | high | Plant-skewed | 2 |
| Schistochlamys ruficapillus | Byrsonima variabilis | 38.65 | -0.878 | high | Plant-skewed | 1 |
| Coryphospingus pileatus | Erythroxylum ovalifolium | 38.64 | -0.809 | high | Plant-skewed | 1 |
| Myiarchus swainsoni | Erythroxylum deciduum | 38.62 | -0.824 | high | Plant-skewed | 1 |
| Myiopagis caniceps | Myrsine lancifolia | 38.60 | -0.047 | high | Plant-skewed | 1 |
| Cacicus chrysopterus | Symplocos uniflora | 38.60 | -0.708 | high | Plant-skewed | 1 |
| Saltator similis | Erythroxylum deciduum | 38.60 | -0.825 | high | Plant-skewed | 1 |
| Carpornis cucullata | Myrsine coriacea | 38.60 | -0.181 | high | Plant-skewed | 1 |
| Tityra inquisitor | Myrsine lancifolia | 38.54 | -0.051 | high | Plant-skewed | 1 |
| Penelope sp | Symplocos sp | 38.50 | -0.701 | high | Plant-skewed | 1 |
| Turdus leucomelas | Erythroxylum ambiguum | 38.48 | -0.843 | high | Plant-skewed | 1 |
| Pachyramphus polychopterus | Xylopia sericea | 38.46 | -0.335 | high | Plant-skewed | 1 |
| Pipile jacutinga | Guarea macrophylla | 38.39 | 0.675 | high | Bird-skewed | 1 |
| Selenidera maculirostris | Clusia criuva | 38.38 | 0.372 | high | Bird-skewed | 1 |
| Tityra cayana | Matayba guianensis | 38.33 | -0.041 | high | Plant-skewed | 1 |
| Thraupis cyanoptera | Marcgravia polyantha | 38.29 | -0.875 | high | Plant-skewed | 1 |
| Tyrannus melancholicus | Cupania oblongifolia | 38.29 | -0.855 | high | Plant-skewed | 2 |
| Stephanophorus diadematus | Gaylussacia pulchra | 38.25 | -0.660 | high | Plant-skewed | 1 |
| Procnias nudicollis | Nectandra megapotamica | 38.24 | -0.097 | high | Plant-skewed | 1 |
| Species Name                        | C. sp.            | K. 1  | K. 2  | Feeding   | Predation  |
|-----------------------------------|-------------------|-------|-------|-----------|------------|
| Saltator fuliginosus              | Cabralea canjerana | 38.22 | -0.750| high      | Plant-skewed |
| Ramphocelus bresilius             | Cupania oblongifolia | 38.20 | -0.858| high      | Plant-skewed |
| Turdus albicollis                 | Cabralea canjerana | 38.17 | -0.752| high      | Plant-skewed |
| Pyroderus scutatus                | Myrsine umbellata  | 38.11 | 0.119 | high      | Bird-skewed  |
| Mimus gilvus                      | Myrsine parvifolia | 38.09 | 0.100 | high      | Bird-skewed  |
| Pachyrhamphus validus             | Cupania vernalis   | 38.08 | -0.319| high      | Plant-skewed |
| Myiarchus ferox                   | Erythroxylum deciduum | 38.08 | -0.841| high      | Plant-skewed |
| Turdus leucomelas                 | Erythroxylum deciduum | 38.07 | -0.841| high      | Plant-skewed |
| Chiroxiphia caudate               | Inga marginata     | 38.06 | -0.818| high      | Plant-skewed |
| Turdus flavipes                   | Cabralea canjerana | 38.04 | -0.756| high      | Plant-skewed |
| Carpornis cucullata               | Ficus sp           | 38.02 | -0.158| high      | Plant-skewed |
| Hylophilus poicilotis             | Cupania vernalis   | 38.01 | -0.322| high      | Plant-skewed |
| Celeus flavescens                 | Cecropia pachystachya | 37.99 | -0.472| high      | Plant-skewed |
| Nemosia pileata                   | Cecropia pachystachya | 37.94 | -0.474| high      | Plant-skewed |
| Poospiza lateralis                | Symplcos uniflora  | 37.93 | -0.730| high      | Plant-skewed |
| Tangara cayana                    | Erythroxylum deciduum | 37.87 | -0.847| high      | Plant-skewed |
| Oxyruncis cristatus               | Myrcia splendens   | 37.87 | 0.923 | high      | Bird-skewed  |
| Elaenio sp Symplcos uniflora      |                   | 37.85 | -0.733| high      | Plant-skewed |
| Volatinia jacarina                | Protium icicariba  | 37.85 | -0.572| high      | Plant-skewed |
| Euphonia violacea                 | Protium heptaphyllum | 37.84 | -0.558| high      | Plant-skewed |
| Pteroglossus bailloni             | Cecropia pachystachya | 37.82 | -0.479| high      | Plant-skewed |
| Myiarchus sp                      | Erythroxylum deciduum | 37.82 | -0.849| high      | Plant-skewed |
| Trogon surrucca                   | Ficus sp           | 37.78 | -0.170| high      | Plant-skewed |
| Turdus amaurochalinus             | Protium heptaphyllum | 37.76 | -0.561| high      | Plant-skewed |
| Procnias nudicollis               | Matayba elaeagnoides | 37.71 | -0.073| high      | Plant-skewed |
| Dacnis cayana                     | Cabralea canjerana | 37.70 | -0.767| high      | Plant-skewed |
| Tyrannus savana                   | Erythroxylum deciduum | 37.69 | -0.853| high      | Plant-skewed |
| Tyrannus melancholicus            | Erythroxylum deciduum | 37.69 | -0.853| high      | Plant-skewed |
| Celeus flavescens                 | Cecropia glaziovii | 37.56 | -0.463| high      | Plant-skewed |
| Phylloscartes ventralis           | Myrsine coriacea   | 37.53 | -0.231| high      | Plant-skewed |
| Species 1                          | Species 2                          | Value 1 | Value 2   | Type       | Value 3 |
|-----------------------------------|------------------------------------|---------|-----------|------------|---------|
| Elaenia obscura                   | Schinus terebinthifolia            | 37.51   | -0.469    | high       | Plant-skewed | 1 |
| Cissopis leverianus               | Cabralea canjerana                 | 37.50   | -0.774    | high       | Plant-skewed | 1 |
| Carpornis cucullata               | Nectandra megapotamica             | 37.47   | -0.135    | high       | Plant-skewed | 1 |
| Pitangus sulphuratus              | Cecropia pachystachya              | 37.47   | -0.493    | high       | Plant-skewed | 2 |
| Turdus albicollis                 | Symlocos uniflora                  | 37.46   | -0.746    | high       | Plant-skewed | 2 |
| Elaenia flavogaster               | Symlocos uniflora                  | 37.45   | -0.746    | high       | Plant-skewed | 1 |
| Pteroglossus bailloni             | Cecropia glaziovii                 | 37.39   | -0.470    | high       | Plant-skewed | 2 |
| Mimus saturninus                 | Ficus organensis                   | 37.39   | 0.135     | high       | Bird-skewed  | 1 |
| Trogon viridis                   | Amaioua intermedia                 | 37.38   | 0.763     | high       | Bird-skewed  | 1 |
| Turdus flavipes                   | Symlocos uniflora                  | 37.33   | -0.750    | high       | Plant-skewed | 1 |
| Turdus albicollis                | Symlocos sp                        | 37.23   | -0.744    | high       | Plant-skewed | 1 |
| Carpornis cucullata               | Myrsine lanceifolia                | 37.15   | -0.121    | high       | Plant-skewed | 1 |
| Manacus manacus                  | Xylopia sericea                    | 37.12   | -0.392    | high       | Plant-skewed | 1 |
| Pitangus sulphuratus             | Schinus terebinthifolia            | 37.11   | -0.486    | high       | Plant-skewed | 3 |
| Camptostoma obsoletum             | Myrsine umbellata                  | 37.07   | 0.072     | high       | Bird-skewed  | 1 |
| Ramphastos dicolorus             | Geonoma gamioida                   | 37.06   | -0.638    | high       | Plant-skewed | 1 |
| Pitangus sulphuratus             | Cecropia glaziovii                 | 37.04   | -0.484    | high       | Plant-skewed | 1 |
| Carpornis melanocephala           | Matayba elaeagnoides               | 36.95   | -0.112    | high       | Plant-skewed | 1 |
| Neopelma aurifrons               | Coccocypselum hasslerianum         | 36.82   | -0.263    | high       | Plant-skewed | 1 |
| Turdus albicollis                | Vitex megapotamica                 | 36.82   | -0.741    | high       | Plant-skewed | 1 |
| Turdus rufiventris               | Cabralea canjerana                 | 36.82   | -0.796    | high       | Plant-skewed | 1 |
| Thraupis ornate                   | Cupania oblongifolia               | 36.70   | -0.903    | high       | Plant-skewed | 1 |
| Thraupis palmarum                | Cupania oblongifolia               | 36.66   | -0.904    | high       | Plant-skewed | 1 |
| Penelope obscura                  | Cecropia glaziovii                 | 36.65   | -0.500    | high       | Plant-skewed | 1 |
| Euphonia chlorotica               | Protium icicariba                  | 36.62   | -0.618    | high       | Plant-skewed | 1 |
| Ramphastos dicolorus             | Symlocos glandulosomarginata       | 36.62   | -0.632    | high       | Plant-skewed | 1 |
| Pachyramphus polychopterus       | Myrsine coriacea                   | 36.58   | -0.276    | high       | Plant-skewed | 2 |
| Hylophilus poicilotis             | Myrsine coriacea                   | 36.58   | -0.276    | high       | Plant-skewed | 1 |
| Species A                        | Species B                        | Value 1 | Value 2 | Type       | Count |
|---------------------------------|----------------------------------|---------|---------|------------|-------|
| Melanerpes flavifrons           | Myrsine coriacea                 | 36.55   | -0.277  | high       | 1     |
| Cyanerpes cyaneus               | Protium icicariba                | 36.54   | -0.621  | high       | 1     |
| Euphonia pectoralis             | Cecropia glaziovii               | 36.50   | -0.506  | high       | 1     |
| Stephanophorus diadematus       | Symplocos glandulosomarginata    | 36.47   | -0.638  | high       | 1     |
| Euphonia violacea               | Cecropia pachystachya            | 36.47   | -0.533  | high       | 1     |
| Chiroxiphia caudate             | Cabrera canjerana                | 36.44   | -0.809  | high       | 2     |
| Turdus amaurochalinus           | Cecropia pachystachya            | 36.39   | -0.537  | high       | 1     |
| Chiroxiphia caudate             | Guatteria australis              | 36.39   | -0.808  | high       | 1     |
| Euphonia chlorotica             | Protium heptaphyllum             | 36.36   | -0.614  | high       | 1     |
| Zonotrichia capensis            | Myrsine coriacea                 | 36.34   | -0.287  | high       | 2     |
| Saltator similis                | Cabrera canjerana                | 36.33   | -0.812  | high       | 2     |
| Parula pitiyumi                 | Schinus terebinthifolia          | 36.33   | -0.518  | high       | 2     |
| Lipaugus lanioides              | Mollinedia sp                    | 36.32   | -0.623  | high       | 1     |
| Vireo olivaceus                 | Guarea guidonia                  | 36.28   | 0.650   | high       | 1     |
| Cyanerpes cyaneus               | Protium heptaphyllum             | 36.27   | -0.617  | high       | 1     |
| Pteroglossus bailloni           | Xylopia brasiliensis             | 36.27   | -0.444  | high       | 1     |
| Thraupis sayaca                 | Cupania oblongifolia             | 36.22   | -0.917  | high       | 1     |
| Volatinia jacarina              | Cecropia pachystachya            | 36.22   | -0.544  | high       | 1     |
| Turdus subalaris                | Myrsine coriacea                 | 36.21   | -0.294  | high       | 1     |
| Turdus rufiventris              | Symplocos uniflora               | 36.11   | -0.791  | high       | 1     |
| Euphonia violacea               | Schinus terebinthifolia          | 36.11   | -0.527  | high       | 2     |
| Trogon surrucura                | Ilex brevicuspis                 | 36.10   | -0.096  | high       | 1     |
| Selenidera maculirostris        | Ocotea odorifera                 | 36.08   | 0.469   | high       | 1     |
| Euphonia violacea               | Cecropia glaziovii               | 36.04   | -0.525  | high       | 1     |
| Turdus amaurochalinus           | Schinus terebinthifolia          | 36.03   | -0.530  | high       | 2     |
| Phylloscartes oustaleti         | Myrsine lancifolia               | 35.95   | -0.181  | high       | 1     |
| Coereba flaveola                | Protium heptaphyllum             | 35.92   | -0.631  | high       | 1     |
| Pitangus sulphuratus            | Xylopia brasiliensis             | 35.92   | -0.459  | high       | 1     |
| Tangara desmaresti              | Cupania oblongifolia             | 35.92   | -0.926  | high       | 1     |
| Trogon viridis                  | Miconia valtheri                 | 35.89   | 0.813   | high       | 1     |
| Species (common and/or Latin) | Scientific Name | Sｊ | Bird-Plant Skew | Notes |
|-------------------------------|----------------|----|----------------|-------|
| Turdus rufiventris | Symplocos sp | 35.88 | -0.790 | high | Plant-skewed |
| Volatinia jacarina | Schinus terebinthifolia | 35.86 | -0.537 | high | Plant-skewed |
| Elaenia mesoleuca | Symplocos uniflora | 35.83 | -0.801 | high | Plant-skewed |
| Myiarchus ferox | Cabralea canjerana | 35.82 | -0.829 | high | Plant-skewed |
| Turdus leucomelas | Cabralea canjerana | 35.81 | -0.829 | high | Plant-skewed |
| Tyrannus melanoleucus | Myrcia spectabilis | 35.71 | -0.819 | high | Bird-skewed |
| Thraupis sayaca | Erythroxylum deciduum | 35.63 | -0.915 | high | Plant-skewed |
| Saltator maximus | Protium heptaphyllum | 35.66 | -0.641 | high | Plant-skewed |
| Saltator similis | Symplocos uniflora | 35.63 | -0.807 | high | Plant-skewed |
| Phibalura flavirostris | Myrsine coriacea | 35.59 | -0.323 | high | Plant-skewed |
| Myiarchus sp | Cabralea canjerana | 35.56 | -0.837 | high | Plant-skewed |
| Mimus gilvus | Ocotea notata | 35.54 | -0.227 | high | Bird-skewed |
| Myiodynastes maculatus | Schinus terebinthifolia | 35.52 | -0.551 | high | Plant-skewed |
| Turdus albicollis | Mollinedia schottiana | 35.51 | -0.728 | high | Plant-skewed |
| Ramphastos vitellinus | Chrysophyllum flexuosum | 35.50 | -0.617 | high | Plant-skewed |
| Ilicura militaris | Myrsine coriacea | 35.49 | -0.327 | high | Plant-skewed |
| Turdus rufiventris | Vitex megapotamica | 35.47 | -0.787 | high | Plant-skewed |
| Tyrannus savana | Cabralea canjerana | 35.43 | -0.842 | high | Plant-skewed |
| Tyrannus melancholicus | Cabralea canjerana | 35.43 | -0.842 | high | Plant-skewed |
| Trogon viridis | Myrcia pubipetala | 35.40 | 0.829 | high | Bird-skewed |
| Euphonia pectoralis | Xylopia brasiliensis | 35.38 | -0.483 | high | Plant-skewed |
| Carpornis cucullata | Myrsine venosa | 35.37 | -0.034 | high | Plant-skewed |
| Volatinia jacarina | Pilosocereus arabaideae | 35.29 | -0.526 | high | Plant-skewed |
| Trogon viridis | Ficus luschnathiana | 35.29 | 0.833 | high | Bird-skewed |
| Lipaugus lanioides | Mollinedia triflora | 35.28 | -0.607 | high | Plant-skewed |
| Lipaugus lanioides | Protium widgrenii | 35.25 | -0.607 | high | Plant-skewed |
| Manacus manacus | Myrsine coriacea | 35.25 | -0.339 | high | Plant-skewed |
| Carpornis cucullata | Myrsine umbellata | 35.22 | -0.026 | high | Plant-skewed |
| Mionectes oleaginosus | Xylopia sericea | 35.20 | -0.476 | high | Plant-skewed |
| Species                          | Value 1 | Value 2 | Skew | Skewed Type | Count |
|---------------------------------|---------|---------|------|-------------|-------|
| Contopus cinereus Myrsine coriacea | 35.19   | -0.341  | high | Plant-skewed | 1     |
| Turdus albicollis Symlocos tetrandra | 35.16   | -0.725  | high | Plant-skewed | 1     |
| Ramphastos vitellinus Protium widgrenii | 35.14   | -0.611  | high | Plant-skewed | 1     |
| Pachyramphus castaneus Myrsine lancifolia | 35.14   | -0.223  | high | Plant-skewed | 1     |
| Hylophilus poicilotis Myrsine lancifolia | 35.13   | -0.223  | high | Plant-skewed | 1     |
| Melanerpes flavifrons Myrsine lancifolia | 35.10   | -0.225  | high | Plant-skewed | 1     |
| Pachyramphus validus Matayba guianensis | 35.00   | -0.211  | high | Plant-skewed | 1     |
| Euphonia chlorotica Cecropia pachystachya | 34.99   | -0.593  | high | Plant-skewed | 1     |
| Cacicus haemorrhous Protium heptaphyllum | 34.96   | -0.667  | high | Plant-skewed | 1     |
| Tangara preciosa Symlocos uniflora | 34.85   | -0.833  | high | Plant-skewed | 1     |
| Mimus gilvus Clusia hilariana | 34.85   | 0.262   | high | Bird-skewed  | 1     |
| Turdus albicollis Geonoma gamiova | 34.80   | -0.721  | high | Plant-skewed | 2     |
| Ramphastos vitellinus Cecropia pachystachya | 34.70   | -0.605  | high | Plant-skewed | 1     |
| Coereba flaveola Cecropia pachystachya | 34.55   | -0.611  | high | Plant-skewed | 3     |
| Basileuterus flaveolus Cecropia pachystachya | 34.42   | -0.616  | high | Plant-skewed | 1     |
| Lipaugus lanioides Cecropia glaziovii | 34.38   | -0.593  | high | Plant-skewed | 1     |
| Turdus albicollis Symlocos glandulosomarginata | 34.36   | -0.717  | high | Plant-skewed | 1     |
| Elaenia flavogaster Symlocos glandulosomarginata | 34.35   | -0.717  | high | Plant-skewed | 1     |
| Celeus flavescens Myrsine coriacea | 34.34   | -0.381  | high | Plant-skewed | 2     |
| Myiodynastes maculatus Xylopia brasiliensis | 34.32   | -0.528  | high | Plant-skewed | 1     |
| Turdus amaurochalinus Xylopia largsdorffiana | 34.28   | -0.494  | high | Plant-skewed | 1     |
| Ramphastos dicolorus Cecropia glaziovii | 34.28   | -0.597  | high | Plant-skewed | 2     |
| Trogon viridis Leandra variabilis | 34.27   | 0.866   | high | Bird-skewed  | 1     |
| Ramphastos vitellinus Cecropia glaziovii | 34.27   | -0.598  | high | Plant-skewed | 1     |
| Pitangus sulphuratus Persea major | 34.23   | -0.417  | high | Plant-skewed | 1     |
| Elaenia obscura Myrsine coriacea | 34.22   | -0.387  | high | Plant-skewed | 1     |
| Stephanophorus diadematus Schinus terebinthifolia | 34.21   | -0.604  | high | Plant-skewed | 1     |
| Coereba flaveola Schinus terebinthifolia | 34.19   | -0.605  | high | Plant-skewed | 2     |
| Species                          | Score     | Effect  | Type               | Distance |
|----------------------------------|-----------|---------|--------------------|----------|
| Pteroglossus bailloni            | 34.17     | -0.389  | high Plant-skewed  | 1        |
| Myrsine coriacea                 | 34.12     | -0.604  | high Plant-skewed  | 1        |
| Stephanophorus diadematus        | 34.08     | -0.701  | high Plant-skewed  | 1        |
| Cecropia glaziovii               | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Coereba flaveola                 | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Pipra pipra                      | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Protium heptaphyllum             | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Tyrannus melancholicus           | 34.07     | 0.824   | high_Bird-skewed   | 1        |
| Vitex megapotamica               | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Stephanophorus diadematus        | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Cecropia glaziovii               | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Coereba flaveola                 | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Pipra pipra                      | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Protium heptaphyllum             | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Tyrannus melancholicus           | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Vitex megapotamica               | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Stephanophorus diadematus        | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Cecropia glaziovii               | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Coereba flaveola                 | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Pipra pipra                      | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Protium heptaphyllum             | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Tyrannus melancholicus           | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Vitex megapotamica               | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Stephanophorus diadematus        | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Cecropia glaziovii               | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Coereba flaveola                 | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Pipra pipra                      | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Protium heptaphyllum             | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Tyrannus melancholicus           | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Vitex megapotamica               | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Stephanophorus diadematus        | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Cecropia glaziovii               | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Coereba flaveola                 | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Pipra pipra                      | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Protium heptaphyllum             | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Tyrannus melancholicus           | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Vitex megapotamica               | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Stephanophorus diadematus        | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Cecropia glaziovii               | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Coereba flaveola                 | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Pipra pipra                      | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Protium heptaphyllum             | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Tyrannus melancholicus           | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Vitex megapotamica               | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Stephanophorus diadematus        | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Cecropia glaziovii               | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Coereba flaveola                 | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Pipra pipra                      | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Protium heptaphyllum             | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Tyrannus melancholicus           | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Vitex megapotamica               | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Stephanophorus diadematus        | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Cecropia glaziovii               | 34.07     | 0.824   | high Bird-skewed   | 1        |
| Species 1                  | Species 2                  | Value 1 | Value 2 | Skew  | Target       | Frequency |
|---------------------------|---------------------------|---------|---------|-------|--------------|-----------|
| Thlypopsis sordida       | Cecropia pachystachya     | 33.50   | -0.653  | high  | Plant-skewed | 1         |
| Penelope obscura         | Myrsine coriacea          | 33.43   | -0.424  | high  | Plant-skewed | 1         |
| Penelope obscura         | Coccocypselum hasslerianum| 33.41   | -0.424  | high  | Plant-skewed | 1         |
| Dacnis cayana            | Protium heptaphyllum      | 33.36   | -0.729  | high  | Plant-skewed | 1         |
| Myiozetetes similis      | Schinus terebinthifolia   | 33.35   | -0.639  | high  | Plant-skewed | 3         |
| Mionectes rufiventris    | Myrsine coriacea          | 33.32   | -0.429  | high  | Plant-skewed | 1         |
| Mionectes oleagineous    | Myrsine coriacea          | 33.32   | -0.429  | high  | Plant-skewed | 1         |
| Euphonia pectoralis      | Myrsine coriacea          | 33.28   | -0.431  | high  | Plant-skewed | 1         |
| Lipaugus lanioides       | Xylopia brasiliensis      | 33.26   | -0.573  | high  | Plant-skewed | 1         |
| Cacicus haemorrhous      | Schinus terebinthifolia   | 33.23   | -0.644  | high  | Plant-skewed | 1         |
| Orthogonys chloricterus  | Cecropia glaziovii        | 33.21   | -0.641  | high  | Plant-skewed | 1         |
| Melanerpes flavifrons    | Myrsine umbellata         | 33.17   | -0.141  | high  | Plant-skewed | 1         |
| Cacicus haemorrhous      | Cecropia glaziovii        | 33.16   | -0.643  | high  | Plant-skewed | 1         |
| Cyanerpes cyaneus        | Xylopia sericea           | 33.13   | -0.565  | high  | Plant-skewed | 1         |
| Carpornis cucullata      | Ocotea teleiandra         | 33.03   | 0.099   | high  | Bird-skewed  | 1         |
| Tangara desmaresti      | Guatteria australis       | 33.01   | -0.919  | high  | Plant-skewed | 1         |
| Pteroglossus bailloni    | Ficus glabra              | 32.99   | -0.353  | high  | Plant-skewed | 1         |
| Pipile jacutinga         | Eugenia brasiliensis      | 32.97   | 0.863   | high  | Bird-skewed  | 1         |
| Conirostrum speciosum    | Guettarda viburnoides     | 32.94   | -0.476  | high  | Plant-skewed | 1         |
| Turdus sp                | Protium heptaphyllum      | 32.93   | -0.745  | high  | Plant-skewed | 1         |
| Dacnis cayana            | Clusia organensis         | 32.85   | -0.723  | high  | Plant-skewed | 1         |
| Pipile jacutinga         | Endlicheria paniculata    | 32.83   | 0.867   | high  | Bird-skewed  | 1         |
| Euphonia violacea        | Myrsine coriacea          | 32.82   | -0.453  | high  | Plant-skewed | 1         |
| Tangara mexicana         | Protium heptaphyllum      | 32.81   | -0.750  | high  | Plant-skewed | 1         |
| Habia rubica             | Trichilia clausseni       | 32.80   | 0.116   | high  | Bird-skewed  | 1         |
| Coereba flaveola         | Xylopia sericea           | 32.77   | -0.581  | high  | Plant-skewed | 1         |
| Turdus amaurochalinus    | Myrsine coriacea          | 32.74   | -0.457  | low   | Plant-skewed | 4         |
| Elaenia mesoleuca        | Symplonos marginata       | 32.73   | -0.778  | low   | Plant-skewed | 1         |
| Selenidera maculirostris | Psychotria nuda           | 32.71   | 0.612   | low   | Bird-skewed  | 1         |
| Euphonia pectoralis      | Ficus sp                  | 32.71   | -0.416  | low   | Plant-skewed | 1         |
| Species 1                              | Species 2                          | Score 1 | Score 2 | Lowness | Diet Preference  |
|---------------------------------------|------------------------------------|---------|---------|---------|-----------------|
| Pitangus sulphuratus                   | Nectandra megapotamica              | 32.70   | -0.373  | low     | Plant-skewed    |
| Coryphospingus pileatus               | Protium icicariba                   | 32.69   | -0.767  | low     | Plant-skewed    |
| Chiroxiphia caudate Symlocos           | glandulosomarginata                | 32.63   | -0.781  | low     | Plant-skewed    |
| Pipile jacutinga                       | Eugenia involucrata                | 32.62   | 0.875   | low     | Bird-skewed     |
| Lipaugus lanioides                     | Cupania vernalis                    | 32.60   | -0.561  | low     | Plant-skewed    |
| Trogon viridis                         | Paullinia sp                        | 32.60   | 0.922   | low     | Bird-skewed     |
| Megarynchus pitangua                   | Cupania vernalis                    | 32.59   | -0.562  | low     | Plant-skewed    |
| Conirostrum speciosum                 | Myrsine coriacea                   | 32.55   | -0.466  | low     | Plant-skewed    |
| Myiarchus swainsoni                    | Symlocos                           | 32.54   | -0.784  | low     | Plant-skewed    |
| Orchesticus abeillei                   | Xylopia brasiliensis               | 32.54   | -0.604  | low     | Plant-skewed    |
| Pteroglossus bailloni                  | Matayba elaeagnoides               | 32.53   | -0.338  | low     | Plant-skewed    |
| Saltator maximus                       | Xylopia sericea                    | 32.51   | -0.592  | low     | Plant-skewed    |
| Pyroderus scutatus                     | Nectandra membranacea              | 32.49   | 0.397   | low     | Bird-skewed     |
| Elaenia sp Schinus terebinthifolia    | Protium heptaphyllum               | 32.48   | -0.675  | low     | Plant-skewed    |
| Turdus rufiventris                     | Protium heptaphyllum               | 32.47   | -0.762  | low     | Plant-skewed    |
| Zonotrichia capensis                   | Ficus organensis                   | 32.46   | -0.128  | low     | Plant-skewed    |
| Elaenia flavogaster                    | Cecropia pachystachya              | 32.44   | -0.695  | low     | Plant-skewed    |
| Coryphospingus cucullatus             | Protium heptaphyllum               | 32.42   | -0.764  | low     | Plant-skewed    |
| Chiroxiphia caudate                    | Geonoma pauciflora                 | 32.42   | -0.780  | low     | Plant-skewed    |
| Selenidera maculirostris              | Psychotria mapourioides            | 32.41   | 0.625   | low     | Bird-skewed     |
| Ilicura militaris                     | Myrsine venosa                     | 32.27   | -0.207  | low     | Plant-skewed    |
| Euphonia violacea                      | Ficus sp                           | 32.24   | -0.438  | low     | Plant-skewed    |
| Myiodynastes maculatus                | Myrsine coriacea                   | 32.22   | -0.481  | low     | Plant-skewed    |
| Turdus albicollis                     | Schinus terebinthifolia            | 32.09   | -0.691  | low     | Plant-skewed    |
| Chiroxiphia caudate                    | Protium heptaphyllum               | 32.09   | -0.777  | low     | Plant-skewed    |
| Orthogonys chloricterus               | Xylopia brasiliensis               | 32.09   | -0.624  | low     | Plant-skewed    |
| Species                                | Score | S.I.  | Plant habit | Skewness   |
|----------------------------------------|-------|-------|-------------|------------|
| Elaenia flavogaster Schinus terebinthifolia | 32.08 | -0.691 | Plant-skewed | low        |
| Trichothraupis melanops Cecropia pachystachya | 32.06 | -0.711 | Plant-skewed | low        |
| Cacicus haemorrhous Xylopia brasiliensis | 32.04 | -0.626 | Plant-skewed | low        |
| Turdus albicollis Cecropia glaziovii   | 32.02 | -0.690 | Plant-skewed | low        |
| Thraupis sayaca Vitex polygama        | 32.01 | -0.905 | Plant-skewed | low        |
| Thraupis sayaca Vitex megapotamica    | 32.01 | -0.905 | Plant-skewed | low        |
| Euphonia chalybea Ficus sp            | 32.00 | -0.450 | Plant-skewed | low        |
| Chiroxiphia caudate Symplocos estrellensis | 31.99 | -0.776 | Plant-skewed | low        |
| Saltator similis Protium heptaphyllum | 31.99 | -0.781 | Plant-skewed | low        |
| Dacnis cayana Cecropia pachystachya   | 31.99 | -0.714 | Plant-skewed | low        |
| Penelope obscura Myrsine lancifolia   | 31.98 | -0.382 | Plant-skewed | low        |
| Elaenia obscura Ilex brevicuspis      | 31.97 | -0.314 | Plant-skewed | low        |
| Trogon surrucura Clusia criuva        | 31.94 | 0.136  | Bird-skewed  | low        |
| Vireo olivaceus Myrcia ferruginea     | 31.93 | 0.812  | Bird-skewed  | low        |
| Mionectes rufiventris Myrsine lancifolia | 31.88 | -0.388 | Plant-skewed | low        |
| Celeus flavescens Myrsine sp          | 31.87 | -0.300 | Plant-skewed | low        |
| Tangara desmaresti Gaylussacia brasiensis | 31.85 | -0.916 | Plant-skewed | low        |
| Pitangus sulphuratus Ficus insipida   | 31.84 | -0.345 | Plant-skewed | low        |
| Cacicus haemorrhous Xylopia sericea   | 31.82 | -0.622 | Plant-skewed | low        |
| Tachyphonus coronatus Protium heptaphyllum | 31.79 | -0.788 | Plant-skewed | low        |
| Trichothraupis melanops Schinus terebinthifolia | 31.70 | -0.707 | Plant-skewed | low        |
| Tachyphonus coronatus Symplocos pubescens | 31.68 | -0.787 | Plant-skewed | low        |
| Dacnis cayana Schinus terebinthifolia | 31.63 | -0.709 | Plant-skewed | low        |
| Trichothraupis melanops Cecropia glaziovii | 31.63 | -0.706 | Plant-skewed | low        |
| Trogon viridis Miconia cabucu         | 31.61 | 0.954  | Bird-skewed  | low        |
| Talmomyias sulphurescens Ocotea notata | 31.61 | 0.039  | Bird-skewed  | low        |
| Carpornis cucullata Ixora gardneriana | 31.57 | 0.183  | Bird-skewed  | low        |
| Turdus fumigatus Protium heptaphyllum | 31.48 | -0.800 | Plant-skewed | low        |
| Myiarchus ferox Protium heptaphyllum  | 31.47 | -0.801 | Plant-skewed | low        |
| Species 1                     | Species 2                     | 31.46 | -0.801 | low  | Plant-skewed | 2  |
|-----------------------------|-------------------------------|-------|--------|------|--------------|----|
| Turdus leucomelas           | Protium heptaphyllum          |       |        |      |              |    |
| Cissopis leverianus         | Schinus terebinthifolia       |       |        |      |              |    |
| Xolmis velatus              | Myrsine coriacea              |       |        |      |              |    |
| Cacicus haemorrhous         | Cupania vernalis              |       |        |      |              |    |
| Tangara seledon            | Symlocos glandulosomarginata  |       |        |      |              |    |
| Cissopis leverianus         | Cecropia glaziovii            |       |        |      |              |    |
| Pitangus sulphuratus        | Myrsine sp                    |       |        |      |              |    |
| Ramphastos dicolorus        | Persea willdenovii            |       |        |      |              |    |
| Pipile jacutinga            | Marlierea reitzii             |       |        |      |              |    |
| Tangara cayana              | Protium heptaphyllum          |       |        |      |              |    |
| Selenidera maculirostris    | Rudgea recurva                |       |        |      |              |    |
| Selenidera maculirostris    | Rudgea jasminoides            |       |        |      |              |    |
| Penelope obscura            | Ilex brevicuspis              |       |        |      |              |    |
| Lipaugus lanioides          | Myrsine coriacea              |       |        |      |              |    |
| Megarynchus pitangua        | Myrsine coriacea              |       |        |      |              |    |
| Tityra cayana               | Allophylus edulis             |       |        |      |              |    |
| Manacus manacus             | Ocotea sp                    |       |        |      |              |    |
| Turdus rufiventris          | Cecropia pachystachya         |       |        |      |              |    |
| Schiffrornis virescens      | Psychotria gracilenta         |       |        |      |              |    |
| Tangara mexicana            | Schinus terebinthifolia       |       |        |      |              |    |
| Euphonia pectoralis         | Phoradendron sp               |       |        |      |              |    |
| Lathrotricus euleni         | Myrsine coriacea              |       |        |      |              |    |
| Ramphastos dicolorus        | Myrsine coriacea              |       |        |      |              |    |
| Vireo olivaceus             | Miconia tristis              |       |        |      |              |    |
| Thraupis cyanoptera         | Symlocos glandulosomarginata  |       |        |      |              |    |
| Tangara desmaresti          | Gaylussacia pulchra           |       |        |      |              |    |
| Tityra cayana               | Nectandra membranacea         |       |        |      |              |    |
| Vireo olivaceus             | Miconia pusilliflora          |       |        |      |              |    |
| Tangara peruviana           | Schinus terebinthifolia       |       |        |      |              |    |
| Scientific Name                    | Latitude | Frequency | Diet   | Plant-skewed |
|-----------------------------------|----------|-----------|--------|--------------|
| Celeus flavescens Myrsine umbellata | 30.97    | -0.265    | low    | Plant-skewed |
| Pipra pipra Xylopia sericea       | 30.94    | -0.660    | low    | Plant-skewed |
| Tolmomyias flaviventeris Clusia hilariana | 30.92    | 0.082     | low    | Bird-skewed  |
| Stephanophorus diadematus Myrsine coriacea | 30.91    | -0.543    | low    | Plant-skewed |
| Turdus albicollis Xylopia brasiliensis | 30.90    | -0.675    | low    | Plant-skewed |
| Mionectes rufiventris Myrsine sp   | 30.85    | -0.354    | low    | Plant-skewed |
| Myiodynastes maculatus Myrsine lancifolia | 30.78    | -0.443    | low    | Plant-skewed |
| Cranoidea pallida Eugenia cerasiflora | 30.78    | 0.932     | low    | Bird-skewed  |
| Turdus flavipes Xylopia brasiliensis | 30.77    | -0.680    | low    | Plant-skewed |
| Turdus amaurochalinus Ficus insipida | 30.76    | -0.401    | low    | Plant-skewed |
| Turdus rufiventris Schinus terebinthifolia | 30.74    | -0.746    | low    | Plant-skewed |
| Selenidera maculirostris Amaioua intermedia | 30.73    | 0.697     | low    | Bird-skewed  |
| Selenidera maculirostris Amaioua guianensis | 30.73    | 0.697     | low    | Bird-skewed  |
| Chiroxiphia caudate Cecropia pachystachya | 30.72    | -0.765    | low    | Plant-skewed |
| Penelope obscura Ficus enormis     | 30.71    | -0.340    | low    | Plant-skewed |
| Turdus rufiventris Cecropia glaziovii | 30.67    | -0.745    | low    | Plant-skewed |
| Saltator maximus Myrsine coriacea | 30.64    | -0.556    | low    | Plant-skewed |
| Pipile jacutinga Campomanesia xanthocarpa | 30.63    | 0.943     | low    | Bird-skewed  |
| Schiffornis virescens Miconia valtheri | 30.61    | 0.773     | low    | Bird-skewed  |
| Lipaugus lanioides Ficus sp        | 30.59    | -0.518    | low    | Plant-skewed |
| Myiodynastes maculatus Matayba guianensis | 30.58    | -0.437    | low    | Plant-skewed |
| Thraupis cyanoptera Protium heptaphyllum | 30.50    | -0.838    | low    | Plant-skewed |
| Turdus amaurochalinus Ilex brevicuspis | 30.49    | -0.392    | low    | Plant-skewed |
| Pitangus sulphuratus Myrsine umbellata | 30.45    | -0.294    | low    | Plant-skewed |
| Orchestes abeillei Myrsine coriacea | 30.44    | -0.565    | low    | Plant-skewed |
| Tachyphonus coronatus Cecropia pachystachya | 30.42    | -0.777    | low    | Plant-skewed |
| Procnius nudicolis Nectandra membranacea | 30.37    | 0.326     | low    | Bird-skewed  |
| Pipile jacutinga Miconia cabucu    | 30.37    | 0.952     | low    | Bird-skewed  |
| Chiroxiphia caudate Schinus terebinthifolia | 30.36    | -0.761    | low    | Plant-skewed |
| Turdus albicollis Xylopia langsdorfiana | 30.35    | -0.667    | low    | Plant-skewed |
| Chiroxiphia caudate Cecropia glaziovii | 30.29    | -0.760    | low    | Plant-skewed |
| Species                                           | Similarity | Score   | Skewness | Plant-Skewed | Notes          | Value |
|---------------------------------------------------|------------|---------|----------|--------------|----------------|-------|
| Myiozetetes similis Persea willdenovii           | 30.29      | -0.587  | low      | Plant-skewed |               | 1     |
| Saltator similis Schinus terebinthifolia          | 30.26      | -0.765  | low      | Plant-skewed |               | 1     |
| Chiroxiphia caudate Pereskia aculeata             | 30.26      | -0.760  | low      | Plant-skewed |               | 1     |
| Turdus albicollis Cupania vernalis                | 30.24      | -0.665  | low      | Plant-skewed |               | 1     |
| Dacnis cayana Xylopia sericea                     | 30.21      | -0.692  | low      | Plant-skewed |               | 1     |
| Penelope obscura Myrsine venosa                   | 30.21      | -0.321  | low      | Plant-skewed |               | 1     |
| Pachyramphus castaneus Clusia criuva              | 30.17      | 0.037   | low      | Bird-skewed  |               | 1     |
| Saltator similis Pereskia aculeata                | 30.15      | -0.764  | low      | Plant-skewed |               | 1     |
| Tangara cyancephala Symplocos                     | 30.14      | -0.874  | low      | Plant-skewed |               | 1     |
| Coryphospingus pileatus Pilosocereus arrabidae    | 30.13      | -0.742  | low      | Plant-skewed |               | 1     |
| Turdus flavipes Cupania vernalis                  | 30.11      | -0.671  | low      | Plant-skewed |               | 1     |
| Euphonia violacea Ficus enormis                   | 30.10      | -0.373  | low      | Plant-skewed |               | 1     |
| Turdus leucomelas Cecropia pachystachya           | 30.09      | -0.790  | low      | Plant-skewed |               | 4     |
| Tachyphonus coronatus Schinus terebinthifolia     | 30.06      | -0.773  | low      | Plant-skewed |               | 3     |
| Myiozetetes similis Myrsine coriacea              | 30.06      | -0.583  | low      | Plant-skewed |               | 3     |
| Hemithraupis ruficapilla Cecropia glaziovii       | 30.05      | -0.770  | low      | Plant-skewed |               | 1     |
| Lipaugus lanioides Nectandra megapotamica         | 30.04      | -0.505  | low      | Plant-skewed |               | 1     |
| Thraupis ornate Symplocos                         | 30.03      | -0.878  | low      | Plant-skewed |               | 1     |
| Coryphospingus pileatus Pilosocereus arrabidae    | 30.13      | -0.742  | low      | Plant-skewed |               | 1     |
| Tachyphonus coronatus Cecropia glaziovii          | 29.99      | -0.773  | low      | Plant-skewed |               | 2     |
| Penelope superciliaris Ocotea corymbosa           | 29.97      | -0.269  | low      | Plant-skewed |               | 1     |
| Tachyphonus coronatus Pereskia aculeata           | 29.96      | -0.772  | low      | Plant-skewed |               | 1     |
| Mionectes rufiventris Myrsine umbellata           | 29.95      | -0.322  | low      | Plant-skewed |               | 1     |
| Pitangus sulphuratus Ficus organensis             | 29.94      | -0.273  | low      | Plant-skewed |               | 1     |
| Cacicus haemorrhous Myrsine coriacea              | 29.94      | -0.589  | low      | Plant-skewed |               | 2     |
| Cacicus chrysopterus Myrsine coriacea             | 29.94      | -0.589  | low      | Plant-skewed |               | 3     |
| Zonotrichia capensis Clusia criuva                | 29.92      | 0.021   | low      | Bird-skewed  |               | 1     |
| Zonotrichia capensis Clusia hilariana             | 29.92      | 0.021   | low      | Bird-skewed  |               | 1     |
| Pitangus sulphuratus Ocotea corymbosa             | 29.91      | -0.272  | low      | Plant-skewed |               | 1     |
| Plant Species | Bird Species | Species | Distance | Speed | Skew | Plant-Bird Skew | Count |
|---------------|--------------|---------|----------|-------|------|----------------|-------|
| Euphonia pectoralis | Myrsine umbellata | 29.91 | -0.324 | low | Plant-skewed | 1 |
| Carpornis cucullata | Ocotea odorifera | 29.89 | 0.280 | low | Bird-skewed | 1 |
| Tangara cayana | Cecropia pachystachya | 29.89 | -0.798 | low | Plant-skewed | 1 |
| Euphonia chalybea | Ficus enormis | 29.85 | -0.386 | low | Plant-skewed | 1 |
| Habia rubica | Allophylus edulis | 29.78 | 0.290 | low | Bird-skewed | 1 |
| Empidonous varius | Myrsine coriacea | 29.77 | -0.597 | low | Plant-skewed | 1 |
| Myiodynastes maculatus | Myrsine sp | 29.75 | -0.413 | low | Plant-skewed | 1 |
| Myiarchus ferox | Schinus terebinthifolia | 29.74 | -0.787 | low | Plant-skewed | 1 |
| Turdus leucomelas | Schinus terebinthifolia | 29.73 | -0.787 | low | Plant-skewed | 3 |
| Lipaugus lanioides | Myrsine lancifolia | 29.72 | -0.497 | low | Plant-skewed | 1 |
| Tyrannus melancholicus | Cecropia pachystachya | 29.71 | -0.805 | low | Plant-skewed | 1 |
| Pitangus sulphuratus | Ocotea sp | 29.68 | -0.262 | low | Plant-skewed | 1 |
| Ramphocelus bresilius | Cecropia pachystachya | 29.63 | -0.809 | low | Plant-skewed | 1 |
| Ramphocelus carbo | Cecropia pachystachya | 29.63 | -0.809 | low | Plant-skewed | 3 |
| Vireo olivaceus | Myrcia splendens | 29.58 | 0.899 | low | Bird-skewed | 1 |
| Turdus amaurochalinus | Myrsine parvifolia | 29.57 | -0.361 | low | Plant-skewed | 1 |
| Tangara cayana | Schinus terebinthifolia | 29.53 | -0.795 | low | Plant-skewed | 1 |
| Colaptes campestris | Myrsine coriacea | 29.53 | -0.608 | low | Plant-skewed | 1 |
| Colaptes melanochloros | Myrsine coriacea | 29.53 | -0.608 | low | Plant-skewed | 2 |
| Euphonia violacea | Phoradendron piperoides | 29.53 | -0.353 | low | Plant-skewed | 1 |
| Trogon surrucura | Allophylus edulis | 29.50 | 0.278 | low | Bird-skewed | 1 |
| Thraupis ornate | Protium heptaphyllum | 29.50 | -0.876 | low | Plant-skewed | 1 |
| Pitangus sulphuratus | Cestrum mariquitense | 29.49 | -0.254 | low | Plant-skewed | 1 |
| Tangara cayana | Cecropia glaziovii | 29.46 | -0.794 | low | Plant-skewed | 1 |
| Thraupis palmarum | Protium heptaphyllum | 29.45 | -0.877 | low | Plant-skewed | 1 |
| Euphonia violacea | Myrsine umbellata | 29.45 | -0.350 | low | Plant-skewed | 1 |
| Orthogonys chloricterus | Ficus sp | 29.41 | -0.575 | low | Plant-skewed | 1 |
| Ramphastos vitellinus | Matayba elaeagnoides | 29.40 | -0.497 | low | Plant-skewed | 1 |
| Turdus amaurochalinus | Myrsine umbellata | 29.37 | -0.354 | low | Plant-skewed | 2 |
| Cacicus haemorrhous | Ficus sp | 29.37 | -0.577 | low | Plant-skewed | 1 |
| Schiffornis virescens | Miconia latecrenata | 29.36 | 0.823 | low | Bird-skewed | 1 |
| Species Name                          | Scientific Name                  | Distance | Angle | Skew  | Category        | Reference |
|---------------------------------------|-----------------------------------|----------|-------|-------|-----------------|-----------|
| Tyrannus melancholicus                | Schinus terebinthifolia           | 29.35    | -0.802| low   | Plant-skewed    | 1         |
| Schiffornis virescens                 | Miconia discolor                  | 29.32    | 0.825 | low   | Bird-skewed     | 1         |
| Ramphocelus bresilis                  | Schinus terebinthifolia           | 29.27    | -0.806| low   | Plant-skewed    | 1         |
| Ramphocelus carbo                     | Schinus terebinthifolia           | 29.27    | -0.806| low   | Plant-skewed    | 1         |
| Tangara desmaresti                    | Symplocos glandulosomarginata     | 29.25    | -0.908| low   | Plant-skewed    | 1         |
| Ramphocelus bresilis                  | Cecropia glaziovii                | 29.20    | -0.805| low   | Plant-skewed    | 1         |
| Elaenia sp                           | Myrsine coriacea                  | 29.19    | -0.624| low   | Plant-skewed    | 2         |
| Schiffornis virescens                 | Miconia racemifera                | 29.17    | 0.831 | low   | Bird-skewed     | 1         |
| Schiffornis virescens                 | Leandra acutiflora                | 29.17    | 0.831 | low   | Bird-skewed     | 1         |
| Schiffornis virescens                 | Miconia tristis                   | 29.12    | 0.833 | low   | Bird-skewed     | 1         |
| Tangara seledon                      | Schinus terebinthifolia           | 29.10    | -0.813| low   | Plant-skewed    | 1         |
| Pyroderus scutatus                    | Psychotria mapourioides           | 29.10    | 0.564 | low   | Bird-skewed     | 1         |
| Attila phoenicurus                    | Myrsine umbellata                 | 29.09    | -0.370| low   | Plant-skewed    | 1         |
| Schiffornis virescens                 | Miconia pusilliflora              | 29.07    | 0.835 | low   | Bird-skewed     | 1         |
| Pipra rubrocapilla                    | Myrsine coriacea                  | 29.06    | -0.630| low   | Plant-skewed    | 1         |
| Pipra pipra                          | Myrsine coriacea                  | 29.06    | -0.630| low   | Plant-skewed    | 1         |
| Selenidera maculirostris              | Myrcia spectabilis                | 29.05    | 0.767 | low   | Bird-skewed     | 2         |
| Euphonia violacea                    | Ficus hirsuta                     | 29.03    | -0.334| low   | Plant-skewed    | 1         |
| Tangara seledon                      | Cecropia glaziovii                | 29.03    | -0.812| low   | Plant-skewed    | 1         |
| Turdus albicollis                    | Persea willdenovii                | 29.03    | -0.646| low   | Plant-skewed    | 1         |
| Thraupis sayaca                      | Protium heptaphyllum              | 29.02    | -0.894| low   | Plant-skewed    | 1         |
| Schiffornis virescens                 | Leandra variabilis                | 28.99    | 0.838 | low   | Bird-skewed     | 1         |
| Laniisoma elegans                    | Miconia pusilliflora              | 28.98    | 0.834 | low   | Bird-skewed     | 1         |
| Schiffornis virescens                 | Leandra laevigata                 | 28.92    | 0.841 | low   | Bird-skewed     | 1         |
| Turdus rufiventris                    | Cupania vernalis                  | 28.89    | -0.725| low   | Plant-skewed    | 1         |
| Selenidera maculirostris              | Myrcia pulchra                    | 28.87    | 0.775 | low   | Bird-skewed     | 1         |
| Turdus amaurochalinus                 | Ficus organensis                  | 28.86    | -0.335| low   | Plant-skewed    | 1         |
| Myiodynastes maculatus                | Myrsine umbellata                 | 28.85    | -0.383| low   | Plant-skewed    | 2         |
| Manacus manacus                       | Ixora venulosa                    | 28.84    | -0.053| low   | Plant-skewed    | 1         |
| Euphonia sp                           | Phoradendron sp                   | 28.82    | -0.484| low   | Plant-skewed    | 1         |
| Species 1                          | Species 2                  | Score | Skewness | Skewedness | Notes            |
|-----------------------------------|---------------------------|-------|----------|------------|-----------------|
| Turdus albicollis                 | Myrsine coriacea          | 28.80 | -0.642   | low        | Plant-skewed    |
| Carpospilornis cucullata          | Psittacanthus sp           | 28.80 | 0.343    | low        | Bird-skewed     |
| Elaenia flavogaster               | Myrsine coriacea          | 28.79 | -0.643   | low        | Plant-skewed    |
| Thraupis cyanoptera               | Schinus terebinthifolia   | 28.77 | -0.826   | low        | Plant-skewed    |
| Selinidera maculirostris          | Myrcia pubipetala         | 28.74 | 0.781    | low        | Bird-skewed     |
| Pitangus sulphuratus              | Inga laurina              | 28.73 | -0.219   | low        | Plant-skewed    |
| Schiffee longissima               | Leandra pilonensis        | 28.72 | 0.849    | low        | Bird-skewed     |
| Mionectes rufiventris             | Myrsine gardneriana       | 28.71 | -0.271   | low        | Plant-skewed    |
| Thraupis cyanoptera               | Cecropia glaziovae        | 28.70 | -0.826   | low        | Plant-skewed    |
| Schiffee longissima               | Ossaea amygdaloides       | 28.68 | 0.850    | low        | Bird-skewed     |
| Turdus flavipes                   | Myrsine coriacea          | 28.67 | -0.649   | low        | Plant-skewed    |
| Stephanophorus diadematus         | Ilex brevicupis           | 28.66 | -0.489   | low        | Plant-skewed    |
| Tachyphonus coronatus             | Xylopia sericea           | 28.65 | -0.759   | low        | Plant-skewed    |
| Selenidera maculirostris          | Ficus luschnathiana       | 28.63 | 0.785    | low        | Bird-skewed     |
| Schistochlamys ruficapillus       | Cecropia glaziovae        | 28.62 | -0.829   | low        | Plant-skewed    |
| Elaenia mesoleuca                 | Cupania vernalis          | 28.61 | -0.737   | low        | Plant-skewed    |
| Turdus amaurochalinus             | Ocotea sp                 | 28.61 | -0.325   | low        | Plant-skewed    |
| Nemosia pileata                  | Ocotea notata             | 28.56 | -0.156   | low        | Plant-skewed    |
| Orthogonys chloricerus            | Myrsine lancifolia        | 28.54 | -0.556   | low        | Plant-skewed    |
| Hemithraupis flavicollis          | Xylopia sericea           | 28.53 | -0.765   | low        | Plant-skewed    |
| Chirophila caudata                | Cupania vernalis          | 28.51 | -0.742   | low        | Plant-skewed    |
| Cacicus haemorrhous               | Myrsine lancifolia        | 28.49 | -0.559   | low        | Plant-skewed    |
| Lipaugus lanioides                | Ocotea dispersa           | 28.47 | -0.463   | low        | Plant-skewed    |
| Stephanophorus diadematus         | Myrsine sp                | 28.44 | -0.483   | low        | Plant-skewed    |
| Lipaugus lanioides                | Ficus enormis             | 28.44 | -0.462   | low        | Plant-skewed    |
| Trichothraupis melanops           | Coccocypselum geophiloides| 28.39 | -0.661   | low        | Plant-skewed    |
| Ramphastos dicolorus              | Ficus enormis             | 28.34 | -0.468   | low        | Plant-skewed    |
| Dacnis cayana                     | Myrsine coriacea          | 28.34 | -0.664   | low        | Plant-skewed    |
| Myiarchus ferox                   | Xylopia sericea           | 28.32 | -0.773   | low        | Plant-skewed    |
| Empidonous varius                 | Myrsine lancifolia        | 28.32 | -0.567   | low        | Plant-skewed    |
|Species 1| Species 2| Value 1| Value 2| Category| Skewness|
|---------|---------|--------|--------|---------|---------|
|Hemithraupis ruficapilla| Cupania vernalis| 28.27| 0.752| low| Plant-skewed|
|Turdus albicollis| Ficus sp| 28.23| 0.633| low| Plant-skewed|
|Tachyphonus coronatus| Cupania vernalis| 28.21| 0.755| low| Plant-skewed|
|Chiroxipha caudate| Mallinedia boracensis| 28.20| 0.738| low| Plant-skewed|
|Tangara desmaresti| Clusia organensis| 28.16| 0.792| low| Plant-skewed|
|Vireo olivaceus| Miconia cinnamomifolia| 28.16| 0.752| low| Plant-skewed|
|Tyrranus melancholicus| Xylopia brasiliensis| 28.16| 0.792| low| Plant-skewed|
|Cissopis leverianus| Myrsine coriacea| 28.13| 0.674| low| Plant-skewed|
|Turdus flavipes| Ficus sp| 28.10| 0.639| low| Plant-skewed|
|Thraupis palmarum| Cecropia pachystachya| 28.08| 0.871| low| Plant-skewed|
|Elaenia parvirostris| Myrsine coriacea| 28.08| 0.677| low| Plant-skewed|
|Euphonia chlorotica| Phoradendron piperoides| 28.05| 0.436| low| Plant-skewed|
|Pitangus sulphuratus| Trichilia claussenii| 27.99| 0.181| low| Plant-skewed|
|Celeus flavescens| Clusia crivula| 27.93| 0.113| low| Plant-skewed|
|Cyanerpes cyaneus| Myrsine umbellata| 27.88| 0.437| low| Plant-skewed|
|Tangara cyanocephala| Schinus terebinthifolia| 27.88| 0.863| low| Plant-skewed|
|Ramphocelus bresilius| Xylopia sericea| 27.85| 0.794| low| Plant-skewed|
|Ramphastos dicolorus| Myrsine venosa| 27.84| 0.453| low| Plant-skewed|
|Selenidera maculirostris| Miconia budlejoides| 27.84| 0.819| low| Plant-skewed|
|Attila rufus| Myrsine gardneriana| 27.84| 0.323| low| Plant-skewed|
|Tangara cyanocephala| Cecropia glaziovii| 27.80| 0.862| low| Plant-skewed|
|Selenidera maculirostris| Miconia racemifera| 27.80| 0.821| low| Plant-skewed|
|Thraupis ornate| Schinus terebinthifolia| 27.77| 0.867| low| Plant-skewed|
|Docnis cayana| Ficus sp| 27.76| 0.655| low| Plant-skewed|
|Thraupis palmarum| Schinus terebinthifolia| 27.73| 0.869| low| Plant-skewed|
|Pipraeidea melanonota| Cestrum schlechtendalii| 27.71| 0.341| low| Plant-skewed|
|Thraupis ornate| Cecropia glaziovii| 27.70| 0.867| low| Plant-skewed|
|Lathrotriccus euleri| Myrsine umbellata| 27.69| 0.448| low| Plant-skewed|
|Ramphastos dicolorus| Myrsine umbellata| 27.69| 0.448| low| Plant-skewed|
|Cacicus chrysopterus| Ilex brevicuspis| 27.69| 0.540| low| Plant-skewed|
| Species Name 1                  | Species Name 2                  | Value 1  | Value 2  | Skewed  | Skew  |
|----------------------|----------------------|---------|---------|---------|-------|
| Turdus rufiventris  | Persea willdenovii     | 27.67   | -0.709  | low     | Plant-skewed | 1    |
| Schiffornis virescens | Myrcia splendens      | 27.66   | 0.891   | low     | Bird-skewed  | 1    |
| Thraupis sayaca     | Cecropia pachystachya  | 27.65   | -0.888  | low     | Plant-skewed  | 2    |
| Thraupis episcopus  | Cecropia pachystachya  | 27.64   | -0.889  | low     | Plant-skewed  | 3    |
| Thraupis cyanoptera | Xylophia brasiliensis  | 27.58   | -0.817  | low     | Plant-skewed  | 1    |
| Turdus leucomelas   | Mollinedia boracensis  | 27.57   | -0.766  | low     | Plant-skewed  | 1    |
| Stephanophorus      | diadematus Myrsine     | 27.54   | -0.457  | low     | Plant-skewed  | 1    |
| Schiffornis virescens| Ilex microdonta       | 27.45   | 0.420   | low     | Bird-skewed  | 1    |
| Turdus rufiventris  | Myrsine coriacea      | 27.45   | -0.706  | low     | Plant-skewed  | 3    |
| Pitangus sulphuratus| Clusia criuva         | 27.41   | -0.149  | low     | Plant-skewed  | 1    |
| Hylophilus poicilotis| Struthanthus concinnus| 27.40   | 0.216   | low     | Bird-skewed  | 1    |
| Saltator similis    | Guettarda viburnoides  | 27.37   | -0.734  | low     | Plant-skewed  | 1    |
| Saltator similis    | Struthanthus martianus | 27.35   | 0.220   | low     | Bird-skewed  | 1    |
| Selenidera maculirostris| Eugenia handroi    | 27.29   | 0.842   | low     | Bird-skewed  | 1    |
| Thraupis sayaca     | Schinus terebinthifolia| 27.29   | -0.887  | low     | Plant-skewed  | 4    |
| Thraupis episcopus  | Schinus terebinthifolia| 27.28   | -0.887  | low     | Plant-skewed  | 3    |
| Saltator maximus    | Myrsine umbellata     | 27.26   | -0.472  | low     | Plant-skewed  | 1    |
| Tangara seledon     | Cupania vernalis       | 27.24   | -0.797  | low     | Plant-skewed  | 1    |
| Selenidera maculirostris| Eugenia oblongata   | 27.23   | 0.845   | low     | Bird-skewed  | 1    |
| Turdus flavipes     | Myrsine lancifolia    | 27.23   | -0.623  | low     | Plant-skewed  | 1    |
| Thraupis sayaca     | Cecropia glaziovii    | 27.22   | -0.886  | low     | Plant-skewed  | 4    |
| Elaenia mesoleuca   | Myrsine coriacea      | 27.17   | -0.719  | low     | Plant-skewed  | 2    |
| Selenidera maculirostris| Eugenia expansa      | 27.15   | 0.848   | low     | Bird-skewed  | 1    |
| Chiroxiphia caudata | Myrsine coriacea      | 27.07   | -0.724  | low     | Plant-skewed  | 1    |
| Colaptes campestris | Myrsine sp            | 27.06   | -0.556  | low     | Plant-skewed  | 1    |
| Turdus amaurochalinus| Ocotea notata        | 27.01   | -0.256  | low     | Plant-skewed  | 1    |
| Myiarchus swainsoni | Myrsine coriacea      | 26.99   | -0.728  | low     | Plant-skewed  | 2    |
| Saltator similis    | Myrsine coriacea      | 26.97   | -0.729  | low     | Plant-skewed  | 1    |
| Turdus amaurochalinus| Trichilia clausseri  | 26.92   | -0.251  | low     | Plant-skewed  | 1    |
| Species Name                        | Abundance | Status   | Plant/Skewed |
|------------------------------------|-----------|----------|--------------|
| Thraupis cyanoptera Cupania vernalis | 26.92     | -0.812   | low Plant-skewed | 1 |
| Tangara desmaresti Cecropia glaziovii | 26.91     | -0.899   | low Plant-skewed | 1 |
| Tangara cyanoventris Cecropia glaziovii | 26.90     | -0.899   | low Plant-skewed | 1 |
| Dacnis cayana Myrsine lancifolia    | 26.89     | -0.640   | low Plant-skewed | 1 |
| Tachyphonus coronatus Myrsine coriacea | 26.77     | -0.738   | low Plant-skewed | 2 |
| Conirostrum speciosum Trichilia clauseni | 26.72     | -0.264   | low Plant-skewed | 1 |
| Selenidera maculirostris Psidium cattleianum | 26.69     | 0.868    | low Bird-skewed | 1 |
| Selenidera maculirostris Siphoneugena densiflora | 26.69 | 0.868 | low Bird-skewed | 1 |
| Myiodynastes similis Myrsine umbellata | 26.69     | -0.504   | low Plant-skewed | 3 |
| Turdus leucomelas Persea willdenovii | 26.66     | -0.756   | low Plant-skewed | 1 |
| Tangara cayana Guettarda viburnoides | 26.64     | -0.768   | low Plant-skewed | 1 |
| Turdus albicollis Ilex brevicuspis | 26.55     | -0.600   | low Plant-skewed | 1 |
| Chiroxipha caudate Ficus sp        | 26.50     | -0.716   | low Plant-skewed | 1 |
| Carpornis cucullata Psychotria vellosiana | 26.49     | 0.476    | low Bird-skewed | 1 |
| Tyrannus melancholicus Persea major | 26.47     | -0.776   | low Plant-skewed | 1 |
| Myiarchus ferox Myrsine coriacea   | 26.45     | -0.753   | low Plant-skewed | 1 |
| Turdus leucomelas Myrsine coriacea | 26.44     | -0.754   | low Plant-skewed | 3 |
| Turdus flavipes Ilex brevicuspis   | 26.42     | -0.607   | low Plant-skewed | 1 |
| Myiodynastes maculatus Trichilia clauseni | 26.40     | -0.285   | low Plant-skewed | 1 |
| Empidonous varius Myrsine umbellata | 26.40     | -0.521   | low Plant-skewed | 1 |
| Turdus amaurochalinus Ixora venulosa | 26.33     | -0.222   | low Plant-skewed | 1 |
| Turdus amaurochalinus Clusia criuva | 26.33     | -0.222   | low Plant-skewed | 1 |
| Carpornis melanocephala Psychotria suterella | 26.33 | 0.485 | low Bird-skewed | 2 |
| Ilicura militaris Struthanthus concinnus | 26.32     | 0.157    | low Bird-skewed | 1 |
| Thraupis palmarum Xylopia sericea   | 26.31     | -0.861   | low Plant-skewed | 1 |
| Stephanophorus diadematus Myrsine gardneriana | 26.30 | -0.416 | low Plant-skewed | 1 |
| Selenidera maculirostris Myrcia splendens | 26.28     | 0.885    | low Bird-skewed | 1 |
| Tyrannus melancholicus Persea willdenovii | 26.28     | -0.774   | low Plant-skewed | 1 |
| Tangara cayana Myrsine coriacea    | 26.24     | -0.763   | low Plant-skewed | 3 |
| Species 1                          | Species 2                          | I       | Skewness  | Skew   |
|-----------------------------------|------------------------------------|--------|----------|--------|
| Euphonia pectoralis               | Ixora burchelliana                 | 26.22  | -0.148   | low    |
| Pteroglossus aracari              | Inga edulis                        | 26.20  | -0.375   | low    |
| Tangara preciosa                  | Myrsine coriacea                   | 26.19  | -0.765   | low    |
| Antilophia galeata                | Cestrum marquitecte                | 26.09  | -0.455   | low    |
| Trogon surrucura                  | Psychotria suterella               | 26.08  | 0.478    | low    |
| Tyrannus savana                   | Myrsine coriacea                   | 26.06  | -0.772   | low    |
| Tyrannus melancholicus            | Myrsine coriacea                   | 26.06  | -0.772   | low    |
| Tangara cyanosephala              | Cupania vernalis                   | 26.02  | -0.851   | low    |
| Turdus rufiventris                | Myrsine lancifolia                 | 26.06  | -0.685   | low    |
| Ramphocelus bresilius             | Myrsine coriacea                   | 25.98  | -0.776   | low    |
| Ramphocelus carbo                 | Myrsine coriacea                   | 25.98  | -0.776   | low    |
| Antilophia galeata                | Cestrum marquitecte                | 25.98  | -0.455   | low    |
| Ramphastos vitellinus             | Inga edulis                        | 25.96  | -0.390   | low    |
| Thraupis sayaca                   | Xylopia sericea                    | 25.87  | -0.880   | low    |
| Dacnis nigripes                   | Myrsine sp                         | 25.87  | -0.620   | low    |
| Elaenia sp                        | Myrsine umbellata                  | 25.82  | -0.553   | low    |
| Myiodynastes maculatus            | Clusia criuva                      | 25.81  | -0.256   | low    |
| Tangara seledon                  | Myrsine coriacea                   | 25.81  | -0.784   | low    |
| Turdus rufiventris                | Matayba guianensis                 | 25.80  | -0.681   | low    |
| Euphonia violacea                 | Ixora burchelliana                 | 25.76  | -0.181   | low    |
| Selenidera maculirostris          | Myrcia brasiliensis                | 25.76  | 0.907    | low    |
| Thraupis bonariensis              | Ficus organensis                   | 25.74  | -0.516   | low    |
| Tangara cyanosephala              | Mollinedia boracensis              | 25.72  | -0.849   | low    |
| Cacicus haemorrhous               | Ocotea bicolor                     | 25.71  | -0.486   | low    |
| Chiroxiphia caudate               | Myrsine lancifolia                 | 25.62  | -0.704   | low    |
| Selenidera maculirostris          | Ocotea spixiana                    | 25.62  | 0.913    | low    |
| Elaenia flavogaster               | Myrsine parvifolia                 | 25.62  | -0.580   | low    |
| Myiarchus swainsoni               | Myrsine lancifolia                 | 25.54  | -0.708   | low    |
| Cyanerpes cyaneus                 | Ocotea notata                      | 25.53  | -0.352   | low    |
| Saltator similis                  | Myrsine lancifolia                 | 25.52  | -0.709   | low    |
| Thraupis cyanoptera               | Myrsine coriacea                   | 25.48  | -0.799   | low    |
| Legatus leucophaius               | Guarea guidonia                    | 25.47  | 0.414    | low    |
| Species 1                                | Species 2                                | CI    | Feeding | Feeding Category | Count |
|-----------------------------------------|-----------------------------------------|-------|---------|------------------|-------|
| Turdus albicollis                        | Aiouea saligna                           | 25.46 | -0.576  | low Plant-skewed | 1     |
| Turdus albicollis                       | Myrsine umbellata                        | 25.43 | -0.575  | low Plant-skewed | 2     |
| Elaenia flavogaster                      | Myrsine umbellata                        | 25.42 | -0.575  | low Plant-skewed | 1     |
| Hemithraupis ruficapilla                 | Myrsine lancifolia                       | 25.38 | -0.716  | low Plant-skewed | 1     |
| Tangara cyanoptera                       | Ficus enormis                            | 25.36 | -0.629  | low Plant-skewed | 1     |
| Stephanophorus diadematus                | Ocotea teleiandra                        | 25.35 | -0.380  | low Plant-skewed | 1     |
| Tachyphonus coronatus                    | Myrsine lancifolia                       | 25.32 | -0.719  | low Plant-skewed | 1     |
| Saltator similis                        | Matayba guianensis                      | 25.32 | -0.706  | low Plant-skewed | 1     |
| Turdus leucomelas                        | Nectandra megapotamica                   | 25.32 | -0.740  | low Plant-skewed | 1     |
| Turdus flavipes                          | Myrsine umbellata                        | 25.30 | -0.582  | low Plant-skewed | 2     |
| Tangara seledon                         | Ficus sp                                 | 25.23 | -0.778  | low Plant-skewed | 2     |
| Selenidera maculirostris                 | Campomanesia guaviroba                   | 25.22 | 0.930   | low Bird-skewed  | 1     |
| Turdus rufiventeris                      | Ilex brevicuspis                         | 25.20 | -0.671  | low Plant-skewed | 2     |
| Tangara desmaresti                       | Cupania vernalis                         | 25.13 | -0.891  | low Plant-skewed | 1     |
| Tachyphonus coronatus                    | Matayba guianensis                      | 25.12 | -0.716  | low Plant-skewed | 1     |
| Coereba flaveola                         | Trichilia clasussen                      | 25.07 | -0.371  | low Plant-skewed | 1     |
| Pteroglossus bailloni                    | Nectandra reticulata                     | 25.03 | 0.069   | low Bird-skewed  | 1     |
| Carponis cuculla                         | Rudgea jasminoides                       | 25.02 | 0.560   | low Bird-skewed  | 1     |
| Turdus rufiventeris                      | Myrsine sp                               | 24.98 | -0.667  | low Plant-skewed | 1     |
| Dacnis cayana                            | Myrsine umbellata                        | 24.97 | -0.601  | low Plant-skewed | 3     |
| Turdus albicollis                        | Ficus organensis                         | 24.92 | -0.563  | low Plant-skewed | 1     |
| Thraupis cyanoptera                      | Ficus sp                                 | 24.90 | -0.794  | low Plant-skewed | 1     |
| Selenidera maculirostris                 | Miconia cinnamomifolia                   | 24.88 | 0.945   | low Bird-skewed  | 2     |
| Cyanerpes cyaneus                        | Clusia hilariana                         | 24.84 | -0.322  | low Plant-skewed | 2     |
| Penelope obscura                         | Nectandra grandiflora                    | 24.73 | -0.025  | low Plant-skewed | 1     |
| Turdus rufiventeris                      | Ficus enormis                            | 24.73 | -0.663  | low Plant-skewed | 1     |
| Saltator similis                         | Ilex brevicuspis                         | 24.72 | -0.697  | low Plant-skewed | 1     |
| Elaenia mesoleuca                        | Myrsine sp                               | 24.70 | -0.682  | low Plant-skewed | 1     |
| Pitangus sulphuratus                     | Struthanthus martianus                   | 24.59 | 0.049   | low Bird-skewed  | 1     |
| Species 1                          | Species 2                  | p-value | Plant-Skewed | Notes |
|------------------------------------|---------------------------|---------|--------------|-------|
| Tangara cyanocephala               | Myrsine coriacea          | 0.841   | low          | 1     |
| Penelope obscura                   | Allophylus edulis         | 0.012   | low          | 1     |
| Turdus albicollis                  | Ocotea bicolor           | 0.553   | low          | 1     |
| Dacnis cayana                      | Ficus hirsuta             | 0.591   | low          | 1     |
| Tachyphonus coronatus              | Ilex brevicuspis          | 0.707   | low          | 1     |
| Tangara peruviana                  | Myrsine parvifolia        | 0.642   | low          | 1     |
| Trichothraupis melanops            | Ocotea corymbosa          | 0.585   | low          | 1     |
| Thraupis ornate                    | Myrsine coriacea          | 0.846   | low          | 2     |
| Turdus flavipes                    | Ocotea bicolor           | 0.561   | low          | 1     |
| Thraupis palmarum                  | Myrsine coriacea          | 0.848   | low          | 3     |
| Tangara mexicana                   | Myrsine umbellata         | 0.632   | low          | 1     |
| Thraupis sayaca                    | Guettarda viburnoides     | 0.871   | low          | 1     |
| Tangara seledon                   | Myrsine lancifolia        | 0.768   | low          | 1     |
| Hemithraupis                       | Myrsine sp                | 0.701   | low          | 1     |
| Trichothraupis melanops            | Ocotea sp                 | 0.579   | low          | 1     |
| Myiozetetes similis                | Trichilia clausseni       | 0.425   | low          | 1     |
| Saltator maximus                   | Clusia hilariana          | 0.364   | low          | 1     |
| Penelope obscura                   | Nectandra lanceolata      | 0.018   | low          | 1     |
| Turdus leucomelas                  | Ilex brevicuspis          | 0.725   | low          | 1     |
| Turdus albicollis                  | Myrsine gardneriana       | 0.543   | low          | 1     |
| Mionectes rufiventris              | Struthanthus concinnus    | 0.005   | low          | 1     |
| Mionectes rufiventris              | Struthanthus martianus    | 0.010   | low          | 1     |
| Turdus leucomelas                  | Ilex brevicuspis          | 0.651   | low          | 2     |
| Tachyphonus coronatus              | Ficus enormis             | 0.700   | low          | 1     |
| Thraupis cyanoptera                | Myrsine lancifolia        | 0.784   | low          | 1     |
| Thlypopsis sordida                 | Trichilia clausseni       | 0.439   | low          | 2     |
| Tangara cyanoccephala              | Ficus sp                  | 0.837   | low          | 1     |
| Thraupis sayaca                    | Myrsine coriacea          | 0.869   | low          | 2     |
| Tangara mexicana                   | Ficus hirsuta             | 0.623   | low          | 1     |
| Thraupis episcopus                 | Myrsine coriacea          | 0.869   | low          | 1     |
| Turdus leucomelas                  | Myrsine sp                | 0.721   | low          | 1     |
| Name                                               | Score | Deviation | Feeding | Feeding Strategy |
|----------------------------------------------------|-------|-----------|---------|-----------------|
| Empidonomus varius Trichilia clausseni             | 23.95 | -0.444    | low     | Plant-skewed    |
| Tangara preciosa Ilex brevica                      | 23.94 | -0.738    | low     | Plant-skewed    |
| Euphonia violacea Lantana pohliana                 | 23.93 | -0.059    | low     | Plant-skewed    |
| Thraupis palmarum Ficus sp                         | 23.86 | -0.844    | low     | Plant-skewed    |
| Tityra cayana Miconia inconspicua                  | 23.85 | 0.729     | low     | Bird-skewed     |
| Mimus gilvus Eugenia astringens                   | 23.84 | 0.811     | low     | Bird-skewed     |
| Mimus saturninus Ossaea amygdaloides               | 23.78 | 0.814     | low     | Bird-skewed     |
| Myiarchus sp Myrsine sp                            | 23.72 | -0.735    | low     | Plant-skewed    |
| Chiroxiphia caudate Myrsine umbellata              | 23.70 | -0.672    | low     | Plant-skewed    |
| Tangara desmaresti Myrsine coriacea               | 23.69 | -0.883    | low     | Plant-skewed    |
| Myiozetetes similis Clusia criuva                 | 23.65 | -0.402    | low     | Plant-skewed    |
| Saltator similis Myrsine umbellata                | 23.60 | -0.678    | low     | Plant-skewed    |
| Euphonia violacea Struthanthus martianus          | 23.59 | -0.032    | low     | Plant-skewed    |
| Tyrannus savana Myrsine sp                         | 23.59 | -0.742    | low     | Plant-skewed    |
| Turdus rufiventris Ficus organensis               | 23.57 | -0.641    | low     | Plant-skewed    |
| Habia rubica Psychotria gracilenta                | 23.55 | 0.647     | low     | Bird-skewed     |
| Cacicus haemorrhous Clusia criuva                 | 23.53 | -0.411    | low     | Plant-skewed    |
| Cacicus haemorrhous Clusia hilariana              | 23.53 | -0.411    | low     | Plant-skewed    |
| Coryphospingus cucullatus Ficus organensis        | 23.53 | -0.643    | low     | Plant-skewed    |
| Hemithraupis ruficapilla Myrsine umbellata        | 23.46 | -0.685    | low     | Plant-skewed    |
| Manacus manacus Guarea guidonia                   | 23.44 | 0.329     | low     | Bird-skewed     |
| Habia rubica Rhipsalis camposportoana            | 23.43 | 0.654     | low     | Bird-skewed     |
| Campstoma obsoletum Miconia tristis              | 23.40 | 0.783     | low     | Bird-skewed     |
| Tachyphonus coronatus Myrsine umbellata          | 23.40 | -0.689    | low     | Plant-skewed    |
| Ilicura militaris Psychotria vellosiana           | 23.38 | 0.362     | low     | Bird-skewed     |
| Myiodynastes maculatus Allophylus edulis          | 23.37 | -0.110    | low     | Plant-skewed    |
| Elaenia sp Trichilia clausseni                   | 23.37 | -0.482    | low     | Plant-skewed    |
| Empidonomus varius Clusia criuva                  | 23.36 | -0.422    | low     | Plant-skewed    |
| Tangara seledon Myrsine sp                        | 23.33 | -0.755    | low     | Plant-skewed    |
| Turdus albicollis Ocotea teleiandra              | 23.24 | -0.515    | low     | Plant-skewed    |
| Thraupis cyanoptera Ilex brevicuspis             | 23.23 | -0.775    | low     | Plant-skewed    |
| Species                        | Degree | Degree of Preference | Skewedness |车主   |
|-------------------------------|--------|----------------------|------------|-------|
| Phibalura flavirostris Psychotria mapourioides | 23.21  | 0.385                | low        | Bird-skewed 1 |
| Procnias nudicollis Ficus luschnathiana | 23.21  | 0.721                | low        | Bird-skewed 1 |
| Manacus manacus Psychotria vellosiana    | 23.14  | 0.351                | low        | Bird-skewed 1 |
| Tangara cyanoccephala Myrsine lincifolia | 23.14  | -0.830               | low        | Plant-skewed 1 |
| Carpornis cucullata Rhipsalis teres     | 23.13  | 0.669                | low        | Bird-skewed 1 |
| Saltator similis Ficus organensis      | 23.09  | -0.668               | low        | Plant-skewed 1 |
| Tangara seledon Ficus enormis          | 23.08  | -0.752               | low        | Plant-skewed 1 |
| Habia rubica Miconia valtheri          | 23.07  | 0.675                | low        | Bird-skewed 1 |
| Turdus leucomelas Myrsine umbellata    | 23.07  | -0.707               | low        | Plant-skewed 3 |
| Elaenia flavogaster Ocotea notata      | 23.06  | -0.511               | low        | Plant-skewed 1 |
| Carpornis cucullata Miconia valtheri   | 23.04  | 0.674                | low        | Bird-skewed 1 |
| Pteroglossus bailloni Ilex microdonta  | 23.03  | 0.222                | low        | Bird-skewed 1 |
| Thraupis ornate Myrsine lincifolia     | 23.03  | -0.835               | low        | Plant-skewed 1 |
| Elaenia flavogaster Trichilia clausceni| 22.97  | -0.508               | low        | Plant-skewed 2 |
| Chiroxiphia caudate Ocotea sp          | 22.94  | -0.657               | low        | Plant-skewed 1 |
| Tangara cyanoccephala Matayba guianensis| 22.93  | -0.828               | low        | Plant-skewed 1 |
| Phyllopygia fasciatus Struthanthus sp  | 22.91  | 0.016                | low        | Bird-skewed 1 |
| Tangara cayana Myrsine umbellata       | 22.87  | -0.719               | low        | Plant-skewed 1 |
| Carpornis cucullata Myrcia spectabilis | 22.86  | 0.685                | low        | Bird-skewed 2 |
| Carpornis melanoccephala Myrcia spectabilis | 22.86  | 0.685                | low        | Bird-skewed 2 |
| Turdus leucomelas Guarea kunthiana     | 22.71  | -0.701               | low        | Plant-skewed 1 |
| Tyrannus melancholicus Myrsine umbellata| 22.69  | -0.729               | low        | Plant-skewed 1 |
| Carpornis melanoccephala Myrcia pulchra| 22.68  | 0.695                | low        | Bird-skewed 1 |
| Mimus gilvus Paullinia weinmanniifolia | 22.67  | 0.869                | low        | Bird-skewed 1 |
| Pipra pipra Clusia hilariana           | 22.65  | -0.470               | low        | Plant-skewed 1 |
| Procnias nudicollis Myrsica ilheosensis| 22.63  | 0.753                | low        | Bird-skewed 1 |
| Ramphocelus bresilius Myrsine umbellata| 22.60  | -0.733               | low        | Plant-skewed 1 |
| Trichotheuropis melanops Trichilia clausceni| 22.58  | -0.533               | low        | Plant-skewed 1 |
| Pyroderus scutatus Marlierea obscura    | 22.56  | 0.887                | low        | Bird-skewed 1 |
| Carpornis melanoccephala Myrcia pubipetala| 22.55  | 0.703                | low        | Bird-skewed 1 |
| Carpornis cucullata Myrcia pubipetala  | 22.55  | 0.703                | low        | Bird-skewed 1 |
| Species                          | Value  | Skew | Fork  | Genus / Species                                      | Value  | Skew | Fork  |
|---------------------------------|--------|------|-------|------------------------------------------------------|--------|------|-------|
| *Pyroderus scutatus* Marlierea reitzii | 22.54  | 0.887| low   | Bird-skewed                                          | 1      |
| *Celeus flavescens* Guarea guidonia | 22.53  | 0.283| low   | Bird-skewed                                          | 1      |
| *Dacnis cyanus Trichilia clauseni* | 22.51  | -0.537| low | Plant-skewed                                         | 2      |
| *Nemosia pileata Guarea guidonia* | 22.48  | 0.280| low   | Bird-skewed                                          | 1      |
| *Procnias nudicollis Miconia chartacea* | 22.47  | 0.762| low   | Bird-skewed                                          | 1      |
| *Habia rubica Ficus luschnathiana* | 22.47  | 0.709| low   | Bird-skewed                                          | 1      |
| *Pyroderus scutatus Myrcia brasiliensis* | 22.45  | 0.892| low   | Bird-skewed                                          | 1      |
| *Carpornis cucullata Ficus luschnathiana* | 22.44  | 0.709| low   | Bird-skewed                                          | 1      |
| *Tangara seledon Myrsine umbellata* | 22.43  | -0.743| low | Plant-skewed                                         | 1      |
| *Turdus albicollis Clusia criuva* | 22.39  | -0.488| low | Plant-skewed                                         | 1      |
| *Tityra cayana Ocotea puberula* | 22.37  | 0.808| low   | Bird-skewed                                          | 1      |
| *Thraupis ornate ilex brevicuspis* | 22.22  | -0.828| low | Plant-skewed                                         | 1      |
| *Ramphastos dicolorus Allophylus edulis* | 22.21  | -0.204| low | Plant-skewed                                         | 1      |
| *Trogon surrurcua Ficus luschnathiana* | 22.20  | 0.705| low   | Bird-skewed                                          | 1      |
| *Lipaugus laniioides Alibertia sp* | 22.16  | -0.186| low | Plant-skewed                                         | 1      |
| *Penelope obscura Vassobia breviflora* | 22.16  | 0.185| low   | Bird-skewed                                          | 1      |
| *Tyrannus melancholicus Ocotea corymbosa* | 22.16  | -0.720| low | Plant-skewed                                         | 1      |
| *Carpornis melanocephala Myrcia anacardiifolia* | 22.12  | 0.727| low   | Bird-skewed                                          | 2      |
| *Carpornis cucullata Myrcia anacardiifolia* | 22.12  | 0.727| low   | Bird-skewed                                          | 2      |
| *Turdus leucomas Cestrum mariquitense* | 22.11  | -0.691| low | Plant-skewed                                         | 2      |
| *Tangara cyanoccephala Myrsine sp* | 22.11  | -0.820| low | Plant-skewed                                         | 1      |
| *Mimus saturninus Ocotea pulchella* | 22.10  | 0.898| low   | Bird-skewed                                          | 1      |
| *Ramphastos dicolorus Nectandra membranacea* | 22.07  | -0.195| low | Plant-skewed                                         | 1      |
| *Pteroglossus aracari Nectandra lanceolata* | 22.07  | -0.160| low | Plant-skewed                                         | 1      |
| *Pteroglossus bailloni Psychotria vellosiana* | 22.07  | 0.297| low   | Bird-skewed                                          | 1      |
| *Ramphastos vitellinus Nectandra membranacea* | 22.06  | -0.196| low | Plant-skewed                                         | 1      |
| *Thraupis sayaca Ficus insipida* | 22.01  | -0.855| low | Plant-skewed                                         | 1      |
| *Pitangus sulphuratus Guarea guidonia* | 22.01  | 0.253| low   | Bird-skewed                                          | 2      |
| *Thraupis ornate Myrsine sp* | 22.00  | -0.826| low | Plant-skewed                                         | 1      |
| Species | Common Name | Weight | Size | Skewness | Type          | Value |
|---------|-------------|--------|------|----------|---------------|-------|
| Carpornis melanocephala | Miconia sp | 21.98  | 0.735 | low      | Bird-skewed   | 1     |
| Thraupis palmarum | Myrsine sp | 21.96  | -0.828 | low     | Plant-skewed  | 1     |
| Procnias nudicollis | Eugenia astringens | 21.94  | 0.791  | low      | Bird-skewed   | 1     |
| Dacnis cayana | Clusia criuva | 21.93  | -0.519 | low     | Plant-skewed  | 4     |
| Dacnis cayana | Clusia hilariana | 21.93  | -0.519 | low     | Plant-skewed  | 1     |
| Pyroderus scutatus | Campomanesia xanthocarpa | 21.91  | 0.919  | low      | Bird-skewed   | 1     |
| Tangara cyanoccephala | Ficus enormis | 21.86  | -0.818 | low     | Plant-skewed  | 1     |
| Habia rubica | Miconia discolor | 21.78  | 0.749  | low      | Bird-skewed   | 1     |
| Turdus albicollis | Ixora gardneriana | 21.78  | -0.466 | low     | Plant-skewed  | 1     |
| Thraupis ornate | Ficus enormis | 21.75  | -0.824 | low     | Plant-skewed  | 1     |
| Thraupis sayaca | Ilex brevicuspis | 21.75  | -0.853 | low     | Plant-skewed  | 1     |
| Turdus leucomelas | Trichilia catigua | 21.74  | -0.684 | low     | Plant-skewed  | 1     |
| Thraupis palmarum | Ficus enormis | 21.71  | -0.826 | low     | Plant-skewed  | 1     |
| Carpornis cucullata | Miconia chartacea | 21.71  | 0.751  | low      | Bird-skewed   | 1     |
| Carpornis cucullata | Leandra regnellii | 21.67  | 0.753  | low      | Bird-skewed   | 1     |
| Habia rubica | Leandra australis | 21.66  | 0.756  | low      | Bird-skewed   | 1     |
| Ramphocelus carbo | Cestrum mariquitense | 21.65  | -0.718 | low     | Plant-skewed  | 1     |
| Carpornis cucullata | Miconia budlejoide | 21.65  | 0.754  | low      | Bird-skewed   | 1     |
| Habia rubica | Miconia racemifera | 21.64  | 0.757  | low      | Bird-skewed   | 1     |
| Habia rubica | Leandra acutiflora | 21.63  | 0.757  | low      | Bird-skewed   | 1     |
| Carpornis cucullata | Leandra australis | 21.63  | 0.755  | low      | Bird-skewed   | 1     |
| Turdus amaurochalinus | Ilex pseudobuxus | 21.60  | 0.126  | low      | Bird-skewed   | 1     |
| Habia rubica | Miconia pusilliflora | 21.53  | 0.763  | low      | Bird-skewed   | 1     |
| Mionectes oleaginosus | Guarea guidonia | 21.51  | 0.223  | low      | Bird-skewed   | 1     |
| Carpornis cucullata | Miconia pusilliflora | 21.50  | 0.763  | low      | Bird-skewed   | 1     |
| Turdus sp | Clusia criuva | 21.50  | -0.548 | low     | Plant-skewed  | 1     |
| Tityra cayana | Myrcia splendens | 21.48  | 0.855  | low      | Bird-skewed   | 1     |
| Tangara desmaresti | Phoradendron sp | 21.48  | -0.870 | low     | Plant-skewed  | 1     |
| Turdus amaurochalinus | Acnistus arborescens | 21.48  | 0.137  | low      | Bird-skewed   | 1     |
| Habia rubica | Leandra variabilis | 21.45  | 0.768  | low      | Bird-skewed   | 1     |
| Species 1                                      | Species 2                                      | Frequency | Skewness  | 1     |
|-----------------------------------------------|-----------------------------------------------|-----------|-----------|-------|
| Carpornis cucullata                           | Leandra variabilis                            | 21.42     | 0.767     | low Bird-skewed 1 |
| Trogon surrucura                             | Miconia budlejoides                           | 21.41     | 0.751     | low Bird-skewed 1 |
| Pteroglossus bailloni                        | Psychotria leiocarpa                          | 21.40     | 0.348     | low Bird-skewed 1 |
| Thraupis episcopus                            | Genipa americana                              | 21.36     | -0.851    | low Plant-skewed 1 |
| Mimus gilvus                                  | Miconia cinnamomifolia                        | 21.36     | 0.935     | low Bird-skewed 1 |
| Carpornis cucullata                           | Leandra sp                                    | 21.33     | 0.773     | low Bird-skewed 1 |
| Habia rubica Leandra refracta                |                                               | 21.29     | 0.777     | low Bird-skewed 1 |
| Conirostrum speciosum                        | Acnistus arborescens                          | 21.28     | 0.122     | low Bird-skewed 1 |
| Ramphocelus carbo                             | Trichilia catigua                             | 21.27     | -0.712    | low Plant-skewed 1 |
| Thraupis episcopus                            | Ficus enormis                                 | 21.27     | -0.850    | low Plant-skewed 1 |
| Chiroxiphia caudate                           | Trichilia clausseni                           | 21.25     | -0.620    | low Plant-skewed 1 |
| Tangara cyanocephala Myrsine umbellata       |                                               | 21.21     | -0.811    | low Plant-skewed 2 |
| Euphonia pectoralis                           | Psychotria vellosiana                         | 21.17     | 0.245     | low Bird-skewed 1 |
| Penelope obscura                              | Psychotria suterella                          | 21.16     | 0.267     | low Bird-skewed 1 |
| Habia rubica Leandra melastomoides           |                                               | 21.16     | 0.785     | low Bird-skewed 1 |
| Carpornis cucullata                           | Leandra pilonensis                            | 21.15     | 0.783     | low Bird-skewed 1 |
| Habia rubica Ossaea amygdaloides             |                                               | 21.15     | 0.785     | low Bird-skewed 1 |
| Saltator similis                              | Trichilia clausseni                           | 21.14     | -0.626    | low Plant-skewed 1 |
| Carpornis cucullata Eugenia melanogyna        |                                               | 21.12     | 0.785     | low Bird-skewed 1 |
| Carpornis melancephala Eugenia mosenii       |                                               | 21.11     | 0.785     | low Bird-skewed 2 |
| Carpornis cucullata Eugenia mosenii          |                                               | 21.11     | 0.785     | low Bird-skewed 1 |
| Carpornis melancephala Eugenia neogglomerata |                                               | 21.11     | 0.786     | low Bird-skewed 2 |
| Thraupis ornate                               | Myrsine umbellata                             | 21.10     | -0.817    | low Plant-skewed 1 |
| Pteroglossus bailloni                         | Ficus eximia                                  | 21.08     | 0.373     | low Bird-skewed 1 |
| Thraupis palmarum                            | Myrsine umbellata                             | 21.06     | -0.820    | low Plant-skewed 1 |
| Turdus rufiventris                            | Clusia criuva                                 | 21.04     | -0.579    | low Plant-skewed 1 |
| Coryphospingus pileatus                      | Clusia hilariana                              | 20.99     | -0.582    | low Plant-skewed 1 |
| Carpornis cucullata                           | Nectandra cuspidata                           | 20.98     | 0.793     | low Bird-skewed 1 |
| Cacicus haemorrhous                           | Nectandra membranacea                         | 20.95     | -0.286    | low Plant-skewed 1 |
| Thaupyphon coronatus                          | Trichilia clausseni                           | 20.95     | -0.639    | low Plant-skewed 2 |
| Species                          | Abundance | Skewness | Skewness Category | Value |
|---------------------------------|-----------|----------|------------------|-------|
| Turdus amaurochalinus Guarea guidonia | 20.93     | 0.184    | Low Bird-skewed  | 1     |
| Procnias nudicollis Myrca splendens | 20.86     | 0.851    | Low Bird-skewed  | 1     |
| Dacnis cayana Lantana camara     | 20.80     | 0.479    | Low Plant-skewed | 1     |
| Trogon surrucura Ocotea puberula | 20.74     | 0.790    | Low Bird-skewed  | 1     |
| Chiroxipha caudate Ixora venulosa | 20.66     | 0.605    | Low Plant-skewed | 1     |
| Chiroxipha caudate Clusia criuva | 20.66     | 0.605    | Low Plant-skewed | 1     |
| Thraupis sayaca Myrsine umbellata | 20.63     | 0.844    | Low Plant-skewed | 2     |
| Myiarchus ferox Trichilia clauseni | 20.62     | 0.660    | Low Plant-skewed | 1     |
| Thraupis episcopus Myrsine umbellata | 20.61     | 0.845    | Low Plant-skewed | 1     |
| Turdus leucomelas Trichilia clauseni | 20.61     | 0.661    | Low Plant-skewed | 2     |
| Myiarchus swainsoni Clusia criuva | 20.58     | 0.610    | Low Plant-skewed | 1     |
| Saltator similis Ixora venulosa  | 20.56     | 0.612    | Low Plant-skewed | 1     |
| Carpornis cucullata Siphoneugena densiflora | 20.50     | 0.820    | Low Bird-skewed  | 1     |
| Myiodynastes maculatus Guarea guidonia | 20.42     | 0.145    | Low Bird-skewed  | 1     |
| Tangara cayana Trichilia clauseni | 20.42     | 0.674    | Low Plant-skewed | 2     |
| Tachyphonus coronatus Clusia criuva | 20.36     | 0.625    | Low Plant-skewed | 1     |
| Procnias nudicollis Myrca brasiliensis | 20.33     | 0.879    | Low Bird-skewed  | 1     |
| Tangara desmaresti Myrsine umbellata | 20.32     | 0.861    | Low Plant-skewed | 1     |
| Tyrannus melancholicus Trichilia clauseni | 20.24     | 0.685    | Low Plant-skewed | 1     |
| Ramphocelus carbo Trichilia clauseni | 20.15     | 0.691    | Low Plant-skewed | 2     |
| Thraupis sayaca Ficus organensis  | 20.12     | 0.840    | Low Plant-skewed | 1     |
| Pteroglossus bailloni Amaioa intermedia | 20.11     | 0.448    | Low Bird-skewed  | 1     |
| Carpornis cucullata Myrca splendens | 20.09     | 0.844    | Low Bird-skewed  | 1     |
| Turdus subalaris Miconia inconspicua | 20.08     | 0.661    | Low Bird-skewed  | 1     |
| Myiarchus ferox Clusia criuva     | 20.04     | 0.647    | Low Plant-skewed | 2     |
| Turdus albicollis Allophylus edulis | 19.95     | 0.387    | Low Plant-skewed | 1     |
| Ramphastos dicolorus ilex microdonta | 19.92     | 0.023    | Low Plant-skewed | 1     |
| Trogon surrucura Myrca splendens  | 19.85     | 0.842    | Low Bird-skewed  | 1     |
| Turdus albicollis Nectandra membranacea | 19.81     | 0.380    | Low Plant-skewed | 2     |
| Tangara desmaresti Ocotea corymbosa | 19.79     | 0.857    | Low Plant-skewed | 1     |
| Machaeropterus regulus Guarea guidonia | 19.77     | 0.092    | Low Bird-skewed  | 1     |
| Species                        | Shell1 | Shell2 | Shell3 | Skew  | Type1   |
|-------------------------------|--------|--------|--------|-------|---------|
| Stephanophorus diadematus     | 19.77  | -0.037 | low    | Plant-skewed | 1      |
| Ilex microdonta               | 19.75  | 0.864  | low    | Bird-skewed  | 1      |
| Turdus flavipes Nectandra membranacea | 19.68  | -0.390 | low    | Plant-skewed | 1      |
| Carpornis melanocephala       | 19.68  | 0.868  | low    | Bird-skewed  | 2      |
| Thraupis sayaca              | 19.67  | -0.835 | low    | Plant-skewed | 1      |
| Stephanophorus diadematus     | 19.65  | -0.025 | low    | Plant-skewed | 1      |
| Tyrannus melancholicus        | 19.65  | -0.673 | low    | Plant-skewed | 3      |
| Carpornis cucullata           | 19.64  | 0.870  | low    | Bird-skewed  | 2      |
| Coereba flaveola              | 19.63  | -0.027 | low    | Plant-skewed | 1      |
| Carpornis melanocephala       | 19.60  | 0.872  | low    | Bird-skewed  | 1      |
| Turdus albicollis             | 19.58  | -0.367 | low    | Plant-skewed | 1      |
| Carpornis cucullata           | 19.57  | 0.874  | low    | Bird-skewed  | 1      |
| Ramphocelus bresilius         | 19.56  | -0.679 | low    | Plant-skewed | 1      |
| Melanerpes flavifrons         | 19.51  | 0.728  | low    | Bird-skewed  | 1      |
| Hylophilus poicilotos         | 19.48  | 0.732  | low    | Bird-skewed  | 1      |
| Dacnis cayana                 | 19.45  | -0.423 | low    | Plant-skewed | 1      |
| Carpornis cucullata           | 19.43  | 0.882  | low    | Bird-skewed  | 1      |
| Carpornis cucullata           | 19.43  | 0.882  | low    | Bird-skewed  | 1      |
| Ilicura militaris             | 19.40  | 0.641  | low    | Bird-skewed  | 1      |
| Tangara seledon              | 19.39  | -0.690 | low    | Plant-skewed | 1      |
| Megarynchus pitangua          | 19.34  | 0.053  | low    | Bird-skewed  | 1      |
| Ilicura militaris             | 19.34  | 0.646  | low    | Bird-skewed  | 1      |
| Zonotrichia capensis          | 19.30  | 0.724  | low    | Bird-skewed  | 1      |
| Thraupis episcopus            | 19.29  | -0.832 | low    | Plant-skewed | 1      |
| Cnemotriccus fuscatus         | 19.26  | 0.045  | low    | Bird-skewed  | 1      |
| Tachyphonus coronatus         | 19.23  | -0.594 | low    | Plant-skewed | 1      |
| Ilicura militaris             | 19.14  | 0.659  | low    | Bird-skewed  | 1      |
| Chlorophonia cyanea           | 19.10  | 0.725  | low    | Bird-skewed  | 1      |
| Coereba flaveola              | 19.09  | 0.028  | low    | Bird-skewed  | 2      |
| Trogon surrucura              | 19.09  | 0.886  | low    | Bird-skewed  | 1      |
| Species 1                              | Species 2                              | Body Mass | Proportion | Skew  | Region |
|---------------------------------------|---------------------------------------|-----------|------------|-------|--------|
| *Pachyramphus validus*                | *Ocotea puberula*                     | 19.03     | 0.767      | low   | Bird-skewed     |
| *Ramphocelus bresilius* Lantana sp    |                                       | 19.02     | -0.666     | low   | Plant-skewed    |
| *Ramphastos dicolorus* *Psychotria vellosiana* |                               | 18.95     | 0.075      | low   | Bird-skewed     |
| *Tangara mexicana* Lantana pohliana   |                                       | 18.90     | -0.467     | low   | Plant-skewed    |
| *Thraupis episcopus* *Inga laurina*   |                                       | 18.90     | -0.828     | low   | Plant-skewed    |
| *Manacus manacus* Miconia tentaculifera |                   | 18.89     | 0.653      | low   | Bird-skewed     |
| *Saltator maximus* Guarea guidonia    |                                       | 18.83     | 0.001      | low   | Bird-skewed     |
| *Myioborus similis* Acnistus arborescens |                   | 18.80     | -0.111     | low   | Plant-skewed    |
| *Lipaugas lanioides* *Psychotria mapourioides* |                | 18.78     | 0.112      | low   | Bird-skewed     |
| *Carpornis cucullata* Miconia cubatanensis |                     | 18.76     | 0.920      | low   | Bird-skewed     |
| *Tangara seledon* Ixora burchelliana  |                                       | 18.75     | -0.676     | low   | Plant-skewed    |
| *Manacus manacus* Miconia albicans    |                                       | 18.72     | 0.666      | low   | Bird-skewed     |
| *Ramphastos vitellinus* *Psychotria mapourioides* |                | 18.67     | 0.102      | low   | Bird-skewed     |
| *Ilicura militaris* Miconia discolor  |                                       | 18.65     | 0.694      | low   | Bird-skewed     |
| *Ilicura militaris* Miconia chartacea |                                      | 18.60     | 0.697      | low   | Bird-skewed     |
| *Turdus rufiventris* *Allophylus edulis* |                              | 18.60     | -0.496     | low   | Plant-skewed    |
| *Zonotrichia capensis* Solanum          |                                       | 18.59     | 0.770      | low   | Bird-skewed     |
| granulosoleprosum                      |                                       |           |            |       |        |
| *Thlypopsis sordida* Acnistus arborescens |                   | 18.58     | -0.132     | low   | Plant-skewed    |
| *Ilicura militaris* Miconia budlejoiodes |                           | 18.55     | 0.701      | low   | Bird-skewed     |
| *Phibalura flavirostris* Miconia pusilliflora |                     | 18.49     | 0.713      | low   | Bird-skewed     |
| *Ilicura militaris* Miconia tristis    |                                       | 18.45     | 0.708      | low   | Bird-skewed     |
| *Thraupis cyanoptera* Ixora burchelliana |                          | 18.42     | -0.699     | low   | Plant-skewed    |
| *Ilicura militaris* Miconia pusilliflora |                                    | 18.40     | 0.711      | low   | Bird-skewed     |
| *Ilicura militaris* Leandra variabilis |                                       | 18.32     | 0.717      | low   | Bird-skewed     |
| *Thraupis sayaca* Ocotea notata        |                                       | 18.27     | -0.820     | low   | Plant-skewed    |
| *Myioborus similis* Guarea guidonia    |                                       | 18.25     | -0.060     | low   | Plant-skewed    |
| *Tijuca atra* Miconia chartacea        |                                       | 18.25     | 0.689      | low   | Bird-skewed     |
| *Ilicura militaris* Leandra laevigata  |                                       | 18.25     | 0.722      | low   | Bird-skewed     |
| *Pitangus sulphuratus* *Myrica palustris* |                                    | 18.24     | 0.553      | low   | Bird-skewed     |
| *Ilicura militaris* Leandra sp         |                                       | 18.23     | 0.723      | low   | Bird-skewed     |
| Species                          | Distance | Attraction | Skew  | Notes       |
|---------------------------------|----------|------------|-------|-------------|
| Turdus rufiventris Nectandra lanceolata | 18.22    | -0.480     | low   | Plant-skewed|
| Chiroxiphia caudate Allophylus edulis | 18.22    | -0.527     | low   | Plant-skewed|
| Turdus rufiventris Struthanthus martianus | 18.22    | -0.480     | low   | Plant-skewed|
| Thraupis sayaca Trichilia clauseni | 18.17    | -0.819     | low   | Plant-skewed|
| Phylloscartes sylviolus Miconia tristis | 18.17    | 0.702      | low   | Bird-skewed |
| Tangara cyanoccephala Clusia criuva | 18.17    | -0.773     | low   | Plant-skewed|
| llicura militaris Leandra sabiaensis | 18.16    | 0.728      | low   | Bird-skewed |
| Stephanophorus diadematus Psychotria leiocarpa | 18.14    | 0.129      | low   | Bird-skewed |
| Cacicus haemorrhous Guarea guidonia | 18.13    | -0.073     | low   | Plant-skewed|
| Euphonia pectoralis Rhipsalis camposportana | 18.09    | 0.501      | low   | Bird-skewed |
| Chiroxiphia caudate Nectandra membranacea | 18.08    | -0.521     | low   | Plant-skewed|
| Thraupis ornate Clusia criuva | 18.06    | -0.780     | low   | Plant-skewed|
| Euphonia pectoralis Rhipsalis elliptica | 18.06    | 0.503      | low   | Bird-skewed |
| Penelope superciliaris Myrca pulchra | 17.96    | 0.582      | low   | Bird-skewed |
| Icterus cayanensis Eugenia brasiliensis | 17.94    | 0.714      | low   | Bird-skewed |
| Elaenia sp Acnistus arborescens | 17.92    | -0.199     | low   | Plant-skewed|
| Tachyphonus coronatus Allophylus edulis | 17.92    | -0.551     | low   | Plant-skewed|
| Chiroxiphia caudate Struthanthus martianus | 17.84    | -0.512     | low   | Plant-skewed|
| Penelope superciliaris Myrca pubipetala | 17.83    | 0.592      | low   | Bird-skewed |
| Elaenia spectabilis Acnistus arborescens | 17.82    | -0.209     | low   | Plant-skewed|
| Euphonia pectoralis Rhipsalis teres | 17.82    | 0.523      | low   | Bird-skewed |
| Saltator similis Struthanthus concinnus | 17.79    | -0.522     | low   | Plant-skewed|
| Nemosia pileata Miconia albicans | 17.77    | 0.641      | low   | Bird-skewed |
| Mionectes rufiventris Miconia valtheri | 17.76    | 0.533      | low   | Bird-skewed |
| Euphonia pectoralis Miconia valtheri | 17.72    | 0.531      | low   | Bird-skewed |
| Phyllomyias griseocapilla Miconia cinnamomifolia | 17.70    | 0.920      | low   | Bird-skewed |
| Turdus albicollis Ilex pseudobuxus | 17.66    | -0.247     | low   | Plant-skewed|
| Thraupis episcopus Clusia criuva | 17.57    | -0.813     | low   | Plant-skewed|
| Turdus flavipes Ilex pseudobuxus | 17.53    | -0.260     | low   | Plant-skewed|
| Species                          | Index  | Simpson  | Skewness | Type       |
|---------------------------------|--------|----------|----------|------------|
| *Elaenia flavogaster Acnistus arborescens* | 17.53  | -0.239   | low      | Plant-skewed |
| *Euphonia pectoralis Rhipsalis sp*    | 17.51  | 0.548    | low      | Bird-skewed |
| *Tolmomyias sulphurescens Miconia cinnamomifolia* | 17.43  | 0.919    | low      | Bird-skewed |
| *Celeus flavescens Miconia budlejoides* | 17.39  | 0.675    | low      | Bird-skewed |
| *Penelope obscura Myrcia pubipetala*   | 17.38  | 0.577    | low      | Bird-skewed |
| *Zonotrichia capensis Miconia sellowiana* | 17.38  | 0.851    | low      | Bird-skewed |
| *Elaenia obscura Miconia chartacea*   | 17.33  | 0.667    | low      | Bird-skewed |
| *Pteroglossus bailloni Miconia discolor* | 17.33  | 0.663    | low      | Bird-skewed |
| *Pitangus sulphuratus Miconia albicans* | 17.29  | 0.628    | low      | Bird-skewed |
| *Tangara desmaresti Clusia criuva*    | 17.28  | -0.833   | low      | Plant-skewed |
| *Penelope obscura Ficus luschnathiana* | 17.27  | 0.586    | low      | Bird-skewed |
| *Pipra pipra Guarea guidonia*        | 17.26  | -0.166   | low      | Plant-skewed |
| *Chlorophonia cyanae Miconia sellowiana* | 17.23  | 0.849    | low      | Bird-skewed |
| *Mionectes rufiventris Miconia theizans* | 17.23  | 0.577    | low      | Bird-skewed |
| *Pteroglossus bailloni Miconia budlejoides* | 17.23  | 0.671    | low      | Bird-skewed |
| *Turdus leucomelas Nectandra lanceolata* | 17.21  | -0.564   | low      | Plant-skewed |
| *Euphonia pectoralis Miconia theizans* | 17.19  | 0.575    | low      | Bird-skewed |
| *Pteroglossus bailloni Miconia racemifera* | 17.18  | 0.674    | low      | Bird-skewed |
| *Penelope supercilialis Myrcia ilheosensis* | 17.14  | 0.646    | low      | Bird-skewed |
| *Euphonia pectoralis Ficus luschnathiana* | 17.12  | 0.581    | low      | Bird-skewed |
| *Lipaugus lanioides Amaioua intermedia* | 17.10  | 0.281    | low      | Bird-skewed |
| *Lipaugus lanioidesAmaioua guianensis* | 17.10  | 0.281    | low      | Bird-skewed |
| *Dacnis cayana Acnistus arborescens*   | 17.07  | -0.284   | low      | Plant-skewed |
| *Euphonia violacea Rhipsalis sp*       | 17.05  | 0.530    | low      | Bird-skewed |
| *Pteroglossus bailloni Leandra variabilis* | 17.00  | 0.688    | low      | Bird-skewed |
| *Turdus albicollis Guarea macrophylla*  | 16.99  | -0.194   | low      | Plant-skewed |
| *Elaenia flavogaster Guarea guidonia*   | 16.98  | -0.195   | low      | Plant-skewed |
| *Turdus amaurochalinus Myrciaria cuspidata* | 16.97  | 0.528    | low      | Bird-skewed |
| *Euphonia violacea Rhipsalis paradoxa*  | 16.94  | 0.540    | low      | Bird-skewed |
| *Thraupis sayaca Ixora burchelliana*    | 16.94  | -0.804   | low      | Plant-skewed |
| Plant Name                                   | Bird Name                          | Plant-skewed | Bird-skewed | Skeweness |
|---------------------------------------------|------------------------------------|--------------|-------------|-----------|
| Cissopis leverianus Vassobia breviflora     |                                    | 16.87        | -0.305      | low       |
| Pitangus sulphuratus Eugenia uruguayensis  |                                    | 16.82        | 0.665       | low       |
| Elaeia obscura Eugenia astringens           |                                    | 16.80        | 0.708       | low       |
| Manacus manacus Myrcia splendens            |                                    | 16.74        | 0.807       | low       |
| Turdus albicollis Psychotria nuda           |                                    | 16.73        | -0.170      | low       |
| Turdus albicollis Psychotria vellosiana     |                                    | 16.69        | -0.167      | low       |
| Saltator fuliginosus Psychotria suterella   |                                    | 16.58        | -0.146      | low       |
| Icterus cayanensis Plinia cauliflora        |                                    | 16.56        | 0.813       | low       |
| Penelope obscura Miconia chartacea          |                                    | 16.54        | 0.646       | low       |
| Turdus albicollis Psychotria suterella      |                                    | 16.53        | -0.152      | low       |
| Dacnis cayana Guarea guidonia               |                                    | 16.53        | -0.243      | low       |
| Manacus manacus Paullinia rhomboidea         |                                    | 16.53        | 0.822       | low       |
| Turdus albicollis Psychotria sp             |                                    | 16.52        | -0.151      | low       |
| Thraupis cyanoptera Nectandra membranacea   |                                    | 16.49        | -0.651      | low       |
| Euphonia pectoralis Miconia latecrenata     |                                    | 16.47        | 0.634       | low       |
| Orthogonys chloricerus Rudgea jasminoides   |                                    | 16.41        | 0.128       | low       |
| Pitangus sulphuratus Eugenia astringens     |                                    | 16.40        | 0.699       | low       |
| Mionectes rufiventris Miconia budlejoides   |                                    | 16.38        | 0.647       | low       |
| Mionectes rufiventris Miconia racemifera    |                                    | 16.33        | 0.651       | low       |
| Euphonia pectoralis Leandra australis       |                                    | 16.31        | 0.648       | low       |
| Trichothraupis melanops Psychotria vellosiana|                                    | 16.30        | -0.210      | low       |
| Euphonia violacea Miconia albicans          |                                    | 16.29        | 0.596       | low       |
| Mionectes rufiventris Miconia tristis       |                                    | 16.28        | 0.655       | low       |
| Volatania jacarina Miconia rubiginosa       |                                    | 16.24        | 0.569       | low       |
| Manacus manacus Myrcia hebepetala           |                                    | 16.22        | 0.844       | low       |
| Turdus amaurochalinus Miconia albicans      |                                    | 16.22        | 0.593       | low       |
| Turdus albicollis Palicourea forsteronoides |                                    | 16.21        | -0.120      | low       |
| Euphonia pectoralis Miconia pusilliflora    |                                    | 16.18        | 0.658       | low       |
| Tijuca atra Miconia sellowiana              |                                    | 16.18        | 0.838       | low       |
| Euphonia pectoralis Leandra variabilis      |                                    | 16.11        | 0.665       | low       |
| Myiodynastes maculatus Ficus luschnathiana  |                                    | 16.07        | 0.540       | low       |
| Species | Species | Density | Skew | Bird or Plant Skewed | Number |
|---------|---------|---------|------|----------------------|--------|
| Parula pitiayumi | Miconia racemifera | 16.05 | 0.643 | low | Bird-skewed | 1 |
| Nemosia pileata | Solanum mauritianum | 16.03 | 0.774 | low | Bird-skewed | 1 |
| Euphonia pectoralis | Leandra sp | 16.01 | 0.673 | low | Bird-skewed | 1 |
| Penelope obscura | Leandra melastomoides | 15.96 | 0.693 | low | Bird-skewed | 1 |
| Penelope obscura | Solanum bullatum | 15.95 | 0.694 | low | Bird-skewed | 1 |
| Penelope obscura | Eugenia melanogyna | 15.95 | 0.694 | low | Bird-skewed | 1 |
| Euphonia pectoralis | Leandra sabiaensis | 15.95 | 0.678 | low | Bird-skewed | 1 |
| Euphonia pectoralis | Leandra refracta | 15.95 | 0.678 | low | Bird-skewed | 1 |
| Penelope obscura | Eugenia mosenii | 15.95 | 0.694 | low | Bird-skewed | 1 |
| Penelope obscura | Solanum variabile | 15.93 | 0.695 | low | Bird-skewed | 1 |
| Orthogonys chloricterus | Amaioua intermedia | 15.92 | 0.184 | low | Bird-skewed | 1 |
| Pteroglossus bailloni | Solanum mauritianum | 15.92 | 0.772 | low | Bird-skewed | 1 |
| Haplospiza unicolar | Miconia theizans | 15.86 | 0.523 | low | Bird-skewed | 1 |
| Turdus amaurochalinus | Miconia chartacea | 15.85 | 0.625 | low | Bird-skewed | 1 |
| Celeus flavescens | Myrcia splendens | 15.84 | 0.793 | low | Bird-skewed | 1 |
| Euphonia pectoralis | Leandra pilonensis | 15.83 | 0.688 | low | Bird-skewed | 1 |
| Penelope obscura | Nectandra cuspidata | 15.81 | 0.705 | low | Bird-skewed | 1 |
| Trichothraupis melanops | Palicourea forsteronioides | 15.81 | -0.166 | low | Plant-skewed | 1 |
| Euphonia pectoralis | Ossaea amygdaloides | 15.80 | 0.690 | low | Bird-skewed | 1 |
| Nemosia pileata | Myrcia splendens | 15.79 | 0.793 | low | Bird-skewed | 1 |
| Turdus amaurochalinus | Eugenia uruguayensis | 15.74 | 0.634 | low | Bird-skewed | 1 |
| Tangara cyanoccephala | Allophylus edulis | 15.73 | -0.728 | low | Plant-skewed | 2 |
| Turdus amaurochalinus | Miconia tristis | 15.70 | 0.638 | low | Bird-skewed | 1 |
| Nemosia pileata | Plinia cauliflora | 15.68 | 0.800 | low | Bird-skewed | 1 |
| Turdus amaurochalinus | Miconia pusilliflora | 15.65 | 0.642 | low | Bird-skewed | 2 |
| Turdus rufiventris | Guarea macrophylla | 15.64 | -0.337 | low | Plant-skewed | 1 |
| Tachyphonus coronatus | Ilex microdonta | 15.63 | -0.449 | low | Plant-skewed | 1 |
| Thraupis ornate | Allophylus edulis | 15.63 | -0.736 | low | Plant-skewed | 1 |
| Parula pitiayumi | Eugenia astringens | 15.62 | 0.679 | low | Bird-skewed | 1 |
| Lipaugus laniioides | Miconia valtheri | 15.60 | 0.431 | low | Bird-skewed | 1 |
| Species 1                                      | Species 2                                      | Similarity | Frequency | Feeding Skew   | Lotus   |
|------------------------------------------------|------------------------------------------------|------------|-----------|----------------|---------|
| Celeus flavescens                              | Paullinia uloptera                             | 15.56      | 0.814     | low             | Bird-skewed | 1      |
| Turdus amaurochalinus                         | Eugenia brasiliensis                           | 15.51      | 0.654     | low             | Bird-skewed | 1      |
| Conirostrum speciosum                         | Miconia tristis                                | 15.51      | 0.632     | low             | Bird-skewed | 1      |
| Tachyphonus coronatus                          | Acnistus arborescens                           | 15.50      | -0.442    | low             | Plant-skewed | 1      |
| Tachyphonus coronatus Vassobia breviflora     |                                               | 15.50      | -0.442    | low             | Plant-skewed | 1      |
| Thraupis ornate                                | Nectandra membranacea                          | 15.49      | -0.733    | low             | Plant-skewed | 1      |
| Euphonia chalybea                              | Miconia pusilliflora                           | 15.48      | 0.637     | low             | Bird-skewed | 1      |
| Manacus manacus Miconia prasina                |                                               | 15.46      | 0.898     | low             | Bird-skewed | 1      |
| Attila phoenicurus                             | Miconia tristis                                | 15.42      | 0.629     | low             | Bird-skewed | 1      |
| Turdus rufiventris                             | Psychotria vellosiana                          | 15.34      | -0.316    | low             | Plant-skewed | 1      |
| Manacus manacus Miconia cinnamomomifolia      |                                               | 15.34      | 0.907     | low             | Bird-skewed | 1      |
| Penelope obscura Psidium cattleianum           |                                               | 15.33      | 0.745     | low             | Bird-skewed | 1      |
| Thlypopsis sordida                             | Myrcia tomentosa                               | 15.33      | 0.224     | low             | Bird-skewed | 1      |
| Turdus amaurochalinus                          | Eugenia astringens                             | 15.32      | 0.671     | low             | Bird-skewed | 1      |
| Pitangus sulphuratus                           | Myrcia splendens                               | 15.31      | 0.785     | low             | Bird-skewed | 1      |
| Chiroxiphia caudate                            | Guarea macrophylla                             | 15.26      | -0.378    | low             | Plant-skewed | 2      |
| Euphonia sp Rhipsalis sp                       |                                               | 15.26      | 0.445     | low             | Bird-skewed | 1      |
| Turdus albicollis Rudea jasminoides            |                                               | 15.23      | -0.008    | low             | Plant-skewed | 2      |
| Myiodynastes maculatus                         | Miconia tristis                                | 15.18      | 0.621     | low             | Bird-skewed | 1      |
| Thraupis sayaca                                | Allophylus edulis                              | 15.15      | -0.775    | low             | Plant-skewed | 1      |
| Pteroglossus bailloni                          | Myrcia brasiensis                              | 15.15      | 0.831     | low             | Bird-skewed | 1      |
| Conirostrum speciosum                         | Solanum myrianthum                            | 15.14      | 0.664     | low             | Bird-skewed | 1      |
| Pipraeidea melanonota                          | Miconia pusilliflora                           | 15.13      | 0.626     | low             | Bird-skewed | 1      |
| Stephanophorus diadematus Myrceugenia myricoides |                                               | 15.10      | 0.443     | low             | Bird-skewed | 1      |
| Elaenia mesoleuca                              | Psychotria vellosiana                          | 15.06      | -0.346    | low             | Plant-skewed | 1      |
| Lipaugus lanioides Ficus luschnathiana         |                                               | 15.01      | 0.491     | low             | Bird-skewed | 1      |
| Stephanophorus diadematus Myrcea oblongata     |                                               | 15.00      | 0.453     | low             | Bird-skewed | 1      |
| Ramphastos vitellinus                          | Myrcea pubipetala                              | 15.00      | 0.475     | low             | Bird-skewed | 1      |
| Tangara cayana Acnistus arborescens            |                                               | 14.97      | -0.495    | low             | Plant-skewed | 1      |
| Chiroxiphia caudate Psychotria vellosiana      |                                               | 14.96      | -0.357    | low             | Plant-skewed | 2      |
| Species                        | Number of flowers | Hawks-Moore | Size of flowers | Pollinator Behaviour |
|-------------------------------|-------------------|-------------|-----------------|----------------------|
| *Penelope obscura* *Myrcia splendens* | 14.93             | 0.778       | low Bird-skewed | 1                    |
| *Ramphastos dicolorus* *Ficus luschnathiana* | 14.91             | 0.486       | low Bird-skewed | 1                    |
| *Haplospiza unicolor* *Miconia pusilliflora* | 14.86             | 0.616       | low Bird-skewed | 1                    |
| *Volatinia jacarina* *Solanum granulosoleprosum* | 14.82             | 0.694       | low Bird-skewed | 1                    |
| *Mionectes rufiventris* *Myrcia splendens* | 14.82             | 0.776       | low Bird-skewed | 1                    |
| *Chiroxiphia caudate* *Psychotria suterella* | 14.80             | -0.346      | low Plant-skewed | 1                    |
| *Tachyphonus cristatus* *Miconia valtheri* | 14.80             | 0.381       | low Bird-skewed | 1                    |
| *Tyrannus melancholicus* *Acnistus arborescens* | 14.79             | -0.513      | low Plant-skewed | 1                    |
| *Stephanophorus diadematus* *Ficus luschnathiana* | 14.76             | 0.478       | low Bird-skewed | 1                    |
| *Coereba flaveola* *Myrcia ferruginea* | 14.74             | 0.477       | low Bird-skewed | 1                    |
| *Coereba flaveola* *Ficus luschnathiana* | 14.74             | 0.477       | low Bird-skewed | 1                    |
| *Turdus albicollis* *Amaioa intermedia* | 14.74             | 0.057       | low Bird-skewed | 1                    |
| *Ramphastos vitellinus* *Myrcia strigipes* | 14.72             | 0.503       | low Bird-skewed | 1                    |
| *Ramphocelus carbo* *Acnistus arborescens* | 14.71             | -0.522      | low Plant-skewed | 1                    |
| *Tachyphonus coronatus* *Psychotria vellosiana* | 14.66             | -0.390      | low Plant-skewed | 1                    |
| *Pitangus sulphuratus* *Ocotea pulchella* | 14.65             | 0.837       | low Bird-skewed | 2                    |
| *Myiarchus ferox* *Guarea guidonia* | 14.64             | -0.444      | low Plant-skewed | 1                    |
| *Turdus leucomelas* *Guarea macrophylla* | 14.63             | -0.445      | low Plant-skewed | 1                    |
| *Turdus flavipes* *Amaioa intermedia* | 14.61             | 0.041       | low Bird-skewed | 1                    |
| *Myiodynastes maculatus* *Ocotea puberula* | 14.61             | 0.673       | low Bird-skewed | 1                    |
| *Pitangus sulphuratus* *Eugenia cerasiflora* | 14.56             | 0.845       | low Bird-skewed | 1                    |
| *Sicalis flaveola* *Eugenia astringens* | 14.54             | 0.646       | low Bird-skewed | 1                    |
| *Tachyphonus coronatus* *Psychotria suterella* | 14.50             | -0.379      | low Plant-skewed | 1                    |
| *Penelope obscura* *Marlierea reitzii* | 14.49             | 0.813       | low Bird-skewed | 1                    |
| *Tangara desmaresti* *Struthanthus martianus* | 14.46             | -0.794      | low Plant-skewed | 1                    |
| *Celeus flavescens* *Miconia cinnamomifolia* | 14.43             | 0.900       | low Bird-skewed | 1                    |
| *Euphonia pectoralis* *Paullinia sp* | 14.43             | 0.804       | low Bird-skewed | 1                    |
| *Orthogonys chloricterus* *Miconia valtheri* | 14.43             | 0.355       | low Bird-skewed | 1                    |
| *Basileuterus culicivorus* *Miconia tentaculifera* | 14.42             | 0.491       | low Bird-skewed | 1                    |
| *Penelope obscura* *Myrcia brasiliensis* | 14.40             | 0.821       | low Bird-skewed | 1                    |
| Species                        | Density | Skewness | Category      | Count |
|-------------------------------|---------|----------|---------------|-------|
| Penelope obscura Myrcia hebepeptala | 14.40   | 0.821    | low Bird-skewed | 1     |
| Cacicus haemorrhous Miconia valtheri | 14.38   | 0.351    | low Bird-skewed | 1     |
| Pteroglossus bailloni Miconia cabucu | 14.34   | 0.893    | low Bird-skewed | 1     |
| Thraupis cyanoptera Ilex microdonta | 14.34   | -0.577   | low Plant-skewed | 1     |
| Turdus leucomelas Psychotria vellosiana | 14.33   | -0.427   | low Plant-skewed | 1     |
| Capsiempis flaveola Miconia cinnamomifolia | 14.32   | 0.899    | low Bird-skewed | 1     |
| Elaenia obscura Miconia cinnamomifolia | 14.31   | 0.899    | low Bird-skewed | 1     |
| Chiroxiphia caudate Psychotria leicarpa | 14.30   | -0.307   | low Plant-skewed | 1     |
| Euphonia chlorotica Miconia tristis | 14.29   | 0.587    | low Bird-skewed | 1     |
| Pteroglossus bailloni Miconia cinnamomifolia | 14.27   | 0.899    | low Bird-skewed | 2     |
| Tyrannus savana Guarea guidonia | 14.25   | -0.485   | low Plant-skewed | 1     |
| Tyrannus melanocholicus Guarea guidonia | 14.25   | -0.485   | low Plant-skewed | 2     |
| Euphonia pectoralis Myrcia brasiliensis | 14.25   | 0.819    | low Bird-skewed | 1     |
| Lipaugus lanioides Miconia budlejoide | 14.21   | 0.571    | low Bird-skewed | 1     |
| Lipaugus lanioides Miconia racemifera | 14.17   | 0.575    | low Bird-skewed | 1     |
| Ramphocelus bresilinus Guarea guidonia | 14.17   | -0.494   | low Plant-skewed | 1     |
| Saltator maximus Miconia albicans | 14.11   | 0.502    | low Bird-skewed | 1     |
| Antilophia galeata Miconia rubiginosa | 14.09   | 0.469    | low Bird-skewed | 1     |
| Stephanophorus diadematus Miconia chartacea | 14.02   | 0.554    | low Bird-skewed | 2     |
| Ramphastos dicolorus Miconia tristis | 14.02   | 0.576    | low Bird-skewed | 1     |
| Lipaugus lanioides Leandra variabilis | 13.99   | 0.594    | low Bird-skewed | 1     |
| Pipraeidea melanonota Solanum mauritianum | 13.97   | 0.731    | low Bird-skewed | 1     |
| Stephanophorus diadematus Miconia budlejoide | 13.97   | 0.560    | low Bird-skewed | 1     |
| Pitangus sulphuratus Miconia cinnamomifolia | 13.91   | 0.896    | low Bird-skewed | 1     |
| Euphonia violacea Marlierea obscura | 13.90   | 0.802    | low Bird-skewed | 1     |
| Penelope obscura Campomanesia xanthocarpa | 13.86   | 0.865    | low Bird-skewed | 1     |
| Coereba flaveola Miconia tristis | 13.86   | 0.569    | low Bird-skewed | 1     |
| Tachyphonus cristatus Miconia albicans | 13.83   | 0.487    | low Bird-skewed | 1     |
| Stephanophorus diadematus Miconia | 13.82   | 0.575    | low Bird-skewed | 2     |
| Common Name                  | Scientific Name                  | Distance from Control Plot | Diet Preference      | Interactions Count |
|------------------------------|----------------------------------|----------------------------|----------------------|--------------------|
| Pusillus florae              | Phyllomyias fasciatus Miconia sellowiana | 13.81                      | low Bird-skewed      | 1                  |
| Cacicus haemorrhous          | Ficus luschnathiana               | 13.78                      | low Bird-skewed      | 1                  |
| Turdus amaurochalinus        | Miconia sellowiana                | 13.78                      | low Bird-skewed      | 1                  |
| Stephanophorus diadematus    | Solanum inodorum                  | 13.75                      | low Bird-skewed      | 1                  |
| Myiozetetes similis          | Miconia rubiginosa                | 13.73                      | low Bird-skewed      | 1                  |
| Myiodynastes maculatus       | Myrcia splendens                  | 13.72                      | low Bird-skewed      | 1                  |
| Tangara seledon              | Psychotria vellosiana             | 13.70                      | low Plant-skewed     | 1                  |
| Lipaugus lanioides           | Solanum swartzianum              | 13.65                      | low Bird-skewed      | 1                  |
| Cacicus haemorrhous          | Miconia paniculata               | 13.64                      | low Bird-skewed      | 1                  |
| Elaenia sp                   | Myrcia palustris                  | 13.61                      | low Bird-skewed      | 1                  |
| Turdus amaurochalinus        | Ocotea pulchella                  | 13.57                      | low Bird-skewed      | 2                  |
| Lipaugus lanioides           | Eugenia sp                       | 13.56                      | low Bird-skewed      | 1                  |
| Tachyphonus cristatus        | Miconia latecrenata              | 13.55                      | low Bird-skewed      | 1                  |
| Myiozetetes similis          | Miconia albicans                 | 13.54                      | low Bird-skewed      | 2                  |
| Megarynchus pitangua         | Ocotea tubera                    | 13.53                      | low Bird-skewed      | 1                  |
| Stephanophorus diadematus    | Solanum didymum                  | 13.53                      | low Bird-skewed      | 1                  |
| Thlypopsis sordida           | Miconia rubiginosa               | 13.52                      | low Bird-skewed      | 1                  |
| Penelope obscura             | Miconia cinnamomifolia           | 13.52                      | low Bird-skewed      | 1                  |
| Chiroxiphia caudate          | Rudgea jasminoides               | 13.50                      | low Plant-skewed     | 1                  |
| Orchesticus abeillei         | Miconia budlejoiides             | 13.49                      | low Bird-skewed      | 1                  |
| Turdus flavipes              | Rhipsalis camposportoana          | 13.48                      | low Bird-skewed      | 1                  |
| Turdus amaurochalinus        | Eugenia uniflora                 | 13.48                      | low Bird-skewed      | 1                  |
| Empidonous varius            | Miconia rubiginosa               | 13.44                      | low Bird-skewed      | 1                  |
| Stephanophorus diadematus    | Ossaea amygdaloides              | 13.43                      | low Bird-skewed      | 1                  |
| Saltator similis             | Rudgea jasminoides               | 13.42                      | low Plant-skewed     | 1                  |
| Cacicus haemorrhous          | Miconia albicans                 | 13.42                      | low Bird-skewed      | 1                  |
| Saltator similis             | Rudgea jasminoides               | 13.40                      | low Plant-skewed     | 1                  |
| Species                                  | Score | Bird Skew | Plant Skew | Notes |
|------------------------------------------|-------|-----------|------------|-------|
| Euphonia pectoralis Miconia cinnamomifolia | 13.37 | low       |            | 1     |
| Thraupis cyanoptera Psychotria vellosiana | 13.37 | low       | Plant      | 1     |
| Tachyphonus cristatus Miconia racemifera  | 13.36 | low       | Plant      | 1     |
| Thraupis ornate ilex microdonta           | 13.33 | low       | Plant      | 1     |
| Trichothraupis melanops Psychotria gracilenta | 13.33 | low       | Bird      | 1     |
| Pipraeidea melanonota Miconia sellowiana  | 13.27 | low       | Bird      | 1     |
| Orchesticus abeillei Leandra variabilis   | 13.26 | low       | Bird      | 1     |
| Turdus albicollis Miconia valtheri        | 13.24 | low       | Bird      | 1     |
| Tersina viridis Miconia tristis           | 13.21 | low       | Bird      | 1     |
| Orthogonys chloricterus Miconia latecrenata | 13.18 | low       | Bird      | 1     |
| Tachyphonus cristatus Leandra sp          | 13.09 | low       | Bird      | 1     |
| Turdus albicollis Myrcia spectabilis      | 13.07 | low       | Bird      | 1     |
| Myiodynastes maculatus Ocotea pulchella   | 13.06 | low       | Bird      | 1     |
| Orthogonys chloricterus Miconia budlejoides | 13.04 | low       | Bird      | 1     |
| Euphonia violacea Miconia prasina         | 13.03 | low       | Bird      | 1     |
| Orthogonys chloricterus Miconia brasiliensis | 13.03 | low       | Bird      | 1     |
| Chiroxiphia caudate Amaioua intermedia    | 13.01 | low       | Plant     | 1     |
| Turdus amaurochalinus Miconia prasina     | 12.96 | low       | Bird      | 1     |
| Ramphastos vitellinus Psidium cattleianum  | 12.95 | low       | Bird      | 1     |
| Trichothraupis melanops Rhpsalis teres     | 12.94 | low       | Bird      | 1     |
| Trichothraupis melanops Solanum americanum | 12.91 | low       | Bird      | 1     |
| Euphonia violacea Miconia cinnamomifolia  | 12.91 | low       | Bird      | 1     |
| Orthogonys chloricterus Miconia pusilliflora | 12.89 | low       | Bird      | 1     |
| Turdus albicollis Myrcia pulchra          | 12.88 | low       | Bird      | 1     |
| Trichothraupis melanops Miconia valtheri  | 12.85 | low       | Bird      | 1     |
| Cacicus chrysopterus Miconia pusilliflora  | 12.85 | low       | Bird      | 1     |
| Turdus amaurochalinus Miconia cinnamomifolia | 12.83 | low       | Bird      | 3     |
| Turdus flavipes Myrcia pulchra            | 12.76 | low       | Bird      | 1     |
| Turdus albicollis Myrcia pubipetala       | 12.75 | low       | Bird      | 2     |
| Cyanerpes cyaneus Myrcia splendens        | 12.75 | low       | Bird      | 1     |
| Species                                      | Similarity | Skewness | Category        | Weight   |
|----------------------------------------------|------------|----------|-----------------|----------|
| Thraupis sayaca Acnistus arborescens         | 12.73      | -0.721   | low Plant-skewed| 1        |
| Empidononus varius Miconia tristis           | 12.73      | 0.512    | low Bird-skewed | 1        |
| Orthogonys chloricterus Leandra sp           | 12.72      | 0.550    | low Bird-skewed | 1        |
| Thraupis cyanoptera Psychotria leioarpa      | 12.71      | -0.495   | low Plant-skewed| 1        |
| Turdus albicollis Miconia theizans           | 12.71      | 0.325    | low Bird-skewed | 1        |
| Stephanophorus diadematus Solanum mauritianum| 12.66      | 0.695    | low Bird-skewed | 1        |
| Turdus albicollis Myrcia ferruginea          | 12.65      | 0.333    | low Bird-skewed | 1        |
| Turdus albicollis Ficus luschnathiana        | 12.65      | 0.333    | low Bird-skewed | 1        |
| Myiozetetes similis Eugenia astringens       | 12.64      | 0.571    | low Bird-skewed | 1        |
| Conirostrum speciosum Miconia cinnamomifolia| 12.64      | 0.885    | low Bird-skewed | 1        |
| Thlypopsis sordida Eugenia brasiliensis      | 12.62      | 0.538    | low Bird-skewed | 1        |
| Cissopis leverianus Miconia valtheri         | 12.57      | 0.182    | low Bird-skewed | 1        |
| Ramphastos dicolorus Myrcia splendens        | 12.56      | 0.725    | low Bird-skewed | 1        |
| Tangara desmaresti ilex microdonta           | 12.55      | -0.754   | low Plant-skewed| 1        |
| Pipra rubrocapilla Miconia albicans          | 12.54      | 0.402    | low Bird-skewed | 1        |
| Turdus flavipes Ficus luschnathiana          | 12.52      | 0.321    | low Bird-skewed | 1        |
| Saltator maxilosus Miconia chartacea         | 12.47      | 0.469    | low Bird-skewed | 1        |
| Saltator similis Myrcia tomentosa            | 12.45      | -0.141   | low Plant-skewed| 1        |
| Coereba flaveola Myrcia splendens            | 12.39      | 0.720    | low Bird-skewed | 3        |
| Turdus albicollis Myrcia anacardiifolia      | 12.33      | 0.375    | low Bird-skewed | 1        |
| Trichotheaupis melanops Miconia theizans     | 12.31      | 0.288    | low Bird-skewed | 1        |
| Coereba flaveola Plinia cauliflora           | 12.29      | 0.731    | low Bird-skewed | 1        |
| Trichotheaupis melanops Miconia inconspicua  | 12.28      | 0.293    | low Bird-skewed | 1        |
| Turdus albicollis Miconia albicans           | 12.28      | 0.381    | low Bird-skewed | 1        |
| Elaenia flavogaster Miconia albicans         | 12.27      | 0.381    | low Bird-skewed | 1        |
| Saltator maxilosus Miconia pusilliflora      | 12.27      | 0.494    | low Bird-skewed | 1        |
| Turdus amaurochalinus Miconia ligustroides   | 12.26      | 0.936    | low Bird-skewed | 1        |
| Tangara cyanocephala Psychotria mapourioides  | 12.20      | -0.619   | low Plant-skewed| 1        |
| Species                          | Value 1 | Value 2 | Skewness | Interaction                  | Value | 
|---------------------------------|---------|---------|----------|------------------------------|-------|
| *Turdus albicollis* *Miconia sp* | 12.19   | 0.394   | low      | Bird-skewed                  | 1     |
| *Dacnis cayana* *Myrcia ferruginea* | 12.18   | 0.289   | low      | Bird-skewed                  | 1     |
| *Thraupis episcopus* *Guarea guidonia* | 12.18   | -0.706  | low      | Plant-skewed                 | 1     |
| *Elaenia sp* *Miconia tristis*  | 12.15   | 0.476   | low      | Bird-skewed                  | 1     |
| *Saltator maximus* *Myrcia splendens* | 12.13   | 0.712   | low      | Bird-skewed                  | 2     |
| *Thraupis ornate* *Psychotria mapourioides* | 12.09   | -0.631  | low      | Plant-skewed                 | 1     |
| *Tangara cyancephala* *Psychotria sessilis* | 12.07   | -0.613  | low      | Plant-skewed                 | 1     |
| *Turdus albicollis* *Myrcia ilheosensis* | 12.06   | 0.410   | low      | Bird-skewed                  | 2     |
| *Trichothraupis melanops* *Miconia tentaculifera* | 12.06   | 0.324   | low      | Bird-skewed                  | 1     |
| *Ramphastos dicolorus* *Myrcia brasiliensis* | 12.03   | 0.778   | low      | Bird-skewed                  | 1     |
| *Dacnis cayana* *Miconia rubiginosa* | 12.01   | 0.313   | low      | Bird-skewed                  | 1     |
| *Poospiza lateralis* *Leandra sp* | 12.00   | 0.510   | low      | Bird-skewed                  | 1     |
| *Chiroxiphia caudate* *Psychotria gracilenta* | 11.99   | -0.046  | low      | Plant-skewed                 | 1     |
| *Tangara cyancephala* *Palicourea forsteronioides* | 11.99   | -0.609  | low      | Plant-skewed                 | 1     |
| *Dacnis cayana* *Miconia tentaculifera* | 11.98   | 0.317   | low      | Bird-skewed                  | 1     |
| *Stephanophorus diadematus* *Miconia sellowiana* | 11.96   | 0.767   | low      | Bird-skewed                  | 1     |
| *Ramphastos dicolorus* *Ocotea spixiana* | 11.90   | 0.792   | low      | Bird-skewed                  | 1     |
| *Turdus rufiventris* *Miconia valtheri* | 11.89   | 0.092   | low      | Bird-skewed                  | 1     |
| *Trichothraupis melanops* *Miconia albicans* | 11.88   | 0.347   | low      | Bird-skewed                  | 1     |
| *Ramphastos vitellinus* *Ocotea pulchella* | 11.88   | 0.792   | low      | Bird-skewed                  | 1     |
| *Turdus rufiventris* *Myrcia palustris* | 11.87   | 0.096   | low      | Bird-skewed                  | 1     |
| *Turdus albicollis* *Myrcia budlejoides* | 11.85   | 0.437   | low      | Bird-skewed                  | 1     |
| *Tachyphonus cristatus* *Myrcia splendens* | 11.85   | 0.703   | low      | Bird-skewed                  | 1     |
| *Dacnis cayana* *Miconia albicans* | 11.81   | 0.341   | low      | Bird-skewed                  | 2     |
| *Turdus albicollis* *Miconia racemifera* | 11.81   | 0.443   | low      | Bird-skewed                  | 2     |
| *Turdus albicollis* *Leandra acutiflora* | 11.81   | 0.443   | low      | Bird-skewed                  | 1     |
| *Machaeroptrerus regulus* *Miconia prasina* | 11.80   | 0.862   | low      | Bird-skewed                  | 1     |
| Taxonomy                        | Distance | Standard Error | Dominance | Skewness   |
|--------------------------------|----------|----------------|-----------|------------|
| **Turdus flavipes Miconia chartacea** | 11.78    | 0.420          | low       | Bird-skewed | 1 |
| **Turdus albicollis Miconia tristis** | 11.76    | 0.450          | low       | Bird-skewed | 1 |
| **Elaenia flavogaster Miconia tristis** | 11.75    | 0.449          | low       | Bird-skewed | 1 |
| **Tangara cayana Myrcia tomentosa** | 11.72    | -0.250         | low       | Plant-skewed | 1 |
| **Turdus albicollis Miconia pusilliflora** | 11.71    | 0.457          | low       | Bird-skewed | 1 |
| **Tachyphonus coronatus Psychotria gracilenta** | 11.69    | -0.095         | low       | Plant-skewed | 1 |
| **Turdus flavipes Miconia racemifera** | 11.68    | 0.433          | low       | Bird-skewed | 1 |
| **Turdus rufiventris Myrciaria cuspidata** | 11.68    | 0.127          | low       | Bird-skewed | 1 |
| **Machaeropterus regulus Miconia cinnamomifolia** | 11.67    | 0.874          | low       | Bird-skewed | 1 |
| **Turdus albicollis Leandra variabilis** | 11.63    | 0.467          | low       | Bird-skewed | 1 |
| **Turdus flavipes Miconia tristis** | 11.63    | 0.440          | low       | Bird-skewed | 1 |
| **Trichotheaupis melanops Miconia latecrenata** | 11.60    | 0.387          | low       | Bird-skewed | 1 |
| **Turdus flavipes Miconia pusilliflora** | 11.58    | 0.447          | low       | Bird-skewed | 2 |
| **Chiroxiphia caudate Solanum americanum** | 11.58    | 0.023          | low       | Bird-skewed | 1 |
| **Trichotheaupis melanops Miconia discolor** | 11.56    | 0.392          | low       | Bird-skewed | 1 |
| **Myiozetetes similis Myrctica splendens** | 11.56    | 0.693          | low       | Bird-skewed | 1 |
| **Trichotheaupis melanops Miconia chartacea** | 11.52    | 0.398          | low       | Bird-skewed | 1 |
| **Chiroxiphia caudate Miconia valtheri** | 11.51    | 0.034          | low       | Bird-skewed | 1 |
| **Ramphastos dicolorus Campomanesia guaviroba** | 11.50    | 0.832          | low       | Bird-skewed | 1 |
| **Trichotheaupis melanops Leandra regnellii** | 11.49    | 0.403          | low       | Bird-skewed | 1 |
| **Ramphastos vitellinus Campomanesia guaviroba** | 11.49    | 0.832          | low       | Bird-skewed | 1 |
| **Trichotheaupis melanops Miconia budlejoides** | 11.46    | 0.406          | low       | Bird-skewed | 2 |
| **Trichotheaupis melanops Miconia brasiliensis** | 11.45    | 0.407          | low       | Bird-skewed | 1 |
| **Trichotheaupis melanops Leandra australis** | 11.44    | 0.409          | low       | Bird-skewed | 1 |
| **Cacicus haemorrhous Myrctica splendens** | 11.44    | 0.689          | low       | Bird-skewed | 1 |
| **Trichotheaupis melanops Miconia racemifera** | 11.42    | 0.412          | low       | Bird-skewed | 1 |
| **Trichotheaupis melanops Leandra acutiflora** | 11.42    | 0.413          | low       | Bird-skewed | 1 |
| Species of Bird | Species of Plant | Abundance | Skewness | Frequency |
|----------------|------------------|-----------|----------|-----------|
| Dacnis cayana  | Miconia budlejoides | 11.39    | 0.401    | low       |
| Pteroglossus aracari | Miconia cinnamomifolia | 11.38    | 0.870    | low       |
| Turdus albicollis | Eugenia astringens | 11.38    | 0.499    | low       |
| Trichothraupis melanops | Miconia tristis | 11.37    | 0.419    | low       |
| Turdus rufiventris | Miconia theizans | 11.36    | 0.178    | low       |
| Turdus albicollis | Leandra pilonensis | 11.35    | 0.503    | low       |
| Dacnis cayana | Miconia racemifera | 11.35    | 0.407    | low       |
| Lipaugus laniooides | Miconia cabucu | 11.33    | 0.861    | low       |
| Turdus rufiventris | Miconia inconspicua | 11.32    | 0.184    | low       |
| Trichothraupis melanops | Miconia pusilliflora | 11.31    | 0.427    | low       |
| Turdus rufiventris | Myrcia ferruginea | 11.30    | 0.188    | low       |
| Dacnis cayana | Miconia pusilliflora | 11.30    | 0.188    | low       |
| Hemithraupis ruficapilla | Miconia voltheri | 11.27    | -0.008   | Plant     |
| Turdus flavipes | Eugenia astringens | 11.25    | 0.491    | low       |
| Dacnis cayana | Miconia pusilliflora | 11.24    | 0.421    | low       |
| Megarynchus pitangua | Miconia cinnamomifolia | 11.24    | 0.868    | low       |
| Trichothraupis melanops | Leandra variabilis | 11.23    | 0.438    | low       |
| Ramphastos dicolorus | Miconia cabucu | 11.23    | 0.859    | low       |
| Cissopis leverianus | Leandra regnellii | 11.21    | 0.379    | low       |
| Cissopis leverianus | Miconia budlejoides | 11.19    | 0.383    | low       |
| Turdus albicollis | Ocotea puberula | 11.19    | 0.525    | low       |
| Trichothraupis melanops | Leandra laevigata | 11.16    | 0.448    | low       |
| Cnemotriccus fuscatus | Miconia cinnamomifolia | 11.16    | 0.867    | low       |
| Cissopis leverianus | Miconia racemifera | 11.14    | 0.389    | low       |
| Trichothraupis melanops | Leandra sp | 11.14    | 0.451    | low       |
| Saltator fuliginosus | Solanum rufescens | 11.14    | 0.541    | low       |
| Tangara cyanoptera | Miconia racemifera | 11.09    | 0.385    | low       |
| Trichothraupis melanops | Leandra refracta | 11.07    | 0.460    | low       |
| Orthogonys chloricterus | Marlierea obscura | 11.07    | 0.738    | low       |
Tangara cyanoptera Miconia tristis  11.04  0.392  low  Bird-skewed  1
Chiroxiphia caudate Myrcia pubipetala  11.02  0.117  low  Bird-skewed  1
Chiroxiphia caudate Miconia theizens  10.98  0.125  low  Bird-skewed  1
Poospiza thoracica Miconia sellowiana  10.96  0.741  low  Bird-skewed  1
Trichothraupis melanops Leandra pilonensis  10.96  0.476  low  Bird-skewed  1
Cissopis leverianus Leandra variabilis  10.96  0.416  low  Bird-skewed  1
Trichothraupis melanops Leandra melastomoides  10.94  0.479  low  Bird-skewed  1
Trichothraupis melanops Ossaea amygdaloides  10.93  0.481  low  Bird-skewed  1
Chiroxiphia caudate Ficus luschnathiana  10.91  0.136  low  Bird-skewed  1
Knipolegus cyanirostris Miconia sellowiana  10.88  0.738  low  Bird-skewed  1
Knipolegus nigerrimus Miconia sellowiana  10.88  0.738  low  Bird-skewed  1
Saltator similis Miconia theizens  10.87  0.109  low  Bird-skewed  1
Saltator maximus Miconia prasina  10.85  0.848  low  Bird-skewed  1
Saltator similis Myrica ferruginea  10.81  0.120  low  Bird-skewed  1
Chiroxiphia caudate Miconia paniculata  10.77  0.161  low  Bird-skewed  1
Cissopis leverianus Solanum didymum  10.75  0.446  low  Bird-skewed  1
Tangara seledon Psychotria gracilenta  10.73 -0.252  low  Plant-skewed  1
Saltator maximus Miconia cinnamomifolia  10.73  0.861  low  Bird-skewed  1
Chiroxiphia caudate Miconia tentaculifera  10.72  0.169  low  Bird-skewed  1
Trichothraupis melanops Leandra barbinervis  10.70  0.512  low  Bird-skewed  1
Elaenia sp Myrica splendens  10.69  0.660  low  Bird-skewed  1
Myiarchus tyrannulus Eugenia astringens  10.63  0.444  low  Bird-skewed  1
Tachyphonus coronatus Myrica ferruginea  10.62  0.088  low  Bird-skewed  1
Saltator similis Miconia tentaculifera  10.62  0.154  low  Bird-skewed  1
Tachyphonus coronatus Ficus luschnathiana  10.61  0.089  low  Bird-skewed  1
Saltator fuliginosus Solanum mauritianum  10.60  0.612  low  Bird-skewed  1
Chiroxiphia caudate Myrica anacardifolia  10.60  0.190  low  Bird-skewed  1
Thlypopsis sordida Eugenia cerasiflora  10.59  0.774  low  Bird-skewed  1
Elaenia sp Calyptranthes concinna  10.57  0.675  low  Bird-skewed  1
Turdus rufiventris Miconia chartacea  10.56  0.306  low  Bird-skewed  1
| Bird Species | Plant Species | percent | index | Skewness Type | Count |
|--------------|---------------|---------|-------|---------------|-------|
| Pipra pipra  | Myrcia splendens | 10.56   | 0.654 | low           | 1     |
| Turdus sp    | Eugenia astringens | 10.49   | 0.433 | low           | 1     |
| Turdus rufiventris | Miconia racemifera | 10.46   | 0.322 | low           | 1     |
| Turdus rufiventris | Eugenia urugayensis | 10.45   | 0.324 | low           | 1     |
| Tachyphonus cristatus | Miconia cinnamomifolia | 10.45   | 0.857 | low           | 2     |
| Saltator similis | Miconia albicans | 10.44   | 0.184 | low           | 1     |
| Tachyphonus coronatus | Miconia rubiginosa | 10.44   | 0.120 | low           | 1     |
| Coereba flaveola | Miconia ligustroides | 10.42   | 0.924 | low           | 1     |
| Tachyphonus coronatus | Miconia tentaculifera | 10.42   | 0.124 | low           | 1     |
| Turdus rufiventris | Miconia tristis | 10.41   | 0.330 | low           | 2     |
| Saltator maxillosus | Miconia sellowiana | 10.40   | 0.723 | low           | 1     |
| Turdus rufiventris | Miconia pusilliflora | 10.35   | 0.339 | low           | 2     |
| Poospiza lateralis | Miconia sellowiana | 10.31   | 0.720 | low           | 1     |
| Turdus albicollis | Myrcia splendens | 10.30   | 0.642 | low           | 2     |
| Myiarchus ferox | Myrcia ferruginea | 10.29   | 0.032 | low           | 1     |
| Turdus rufiventris | Solanum inodorum | 10.29   | 0.349 | low           | 1     |
| Elaenia flavogaster | Myrcia splendens | 10.29   | 0.642 | low           | 1     |
| Tyrannus savana | Myrciaria cuspidata | 10.29   | -0.110 | low | Plant-skewed | 1 |
| Myiozetetes similis | Miconia prasina | 10.28   | 0.838 | low           | 1     |
| Turdus rufiventris | Leandra variabilis | 10.27   | 0.352 | low           | 1     |
| Chiroxiphia caudate | Miconia latecrenata | 10.26   | 0.247 | low           | 1     |
| Tangara peruviana | Eugenia astringens | 10.26   | 0.413 | low           | 1     |
| Tangara seledon | Miconia valtheri | 10.25   | -0.189 | low | Plant-skewed | 1 |
| Tachyphonus coronatus | Miconia albicans | 10.25   | 0.155 | low           | 2     |
| Chiroxiphia caudate | Miconia discolor | 10.23   | 0.253 | low           | 2     |
| Turdus rufiventris | Leandra laevigata | 10.20   | 0.363 | low           | 1     |
| Chiroxiphia caudate | Miconia chartacea | 10.18   | 0.261 | low           | 1     |
| Turdus albicollis | Calyptranthes concinna | 10.18   | 0.658 | low           | 1     |
| Turdus flavipes | Myrcia splendens | 10.17   | 0.636 | low           | 1     |
| Myiozetetes similis | Miconia cinnamomifolia | 10.15   | 0.852 | low           | 1     |
| Chiroxiphia caudate | Leandra regnellii | 10.15   | 0.266 | low           | 1     |
| Species Name                                    | Z-score | P-value | Competition | Status    | Count |
|------------------------------------------------|---------|---------|-------------|-----------|-------|
| Hemithraupis flavicollis Miconia albicans       | 10.13   | 0.137   | low         | Bird-skewed | 1     |
| Chiroxiphia caudate Miconia budlejoides         | 10.12   | 0.271   | low         | Bird-skewed | 3     |
| Chiroxiphia caudate Miconia brasiliensis        | 10.12   | 0.272   | low         | Bird-skewed | 1     |
| Turdus leucomelas Miconia rubiginosa            | 10.11   | 0.064   | low         | Bird-skewed | 1     |
| Cacicus haemorrhous Miconia cabucu              | 10.11   | 0.841   | low         | Bird-skewed | 1     |
| Chiroxiphia caudate Miconia racemifera          | 10.08   | 0.278   | low         | Bird-skewed | 2     |
| Turdus rufiventris Endlicheria paniculata       | 10.08   | 0.384   | low         | Bird-skewed | 1     |
| Tangara seledon Myrcia spectabilis              | 10.07   | -0.163  | low         | Plant-skewed | 1   |
| Cissopis leverianus Psidium cattleanum           | 10.04   | 0.549   | low         | Bird-skewed | 1     |
| Cacicus haemorrhous Miconia cinnamomifolia      | 10.03   | 0.850   | low         | Bird-skewed | 1     |
| Chiroxiphia caudate Miconia tristis             | 10.03   | 0.287   | low         | Bird-skewed | 2     |
| Turdus rufiventris Eugenia astringens           | 10.03   | 0.391   | low         | Bird-skewed | 1     |
| Elaenia sp Ocotea pulchella                     | 10.02   | 0.743   | low         | Bird-skewed | 1     |
| Hemithraupis ruficapilla Miconia latecrenata    | 10.02   | 0.214   | low         | Bird-skewed | 1     |
| Turdus albicollis Paullinia uloptera            | 10.02   | 0.679   | low         | Bird-skewed | 1     |
| Chiroxiphia caudate Miconia pusilliflora        | 9.98    | 0.296   | low         | Bird-skewed | 2     |
| Turdus rufiventris Ossea amygdaloides           | 9.97    | 0.401   | low         | Bird-skewed | 1     |
| Tachyphonus coronatus Miconia latecrenata       | 9.96    | 0.206   | low         | Bird-skewed | 1     |
| Thlypopsis sordida Miconia cinnamomifolia       | 9.94    | 0.848   | low         | Bird-skewed | 1     |
| Saltator similis Miconia tristis               | 9.93    | 0.274   | low         | Bird-skewed | 1     |
| Myiarchus ferox Miconia albicans                | 9.92    | 0.103   | low         | Bird-skewed | 1     |
| Turdus leucomelas Miconia albicans              | 9.91    | 0.101   | low         | Bird-skewed | 1     |
| Tangara cayana Miconia rubiginosa               | 9.91    | 0.027   | low         | Bird-skewed | 1     |
| Chiroxiphia caudate Solanum inodorum            | 9.91    | 0.307   | low         | Bird-skewed | 1     |
| Tachyphonus coronatus Ossea sp                  | 9.91    | 0.217   | low         | Bird-skewed | 1     |
| Chiroxiphia caudate Leandra variabilis          | 9.90    | 0.310   | low         | Bird-skewed | 1     |
| Turdus flavipes Paullinia uloptera              | 9.89    | 0.673   | low         | Bird-skewed | 1     |
| Turdus rufiventris Eugenia hiemalis             | 9.89    | 0.413   | low         | Bird-skewed | 1     |
| Turdus albicollis Marlierea obscura             | 9.88    | 0.697   | low         | Bird-skewed | 1     |
| Hemithraupis ruficapilla Miconia brasiliensis   | 9.88    | 0.240   | low         | Bird-skewed | 1     |
| Saltator similis Miconia pusilliflora           | 9.87    | 0.284   | low         | Bird-skewed | 1     |
| Species 1                      | Species 2                      | Information 1 | Information 2 | Information 3 | Information 4 |
|-------------------------------|-------------------------------|---------------|---------------|---------------|---------------|
| Turdus albicollis             | Miconia sellowiana            | 9.84          | 0.702         | low           | Bird-skewed   |
| Hemithraupis ruficapilla      | Miconia racemifera            | 9.84          | 0.247         | low           | Bird-skewed   |
| Dacnis cayana                 | Myrcia splendens              | 9.83          | 0.619         | low           | Bird-skewed   |
| Turdus rufiventris            | Ocotea puberula               | 9.83          | 0.422         | low           | Bird-skewed   |
| Elaenia flavogaster           | Miconia sellowiana            | 9.84          | 0.702         | low           | Bird-skewed   |
| Chiroxipha caudate            | Leandra laevigata             | 9.82          | 0.322         | low           | Bird-skewed   |
| Tachyphonus coronatus         | Miconia budlejoides           | 9.82          | 0.231         | low           | Bird-skewed   |
| Ramphocelus bresilius         | Myrcia ferruginea             | 9.82          | -0.060        | low           | Plant-skewed  |
| Saltator similis              | Solanum inodorum              | 9.81          | 0.295         | low           | Bird-skewed   |
| Tachyphonus coronatus         | Leandra australis             | 9.80          | 0.235         | low           | Bird-skewed   |
| Saltator similis              | Leandra variabilis            | 9.79          | 0.297         | low           | Bird-skewed   |
| Hemithraupis ruficapilla      | Miconia tristis               | 9.79          | 0.256         | low           | Bird-skewed   |
| Tachyphonus coronatus         | Miconia racemifera            | 9.78          | 0.239         | low           | Bird-skewed   |
| Tachyphonus coronatus         | Leandra acutiflora            | 9.78          | 0.239         | low           | Bird-skewed   |
| Elaenia flavogaster           | Myrcia hebepetala             | 9.76          | 0.711         | low           | Bird-skewed   |
| Chiroxipha caudate            | Leandra sablaensis            | 9.74          | 0.336         | low           | Bird-skewed   |
| Chiroxipha caudate            | Leandra refracta              | 9.74          | 0.337         | low           | Bird-skewed   |
| Hemithraupis ruficapilla      | Miconia pusilliflora          | 9.73          | 0.266         | low           | Bird-skewed   |
| Tyrannus melancholica         | Miconia rubiginosa            | 9.73          | -0.009        | low           | Plant-skewed  |
| Dacnis cayana                 | Plinia cauliflora             | 9.73          | 0.634         | low           | Bird-skewed   |
| Tachyphonus coronatus         | Miconia tristis               | 9.73          | 0.248         | low           | Bird-skewed   |
| Tangara cayana                | Miconia albicans              | 9.72          | 0.066         | low           | Bird-skewed   |
| Turdus flavipes                | Miconia sellowiana            | 9.71          | 0.697         | low           | Bird-skewed   |
| Saltator similis              | Leandra sp                    | 9.70          | 0.313         | low           | Bird-skewed   |
| Tachyphonus coronatus         | Miconia pusilliflora          | 9.68          | 0.258         | low           | Bird-skewed   |
| Tangara seledon               | Ficus luschnathiana           | 9.65          | -0.093        | low           | Plant-skewed  |
| Ramphocelus carbo             | Miconia rubiginosa            | 9.65          | -0.027        | low           | Plant-skewed  |
| Turdus albicollis             | Ocotea pulchella              | 9.64          | 0.730         | low           | Bird-skewed   |
| Elaenia flavogaster           | Ocotea pulchella              | 9.63          | 0.729         | low           | Bird-skewed   |
| Chiroxipha caudate            | Miconia elegans               | 9.62          | 0.357         | low           | Bird-skewed   |
| Tachyphonus coronatus         | Leandra variabilis            | 9.60          | 0.272         | low           | Bird-skewed   |
| Species                          | Similarity | Distance | Skewness | Skewness Type | Value |
|---------------------------------|------------|----------|----------|---------------|-------|
| Chiroxiphia caudate Ossaea amygdaloïdes | 9.59       | 0.362    | low      | Bird-skewed   | 1     |
| Tangara preciosa Myrcia hartwegiana | 9.56       | 0.080    | low      | Bird-skewed   | 1     |
| Tyrannus melancholicus Miconia albicans | 9.54       | 0.031    | low      | Bird-skewed   | 1     |
| Tachyphonus coronatus Leandra laevigata | 9.52       | 0.285    | low      | Bird-skewed   | 1     |
| Turdus flavipes Ocotea pulchella | 9.51       | 0.725    | low      | Bird-skewed   | 1     |
| Tangara cyanocephala Psychotria gracilenta | 9.51      | -0.452   | low      | Plant-skewed  | 1     |
| Turdus leucomelas Miconia buldejoides | 9.49       | 0.183    | low      | Bird-skewed   | 1     |
| Saltator similis Ossaea amygdaloïdes | 9.49       | 0.350    | low      | Bird-skewed   | 1     |
| Thraupis sayaca Myrcia tomentosa | 9.48       | -0.585   | low      | Plant-skewed  | 1     |
| Saltator similis Solanum variabile | 9.47       | 0.353    | low      | Bird-skewed   | 1     |
| Tangara cayana Leandra aurea | 9.46       | 0.116    | low      | Bird-skewed   | 1     |
| Chiroxiphia caudate Ocotea puberula | 9.45       | 0.385    | low      | Bird-skewed   | 1     |
| Ramphocelus bresilius Miconia albicans | 9.45       | 0.014    | low      | Bird-skewed   | 2     |
| Trichothraupis melanops Miconia sellowiana | 9.45       | 0.686    | low      | Bird-skewed   | 1     |
| Tachyphonus coronatus Leandra sabiaensis | 9.44       | 0.300    | low      | Bird-skewed   | 1     |
| Tachyphonus coronatus Leandra refracta | 9.44       | 0.301    | low      | Bird-skewed   | 1     |
| Thraupis cyanoptera Myrcia pubipetala | 9.43       | -0.175   | low      | Plant-skewed  | 1     |
| Turdus leucomelas Miconia tristis | 9.40       | 0.200    | low      | Bird-skewed   | 1     |
| Dacnis cayana Miconia sellowiana | 9.38       | 0.683    | low      | Bird-skewed   | 1     |
| Tachyphonus coronatus Eugenia astringens | 9.35       | 0.316    | low      | Bird-skewed   | 1     |
| Tangara cayana Miconia chartacea | 9.35       | 0.139    | low      | Bird-skewed   | 2     |
| Thraupis cyanoptera Ficus luschnathiana | 9.32       | -0.158   | low      | Plant-skewed  | 1     |
| Dacnis cayana Myrcia hebepeptala | 9.31       | 0.693    | low      | Bird-skewed   | 1     |
| Tachyphonus coronatus Leandra melastomoides | 9.30      | 0.325    | low      | Bird-skewed   | 1     |
| Tangara cayana Miconia buldejoides | 9.29       | 0.150    | low      | Bird-skewed   | 1     |
| Tachyphonus coronatus Ossaea amygdaloïdes | 9.29       | 0.327    | low      | Bird-skewed   | 1     |
| Elaenia sp Miconia cinnamomifolia | 9.28       | 0.836    | low      | Bird-skewed   | 1     |
| Pipra rubrocapilla Miconia prasina | 9.28       | 0.817    | low      | Bird-skewed   | 1     |
| Pipra pipra Miconia prasina | 9.28       | 0.817    | low      | Bird-skewed   | 1     |
| Saltator similis Solanum rufescens | 9.25       | 0.391    | low      | Bird-skewed   | 1     |
| Species                        | photograph | abundance | frequency | feeding habit |
|-------------------------------|------------|-----------|-----------|---------------|
| *Turdus leucomelas* *Eugenia brasiliensis* | 9.21       | 0.237     | low       | Bird-skewed   | 1 |
| *Tangara cayana* *Miconia tristis* | 9.20       | 0.169     | low       | Bird-skewed   | 1 |
| *Pipra rubrocapilla* *Miconia cinnamomifolia* | 9.15       | 0.833     | low       | Bird-skewed   | 1 |
| *Pipra pipra* *Miconia cinnamomifolia* | 9.15       | 0.833     | low       | Bird-skewed   | 1 |
| *Dacnis cayana* *Eugenia uniflora* | 9.07       | 0.726     | low       | Bird-skewed   | 1 |
| *Tangara cyancephala* *Miconia valtheri* | 9.02       | -0.405    | low       | Bird-skewed   | 1 |
| *Tyrannus melancholicus* *Miconia tristis* | 9.02       | 0.138     | low       | Bird-skewed   | 1 |
| *Turdus leucomelas* *Eugenia astringens* | 9.02       | 0.273     | low       | Bird-skewed   | 1 |
| *Tangara seledon* *Miconia latecrenata* | 9.00       | 0.039     | low       | Bird-skewed   | 1 |
| *Turdus albicollis* *Miconia cubatanensis* | 8.97       | 0.818     | low       | Bird-skewed   | 1 |
| *Turdus rufiventris* *Myrcia splendens* | 8.95       | 0.565     | low       | Bird-skewed   | 2 |
| *Thraupis sp* *Eugenia astringens* | 8.90       | 0.256     | low       | Bird-skewed   | 1 |
| *Turdus albicollis* *Miconia cinnamomifolia* | 8.89       | 0.828     | low       | Bird-skewed   | 1 |
| *Turdus flavipes* *Miconia prasina* | 8.89       | 0.808     | low       | Bird-skewed   | 1 |
| *Tangara seledon* *Miconia budlejoides* | 8.86       | 0.070     | low       | Bird-skewed   | 1 |
| *Turdus flavipes* *Miconia cubatanensis* | 8.84       | 0.814     | low       | Bird-skewed   | 1 |
| *Turdus flavipes* *Miconia cabucu* | 8.84       | 0.814     | low       | Bird-skewed   | 1 |
| *Tangara cyanoptera* *Eugenia uniflora* | 8.82       | 0.716     | low       | Bird-skewed   | 1 |
| *Tangara seledon* *Miconia racemifera* | 8.82       | 0.079     | low       | Bird-skewed   | 1 |
| *Turdus flavipes* *Miconia cinnamomifolia* | 8.76       | 0.825     | low       | Bird-skewed   | 1 |
| *Tangara seledon* *Miconia tristis* | 8.76       | 0.090     | low       | Bird-skewed   | 1 |
| *Ramphocelus carbo* *Eugenia brasiliensis* | 8.74       | 0.163     | low       | Bird-skewed   | 1 |
| *Saltator similis* *Solanum argenteum* | 8.71       | 0.485     | low       | Bird-skewed   | 1 |
| *Tangara seledon* *Miconia pusilliflora* | 8.71       | 0.102     | low       | Bird-skewed   | 2 |
| *Turdus leucomelas* *Solanum granulosoleprosum* | 8.70       | 0.335     | low       | Bird-skewed   | 1 |
| *Schistochlamys ruficapillus* *Leandra aurea* | 8.63       | -0.057    | low       | Plant-skewed  | 1 |
| *Thraupis cyanoptera* *Miconia chartacea* | 8.59       | -0.015    | low       | Plant-skewed  | 1 |
| *Ramphocelus bresilius* *Eugenia astringens* | 8.56       | 0.202     | low       | Bird-skewed   | 1 |
| *Dacnis cayana* *Miconia prasina* | 8.55       | 0.799     | low       | Bird-skewed   | 1 |
| *Elaenia mesoleuca* *Myrciaria floribunda* | 8.55       | 0.564     | low       | Bird-skewed   | 1 |
| Species of Bird                  | Species of Plant                  | Similarity | Skewness | Skewedness |
|---------------------------------|-----------------------------------|------------|----------|------------|
| *Tangara seledon*               | *Leandra sp*                      | 8.54       | 0.140    | low Bird-skewed | 1 |
| *Thraupis cyanoptera*           | *Miconia budlejoides*             | 8.53       | -0.001   | low Plant-skewed | 1 |
| *Schistochlamys ruficapillus*   | *Miconia chartacea*               | 8.51       | -0.032   | low Plant-skewed | 2 |
| *Tachyphonus coronatus*         | *Solanum mauritianum*             | 8.51       | 0.467    | low Bird-skewed | 1 |
| *Dacnis cayana*                 | *Miconia cabucu*                  | 8.51       | 0.806    | low Bird-skewed | 1 |
| *Trichothraupis melanops*       | *Miconia cinnamomifolia*          | 8.50       | 0.818    | low Bird-skewed | 2 |
| *Tangara cayana*                | *Solanum granulosoleprosum*       | 8.50       | 0.308    | low Bird-skewed | 1 |
| *Turdus rufiventris*            | *Miconia sellowiana*              | 8.49       | 0.638    | low Bird-skewed | 1 |
| *Tangara cyanoccephala*         | *Miconia theizans*                | 8.49       | -0.343   | low Plant-skewed | 1 |
| *Myiarchus swainsoni*           | *Myrcia splendens*                | 8.48       | 0.530    | low Bird-skewed | 1 |
| *Saltator similis*              | *Myrcia splendens*                | 8.46       | 0.528    | low Bird-skewed | 1 |
| *Tangara cyanoccephala*         | *Miconia inconspicua*             | 8.45       | -0.338   | low Plant-skewed | 1 |
| *Tyrannus melancholicus*        | *Nectandra cuspidata*             | 8.44       | 0.257    | low Bird-skewed | 1 |
| *Thraupis cyanoptera*           | *Miconia tristis*                 | 8.44       | 0.020    | low Bird-skewed | 1 |
| *Tangara cyanoccephala*         | *Myrcia ferruginea*               | 8.43       | -0.335   | low Plant-skewed | 1 |
| *Dacnis cayana*                 | *Miconia cinnamomifolia*          | 8.43       | 0.816    | low Bird-skewed | 3 |
| *Tangara cyanoccephala*         | *Ficus luschnathiana*             | 8.43       | -0.335   | low Plant-skewed | 1 |
| *Thraupis ornate*               | *Myrcia pubipetala*               | 8.43       | -0.369   | low Plant-skewed | 1 |
| *Turdus rufiventris*            | *Myrcia brasiliensis*             | 8.42       | 0.649    | low Bird-skewed | 1 |
| *Thraupis sayaca*               | *Myrcia palustris*                | 8.42       | -0.507   | low Plant-skewed | 1 |
| *Thraupis cyanoptera*           | *Miconia pusilliflora*            | 8.38       | 0.033    | low Bird-skewed | 2 |
| *Thraupis ornate*               | *Miconia theizans*                | 8.38       | -0.364   | low Plant-skewed | 1 |
| *Tangara seledon*               | *Leandra pilonensis*              | 8.36       | 0.179    | low Bird-skewed | 1 |
| *Thraupis cyanoptera*           | *Solanum inodorum*                | 8.32       | 0.048    | low Bird-skewed | 1 |
| *Turdus rufiventris*            | *Ocotea pulchella*                | 8.28       | 0.671    | low Bird-skewed | 2 |
| *Tachyphonus coronatus*         | *Myrcia splendens*                | 8.27       | 0.512    | low Bird-skewed | 1 |
| *Thraupis sayaca*               | *Myrcia spectabilis*              | 8.26       | -0.493   | low Plant-skewed | 1 |
| *Elaenia mesoleuca*             | *Miconia sellowiana*              | 8.21       | 0.621    | low Bird-skewed | 1 |
| *Turdus rufiventris*            | *Eugenia cerasiflora*             | 8.19       | 0.687    | low Bird-skewed | 1 |
| *Tachyphonus coronatus*         | *Plinia cauliflora*               | 8.16       | 0.530    | low Bird-skewed | 1 |
| Species of Bird                  | Species of Plant       | Insectivory | Skew   | Position |
|----------------------------------|------------------------|------------|--------|----------|
| **Tangara desmaresti**           | **Miconia valtheri**   | 8.13       | -0.563 | low      |
| **Thraupis sayaca**              | **Myrcia oblongata**   | 8.08       | -0.476 | low      |
| **Tangara cyanoccephala**        | **Miconia albicans**   | 8.06       | -0.283 | low      |
| **Thraupis cyanoptera**          | **Eugenia astringens** | 8.06       | 0.109  | Bird     |
| **Thraupis cyanoptera**          | **Leandra xanthocoma** | 8.06       | 0.110  | low      |
| **Chiroxipha caudate**           | **Myrcia hebetepetala**| 8.04       | 0.626  | low      |
| **Saltator similis**             | **Miconia sellowiana** | 8.01       | 0.607  | low      |
| **Tangara mexicana**             | **Miconia prasina**    | 8.00       | 0.782  | low      |
| **Thraupis cyanoptera**          | **Eugenia melanogyna** | 8.00       | 0.123  | low      |
| **Turdus leucomelas**            | **Myrcia splendens**   | 7.93       | 0.481  | low      |
| **Trichothraupis melanops**      | **Miconia minutiflora**| 7.93       | 0.897  | low      |
| **Thraupis palmarum**            | **Miconia albicans**   | 7.91       | -0.314 | low      |
| **Tangara mexicana**             | **Miconia cinnamomifolia** | 7.88   | 0.801  | low      |
| **Thraupis sayaca**              | **Myrcia ferruginea**  | 7.84       | -0.451 | low      |
| **Turdus leucomelas**            | **Plinia cauliflora**  | 7.83       | 0.500  | low      |
| **Tachyphonus coronatus**        | **Miconia sellowiana** | 7.81       | 0.593  | low      |
| **Tangara cyanoccephala**        | **Miconia latecrenata**| 7.78       | -0.236 | low      |
| **Tachyphonus coronatus**        | **Myrcia hebetepetala**| 7.74       | 0.606  | low      |
| **Ramphocelus carbo**            | **Solanum mauritianum**| 7.72       | 0.378  | low      |
| **Tangara seledon**              | **Siphoneugena densiflora** | 7.71   | 0.320  | low      |
| **Thraupis episcopus**           | **Miconia rubiginosa** | 7.66       | -0.433 | low      |
| **Tangara cyanoccephala**        | **Miconia budleijoides**| 7.64       | -0.211 | low      |
| **Tangara cayana**               | **Plinia cauliflora**  | 7.63       | 0.481  | low      |
| **Tangara cyanoccephala**        | **Miconia brasiliensis**| 7.63       | -0.210 | low      |
| **Tangara cyanoccephala**        | **Leandra australis**  | 7.62       | -0.208 | low      |
| **Tangara desmaresti**           | **Miconia theizans**   | 7.60       | -0.517 | low      |
| **Tangara cyanoccephala**        | **Miconia racemifera** | 7.59       | -0.203 | low      |
| **Thraupis ornate**              | **Miconia chartacea**  | 7.59       | -0.247 | low      |
| **Tangara preciosa**             | **Calytranthes concinna** | 7.57    | 0.479  | low      |
| **Tyrannus melancholicus**       | **Myrcia splendens**   | 7.56       | 0.440  | low      |
| **Tangara cyanoccephala**        | **Miconia tristis**    | 7.54       | -0.194 | low      |
| Species 1                                      | Species 2                                      | Score 1 | Score 2 | Skewness | skewness Type | Number |
|------------------------------------------------|------------------------------------------------|---------|---------|-----------|---------------|--------|
| Turdus rufiventris   | Miconia cinnamomifolia       | 7.54    | 0.790   | low       | Bird-skewed   | 2      |
| Tangara desmaresti  | Ficus luschnathiana          | 7.53    | -0.511  | low       | Plant-skewed  | 1      |
| Thraupis ornata     | Miconia bulejoides           | 7.53    | -0.236  | low       | Plant-skewed  | 1      |
| Thraupis ornata     | Miconia brasiliensis         | 7.52    | -0.236  | low       | Plant-skewed  | 1      |
| Tangara cyanoccephal| Miconia pusilliflora         | 7.49    | -0.183  | low       | Plant-skewed  | 2      |
| Thraupis ornata     | Miconia Miconia racemifera   | 7.49    | -0.229  | low       | Plant-skewed  | 1      |
| Thraupis sayaca     | Miconia albicans             | 7.47    | -0.407  | low       | Plant-skewed  | 2      |
| Ramphocelus bresilius | Myrcia splendens            | 7.47    | 0.430   | low       | Bird-skewed   | 2      |
| Thraupis ornata     | Miconia tristis              | 7.43    | -0.219  | low       | Plant-skewed  | 2      |
| Tangara cyanoccephal| Leandra variabilis           | 7.41    | -0.167  | low       | Plant-skewed  | 1      |
| Thraupis palmarum  | Miconia tristis              | 7.39    | -0.229  | low       | Plant-skewed  | 1      |
| Thraupis ornata     | Miconia pusilliflora         | 7.38    | -0.209  | low       | Plant-skewed  | 2      |
| Ramphocelus carbo   | Plinia cauliflora            | 7.37    | 0.452   | low       | Bird-skewed   | 1      |
| Tangara cyanocentris| Miconia tentaculifera        | 7.33    | -0.493  | low       | Plant-skewed  | 1      |
| Tangara cyanoccephal| Leandra sp                  | 7.32    | -0.147  | low       | Plant-skewed  | 1      |
| Tangara cyana       | Miconia sellowiana          | 7.28    | 0.550   | low       | Bird-skewed   | 1      |
| Chiroxiphia caudate| Miconia cabuc                | 7.24    | 0.764   | low       | Bird-skewed   | 1      |
| Chiroxiphia caudate| Miconia cubatanensis        | 7.24    | 0.764   | low       | Bird-skewed   | 1      |
| Thraupis cyanoptera| Solanum mauritianum         | 7.22    | 0.306   | low       | Bird-skewed   | 1      |
| Turdus leucomelas  | Eugenia uniflora             | 7.17    | 0.626   | low       | Bird-skewed   | 3      |
| Tangara desmaresti | Miconia albicans             | 7.17    | -0.473  | low       | Plant-skewed  | 1      |
| Chiroxiphia caudate| Miconia cinnamomifolia       | 7.16    | 0.777   | low       | Bird-skewed   | 2      |
| Tangara cyanoccephal| Ossaea amygdaloides          | 7.10    | -0.099  | low       | Plant-skewed  | 1      |
| Saltator similis   | Miconia cinnamomifolia       | 7.06    | 0.773   | low       | Bird-skewed   | 1      |
| Thraupis palmarum  | Eugenia astringens           | 7.01    | -0.152  | low       | Plant-skewed  | 1      |
| Tachyphonus coronatus | Miconia prasina             | 6.99    | 0.742   | low       | Bird-skewed   | 1      |
| Thraupis cyanoptera| Myrcia splendens            | 6.98    | 0.364   | low       | Bird-skewed   | 1      |
| Thraupis episcopus  | Miconia tristis              | 6.95    | -0.336  | low       | Plant-skewed  | 1      |
| Hemithraupis ruficapilla | Miconia cinnamomifolia    | 6.92    | 0.767   | low       | Bird-skewed   | 1      |
| Tangara desmaresti | Leandra aurea                | 6.91    | -0.443  | low       | Plant-skewed  | 1      |
| Species                          | Species                      | Frequency | Skew | Prey Type          | Score  |
|---------------------------------|------------------------------|-----------|------|--------------------|--------|
| Tyrannus melancholicus Ocotea pulchella | 6.89                        | 0.577     | low  | Bird-skewed        | 1      |
| Tangara desmaresti Miconia latecrenata | 6.88                        | -0.439    | low  | Plant-skewed       | 1      |
| Tachyphonus coronatus Miconia cinnamomifolia | 6.86                        | 0.764     | low  | Bird-skewed        | 2      |
| Tangara desmaresti Miconia chartacea | 6.80                        | -0.428    | low  | Plant-skewed       | 2      |
| Thraupis episcopus Eugenia brasiliensis | 6.76                        | -0.305    | low  | Plant-skewed       | 1      |
| Hemithraupis flavicolallis Miconia cinnamomifolia | 6.75                        | 0.759     | low  | Bird-skewed        | 1      |
| Tangara desmaresti Miconia budlejoides | 6.74                        | -0.420    | low  | Plant-skewed       | 2      |
| Tangara desmaresti Leandra australis | 6.72                        | -0.418    | low  | Plant-skewed       | 1      |
| Ramphocelus carbo Eugenia uniflora | 6.71                        | 0.590     | low  | Bird-skewed        | 2      |
| Tangara desmaresti Miconia racemifera | 6.70                        | -0.415    | low  | Plant-skewed       | 1      |
| Myiarchus ferox Miconia prasina | 6.66                       | 0.726     | low  | Bird-skewed        | 1      |
| Tangara desmaresti Miconia tristis | 6.65                        | -0.407    | low  | Plant-skewed       | 2      |
| Tangara desmaresti Miconia pusilliflora | 6.60                        | -0.400    | low  | Plant-skewed       | 2      |
| Thraupis sayaca Solanum myrianthum | 6.59                        | -0.269    | low  | Plant-skewed       | 1      |
| Thraupis sayaca Eugenia astringens | 6.58                        | -0.267    | low  | Plant-skewed       | 1      |
| Thraupis sayaca Miconia elegans | 6.55                        | -0.261    | low  | Plant-skewed       | 1      |
| Turdus leucomelas Miconia cinnamomifolia | 6.53                        | 0.749     | low  | Bird-skewed        | 2      |
| Thraupis cyanoptera Miconia sellowiana | 6.52                        | 0.470     | low  | Bird-skewed        | 1      |
| Tangara desmaresti Leandra variabilis | 6.52                        | -0.388    | low  | Plant-skewed       | 1      |
| Thraupis cyanoptera Myrcia hebepetala | 6.45                        | 0.487     | low  | Bird-skewed        | 1      |
| Tangara desmaresti Leandra sp | 6.42                        | -0.373    | low  | Plant-skewed       | 1      |
| Tangara cayana Miconia cinnamomifolia | 6.33                        | 0.740     | low  | Bird-skewed        | 2      |
| Tyrannus melancholicus Miconia prasina | 6.28                        | 0.704     | low  | Bird-skewed        | 1      |
| Thraupis episcopus Solanum granulosoleprosum | 6.24                        | -0.203    | low  | Plant-skewed       | 1      |
| Tangara desmaresti Leandra pilonensis | 6.24                        | -0.343    | low  | Plant-skewed       | 1      |
| Ramphocelus bresilius Miconia prasina | 6.19                        | 0.699     | low  | Bird-skewed        | 1      |
| Tyrannus melancholicus Miconia cinnamomifolia | 6.15                        | 0.730     | low  | Bird-skewed        | 1      |
| Species 1                        | Species 2                        | Distance | Specialization | Skeweness | Birds       |
|---------------------------------|----------------------------------|----------|----------------|------------|-------------|
| Tangara cyanocephala            | Myrcia splendens                 | 6.08     | 0.194          | low        | Bird-skewed |
| Ramphocelus bresilius           | Miconia cinnamomifolia           | 6.07     | 0.725          | low        | Bird-skewed |
| Tangara seledon                 | Miconia cabucu                   | 5.97     | 0.698          | low        | Bird-skewed |
| Thraupis ornate                 | Myrcia splendens                 | 5.97     | 0.168          | low        | Bird-skewed |
| Thraupis palmarum               | Myrcia splendens                 | 5.93     | 0.157          | low        | Bird-skewed |
| Thraupis sayaca                 | Psidium cattleianum              | 5.90     | -0.109         | low        | Plant-skewed|
| Tangara seledon                 | Miconia cinnamomifolia           | 5.90     | 0.715          | low        | Bird-skewed |
| Tangara cayana                  | Miconia ligustroides             | 5.76     | 0.853          | low        | Bird-skewed |
| Thraupis episcopus              | Solanum mauritianum             | 5.73     | -0.064         | low        | Plant-skewed|
| Thraupis cyanoptera             | Miconia cabucu                   | 5.65     | 0.675          | low        | Bird-skewed |
| Thraupis cyanoptera             | Miconia cinnamomifolia           | 5.57     | 0.693          | low        | Bird-skewed |
| Thraupis ornate                 | Miconia sellowiana               | 5.52     | 0.307          | low        | Bird-skewed |
| Thraupis sayaca                 | Myrcia splendens                 | 5.49     | 0.025          | low        | Bird-skewed |
| Thraupis sayaca                 | Plinia cauliflora                | 5.39     | 0.062          | low        | Bird-skewed |
| Thraupis episcopus              | Plinia cauliflora                | 5.38     | 0.058          | low        | Bird-skewed |
| Thraupis sayaca                 | Marlirea obscura                 | 5.08     | 0.173          | low        | Bird-skewed |
| Thraupis sayaca                 | Miconia sellowiana               | 5.04     | 0.188          | low        | Bird-skewed |
| Thraupis sayaca                 | Ocotea pulchella                 | 4.83     | 0.263          | low        | Bird-skewed |
| Tangara cyanopehala             | Miconia cabucu                   | 4.75     | 0.589          | low        | Bird-skewed |
| Tangara cyanopehala             | Miconia cubatanensis             | 4.75     | 0.589          | low        | Bird-skewed |
| Thraupis sayaca                 | Eugenia cerasiflora              | 4.73     | 0.298          | low        | Bird-skewed |
| Tangara desmaresti              | Miconia sellowiana               | 4.73     | 0.087          | low        | Bird-skewed |
| Thraupis episcopus              | Eugenia uniflora                 | 4.72     | 0.295          | low        | Bird-skewed |
| Tangara cyanopehala             | Miconia cinnamomifolia           | 4.67     | 0.611          | low        | Bird-skewed |
| Thraupis palmarum               | Miconia prasina                  | 4.65     | 0.555          | low        | Bird-skewed |
| Thraupis ornate                 | Miconia cinnamomifolia           | 4.57     | 0.599          | low        | Bird-skewed |
| Thraupis palmarum               | Miconia cinnamomifolia           | 4.53     | 0.594          | low        | Bird-skewed |
| Thraupis sayaca                 | Miconia prasina                  | 4.21     | 0.485          | low        | Bird-skewed |
| Thraupis sayaca                 | Miconia cinnamomifolia           | 4.09     | 0.530          | low        | Bird-skewed |
| Tangara desmaresti              | Miconia cinnamomifolia           | 3.78     | 0.471          | low        | Bird-skewed |
| Tangara cyanovenris             | Miconia cinnamomifolia           | 3.77     | 0.469          | low        | Bird-skewed |
| Thraupis sayaca Miconia ligustroides | 3.52 | 0.734 | low | Bird-skewed | 1 |