Supplementary Information of the article "Frugivore biodiversity and complementarity in interaction networks enhance landscape-scale seed dispersal function" *Functional Ecology*

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Appendix S1. Comprehensive description of sampling methodologies

Study design

In August 2012, we delimited fourteen 2.25 Ha study plots (150 x 150 m) in two sites (Sierra de Peña Mayor and Bandujo-Puertos de Marabio; average altitude 1000 m asl) in central Asturias Province (Spain; Table S1, Figure S1; for a regional map see García, Carlo & Martínez, 2016). Minimum distance between plots within site was 350 m. For better management of sampling, each plot was subdivided into 36 cells of 25 x 25 m (Fig. S1). These plot and cell dimensions represented spatial grains appropriate for the study of the variability in fruit production, bird abundance and richness, and seed dispersal (Martínez & García, 2017).

Vegetation type was similar across plots, with forest stands of variable size embedded in a matrix of pastures, heathland and stony (limestone) outcrops (Fig. S1). Forest patches included some hardwood tree species in larger patches (i.e. beech *Fagus sylvatica*; birch *Betula celtiberica*; ash *Fraxinus excelsior*) but were typically dominated by fleshy-fruited trees (hawthorn *Crataegus monogyna*, holly *Ilex aquifolium*, rowan *Sorbus aucuparia*, whitebeam *Sorbus aria*, yew *Taxus baccata*, elder *Sambucus nigra*), together with hazel (*Corylus avellana*) and goat willow (*Salix caprea*). Fleshy-fruited shrubs, mostly bramble (*Rubus fruticosus*/*ulmifolius),* and occasionally wild rose (*Rosa canina* and *Rosa* sp.), blackthorn (*Prunus spinosa*), and honeysuckle (*Lonicera* spp.) were typically growing as small fringe patches around forest stands.

Plots were chosen to represent a similar setting in terms of geomorphology (general slope, limestone substrate, altitude) and anthropic management (extensive livestock raising), and to include a gradient of forest habitat availability such that forest cover ranged from 3 to 69% (Table S1; Fig. S1). Previous work had demonstrated that variations in lanscape-scale forest cover correlates with significant changes in both abundance and richness of frugivorous birds and fleshy-fruited plants (García et al., 2010, García & Martínez, 2012) and, therefore, this sort of gradient was expected to lead to variable assemblages of birds and plants. Accurate measures of forest cover were estimated from a Geographic Information System of the study plots (GIS, ArcGIS9.3) based on 2011, 1:5000-scale orthophotographs, from which a layer of forest cover was carefully digitized in order to include the canopy projection of all trees (DBH > 10 cm, height > 1.5 m), including isolated individuals within pastures (Fig. S1). A layer of bramble cover, representing all bramble patches of diameter ≥ 50 cm, was also incorporated into the GIS. The extent and the position of bramble patches was sampled in the field by accurate mapping during fruit production surveys (see below *Fruit abundance and fruit traits*).

Sampling was carried out along two consecutive seasons of fruit production and seed dispersal, from September to March of 2012-2013 and 2013-2014. We refer to these consecutive periods as different sampling years.

Bird abundance and frugivory

Bird censuses were conducted using a point-count methodology. In each plot we established nine points at the center of sets of four adjacent 25 x 25 m cells. In each census, the number of individuals and the species of birds observed (heard or seen) in a 5 min period in the set of four adjacent cells, was recorded. Recordings accounted for birds using the woodland habitat at the scale of the observation extent, and discarded observations of birds performing high (> 50 m height), and non-stopping flights over the observation points. Each year, nine censuses were performed per point per plot (1-2 censuses each month between September and February), resulting in 6.75 observation hours per plot per year (total effort 189 hours). Censuses were performed from 9.00 to 15.00 (previous research had shown no significant changes in the rhythm of bird activity over this period; García & Martínez, 2012; Martínez & García, 2017), but avoided days of heavy rain and wind.

Bird fruit consumption was recorded in 17 rounds of 1-hour-per-plot observations throughout the period, though independent, of bird censuses (September-February): 8 rounds in 2012-13 and 9 in 2013-2014). Observations were performed from 09:00 to 15:00, resulting in a total of 238 observation hours. In each round, a given observer visited 3-4 vantage positions chosen ensure that the full extent of the plot was covered (i.e. including the nine points for bird censuses) as well as to focus on the different fruiting species present, while minimising bird reluctance to observer presence. Observations were made with 8 x 30 binoculars at distances ranging from 50 to 100 m, every fruit consumption event (i.e. an individual bird consuming fruits) and every feeding bout (i.e. a single bird swallowing a single fruit) detected during the observation round. Data from the different observation rounds each sampling year were pooled for each plot, thus accounting for the cumulative number of fruits of different plant species consumed by different bird species (García, 2016).

Fruit resource abundance and fruit traits

The production of fleshy fruits by woody plants was surveyed at the beginning of the fruiting season, providing an estimate of the yearly, community-wide, fruit resource base available for frugivorous birds. We distinguished two dates for monitoring, which matched to the ripening peaks of the different species: early September, for early-season species (honeysuckle, bramble, elder, rowan, whitebeam and yew) and mid-October for the remaining species. In each survey, we walked the entire plot, mapping all trees and shrubs and identifying them at the species level. For each fruiting individual, we visually estimated the number of standing fruits (arilated seeds in yew; individual infrutescences in bramble) using a semi-logarithmic scale (*Fruit Abundance Index* FAI: 1= 1-10 fruits; 2 = 11-100; 3 = 101-1000; 4 = 1001-10000; 5 > 10000). Data on position, species and FAI of each individual tree/shrub were incorporated into a GIS layer of fruiting plants. Individual crop sizes were later extrapolated from FAI ranks considering an allometric fit between the actual crop size and FAI (*actual crop size* = $1.765^{1.924 \times FAI}$; $R^2 = 0.80$; $N = 136$ trees; Martínez & García, 2017). For each plant species in each plot, we estimated absolute (number of ripe fruits) and relative (number of ripe fruits of the species/total number of fruits of all species) production.

For each fleshy-fruited woody species, we collected a sample of 25 ripe fruits (five fruits from five different individuals) from study plots in 2012-2013, in order to measure fruit and seed traits. Fruits were transported into the laboratory and stored in plastic bags at 5ºC for 48 hours for fresh measurements (maximum length and diameter, weight). Later, pulp and seeds were dissected, oven dried for 72 h at 70ºC and weighted separately. The number of seeds per fruit was also recorded. In the case of bramble, whose fruits (blackberry) are actually thick infrutescences composed of small, single-seeded drupes, we took fresh measures for both the whole infrutescence and two separate drupes, but dry measures only for drupes, after accounting for the number of drupes per infrutescence.

Seed dispersal function

The ecological function of avian seed dispersal was studied at the plot level, by identifying and counting the seeds deposited by frugivorous birds in the field during autumn and winter. Birds usually drop seeds undamaged and free of fruit pulp, after regurgitation or defecation, so that they are easily identifiable at the species level from their external morphology (size, shape, coat texture and colour; a local reference collection was also used).

Seed monitoring was based on sampling stations distributed following a grid scheme, with three equidistant sampling stations placed along the central axis of each plot cell (108 stations per plot). Sampling stations were distributed in three types of microhabitat: tree cover, shrub (bramble/wildrose) cover, and open area (i.e. uncovered by trees or fleshy-fruited shrubs, e.g. pastures); the number of stations in each microhabitat being proportional to the relative cover of the microhabitats in each plot. Sampling involved different types of device for seed collection, according to the logistical constraints imposed by the physiognomy of the vegetation and the frequent presence of livestock and wild ungulates in the study sites. Plastic pots (30-cm top diameter, 22-cm depth), hung at a height of 1.75 m, were used for tree cover, while plastic trays (32 x 25 x 6 cm) were placed under shrub cover. Both pots and trays were top-covered by 1-cm pore wire mesh to prevent seed predation by rodents, had 1.5 mm holes in the bottom for water drainage, and were firmly fixed to prevent the spillage of contents (using lateral wire tensors for hanging pots, nails for trays). In open cover, due to the difficulties of keeping any device safe from trampling by ungulates, seed surveys were conducted in flag-labeled, 32 x 32 cm quadrats marked on the ground. Seed removal by rodents from these open surfaces was considered negligible, given the demonstrated low levels of post-dispersal seed predation in open microhabitats in this system (García, Obeso & Martínez, 2005). Sampling stations were set up in August 2012 (and reviewed for repair and cleaning in August 2013). Pots and trays were checked for seed collection in February-March 2013 and 2014, whereas open quadrats were checked in late November and again in late February of each sampling year. Seed samples from each station were collected in individual paper bags and taken to the laboratory, where, after oven-drying for 1 week at 70ºC, they were stored for further identification and counting. The density of seeds (seeds/m^2) deposited by birds at each sampling station was estimated taking into account the different surface areas of the various devices (0.07, 0.08 and 0.10 m^2 for pots, trays and open quadrats, respectively).

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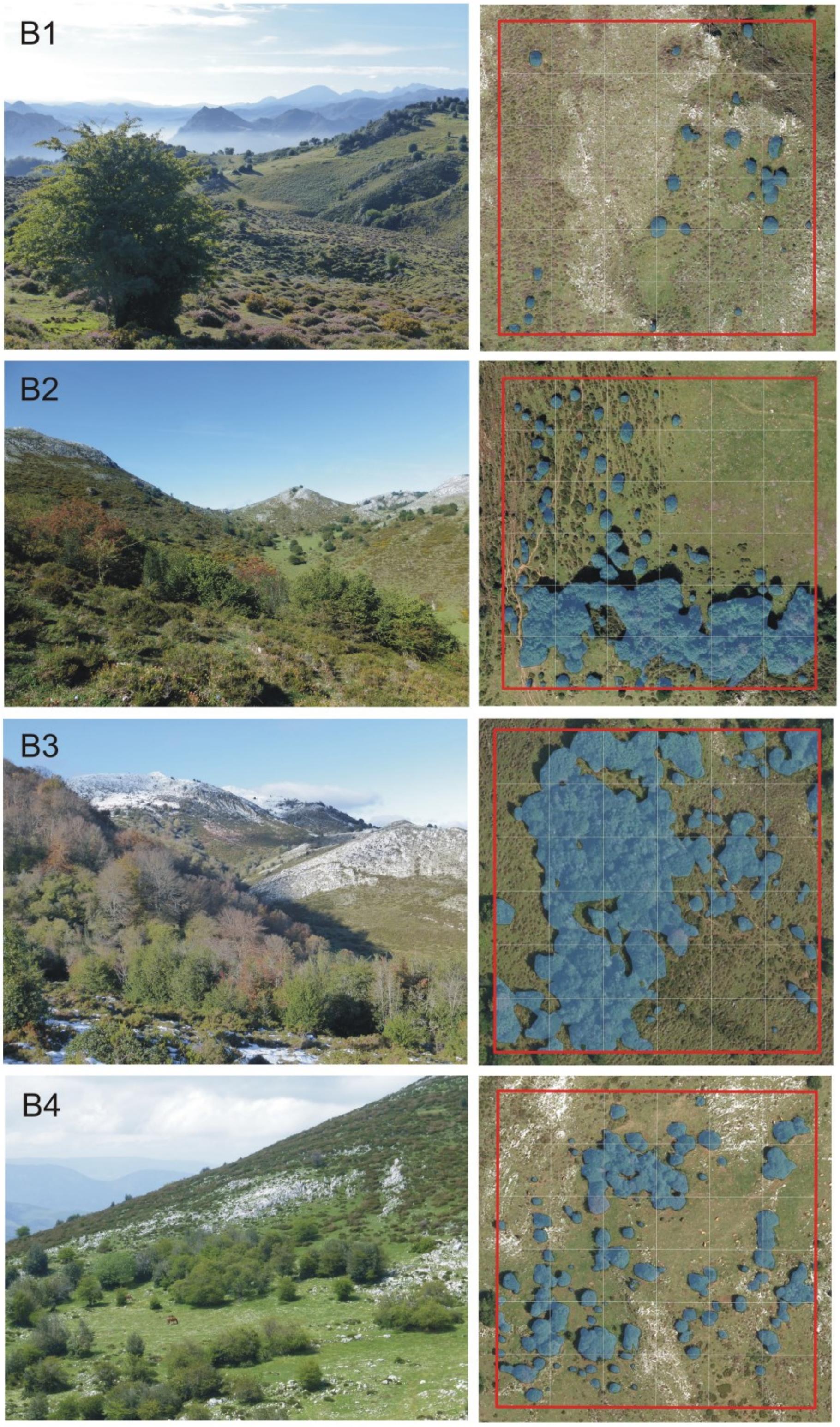
Table S1: Geographical description of the fourteen 2.25-Ha study plots in the Cantabrian Mountain Range (Asturias, Spain).

Plot code	Site	Elevation (m) asl	Geographic coordinates (N-W)		Forest cover (%)
P1	Sierra de Peña Mayor	1034	43° 17' 18.1"	05° 29' 56.0"	19.98
P2	Sierra de Peña Mayor	1001	43° 17' 50.4"	05° 30' 12.2"	31.31
P3	Sierra de Peña Mayor	1067	43° 18' 09.5"	05° 30' 32.6"	8.87
P4	Sierra de Peña Mayor	1092	43° 18' 38.7"	05° 30' 44.7"	68.74
G1	Sierra de Peña Mayor	993	43° 17' 15.3"	05° 30' 28.0"	11.12
G2	Sierra de Peña Mayor	1078	43° 17' 29.8"	05° 30' 32.8"	18.88
G3	Sierra de Peña Mayor	1093	43° 17' 47.4"	05° 30' 46.4"	39.28
B1	Bandujo-Puertos de Marabio	1124	43° 14' 37.2"	06° 05' 03.7"	3.11
B2	Bandujo-Puertos de Marabio	1145	43° 14' 35.2"	06° 05' 41.4"	26.66
B3	Bandujo-Puertos de Marabio	1183	43° 14' 18.6"	06° 05' 38.9"	47.32
B4	Bandujo-Puertos de Marabio	1253	43° 14' 09.7"	06° 06' 21.3"	20.88
M1	Bandujo-Puertos de Marabio	1020	43° 13' 09.5"	06° 07' 19.0"	33.54
M2	Bandujo-Puertos de Marabio	1020	43° 13' 01.1"	06° 07' 37.1"	11.36
M3	Bandujo-Puertos de Marabio	1012	43° 12' 20.2"	06° 07' 25.7"	54.93

Figure S1: On left panels, view of different study plots (different rows) showing the structure of vegetation and habitat physiognomy (Plot ID code as in Table S1, pictures by Daniel García). Note the presence of isolated remnant trees in the pasture-heathland matrix (B1), the patches of mature forest (B3) and the patches of secondary forest dominated by fleshy-fruited trees (B2 and B4). On right panels, aerial photographs depicting the limits of the plots (red), as well as the 25 x 25 m grid cells (dashed white) and the forest cover layer (pale blue patches).



Appendix S2. Sampling completeness of frugivore-plant interaction networks

We sought to confirm that our sampling effort, in terms of the number of interaction events and the number of sampling rounds, was appropriate to capture the richness of bird and plant interacting species of the local communities, as well as the links between pairs of birds and plants. Thus, to evaluate the completeness of the frugivore-plant interaction networks in each plot, we generated sample-based accumulation curves of interacting species and paired bird-plant links (Chacoff et al., 2012; Costa, da Silva, Ramos & Heleno, 2016; Jordano, 2016). As gradients of sampling effort we used both the number of fruit consumption sampling rounds (1-17) and the number of fruit consumption events sampled per plot (1-19 to 1-153, depending on the plot). The accumulation curves and the 95% confidence interval were generated by randomly re-sampling 1000 times (function specaccum in *vegan* package in R; Oksanen et al., 2016), and the expected number of interacting frugivorous birds, plant species, and paired bird-plant links, were computed by means of Chao´s richness estimators (function specpool in *vegan* package in R; Oksanen et al., 2016).

Accumulation curves across plots showed that the local numbers of interacting species observed, of both birds and plants, reached saturating trends along the gradient of sampling effort, and overlapped the estimated asymptotic species richness (Fig. S4.1-4). This result suggests that our sampling efforts was adequate to detect the expected richness of interacting species, of both birds and plants, across plots. Similar patterns emerged when considering the local number of paired bird-plant links observed (Fig. S4. 5-6). Thus, the sampling effort was suitable for capturing a relevant proportion of potential paired interactions between birds and plants. The proportion of observed links between birds and plants per plot, from all local potential paired bird-plant combinations, averaged 0.56 (±0.04SE; min-max: 0.35-0.88). Link sampling completeness values, estimated as the ratio between the number of observed links and the Chao's estimated richness of links (Chacoff et al., 2012; Fig. S4. 5-6), were, on average, 0.62 (±0.05SE; min-max: 0.33-0.88) for the gradient of sampling rounds, and 0.72 (±0.06SE; min-max: 0.39-0.97) for the gradient of consumption events. These values were even higher than those found in networks sampled with deliberately high sampling effort (e.g. Chacoff et al., 2012). We consider, thus, that the links unobserved in our study mostly corresponded to "missing links" determined by ecological reasons (i.e. low probability of occurrence due to small abundances of birds and plants; forbidden links due to trait, small-scale spatial and phenological mismatches; Jordano, 2016) rather than due to sampling failures.

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Figure S2.1: Accumulation curves (solid black line, with grey areas representing the 95% confidence intervals) and Chao's estimated richness (horizontal red dashed line and dot, together with the standard errors) for the number of bird species observed in frugivory interactions as a function of the cumulative sampling effort (number of fruit consumption sampling rounds), at each of the 14 study sites (see Table S1 for plot codes).

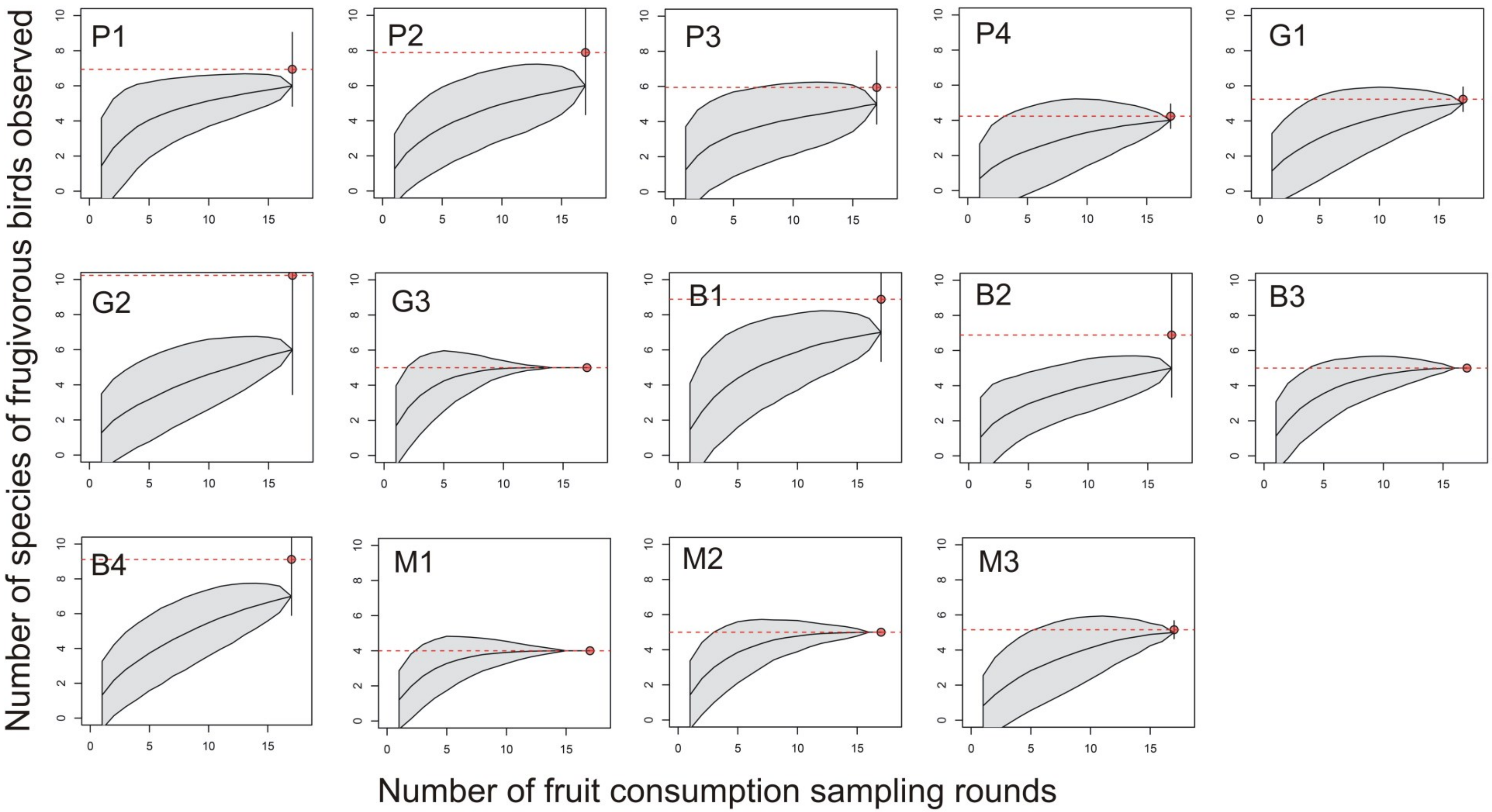


Figure S2.2: Accumulation curves (solid black line, with grey areas representing the 95% confidence intervals) and Chao's estimated richness (horizontal red dashed line and dot, together with the standard errors) for the number of plant species observed in frugivory interactions as a function of the cumulative sampling effort (number of fruit consumption sampling rounds), at each of the 14 study sites (see Table S1 for plot codes).

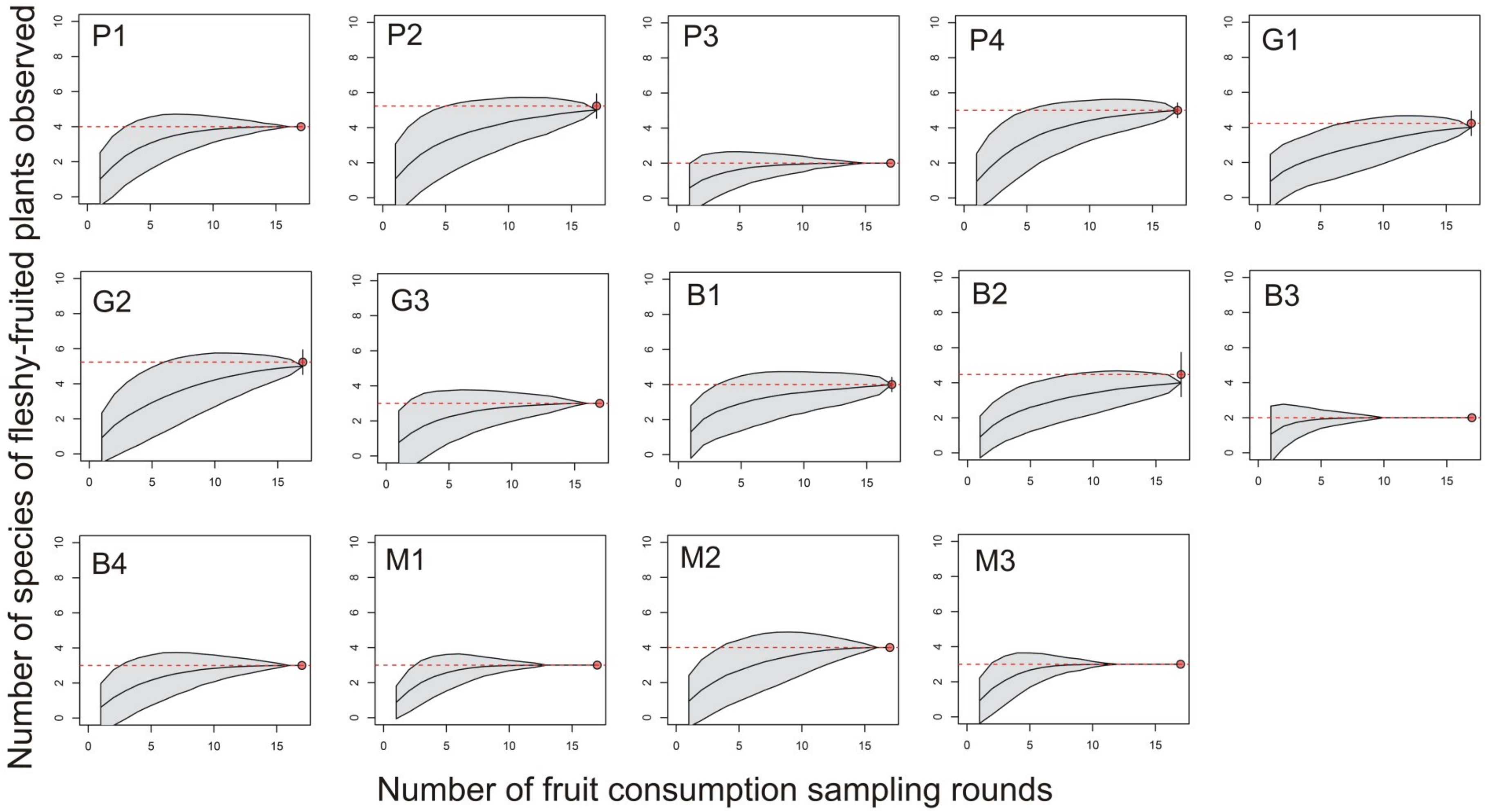


Figure S2.3: Accumulation curves (solid black line, with grey areas representing the 95% confidence intervals) and Chao's estimated richness (horizontal red dashed line and dot, together with the standard errors) for the number of bird species observed in frugivory interactions as a function of the cumulative number of fruit consumption events sampled, at each of the 14 study sites (see Table S1 for plot codes).

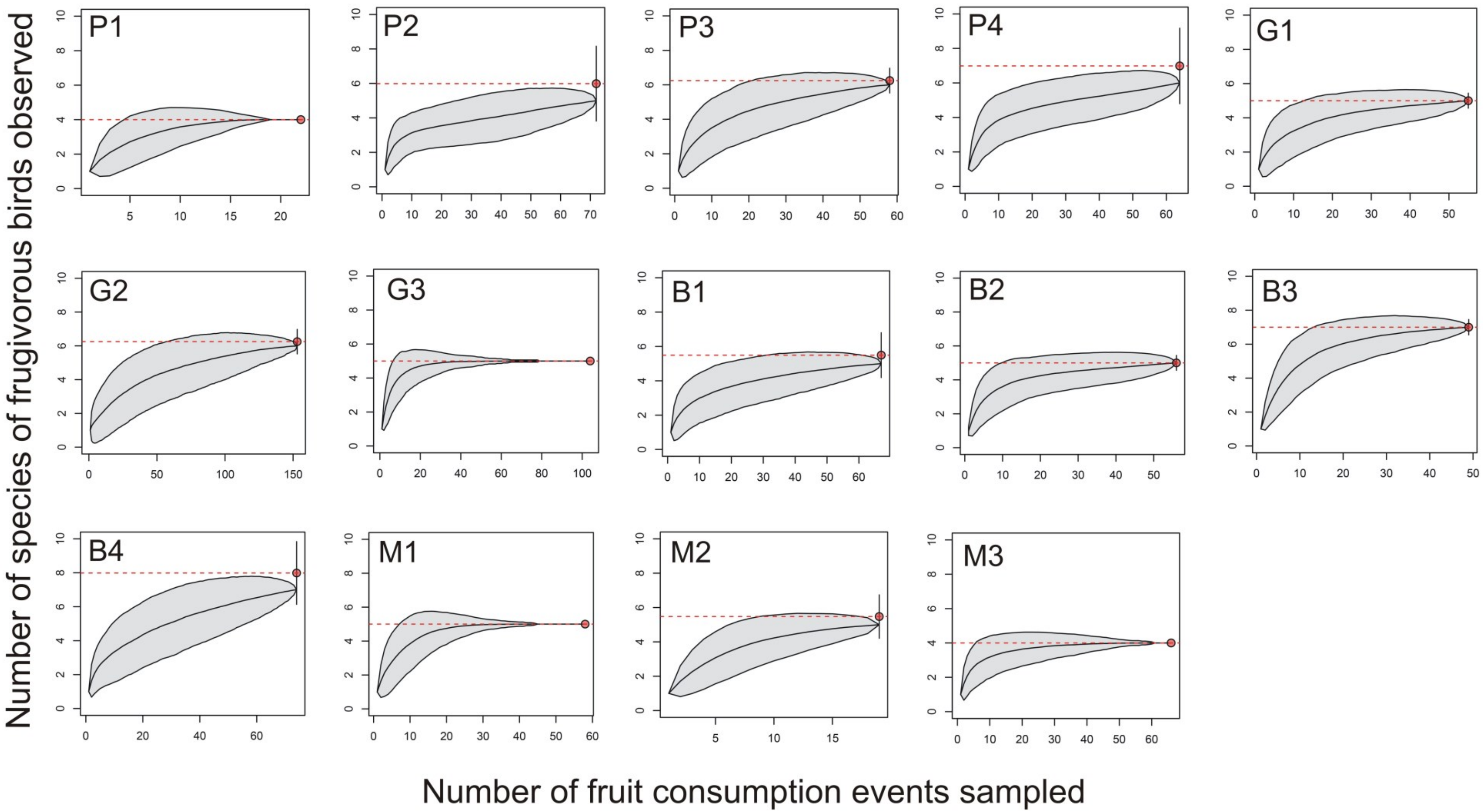


Figure S2.4: Accumulation curves (solid black line, with grey areas representing the 95% confidence intervals) and Chao's estimated richness (horizontal red dashed line and dot, together with the standard errors) for the number of plant species observed in frugivory interactions as a function of the cumulative number of fruit consumption events sampled, at each of the 14 study sites (see Table S1 for plot codes).

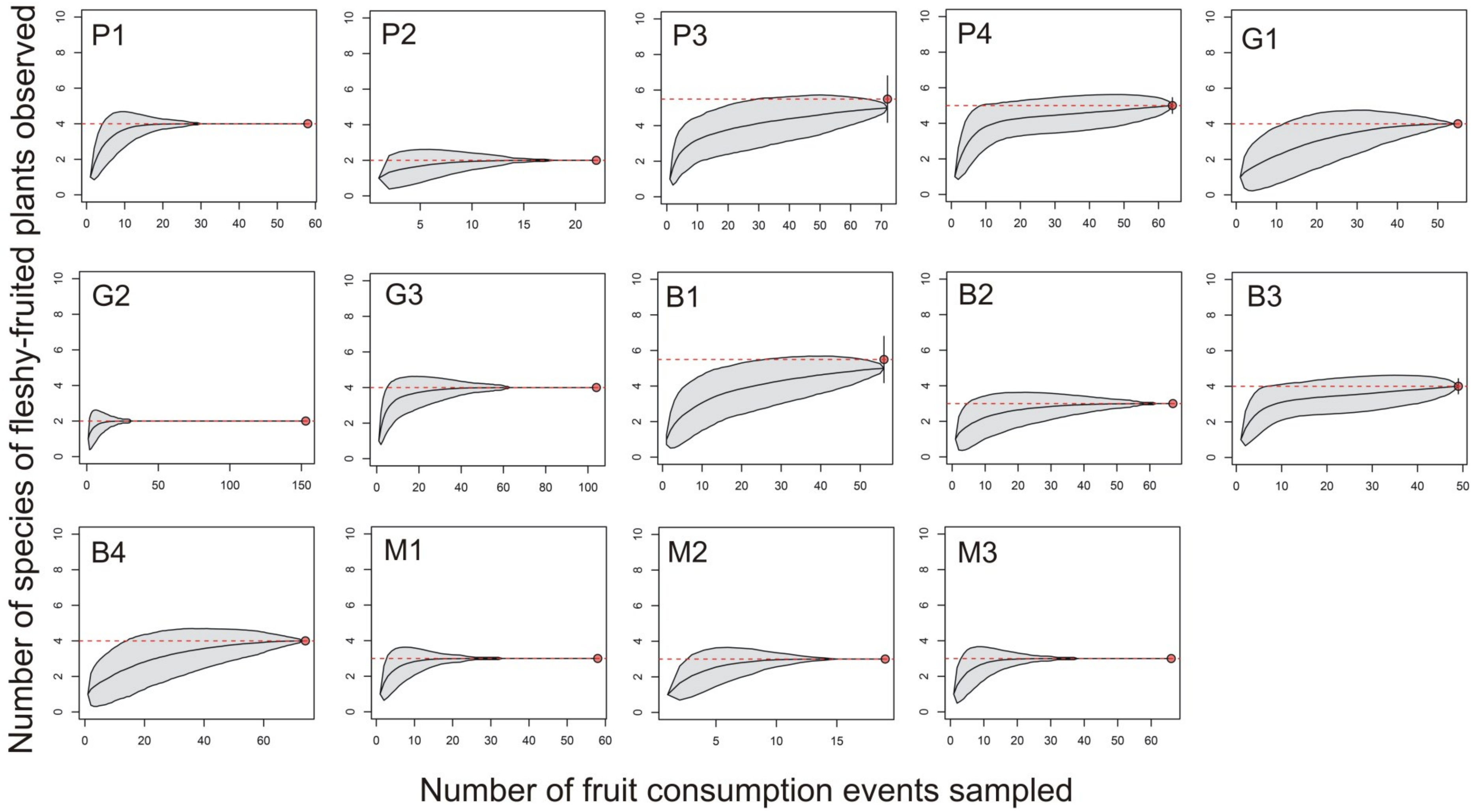


Figure S2.5: Accumulation curves (solid black line, with grey areas representing the 95% confidence intervals) and Chao's estimated richness (horizontal red dashed line and dot, together with the standard errors) for the number of paired bird-plant links observed as a function of the cumulative sampling effort (number of fruit consumption sampling rounds), at each of the 14 study sites (see Table S1 for plot codes). Link sampling completeness values, estimated as the ratio between the number of observed links (see also Fig. S5) and the Chao's estimated richness of links, are shown between brackets.

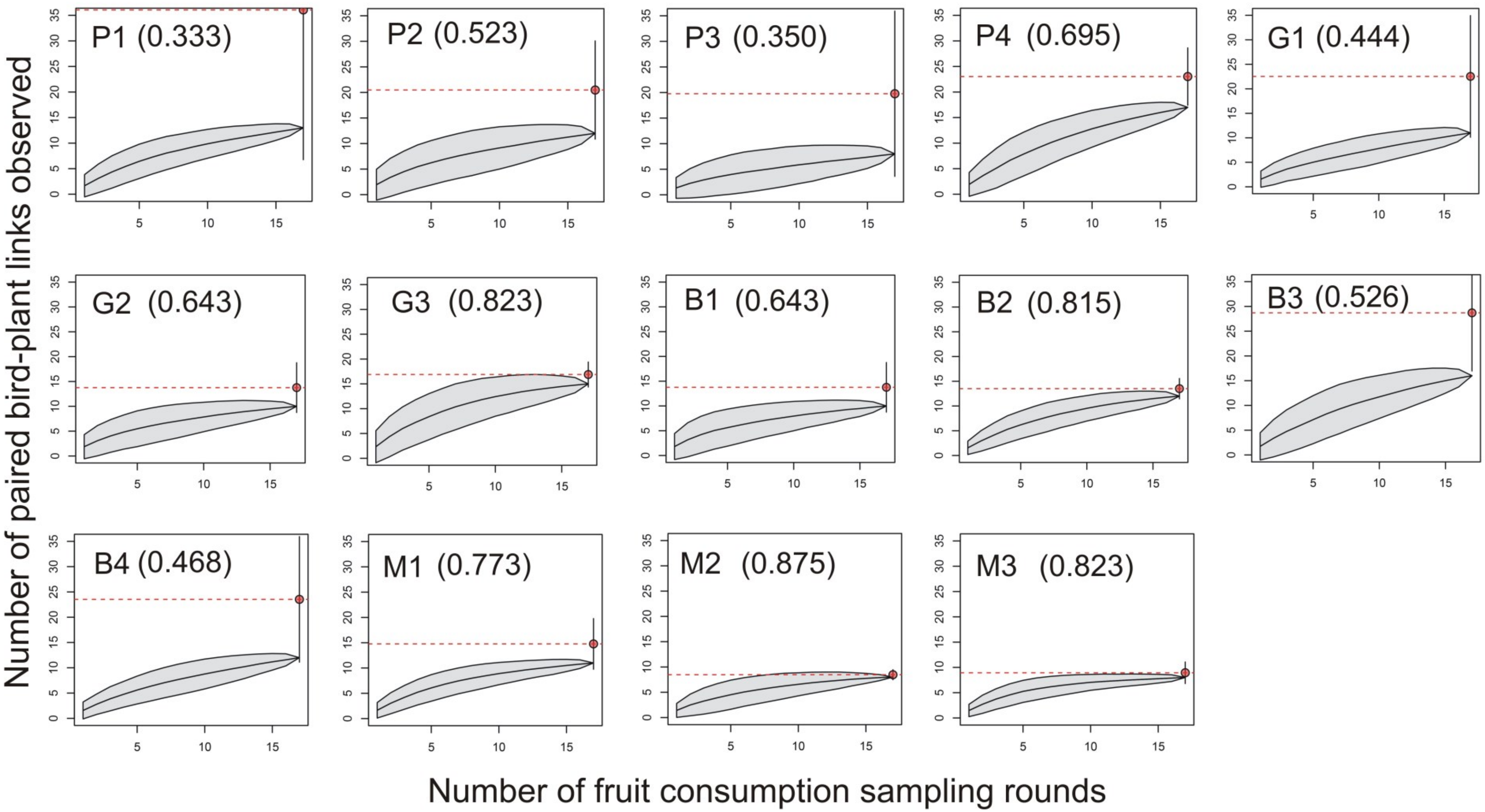
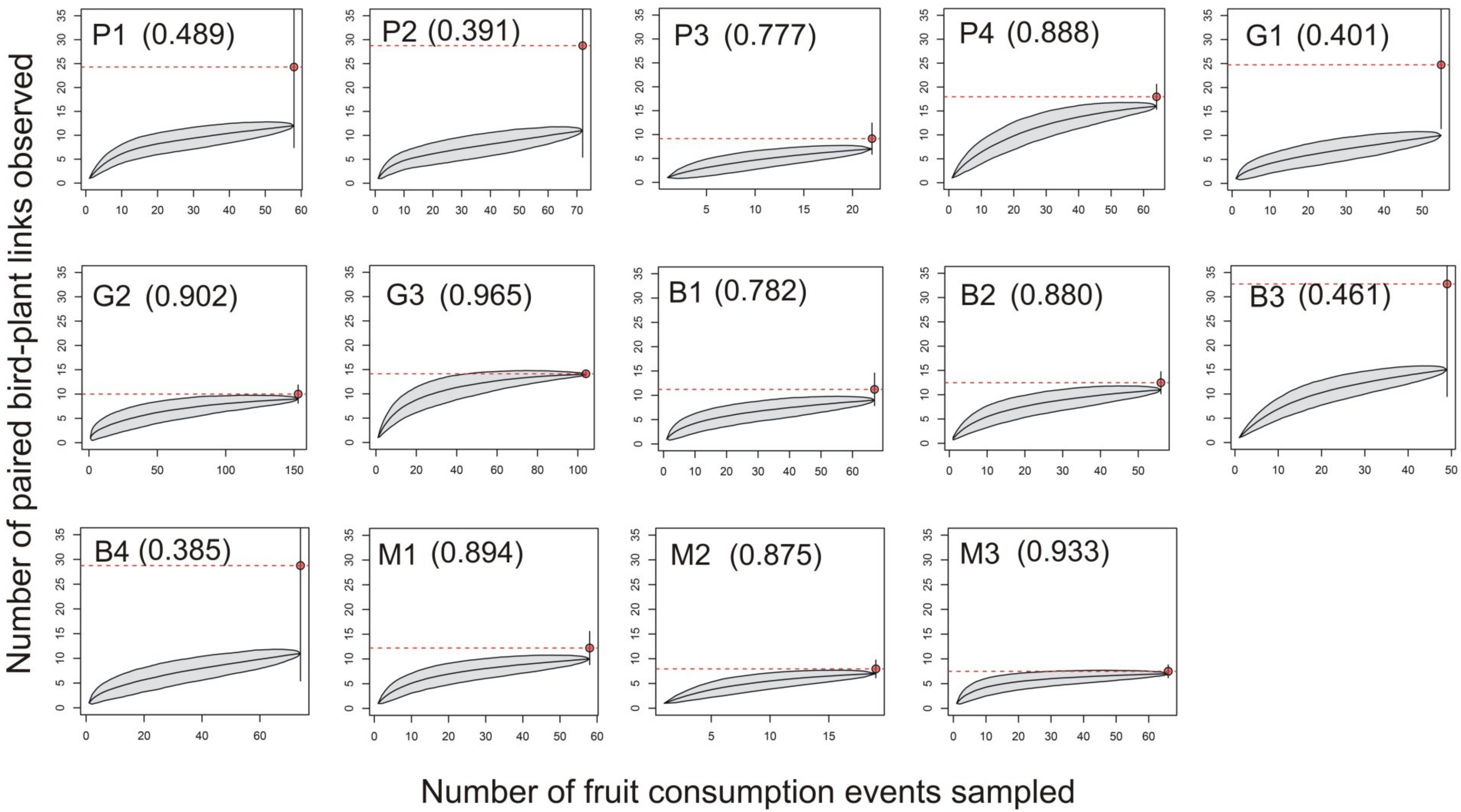


Figure S2.6: Accumulation curves (solid black line, with grey areas representing the 95% confidence intervals) and Chao's estimated richness (horizontal red dashed line and dot, together with the standard errors) for the number of paired bird-plant links observed as a function of the cumulative number of fruit consumption events sampled, at each of the 14 study sites (see Table S1 for plot codes). Link sampling completeness values, estimated as the ratio between the number of observed links (see also Fig. S5) and the Chao's estimated richness of links, are shown between brackets.



Appendix S3. Bird and plant species description

Table S3. Descriptive data on frugivorous birds (legitimate seed dispersers) and fleshy-fruited woody plants. Frequency of occurrence estimated as the proportion of plots in which the species was present. Relative abundance estimated as the proportion of observations (individual birds, fruits, dispersed seeds) accounted for by a given species from the total number of observations across study plots and years. Fruit diameter and no. seeds per fruit were estimated from ripe fruits (5 fresh fruits from each of 5 individual plants) collected in the plots at the beginning of the ripening period. In the case of bramble (blackberry), fruit refers to a single drupe for diameter whereas, for no. seeds/fruit and fruit relative abundance, fruit refers to the individual infrutescence.

Frugivorous birds						
Species name	Common name	Species code	Body mass (g)*	Status**	Frequency of occurrence	Relative abundance
Erithacus rubecula L.	European robin	Eri rub	17.7	R-W	1.00	0.1789
Garrulus glandarius L.	Eurasian jay	Gar gla	159.5	R	0.57	0.0083
Phylloscopus collybita/*ibericus* (Viellot/Ticehurst)	Common/Iberian chiffchaff	Phy coi	8.3	R-W/R	0.57	0.0094
Sylvia atricapilla L.	Eurasian blackcap	Syl atr	16.7	R-W	0.86	0.0359
Turdus iliacus L.	Redwing	Tur ili	61.2	W	1.00	0.2459
Turdus merula L.	Common blackbird	Tur mer	102.7	R-W	1.00	0.4044
Turdus philomelos (Brehm)	Song thrush	Tur phi	67.7	R-W	1.00	0.0814
Turdus pilaris L.	Fieldfare	Tur pil	106.0	W	0.42	0.0048
Turdus torquatus L.	Ring ouzel	Tur tor	117.4	W	0.07	0.0003
Turdus viscivorus L.	Mistle thrush	Tur vis	109.0	R-W	0.57	0.0302

Table S3. (cont.)

Fleshy-fruited plants							
Species	Common name	Species code	Fruit diameter (mm)	No. seeds/fruit	Frequency of occurrence	Relative abundance	Seed relative abundance
Crataegus monogyna (Jacq.)	Hawthorn	Cra mon	9.54	1.00	1.00	0.3671	0.1323
Ilex aquifolium L.	Holly	Ile aqu	8.95	3.28	1.00	0.5212	0.6374
Lonicera periclymenum L.	Honeysuckle	Lon per	6.39	2.44	0.14	6.62 e-6	0
Prunus spinosa L.	Blackthorn	Pru spi	12.02	1.00	0.14	7.57 e-7	0
Rosa canina L.	Wild rose	Ros can	14.38	24.68	0.64	0.0019	0.0026
Rubus fruticosus/*ulmifolius* (L./Schott)	Bramble	Rub fru	3.57	32.12	1.00	0.0725	0.1909
Sambucus nigra L.	Elder	Sam nig	5.01	2.88	0.36	0.0022	0.0048
Sorbus aria (Crantz)	Whitebeam	Sor ari	11.33	3.68	0.36	0.0035	0.0007
Sorbus aucuparia L.	Rowan	Sor auc	10.35	2.52	0.36	0.0136	0.0060
Taxus baccata L.	Yew	Tax bac	9.37	1.00	0.22	0.0179	0.0247

* Bird body mass from: Dunning, J. B. (2008) *CRC handbook of avian body masses*; CRC press.

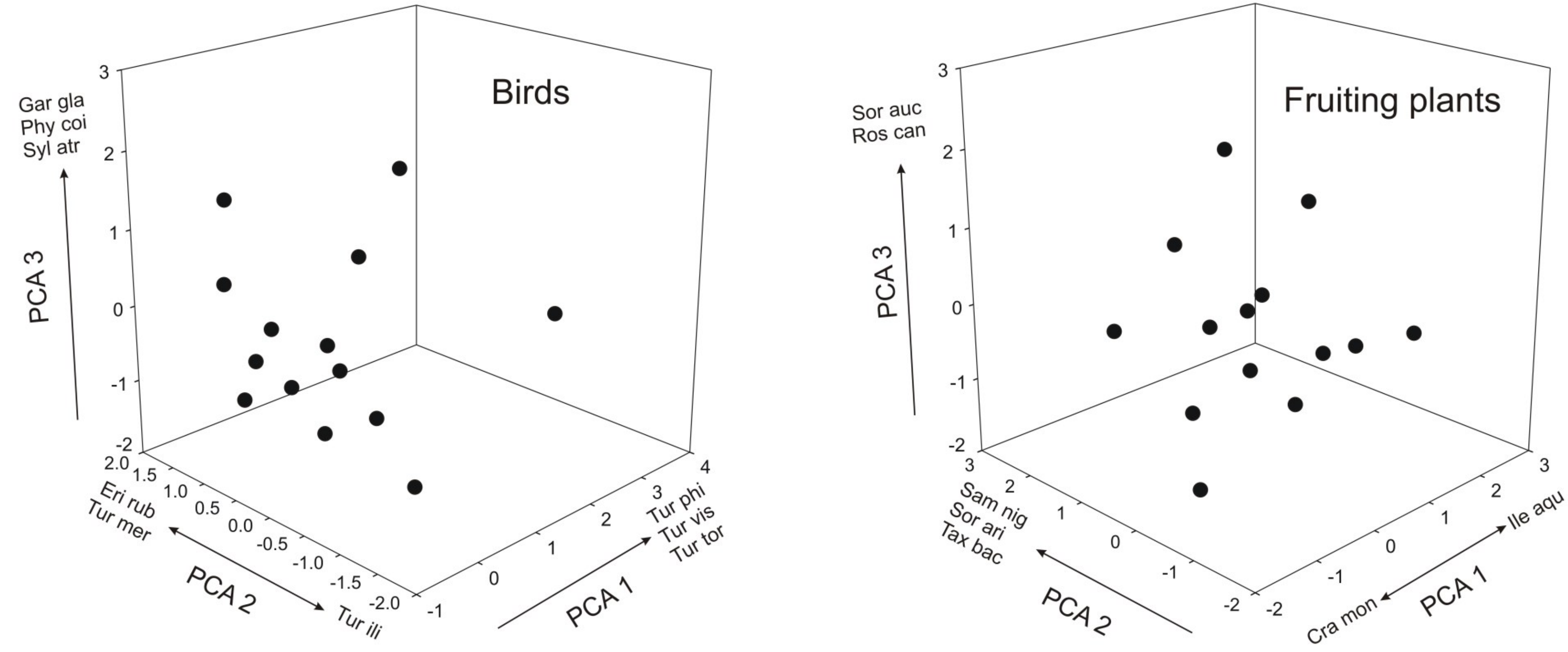
** Bird status (R: year-round resident; W: wintering; R-W: resident species receiving wintering effectives) from: Arce, L. M. & Vázquez, V. M. (2013) *Aves de la España atlántica*; Ediciones Paraninfo SA, Madrid

Appendix S4. Variability in frugivorous bird and fruiting plant species composition across plots

Table S4. Results of Principal Components Analysis (PCA) accounting for the variability in frugivorous bird and fruiting plant species composition. PCAs were calculated from the relative abundances (proportion of observations accounted for by a given species from the total number of observations of all species in a given plot, data from both years pooled) of birds (obtained from bird censuses) and fruits of fleshy-fruited plants (obtained from fruit counts). PCA factor scores were obtained from the three first (Varimax) rotated eigenvectors of each analysis. The percentage of variance accounted for by each eigenvector, as well as the loadings of rotated factors (correlations, coefficients ≥ |0.700| are highlighted in bold) are shown.

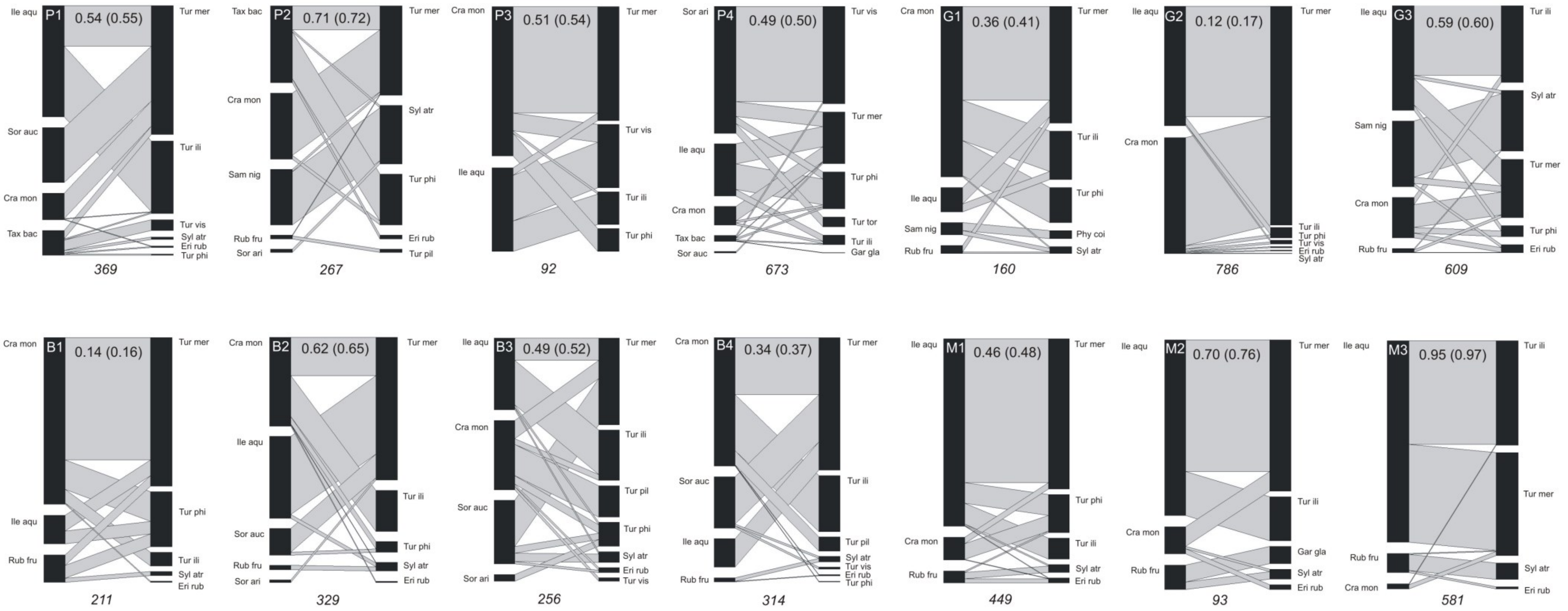
Bird species				**Fruiting plant species**			
Factor	PCA1	PCA2	PCA3	Factor	PCA1	PCA2	PCA3
% Variance	30.82	26.81	15.96	% Variance	28.58	23.29	14.12
Erithacus rubecula	-0.306	**0.810**	0.261	*Crataegus monogyna*	**-0.944**	-0.160	-0.115
Garrulus glandarius	0.084	0.064	**0.877**	*Ilex aquifolium*	**0.901**	-0.044	0.088
Phylloscopus collybita/ibericus	-0.310	-0.254	**0.710**	*Lonicera periclymenum*	0.686	-0.279	-0.166
Sylvia atricapilla	-0.104	-0.002	**0.806**	*Prunus spinosa*	-0.539	-0.288	-0.261
Turdus iliacus	-0.248	**-0.933**	0.156	*Rosa canina*	0.180	-0.251	**0.757**
Turdus merula	-0.267	**0.777**	-0.488	*Rubus fruticosus/ulmifolius*	0.529	-0.222	-0.275
Turdus philomelos	**0.792**	0.5057	0.007	*Sambucus nigra*	-0.028	**0.804**	-0.043
Turdus pilaris	-0.363	-0.254	-0.038	*Sorbus aria*	-0.056	**0.783**	0.035
Turdus viscivorus	**0.873**	-0.240	-0.296	*Sorbus aucuparia*	-0.131	0.154	**0.817**
Turdus torquatus	**0.887**	-0.214	-0.093	*Taxus baccata*	0.005	**0.883**	-0.008

Figure S4. Factor scores of Principal Component Analysis concerning, respectively, frugivorous birds and fruiting plants, for different study plots (represented as different dots). The biological meaning of PCA factors is represented as gradients of increasing relative abundance (signaled by arrow) of different frugivore and plant species (see Table S2 for species codes). The values for bird factors were uncorrelated with those of fruiting plants across study plots (except the case PCA3 birds – PCA1 plants: Pearson's coefficient of correlation r = 0.699; P = 0.005, N = 14).



Appendix S5. Seed dispersal networks

Figure S5. Plot-based interaction networks, represented by bipartite graphs, showing the proportion of seeds of plants (left column) dispersed by frugivorous birds (right column), and the proportion of seeds of each plant consumed by each bird (gray links). Codes in white correspond to the different plots (Table S1). Species codes are based on abbreviated scientific names (Table S2). The values of standardized ($\Delta H_2'$) and raw (H_2', in brackets) degree of specialization, as well as the total number of interactions (number of dispersed seeds; in italics below graphs) are also shown.



Appendix S6. Effects of interaction complementarity and frugivore biodiversity on seed dispersal

Table S6. Results of General Linear Models (GLMs) contrasting the statistical effects of abundance and diversity of frugivorous birds and interaction complementarity on seed dispersal. For each seed dispersal component, GLMs are ordered by increasing AICc value, and incorporate a combination of one predictor or two for which the estimates (±SE) are shown (*t-value* in brackets; ***: $p \leq 0.001$, **: $p \leq 0.01$, *: $p \leq 0.05$, •: $p < 0.10$, ns: $p > 0.10$). Null and residual deviance values are also shown.

Seed density (log10) Null Dev. = 0.767				
Abundance of birds	Diversity of birds	Specialization ($\Delta H_2'$)	Res. Dev.	AICc
0.174 ± 0.032 (5.37 ***)	-	0.110 ± 0.033 (3.42 **)	0.148	-13.54
0.149 ± 0.041 (3.60 ***)	0.096 ± 0.042 (2.31 *)	-	0.206	-8.92
0.188 ± 0.044 (4.25 ***)	-	-	0.305	-6.70
-	0.129 ± 0.050 (2.58 *)	0.097 ± 0.049 (1.94 •)	0.334	-2.13
-	0.156 ± 0.054 (2.91 *)	-	0.449	-1.32
-	-	0.133 ± 0.058 (2.27*)	0.536	1.17
Seed arrival rate Null Dev. = 0.468				
Abundance of birds	Diversity of birds	Specialization ($\Delta H_2'$)	Res. Dev.	AICc
0.128 ± 0.026 (4.67 ***)	0.072 ± 0.027 (2.62 *)	-	0.091	-20.46
0.157 ± 0.031 (5.13 ***)	-	-	0.146	-17.01
0.154 ± 0.030 (4.96 ***)	-	0.029 ± 0.031 (0.96 ns)	0.135	-14.83
-	0.123 ± 0.042 (2.98*)	-	0.269	-8.48
-	0.120 ± 0.045 (2.65 *)	0.016 ± 0.045 (0.37 ns)	0.266	-5.34
-	-	0.049 ± 0.053 (0.93 ns)	0.437	-1.70

Table S6. (cont.)

Seed arrival rate in open (arcsin sqrt) Null Dev. = 0.270				
Abundance of birds	Diversity of birds	Specialization ($\Delta H_2'$)	Res. Dev.	AICc
0.078 ± 0.033 (2.32 *)	-	-0.059 ± 0.034 (-1.75 ns)	0.160	-12.46
0.070 ± 0.031 (1.95 ns)	-	-	0.204	-12.32
-	-	0.049 ± 0.039 (-1.26 ns)	0.239	-10.18
-	0.034 ± 0.040 (0.85 ns)	-	0.255	-9.27
0.068 ± 0.041 (1.65 ns)	0.006 ± 0.041 (0.16 ns)	-	0.204	-9.05
-	0.051 ± 0.039 (1.30 ns)	-0.063 ± 0.039 (-1.60 ns)	0.207	-8.88