Journal of Animal Ecology

Habitat selection in transformed landscapes and the role of forest remnants and shade coffee in the conservation of resident birds

Journal:	*Journal of Animal Ecology*
Manuscript ID	JAE-2019-00290.R1
Manuscript Type:	Research Article
Date Submitted by the Author:	n/a
Complete List of Authors:	Sanchez-Clavijo, Lina; University of Central Florida, Biology; Instituto de Investigacion de Recursos Biologicos Alexander von Humboldt Bayly, Nicholas; SELVA - Research for Conservation in the Neotropics Quintana-Ascencio, Pedro; University of Central Florida, Department of Biology
Key-words:	agroforestry systems, ecological traps, habitat preference, habitat performance, novel ecosystems, source and sink, undervalued resources, habitat selection

Habitat selection in transformed landscapes and the role of forest remnants and shade coffee in the conservation of resident birds

Sánchez-Clavijo, Lina María*[ab]

Bayly, Nicholas James[c]

Quintana-Ascencio, Pedro Francisco[a]

[a] Department of Biology, University of Central Florida, Orlando, FL, USA

[b] Instituto de Investigación de Recursos Biológicos Alexander von Humboldt, Bogotá, Colombia

[c] SELVA – Research for Conservation in the Neotropics, Bogotá, Colombia

* Corresponding author: sanchezc.linam@gmail.com

Abstract

1. Biodiversity conservation in transformed landscapes is becoming increasingly important. However, most assessments of the value of modified habitats rely heavily on species presence and/or abundance, masking ecological processes such as habitat selection and phenomena like ecological traps, which may render species persistence uncertain. High species richness has been documented in tropical agroforestry systems but comparisons with native habitat remnants generally lack detailed information on species demography and habitat use.

2. We generated a multi-species, multi-measure framework to evaluate the role of habitat selection in the adaptation of species to transformed landscapes, and demonstrate that its use could affect how we value the contribution different land uses make to biodiversity conservation.

3. We analyzed seven years of capture-mark-recapture and observation data for twelve species of resident birds present in native forest remnants and shade coffee plantations in a mega-diverse region. We assessed whether species behaved adaptively by evaluating the correlation between measures of habitat preference (occurrence, abundance, fidelity, inter-seasonal variance and age) and performance (body condition, muscle, primary molt, breeding and juveniles) in forest and coffee, and generated hypotheses about their role in species persistence.

4. We documented adaptive habitat selection for seven species, non-ideal selection for four, and maladaptive selection for one. While many species showed equal-preference and/or equal performance in many traits, in general we found more evidence for birds preferring and/or

performing better in forest than coffee, although relationships between our indicators and population adaptation need to be studied further before our proposed framework can be applied to more species and landscapes.

5. While shade coffee can act as a biodiversity-friendly matrix providing complementary or supplementary habitat to a wide range of resident bird species, protecting remnants of native vegetation is still of paramount importance for biodiversity conservation in agricultural landscapes.

Keywords: agroforestry systems; ecological traps; habitat preference; habitat performance; habitat selection; novel ecosystems; source and sink; undervalued resources.

Selección de hábitat en paisajes transformados y el papel de los remanentes de bosque y cafetales con sombra en la conservación de aves residentes.

Resumen

1. La conservación de biodiversidad en paisajes transformados es cada vez más importante. Sin embargo, la mayoría de evaluaciones sobre el valor de los hábitats modificados dependen de la presencia y/o abundancia de especies, ocultando procesos ecológicos como la selección de hábitat y fenómenos como las trampas ecológicas, que hacen incierta la persistencia de las especies. Se han documentado altas riquezas en los sistemas agroforestales tropicales pero las comparaciones con remanentes de hábitats nativos generalmente no proveen información detallada sobre demografía y uso de hábitat.

2. Generamos un marco metodológico multi-especies y multi-medidas para evaluar el papel de la selección de hábitat en la adaptación de las especies a los paisajes transformados, y demostramos que su aplicación podría afectar la forma cómo valoramos la contribución que diferentes usos del paisaje hacen a la conservación de la biodiversidad.

3. Analizamos siete años de datos de captura-marca-recaptura y observaciones para doce especies de aves residentes presentes en remanentes de bosque nativo y plantaciones de café con sombra en una región megadiversa. Valoramos si las especies se comportaban de forma adaptativa evaluando la correlación entre medidas de preferencia (ocurrencia, abundancia, fidelidad, varianza inter-estacional y edad) y desempeño (condición corporal, músculo, muda primaria, reproducción y juveniles) en bosques y cafetales, y generamos hipótesis acerca de su papel en la persistencia de especies.

4. Documentamos selección de hábitat adaptativa para siete especies, no-ideal para cuatro y maladaptativa para una. Aunque muchas especies mostraron preferencias y/o desempeño iguales en muchos rasgos, en general encontramos más evidencia de aves prefiriendo y/o desempeñándose mejor en bosques que en cafetales, aunque las relaciones entre nuestros indicadores y la adaptación poblacional deben ser más estudiadas antes de aplicar el marco que proponemos a más especies y paisajes.

5. Aunque los cafetales con sombra pueden actuar como una matriz amigable con la biodiversidad, proveyendo hábitat complementario o suplementario a una gran variedad de aves

residentes, para asegurar la conservación de biodiversidad en los paisajes agrícolas es supremamente importante proteger los remanentes de vegetación nativa.

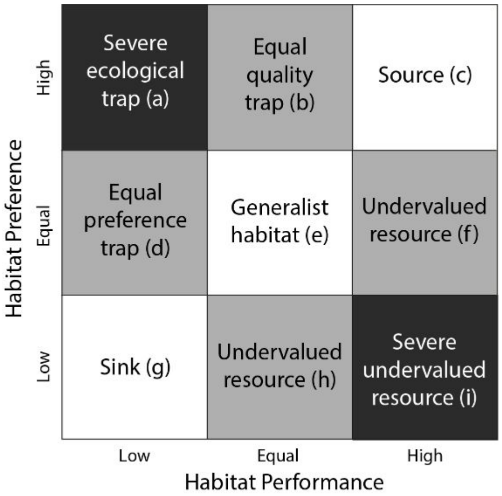
Introduction

Presently, the majority of the world's species inhabit heterogeneous landscapes combining native habitat remnants with novel ecosystems varying in their degree of intervention (Johnson et al. 1992; Hobbs et al. 2006). As human population and resource consumption continue to grow, conservation focus has expanded from the protection of native remnants to include land uses with intermediate levels of transformation (Daily et al. 2001; Norris 2008). Shade coffee plantations have been promoted as a biodiversity-friendly production system that can harbor communities intermediate between those of sun coffee monocultures and remnants of native forest (Perfecto et al. 1996; Philpott et al. 2008; Jha et al. 2014), so financial tools and social incentives have arisen to prevent their replacement by homogeneous land uses (Perfecto et al. 2005; Philpott et al. 2007). However, most assessments of the conservation value of tropical agroforestry systems rely heavily on community-level measures (Hughes et al. 2002; Petit & Petit 2003), and while there is recent evidence on differences for migrant birds (Bakermans et al. 2009; Bayly et al. 2016), information on demography and persistence of resident species is still scarce (Komar 2006; Sánchez-Clavijo et al. 2008; Gleffe et al. 2006; Irizarry et al. 2018).

When species presence is used to compare the relative conservation value of habitats, the implicit assumption is that species show neither preference for any of the habitats occupied, nor differences in performance once they occupy them (Fig. 1e); subsequently the availability of one habitat could theoretically compensate for the absence of another. While this may sometimes be the case, assuming this pattern as a rule may lead to inaccurate assessments of population persistence that cannot be corrected by including abundance (Van Horne 1983; Jones 2001; Johnson 2007), for example where novel habitats are used in complementary or supplementary ways by populations that still depend on native remnants for critical resources (Dunning et al. 1992). In contrast, including habitat-specific demography in comparisons allows for the explicit recognition that species performance varies between habitats and that given adaptive selection behaviors (Pulliam 1988), individuals prefer to settle in higher-quality habitats (sources – Fig. 1c) and avoid settling in lower-quality habitats (sinks – Fig. 1g). Under source-sink dynamics, the best strategy to ensure species persistence in a landscape is to prioritize the conservation of sources within networks of well-connected sinks (Pulliam & Danielson 1991; Furrer & Pasinelli 2016; Gilroy & Edwards 2017).

Measuring habitat preference and performance in a multi-species framework is not straightforward, especially for species with poorly known natural history (Garshelis 2000; Part et al. 2007). To further complicate the understanding of species-habitat relationships and their application to decision-making in conservation, rapid and widespread landscape change may lead to the uncoupling of cues used for habitat selection from habitat quality, resulting in maladaptive choices where individuals prefer lower-quality habitats (ecological traps *sensu* Schlaepfer et al. 2002 - Fig. 1a) and avoid higher-quality options (undervalued resources *sensu* Gilroy & Sutherland 2007 - Fig. 1i). Novel ecosystems may share selection cues with the habitats they replaced, while offering a different set of resources and hazards that reduce overall fitness (Schlaepfer et al. 2002; Fletcher et al. 2012; Robertson et al. 2013). As a result, species presence in novel habitats may mask maladaptive processes, making populations more vulnerable to further landscape change.

Source-sink and ecological trap-undervalued resource dichotomies are extreme cases in a continuum of possible outcomes from the interaction between habitat availability, selection and quality (Battin 2004), and ideally we would evaluate mismatches between preference and performance as continuous variables (Kristan 2003). A compromise is to include outcomes resulting from equal-preference and equal-performance. Robertson and Hutto (2006) distinguished severe ecological traps from equal-preference traps, (Fig. 1d) which while still a result of non-ideal selection, are expected to have less severe consequences at the population level. Filling in the gaps from these outcomes allows for the recognition of three additional cases of mild, non-ideal selection (Fig. 1b, 1f, 1h) that lead to consequences intermediate between those of adaptive (Fig. 1c, 1e, 1g) and maladaptive (Fig. 1a, 1i) behaviors.



Habitat Preference \ Habitat Performance	Low	Equal	High
High	Severe ecological trap (a)	Equal quality trap (b)	Source (c)
Equal	Equal preference trap (d)	Generalist habitat (e)	Undervalued resource (f)
Low	Sink (g)	Undervalued resource (h)	Severe undervalued resource (i)

Figure 1. Outcomes when comparing preference and performance for a species using two habitats (white: adaptive, grey: non-ideal, black: maladaptive habitat selection).

We used this extended framework (Fig. 1) to evaluate the correlation between measures of habitat preference (occurrence, abundance, site fidelity, temporal variance in population size, and distribution of dominant individuals) and performance (body condition, muscle scores, primary plumage molts, breeding evidence and frequency of juveniles) for twelve relatively common resident birds, inhabiting pre-montane forest remnants and shade coffee plantations at mid-elevations in the Sierra Nevada de Santa Marta, Colombia. Because our focal species are associated with habitats representing a gradient of tree cover, we expected marked variation in the outcomes resulting from the interaction of their habitat preference and performance. Our use of field data to generate hypotheses about the role that native forest and shade coffee play in the conservation of resident birds serves as a demonstration of a multi-species approach to compare the contribution of different land-uses to biodiversity conservation in a mega-diverse region.

Materials and Methods

Data Collection

Study area - Data was collected in Hacienda La Victoria (Magdalena, Colombia, 11°7'19.84"N, 74°5'34.14"W), chosen for this study because: 1) coffee production in the region started in the late 1800´s and has always taken place under shade trees as commercial polycultures (Moguel & Toledo 1999) – creating a novel habitat with intermediate levels of transformation that species have had time to adapt to; 2) the watershed where the farm is situated retains 47% native forest cover between 600 and 1,700 meters above sea level (Bayly et al. 2012) – meaning there is still substantial native habitat available; and 3) it is located in a global hotspot for biodiversity and endemism (Cracraft 1985; Myers et al. 2000), experiencing exponential growth in nature-related tourism (Lara, et al. 2017; Ocampo-Peñuela & Winton 2017) – consequently, assessing the conservation potential of this productive system is of environmental and economic importance (see Supporting Information for further details on study area).

Sampling scheme - Between 2009 and 2015, we set up 17 banding stations, eight in pre-montane forest remnants and nine within shade coffee plots, at altitudes ranging from 900 to 1,300 m (Fig. S1). Banding stations consisted of five to ten 12 m mist nets, installed at each site for 5 to 30 days, and operated daily for approximately 6 hours starting at sunrise, following guidelines for the safe and ethical treatment of animals (Fair et al. 2010). Sampling occurred between mid-March and mid-November, which corresponds to a gradient of increasing precipitation and coincides with the onset of breeding for the majority of resident birds, while avoiding sampling during annual coffee harvests. Effort was concentrated in capturing, marking and recapturing individuals, but complementary observations were carried out around banding stations. We used standardized protocols (Ralph et al. 1993; Wolfe et al. 2010) to measure wing chord and body mass, and assess age class, muscle score, breeding and molting activity of captured individuals. Variation in sampling effort among sites and seasons was taken into account during data analysis.

Focal species - 214 resident bird species have been recorded in La Victoria (Bayly & Gómez 2013) but to guarantee adequate sample sizes to assess preference/performance, we required species that were: frequently detected in both habitats, regularly captured in mist-nets, and represented a gradient of sensitivity to forest loss. Based on these criteria we selected *Mionectes olivaceus* (Olive-striped Flycatcher), *Mionectes oleagineus* (Ochre-bellied Flycatcher), *Turdus flavipes* (Yellow-legged Thrush), *Turdus albicollis* (White-necked Thrush), *Ramphocelus* *dimidiatus* (Crimson-backed Tanager), *Tangara gyrola* (Bay-headed Tanager; endemic subspecies), *Saltator maximus* (Buff-throated Saltator), *Saltator striatipectus* (Streaked Saltator), *Myiothlypis conspicillata* (White-lored Warbler; endemic species), *Basileuterus rufifrons* (Rufous-capped Warbler), *Myioborus miniatus* (Slate-throated Redstart), and *Euphonia laniirostris* (Thick-billed Euphonia) (Table S1).

While these species are not representative of the original mountain forest avifauna of the Sierra Nevada de Santa Marta, they are representative of bird communities in Colombian coffee-growing regions (Sánchez-Clavijo et al. 2009). Consequently, conclusions from this study do not extend to highly-sensitive species known to be forest-dependent for their conservation, or open-area species that exist only in deforested areas, but rather the ones in between that potentially use shade coffee plantations as suitable habitat.

Data Processing

We screened the banding database (4,108 captures of 3,214 individuals) to ensure data were consistent within species and individual capture histories (e.g. that individuals followed logical age and plumage sequences, or sex and breeding classifications). Inconsistencies were either resolved based on information from captures of the same individual or changed to unknowns (see Supporting Information for further details on data processing).

Data Analysis

We carried out analyses in three levels: using statistical tests to generate separate indicators of habitat preference and performance; weighting the evidence from level 1 to generate composite indexes of habitat preference and performance; and contrasting the indexes from level 2 to evaluate whether habitat selection was acting adaptively in our study system (see Supporting Information for further details on data analysis).

<u>Level 1: Separate indicators of habitat preference and performance</u> - We used multiple measures of preference and performance, under the assumption that more indicators pointing in the same direction would give us greater confidence in our assessments, but that contradictory patterns were a warning that more evidence was necessary. We designed five statistical tests to evaluate which habitat was preferred by each species (hereafter occurrence, abundance, fidelity, inter-seasonal variance, and age), and five to evaluate in which habitat individuals experienced higher average performance (body condition, muscle, primary molt, breeding and juveniles - Table 1).

Occurrence: the most commonly used indicator for preference is how often a species is detected in a habitat, but because higher frequencies can result from either more individuals in a habitat or a higher tenacity of individuals towards the sites they occupy (Garshelis 2000), occurrence represents an emergent attribute of different demographic properties that can have contradictory preference interpretations. Occupancy models take into account differences in detection probabilities to yield corrected occurrence probabilities in a cost-effective manner (Ruiz-Gutiérrez et al. 2010; Kéry & Schaub 2012). We used observation data to implement a Bayesian occupancy model with the effect of habitat (forest/coffee) on the probability of detection (**p**), and effects of habitat and altitude on the probability of occurrence ($\boldsymbol{\psi}$).

Abundance: in the absence of strong dominance hierarchies and differences in habitat availability, we would expect more individuals to settle in their preferred habitat over other available habitats (Pulliam & Danielson 1991), rendering true abundance a good proxy for preferential choice. Calculating precise estimates of abundance is a field-intensive and data-hungry procedure, especially for highly-mobile animals with low probabilities of detection (Ruiz-Gutiérrez et al. 2012). Unlike observation data, capture-mark-recapture data allows for the recognition of individuals within a species, and is therefore well suited to calculate abundance in relatively small, intensively-sampled areas. To estimate the total number of individuals present in our study area across the entire sampling period, we used mist-net data to run capture-recapture analyses; using closed population models for species with low recapture rates and Jolly-Seber models for species with higher recapture rates - Royle & Dorazio 2008; Kéry & Schaub 2012). We ran separate analyses for each species: habitat combination, included the effect of sampling effort (standardized net hours) on detection probability (**p**) and random variation in apparent survival (**Φ**) by occasion.

Fidelity: individuals of territorial species are expected to show higher site fidelity when occupying their preferred habitat relative to less preferred ones (Robertson & Hutto 2006). Capture-recapture models allow for the estimation of apparent survival (**Φ**), which is a compound measure of site fidelity and true survival (Kéry & Schaub 2012). We used this parameter as a surrogate for fidelity because the contribution of mortality to the parameter was expected to be minimal given the short time between sampling occasions (1-6 months) and the known longevities of tropical birds (Ruiz-Gutiérrez et al. 2012). For species with high recapture rates, **Φ**

per occasion was jointly-estimated in Jolly-Seber models, for species with low recapture rates we used Cormack-Jolly-Seber models with a similar parameterization (Royle & Dorazio 2008; Kéry & Schaub 2012). Resulting parameters were then used to calculate mean site fidelity for each iteration of the model.

Inter-seasonal variance: because species may use different habitats according to life stage or seasonal variation in resources, measuring abundance during different times of year may yield different interpretations about habitat preference in places with high seasonality (van Horne 1983; Skagen & Yackel Adams 2010). We assumed a habitat with less inter-seasonal variation in abundance is experiencing lower individual turnover which can be interpreted as a sign of preference (Robertson & Hutto 2006). Since Jolly-Seber models allow for the estimation of the number of individuals present per occasion, we used this output to calculate the coefficient of variance for each iteration of the model for available species.

Age: abundance may not be a true indicator of habitat preference when individuals follow a despotic distribution where dominant individuals settle in preferred habitats and displace a larger number of submissive individuals to less-preferred ones (Fretwell & Lucas 1970). Although dominance hierarchies are not well described in Neotropical passerines, we assumed that adult birds would displace immature individuals from their preferred habitat (as shown for migratory birds in Marra 1993 & Stutchbury 1994). Therefore, a habitat with a significantly higher proportion of adults could be considered as preferred. To test for segregation according to age, we calculated the model-averaged coefficient for the effect of habitat on the probability of capturing an adult over an immature individual, in a model set that included a null model, model with a non-linear effect of day of the year, model with effect of habitat, and model with the additive effects of day and habitat.

Table 1. Analyses used to generate indicators of habitat preference (rows 1-5) and performance (rows 6-10) for twelve resident birds in native forest and shade coffee (GLM: Generalized linear model; AIC: Akaike´s information criterion).

Indicator	Input	Analysis	Output	Interpretation
Occurrence	Detection/non-detection matrix (9 sites x 16 occasions)	Hierarchical occupancy model; probability of occurrence (ψ)	Habitat coefficient (95% credibility intervals)	95% CI did not contain 0
Abundance	Capture/non-capture matrix (individuals x 12 occasions)	Capture-recapture model; total number of individuals (Nsuper)	Posterior distribution for total number of individuals (per habitat)	No overlap in 50% CI
Fidelity	Capture/non-capture matrix (individuals x 12 occasions)	Capture-recapture model; mean apparent survival (ϕ)	Mean and standard deviation of iterations (per habitat)	No overlap in mean +/- SD
Inter-Seasonal Variance	Estimated number of individuals per occasion (Nocc)	Coefficient of variation for (Nocc)	Mean and standard deviation of iterations (per habitat)	No overlap in mean +/- SD
Age	Number of adults vs. immatures	GLM (binomial/logit), AICc model averaging	Habitat coefficient (95% confidence intervals)	95% CI did not contain 0
Body Condition	Vector of body condition index for all captures	GLM (normal/identity), AICc model averaging	Habitat coefficient (95% confidence intervals)	95% CI did not contain 0
Muscle	Number of records with muscle score 3 vs. muscle score 2	GLM (binomial/logit), AICc model averaging	Habitat coefficient (95% confidence intervals)	95% CI did not contain 0
Primary Molt	Number of records with active vs. inactive primary molt	GLM (binomial/logit), AICc model averaging	Habitat coefficient (95% confidence intervals)	95% CI did not contain 0
Breeding	Number of records with active vs. inactive breeding	GLM (binomial/logit), AICc model averaging	Habitat coefficient (95% confidence intervals)	95% CI did not contain 0
Juveniles	Number of juveniles vs. immatures and adults	GLM (binomial/logit), AICc model averaging	Habitat coefficient (95% confidence intervals)	95% CI did not contain 0

Body condition: body mass in birds is expected to reflect overall condition under most circumstances, after being corrected by body size (Schulte-Hostedde et al. 2005; Schamber et al. 2009). We used the residuals of a standard major axis regression between wing chord length and body mass to calculate a scaled index of body condition (Peig & Green 2009) and assumed that higher condition meant better performance in a given habitat. We calculated the model-averaged coefficient for the effect of habitat on the index with the same model set we used for age (changing error structure and link as shown in Table 1). The same statistical procedure using GLMs and model averaging was used for all habitat performance variables.

Muscle: breast muscle condition is important to species performance; as lower scores indicate reduced flight capacities from competing energy needs (Lindstrom et al. 2000). Although this variable is typically used to assess condition in migratory birds, variation in residents could be related to the amount and/or quality of resources in a habitat. We interpreted higher probabilities of capturing individuals with a muscle score of 3 (the highest in our classification) as an indication of better performance in a habitat (healthy immature and adult tropical residents rarely have scores below 2).

Primary molt: birds undergoing primary feather molts typically associated with annual complete molts have high energy demands and are compromised in their ability to fly, consequently this activity is usually undertaken when and where resources are high (Echeverry-Galvis & Córdoba-Córdoba 2008, Echeverry-Galvis & Hau 2013). We interpret higher probabilities of capturing individuals undergoing active primary molts as an indication of better performance in a habitat.

Breeding: since breeding-related activities like incubation and food provisioning are energy demanding, their timing and location are typically constrained by resource availability (Echeverry-Galvis & Córdoba-Córdoba 2008, Echeverry-Galvis & Hau 2013). We interpret a higher probability of capturing individuals with evidence of active breeding as an indication of better performance in a habitat.

Juveniles: higher reproductive performance by a species in a habitat will result in higher proportions of recently-fledged juvenile birds, assuming that their dispersal is limited by dependence on adults and reduced movement capacities (Cox et al. 2014). We interpret higher probabilities of capturing juveniles as an indication of better performance in a habitat.

<u>Level 2: Composite indexes of habitat preference and performance</u> - Because our five tests of performance used the same statistical method and model set, we generated a quantitative estimate of differences between habitats for each species by weighting mean effect sizes by their standard deviation, using a fixed-effects model in a meta-analysis. Species were classified as having higher performance in forest when the 90% confidence intervals of this estimate were above zero, as having higher performance in coffee when below zero, and as having equal performance when they included zero.

The same method was not available for calculating a composite index of habitat preference because for two of our indicators the output was a habitat coefficient, while the remaining three relied on comparisons of habitat-specific parameters. Additionally, we were unable to identify a clear method for estimating the standard error around measures coming from iterative procedures. We calculated a preference score by subtracting the number of times evidence showed coffee was preferred from the number of times forest was preferred (response range -5 to +5). Birds with positive scores were classified as preferring forest, negative scores as preferring coffee, and zero as having equal-preference.

Level 3: Is habitat selection acting adaptively? - Our different approaches to create composite indexes of habitat preference and performance were not quantitatively comparable. Therefore, we qualitatively compared each species assigned habitat preference and performance, and used the framework in Figure 1 to generate hypotheses about the role of shade coffee and native forests.

Results

We were able to perform 88% of the planned comparisons (52/60 for preference and 54/60 for performance); omitting those without an adequate sample size for certain species/habitat/response combinations (which appear as NAs). Outcomes gave us multiple lines of evidence to classify the twelve species according to preference and performance, and therefore to assess the adaptiveness of habitat choices (see Supporting Information for further details on sample sizes and data outputs).

Level 1: Separate indicators of habitat preference and performance

Of the tests performed for preference, 33 showed statistically unclear (Dushoff et al. 2019) differences between habitats, 12 favored forest and 7 coffee. Abundance was the most informative indicator (8 clear differences), followed by fidelity (6), inter-seasonal variance (2), age (2), and occurrence (1) (Table 2).

Table 2. Indicators of habitat preference for twelve resident birds in native forest and shade coffee (HC: habitat coefficient (standard error), C: parameter estimate for coffee (standard

deviation), F: parameter estimate for forest (standard deviation), Int.: interpretation i.e. preferred habitat according to that indicator; coffee was the reference for occurrence while forest was the reference for age).

Species	**Occurrence**		**Abundance**			**Fidelity**			**Inter-seasonal variance**			**Age**	
	HC	*Int.*	*C*	*F*	*Int.*	*C*	*F*	*Int.*	*C*	*F*	*Int.*	*HC*	*Int.*
Mionectes	4.72	Equal	1257	1173	Equal	0.49	0.66	Forest	NA	NA	-	NA	-
olivaceus	(8.01)		(571)	(91)		(0.08)	(0.03)						
Mionectes	-5.88	Equal	253	674	Forest	0.68	0.71	Equal	0.51	0.41	Equal	NA	-
oleagineus	(6.89)		(65)	(83)		(0.05)	(0.03)		(0.10)	(0.06)			
Turdus	4.70	Equal	766	1239	Forest	0.63	0.70	Equal	NA	NA	-	-0.40	Coffee
flavipes	(7.97)		(149)	(153)		(0.06)	(0.04)					(0.20)	
Turdus	1.44	Equal	NA	482	Forest	0.50	0.71	Forest	NA	NA	-	1.29	Forest
albicollis	(8.48)			(41)		(0.09)	(0.03)					(0.50)	
Ramphocelus	4.55	Equal	613	329	Coffee	0.65	0.74	Forest	0.68	0.62	Equal	-0.07	Equal
dimidiatus	(8.03)		(165)	(64)		(0.04)	(0.04)		(0.12)	(0.09)		(0.29)	
Tangara	4.80	Equal	558	591	Equal	0.64	0.73	Forest	1.01	0.46	Forest	0.29	Equal
gyrola	(7.93)		(105)	(48)		(0.04)	(0.02)		(0.13)	(0.04)		(0.20)	
Saltator	4.74	Equal	208	165	Equal	0.62	0.68	Equal	NA	NA	-	0.00	Equal
maximus	(7.83)		(48)	(31)		(0.06)	(0.05)					(0.31)	
Saltator	4.66	Equal	235	NA	Coffee	0.68	0.54	Coffee	NA	NA	-	-0.87	Equal
striatipectus	(7.96)		(82)			(0.06)	(0.08)					(0.51)	
Myiothlypis	4.64	Equal	317	604	Forest	0.65	0.68	Equal	0.70	0.71	Equal	-0.39	Equal
conspicillata	(7.71)		(97)	(100)		(0.05)	(0.04)		(0.13)	(0.08)		(0.26)	
Basileuterus	4.71	Equal	481	319	Coffee	0.67	0.64	Equal	0.79	0.53	Forest	-0.26	Equal
rufifrons	(7.69)		(94)	(115)		(0.04)	(0.05)		(0.10)	(0.14)		(0.26)	
Myioborus	14.42	Coffee	231	273	Equal	0.64	0.63	Equal	0.80	0.64	Equal	0.07	Equal
miniatus	(6.02)		(72)	(187)		(0.04)	(0.06)		(0.17)	(0.16)		(0.35)	
Euphonia	-2.63	Equal	249	606	Forest	0.68	0.53	Coffee	NA	NA	-	-0.27	Equal
laniirostris	(6.30)		(58)	(224)		(0.06)	(0.07)					(0.32)	

Of the tests for performance, 41 showed no statistically clear differences between habitats, 5 favored forest and 8 coffee. Breeding was the most informative indicator (5 clear differences), followed by body condition (4), muscle (3), primary molt (1), and juveniles (0) (Table 3).

Table 3. Indicators of habitat performance for twelve resident birds in native forest and shade coffee (values in the first column correspond to model-averaged habitat coefficients (standard errors), second column shows interpretation i.e. in which habitat the species performed better according to that indicator; forest was the reference habitat in all analyses).

Species	**Body Condition**		**Muscle**		**Primary Molt**		**Breeding**		**Juveniles**	
Mionectes olivaceus	0.25 (0.09)	Forest	-0.01 (0.22)	Equal	-0.09 (0.54)	Equal	0.20 (0.45)	Equal	NA	-
Mionectes oleagineus	0.18 (0.11)	Equal	-0.44 (0.24)	Equal	NA	-	-0.50 (0.42)	Equal	NA	-
Turdus flavipes	0.02 (0.08)	Equal	-0.04 (0.17)	Equal	0.41 (0.48)	Equal	-0.92 (0.19)	Coffee	0.80 (0.50)	Equal
Turdus albicollis	-0.30 (0.23)	Equal	0.45 (0.51)	Equal	-1.24 (1.50)	Equal	0.07 (0.64)	Equal	NA	-
Ramphocelus dimidiatus	-0.27 (0.12)	Coffee	0.73 (0.26)	Forest	-0.19 (0.55)	Equal	-0.31 (0.33)	Equal	0.02 (0.83)	Equal
Tangara gyrola	0.11 (0.08)	Equal	-0.40 (0.19)	Coffee	0.07 (0.22)	Equal	-0.41 (0.18)	Coffee	0.99 (0.58)	Equal
Saltator maximus	0.19 (0.14)	Equal	0.35 (0.34)	Equal	0.94 (0.58)	Equal	0.29 (0.34)	Equal	1.05 (1.44)	Equal
Saltator striatipectus	-0.35 (0.22)	Equal	0.23 (0.44)	Equal	-0.44 (0.86)	Equal	-1.47 (0.64)	Coffee	0.78 (0.88)	Equal
Myiothlypis conspicillata	0.40 (0.12)	Forest	0.14 (0.25)	Equal	1.16 (0.88)	Equal	-0.30 (0.27)	Equal	-0.34 (0.85)	Equal
Basileuterus rufifrons	0.04 (0.12)	Equal	0.28 (0.26)	Equal	-1.15 (0.57)	Coffee	-0.97 (0.34)	Coffee	0.80 (0.61)	Equal
Myioborus miniatus	0.31 (0.16)	Equal	1.31 (0.49)	Forest	-1.10 (1.20)	Equal	0.33 (0.40)	Equal	NA	-
Euphonia laniirostris	-0.29 (0.14)	Coffee	-0.19 (0.30)	Equal	NA	-	0.71 (0.33)	Forest	0.20 (1.46)	Equal

Level 2: Composite indexes of habitat preference and performance

We classified five species as preferring forest (*M. olivaceus*, *M. oleagineus*, *T. albicollis*, *T. gyrola*, and *M. conspicillata*), two as preferring coffee (*S. striatipectus* and *M. miniatus*) and five as having equal-preference (*T. flavipes*, *R. dimidiatus*, *S. maximus, B. rufifrons* and *E. laniirostris*). There were varying degrees of evidence available to make these assignments, with preference scores ranging from -2 to 3 (Table 4).

We classified four species as experiencing higher performance in forest (*M. olivaceus*, *S. maximus*, *M. conspicillata* and *M. miniatus*), one as experiencing higher performance in coffee (*S. striatipectus*) and the remaining seven as experiencing no difference in performance between habitats (*M. oleagineus*, *T. flavipes*, *T. albicollis*, *R. dimidiatus*, *T. gyrola*, *B. rufifrons* and *E. laniirostris*). There were varying degrees of evidence available to make these assignments, with coefficients of the meta-analysis for the effect of habitat ranging from -0.30 to 0.38 (Table 4).

Level 3: Is habitat selection acting adaptively?

We documented: 1) three species preferring their higher-performance habitat (*M. olivaceus*, and *M. conspicillata* for forest, and *S. striatipectus* for coffee); 2) three species preferring forest but without consistent evidence for differences in performance (*M. oleagineus, T. albicollis* and *T. gyrola*); 3) four species without consistent differences in either trait (*T. flavipes, R. dimidiatus, B. rufifrons* and *E. laniirostris*); 4) *S. maximus* potentially being caught in an equal-preference trap (preferring neither habitat despite forest showing higher performance); and 5) *M. miniatus* potentially being caught in a severe ecological trap (higher preference for coffee despite higher performance in forest) (Table 4).

Table 4. Composite indexes of habitat preference and performance, and hypotheses about the role that shade coffee, native forest and habitat selection play at the landscape level for populations of twelve resident birds.

	Preference		**Performance**		**Interpretation**		
Species	*Index*	*Int.*	*Index*	*Int.*	**Coffee**	**Forest**	**Selection**
Mionectes olivaceus	1	Forest	0.21 (0.08)	Forest	Sink	Source	Adaptive
Mionectes oleagineus	1	Forest	0.04 (0.10)	Equal	Undervalued resource	Equal-quality trap	Non-ideal
Turdus flavipes	0	Equal	-0.08 (0.07)	Equal	Generalist habitat	Generalist habitat	Adaptive
Turdus albicollis	3	Forest	-0.17 (0.20)	Equal	Undervalued resource	Equal-quality trap	Non-ideal
Ramphocelus dimidiatus	0	Equal	-0.12 (0.10)	Equal	Generalist habitat	Generalist habitat	Adaptive
Tangara gyrola	2	Forest	-0.01 (0.06)	Equal	Undervalued resource	Equal-quality trap	Non-ideal
Saltator maximus	0	Equal	0.26 (0.12)	Forest	Equal-preference trap	Undervalued resource	Non-ideal

Saltator striatipectus	-2	Coffee	-0.30 (0.18)	Coffee	Source	Sink	Adaptive
Myiothlypis conspicillata	1	Forest	0.26 (0.10)	Forest	Sink	Source	Adaptive
Basileuterus rufifrons	0	Equal	-0.03 (0.10)	Equal	Generalist habitat	Generalist habitat	Adaptive
Myioborus miniatus	-1	Coffee	0.38 (0.14)	Forest	Severe ecological trap	Severe undervalued resource	Maladaptive
Euphonia laniirostris	0	Equal	-0.14 (0.12)	Equal	Generalist habitat	Generalist habitat	Adaptive

Discussion

We evaluated the role of native forest and shade coffee in the conservation of resident birds by assessing the correlation between measures of habitat preference and performance in a three-level analytical approach designed to gauge whether habitat selection was acting adaptively in an intermediately-modified landscape.

At the first level of analysis, where we calculated separate indicators of habitat preference and performance, 70% of statistical tests showed no statistically clear differences between habitats, partly possibly due to unaccounted variation such as temporal effects, but also reflecting high levels of use of both habitats by our focal species. Indicators pointed more commonly towards higher preference in forest (12 vs. 7) and higher performance in coffee (8 vs. 5). Evidence provided by these indicators was rarely consistent within a species, so no single indicator could accurately assess either process for all of them. While using a suite of indicators gave us more confidence in our assessments and is recommended when little is known about the behavior of the species of interest, further work is needed to validate our chosen variables (see Supporting Information for further discussion of these issues). Preference assessment could be improved by measuring settlement patterns (Hollander et al. 2011), which in resident species would imply being able to follow young during post-natal dispersal (Cox et al. 2014) or conducting choice experiments involving the manipulation of selection cues (Robertson & Hutto 2006).

Performance assessment could be improved by including parameters more directly related to survival and reproduction (Johnson 2007), as the relationship between fitness and parameters such as body condition, muscle and plumage have not been evaluated directly for the focal species (Labocha & Hayes 2012).

At the second level of analysis, the composite index for habitat preference had the disadvantage of not taking into account uncertainty in estimates or the strength of evidence supporting preference for each habitat, however, it allowed us to deal with contradictory evidence and gauge whether unclear differences were pointing to equal-preference or insufficient information. Although effect sizes of habitat at the first level of analysis were generally small, the index of habitat performance allowed us to weight the strength of evidence when combining the five indicators (further work could develop an index that allows for non-equal weighing of variables in relationship to how strongly they correlate with fitness). Half of the resulting assignments pointed to patterns expected for generalist species (equal-preference and equal-quality), while in the remaining comparisons evidence favored forest over coffee as the preferred (5 vs. 2) and better-performance (4 vs. 1) habitat.

At the third level of analysis, we found evidence of source-sink dynamics for three species, although these patterns need to be corroborated with detailed demographic information (Furrer & Pasinelli 2015; Gilroy & Edwards 2017). Four species showed a pattern consistent with the equal-preference and equal-quality assumption underlying community-level analyses. Of the four species displaying evidence of mild non-ideal selection, three appeared to undervalue coffee as a suitable habitat. If this trend is explored further and proves to be relatively common, detailed studies into the cues used for selection may provide straightforward management actions to raise the conservation value of coffee and similar novel ecosystems (Gilroy & Sutherland 2007).

We only found evidence of one species being caught in a severe ecological trap but the strength of evidence behind preference and performance was weak (statistically clear differences were only found for occupancy and muscle score). If this pattern were to hold with additional evidence, actions could be designed to reduce the attractiveness of shade coffee for the species (Gilroy & Sutherland 2007). Indeed, abundance (Chandler et al. 2013) and demographic (Mumme 2015) data from Central America suggest a high sensitivity of *Myioborus miniatus* to landscape structure, making it an interesting species for further study.

Even though the expansion of coffee plantations in the Sierra Nevada de Santa Marta was rapid and widespread, it occurred in the late 19th century (Carriker 2001), raising the question as to why species subject to maladaptive selection should persist. Methodologically, tradeoffs between different aspects of preference and performance may compensate for what appears to be maladaptive selection (Battin 2004; Chalfoun & Martin 2007), and both density dependence and the mixing of territorial and floater individuals may interfere with our ability to detect phenomena that lead to ecological traps (Watkinson 1995; Sherry & Holmes 1996), especially if population-level phenomena such as source-sink dynamics compensate for differences in individual-level performance. Ecologically, traps originating from novel components in a landscape seem less likely to facilitate extinction than those arising from habitat degradation (Fletcher et al. 2012). We know from simulations of our study system that even if the effect of an ecological trap is not strong enough to lead to population extinction under current conditions, this may change rapidly with further landscape change (Sánchez-Clavijo et al. 2016); so that under further forest loss the landscape could lose more species than predicted by models assuming adaptive habitat selection.

Our preference/performance results showed no clear pattern of association with individual species characteristics such as habitat guild, family, size and connectedness of the subspecies distributions, diet, participation in mixed flocks, body size or previous classifications of sensitivity to human activity (Table S1). Most of the characteristics hypothesized to make species vulnerable to traps (speed of evolution, rate of learning, behavioral plasticity, etc. - Battin et al. 2004) are unknown for the majority of tropical species, and even though we assume residents have better knowledge of their environments than their migrant counterparts, our ability to prove this is hindered by the lack of studies that go beyond community-level measures for resident birds.

Research and conservation implications

For future applications of this framework in the assessment of the value of different land-uses for biodiversity conservation, we strongly advise using multiple lines of evidence to simultaneously assess habitat preference and performance, as indicator choice may lead to different interpretations about the adaptiveness of habitat selection (Robertson & Hutto 2006; Chalfoun & Martin 2007). The value of this approach will increase as our understanding of the relationship between the variables of interest and the chosen indicators improves (Noss 1990). A further refinement will be to extend our framework into a continuous approach to evaluate the adaptiveness of habitat selection, by evaluating preference and performance in a way that makes them directly comparable. A quantitative approach would help reduce the subjectivity of interpretations and is more realistic for cases in which the habitats being compared do not hold independent populations of the species of interest (Kristan 2003; Part et al. 2007).

While the ideal way to measure the value of a habitat would be to estimate survival and reproduction parameters based on long-term demographic and/or movement studies of species showing a representative range of ecological and behavioral traits (Sekercioglu et al. 2007; Milder et al. 2014), these are rarely feasible in tropical ecosystems. Our results show that occupancy and abundance models generated from the wide-scale application of simple sampling methodologies (Ruiz-Gutiérrez et al. 2016; Irizarry et al. 2018) may neglect important differences in habitat preference and performance. Capture data allows for the exploration of habitat-species relationships at a resolution intermediate between these two extremes (Ruiz-Gutiérrez et al. 2012; Sekercioglu 2012), but to increase the reliability of our inference, we need further research into the relationships between individual-level data and consequences at the population level. An ideal approach would be to combine these three scales of analysis.

For example, studies comparing “spare” (leaving remnant habitats as intact as possible and intensifying the use of surrounding lands to provide goods and services) and “share” (promoting land uses where farming and biodiversity conservation occur simultaneously) approaches to rural management still assess land use contributions to biodiversity conservation based solely on species abundance (Fischer et al. 2008; Phalan et al. 2011; von Wehrden et al. 2014; Gilroy & Edwards 2017). Monitoring approaches using a multi-species, multi-indicator and multi-scale approach to quantify preference and performance in landscapes of different compositions, could advance our understanding of biodiversity responses to landscape heterogeneity and support better decision-making for conservation and sustainable use.

Even though our site has an unusual combination of large remnants of native forest and shade coffee plantations with 60% average canopy cover (Guhl 2004; Sánchez-Clavijo et al. 2009), our findings are similar to those from comparable studies carried out in tropical agricultural landscapes (Perfecto & Vandermeer 2002; Chandler et al. 2013; Kremen 2015). The mostly adaptive or neutral selection behaviors found for our focal species suggest that shade coffee can be a biodiversity-friendly matrix that provides complementary or supplementary habitat to a wide range of resident birds, even becoming a favorable breeding habitat for some generalist species. However, higher preference and performance in forest for species with varied life histories, reinforce the importance of protecting remnants of native vegetation in agricultural landscapes.

Acknowledgements

We thank A. Rodewald, R. Noss, J. Weishampel, Department of Biology, MEDIANS lab and BGSA for support during LMSC´s PhD; plus financial support from the International Fulbright Student Program and the University of Central Florida. Fieldwork was made possible by Micky and Claudia Weber; data collection by C. Gómez, L. Cárdenas, V. Gómez, J. Sanabria, H. Arias, M.C. Jiménez, A. Suárez, J. Bermúdez, C. Alfonso and D. Santos. IdeaWild donated equipment. Research was carried out under permits 10-17W/13-05W from IACUC and 0819 from ANLA. F. López-Borghesi, D. Jenkins and UCF Advanced Research Computing Center assisted analyses. Data collection under SELVA´s "Crossing the Caribbean" project was funded by the Rufford Small Grants Foundation, Environment and Climate Change Canada and the Cornell Lab of Ornithology - with special thanks to K. Hobson and K. Rosenberg. We thank all anonymous reviewers whose suggestions helped improve this manuscript.

Authors´ contributions

LMSC and PFQA conceived the ideas, designed methodology and analyzed the data; NJB guided data collection and provided additional data; LMSC led the writing of the manuscript. All authors contributed critically to the drafts and gave final approval for publication.

Data Availability

Raw data used in this paper is available from SiB Colombia (DOI pending), while curated datasets for all analyses presented are available from the Dryad Digital Repository (DOI pending).

References

Battin, J. (2004) When good animals love bad habitats: Ecological traps and the conservation of animal populations. Conservation Biology, 18, 1482-1491.

Bakermans, M.H., Vitz, A.C., Rodewald, A.D. & Rengifo, C.G. (2009) Migratory songbird use of shade coffee in the Venezuelan Andes with implications for conservation of cerulean warbler. Biological Conservation, 142, 2476-2483.

Bayly, N.J., Paez, A., Gómez, C. & Mora, C. (2012) Conservation hotspots for migratory landbirds in the Sierra Nevada de Santa Marta, Colombia. Project Crossing the Caribbean: Technical Report No. CEC07. SELVA: Investigación para la conservación en el Neotropico, Bogotá, Colombia.

Bayly, N., Gómez, C., Hobson, K. & Rosenberg, K. (2016) Prioritizing tropical habitats for long-distance migratory songbirds: an assessment of habitat quality at a stopover site in Colombia. Avian Conservation and Ecology, 11, 5.

Bayly, N.J. & Gómez, C. (2013) Birds of la Hacienda La Victoria, Sierra Nevada de Santa Marta. SELVA: Research for conservation in the Neotropics, Bogota. Technical report No. CEC01 Edition 4.

Carriker, M.B. (2001) Vista Nieve: The Remarkable True Adventures of an Early Twentieth Century Naturalist and His Family in Colombia, South America. Blue Mantle Press, Rio Hondo, Texas, USA.

Chalfoun, A.D. & Martin, T.E. (2007) Assessments of Habitat Preferences and Quality Depend on Spatial Scale and Metrics of Fitness. Journal of Applied Ecology, 44, 983-992.

Chandler, R.B., King, D.I., Raudales, R., Trubey, R., Chandler, C. & Chavez, V.J.A. (2013) A Small-Scale Land-Sparing Approach to Conserving Biological Diversity in Tropical Agricultural Landscapes. Conservation Biology, 27, 785-795.

Cox, W.A., Thompson III, F.R., Cox, A.S. & Faaborg, J. (2014) Post-Fledging Survival in Passerine Birds and the Value of Post-Fledging Studies to Conservation. The Journal of Wildlife Management, 78, 183-193.

Cracraft, J. (1985) Historical Biogeography and Patterns of Differentiation within the South American Avifauna: Areas of Endemism. Ornithological Monographs, 49-84.

Daily, G.C., Ehrlich, P.R. & Sanchez-Azofeifa, G.A. (2001) Countryside biogeography: use of human-dominated habitats by the avifauna of southern Costa Rica. Ecological Applications, 11, 1-13.

Dunning, J.B., Danielson, B.J., Pulliam, H.R. (1992) Ecological processes that affect populations in complex landscapes. Oikos 65, 169-175.

Dushoff, J., Kain, M.P. & Bolker, B.M. (2019) I can see clearly now: Reinterpreting statistical significance. Methods Ecol Evol, 10, 756–759.

Echeverry-Galvis, M.A. & Córdoba-Córdoba, S. (2008) Una visión general de la reproducción y muda de aves en el Neotrópico. Ornitología Neotropical, 19 (Suppl.), 197-205.

Echeverry-Galvis, M.A. & Hau, M. (2013) Flight Performance and Feather Quality: Paying the Price of Overlapping Moult and Breeding in a Tropical Highland Bird. PLoS ONE, 8, 1-9.

Fair, J., Paul, E. & Jones, J. Eds. (2010) Guidelines to the Use of Wild Birds in Research. Ornithological Council, Washington, D.C.

Fischer, J., Brosi, B., Daily, G.C., Ehrlich, P.R., Goldman, R., Goldstein, J., Lindenmayer, D.B., Manning, A.D., Mooney, H.A., Pejchar, L., Ranganathan, J. & Tallis, H. (2008) Should agricultural policies encourage land sparing or wildlife-friendly farming? Frontiers in Ecology and the Environment, 6, 380-385.

Fletcher, R.J., Jr., Orrock, J.L. & Robertson, B.A. (2012) How the type of anthropogenic change alters the consequences of ecological traps. Proceedings of the Royal Society B-Biological Sciences, 279, 2546-2552.

Fretwell, S. & Lucas, H., Jr. (1970) On territorial behavior and other factors influencing habitat distribution in birds. Acta Biotheoretica, - 19.

Furrer, R.D. & Pasinelli, G. (2016) Empirical evidence for source–sink populations: a review on occurrence, assessments and implications. Biological Reviews, 91, 782-795.

Garshelis, D.L. (2000) Delusions in Habitat Evaluation: Measuring Use, Selection, and Importance. In: Boitani, L. & Fuller, T.K. Research Techniques in Animal Ecology: Controversies and Consequences. Columbia University Press, New York, USA.

Gilroy, J.J. & Edwards, D.P. (2017) Source-Sink Dynamics: A Neglected Problem for Landscape-Scale Biodiversity Conservation in the Tropics. Current Landscape Ecology Reports, 2, 51-60.

Gilroy, J.J. & Sutherland, W.J. (2007) Beyond ecological traps: perceptual errors and undervalued resources. Trends in Ecology & Evolution, 22, 351-356.

Gleffe, J.D., Collazo, J.A., Groom, M.J. & Miranda-Castro, L. (2006) Avian reproduction and the conservation value of shaded coffee plantations. Ornitología Neotropical, 17, 271-282.

Guhl, A. (2004). Café y cambio de paisaje en la zona cafetera Colombiana entre 1970 y 1997. Cenicafé, 55, 29-44.

Hobbs, R.J., Arico, S., Aronson, J., Baron, J.S., Bridgewater, P., Cramer, V.A., Epstein, P.R., Ewel, J.J., Klink, C.A. & Lugo, A.E. (2006) Novel ecosystems: theoretical and management aspects of the new ecological world order. Global Ecology and Biogeography, 15, 1-7.

Hollander, F.A., Van Dyck, H., San Martin, G. & Titeux, N. (2011) Maladaptive Habitat Selection of a Migratory Passerine Bird in a Human-Modified Landscape. PLos ONE, 6, 1-11.

Hughes, J.B., Daily, G.C. & Ehrlich, P.R. (2002) Conservation of tropical forest birds in countryside habitats. Ecology Letters, 5, 121-129.

Irizarry, A.D., Collazo, J.A., Pacifici, K., Reich, B.J.& Battle, K.E. (2018) Avian response to shade-layer restoration in coffee plantations in Puerto Rico. Restoration Ecology, 26, 1212-1220.

Jha, S., Bacon, C.M., Philpott, S.M., Mendez, V.E., Laederach, P. & Rice, R.A. (2014) Shade Coffee: Update on a Disappearing Refuge for Biodiversity. Bioscience, 64, 416-428.

Johnson, A.R., Wiens, J.A., Milne, B.T. & Crist, T.O. (1992) Animal movements and population-dynamics in heterogeneous landscapes. Landscape Ecology, 7, 63-75.

Johnson, M.D. (2007) Measuring Habitat Quality: A Review. The Condor, 109, 489-504.

Jones, J. (2001) Habitat selection studies in avian ecology: A critical review. Auk, 118, 557-562.

Kéry, M. & Schaub, M. (2012) Bayesian population analysis using WinBUGS: a hierarchical perspective. Academic Press.

Komar, O. (2006) Ecology and conservation of birds in coffee plantations: a critical review. Bird Conservation International, 16, 1-23.

Kremen, C. (2015) Reframing the land-sparing/land-sharing debate for biodiversity conservation. Annals of the New York Academy of Sciences, 1355, 52-76.

Kristan, W.B. (2003) The role of habitat selection behavior in population dynamics: source-sink systems and ecological traps. Oikos, 103, 457-468.

Labocha, M.K. & Hayes, J.P. (2012) Morphometric indices of body condition in birds: a review. Journal of Ornithology, 153, 1-22.

Lara, D., Rojas, C. & Velásquez-Tibatá, J. (2017) Turismo de naturaleza: Oportunidad de desarrollo de las comunidades locales. In: Moreno, L.A., Andrade, G.I., & Ruíz-Contreras, L.F. (Eds.) Biodiversidad 2016. Estado y tendencias de la biodiversidad continental de Colombia. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt. Bogotá, D.C., Colombia.

Lindstrom, A., Kvist, A., Piersma, T., Deking, A. & Dietz, M.W. (2000) Avian pectoral muscle size rapidly tracks body mass changes during flight, fasting and fueling. The Journal of Experimental Biology, 203, 913-919.

Marra, P.P., Sherry, T.W. & Holmes, R.T. (1993) Territorial Exclusion by a Long-Distance Migrant Warbler in Jamaica: A Removal Experiment with American Redstarts (Setophaga ruticilla). The Auk, 110, 565-572.

Milder, J.C., Arbuthnot, M., Blackman, A., Brooks, S.E., Giovannucci, D., Gross, L., Kennedy, E.T., Komives, K., Lambin, E.F., Lee, A., Meyer, D., Newton, P., Phalan, B., Schroth, G., Semroc, B., Van Rikxoort, H., Zrust, M. (2014) An agenda for assessing and improving conservation impacts of sustainability standards in tropical agriculture. Conservation Biology, 29, 309-320.

Moguel, P. & Toledo, V.M. (1999) Biodiversity conservation in traditional coffee systems of Mexico. Conservation Biology, 13, 11-21.

Mumme, R.L. (2015) Demography of Slate-throated Redstarts (*Myioborus miniatus*): a non-migratory Neotropical warbler. Journal of Field Ornithology, 86, 89-102.

Myers, N., Mittermeier, R.A., Mittermeier, C.G., Da Fonseca, G.A. & Kent, J. (2000) Biodiversity hotspots for conservation priorities. Nature, 403, 853-858.

Norris, K. (2008) Agriculture and biodiversity conservation: opportunity knocks. Conservation letters, 1, 2-11.

Noss. R.F. (1990) Indicators for monitoring biodiversity: A hierarchical approach. Conservation Biology, 4, 355364.

Ocampo-Peñuela, N. & Winton, R.S. (2017) Economic and Conservation Potential of Bird-Watching Tourism in Postconflict Colombia. Tropical Conservation Science, 10, 1-6.

Part, T., Arlt, D. & Villard, M. (2007) Empirical evidence for ecological traps: a two-step model focusing on individual decisions. Journal of Ornithology, 148, 327-332.

Peig, J. & Green, A.J. (2009) New perspectives for estimating body condition from mass/length data: the scaled mass index as an alternative method. Oikos, 118, 1883-1891.

Perfecto, I., Rice, R.A., Greenberg, R. & VanderVoort, M.E. (1996) Shade coffee: A disappearing refuge for biodiversity. Bioscience, 46, 598-608.

Perfecto, I. & Vandermeer, J. (2002) Quality of agroecological matrix in a tropical montane landscape: ants in coffee plantations in southern Mexico. Conservation Biology, 16, 174-182.

Perfecto, I., Vandermeer, J., Mas, A. & Pinto, L.S. (2005) Biodiversity, yield, and shade coffee certification. Ecological Economics, 54, 435-446.

Petit, L.J. & Petit, D.R. (2003) Evaluating the Importance of Human-Modified Lands for Neotropical Bird Conservation. Conservation Biology, 17, 687-694.

Phalan, B., Onial, M., Balmford, A. & Green, R.E. (2011) Reconciling Food Production and Biodiversity Conservation: Land Sharing and Land Sparing Compared. Science, 333, 1289-1291.

Philpott, S.M., Arendt, W.J., Armbrecht, I., Bichier, P., Diestch, T.V., Gordon, C., Greenberg, R., Perfecto, I., Reynoso-Santos, R., Soto-Pinto, L., Tejeda-Cruz, C., Williams-Linera, G., Valenzuela, J. & Zolotoff, J.M. (2008) Biodiversity Loss in Latin American Coffee Landscapes: Review of the Evidence on Ants, Birds, and Trees. Conservation Biology, 22, 1093-1105.

Philpott, S.M., Bichier, P., Rice, R. & Greenberg, R. (2007) Field-testing ecological and economic benefits of coffee certification programs. Conservation Biology, 21, 975-985.

Pulliam, H.R. (1988) Sources, sinks, and population regulation. American Naturalist, 132, 652-661.

Pulliam, H.R. & Danielson, B.J. (1991) Sources, sinks, and habitat selection - a landscape perspective on population-dynamics. American Naturalist, 137, S50-S66.

Ralph, C.J., Geupel, G.R., Pyle, P., Martin, T.E. & DeSante, D.F. (1993) Handbook of Field Methods for Monitoring Landbirds. USDA Forest Service / UNL Faculty Publications. 105.

Robertson, B.A. & Hutto, R.L. (2006) A framework for understanding ecological traps and an evaluation of existing evidence. Ecology, 87, 1075-1085.

Robertson, B.A., Rehage, J.S. & Sih, A. (2013) Ecological novelty and the emergence of evolutionary traps. Trends in Ecology & Evolution, 28, 552-560.

Royle, J.A. & Dorazio, R.M. (2008) Hierarchical modeling and inference in ecology: the analysis of data from populations, metapopulations and communities. Academic Press, USA.

Ruiz-Gutiérrez, V., Zipkin, E.F. & Dhondt, A.A. (2010) Occupancy dynamics in a tropical bird community: unexpectedly high forest use by birds classified as non-forest species. Journal of Applied Ecology, 47, 621-630.

Ruiz-Gutiérrez, V., Doherty, P.F. Santana, C.E., Contreras Martínez, S., Schondube, J., Munguía, H.V. & Iñigo-Elias, E. (2012) Survival of Resident Neotropical Birds: Considerations for Sampling and Analysis Based on 20 Years of Bird-Banding Efforts in Mexico. The Auk, 129, Pages 500–509.

Ruiz-Gutiérrez, V., Hooten, M.B. & Campbell Grant, E.H. (2016) Uncertainty in biological monitoring: a framework for data collection and analysis to account for multiple sources of sampling bias. Methods in Ecology and Evolution, 7, 900-909.

Sánchez-Clavijo, L.M., Arbeláez-Alvarado, D. & Renjifo, L.M. (2008) Investigación y conservación de aves en paisajes rurales neotropicales. Ornitología Neotropical, 19, 549-565.

Sánchez-Clavijo, L.M., Botero, J.E. & Espinosa, R. (2009) Assessing the value of shade coffee for bird conservation in the Colombian Andes at a local, regional and national level. *In*: Rich, T.D., C. Arizmendi, D. Demarest & C. Thompson [eds.]. Tundra to Tropics: Connecting Birds, Habitats and People. Proceedings of the 4th International Partners in Flight Conference, 13-16 February 2008, McAllen, TX, USA.

Sánchez-Clavijo, L.M., Hearns, J. & Quintana-Ascencio, P.F. (2016) Modeling the effect of habitat selection mechanisms on population responses to landscape structure. Ecological Modelling, 328, 99-107.

Schamber, J.L., Esler, D. & Flint, P.L. (2009) Evaluating the validity of using unverified indices of body condition. Journal of Avian Biology, 40, 49-56.

Schlaepfer, M.A., Runge, M.C. & Sherman, P.W. (2002) Ecological and evolutionary traps. Trends in Ecology & Evolution, 17, 474-480.

Schulte-Hostedde, A.I., Zinner, B., Millr, J.S. & Hickling, G.J. (2005) Restitution of mass–size residuals: validating body condition indices. Ecology, 86, 155-163.

Sekercioglu, C.H., Loarie, S.R., Brenes, F.O., Ehrlich, P.R. & Daily, G.C. (2007) Persistence of forest birds in the Costa Rican agricultural countryside. Conservation Biology, 21, 482-494.

Sekercioglu, C.H. (2012) Promoting community-based bird monitoring in the tropics: Conservation, research, environmental education, capacity-building, and local incomes. Biological Conservation, 151, 69-73.

Sherry, T.W. & Holmes, R.T. (1996). Winter Habitat Quality, Population Limitation, and Conservation of Neotropical-Nearctic Migrant Birds. Ecology, 77, 36-48.

Skagen, S.K. & Yackel Adams, A.A. (2010) Potential Misuse of Avian Density as a Conservation Metric. Conservation Biology, 25, 48-55.

Stutchbury, B.J. (1994) Competition for Winter Territories in a Neotropical Migrant: The Role of Age, Sex and Color. The Auk, 111, 63-69.

Van Horne, B. (1983) Density as a misleading indicator of habitat quality. Journal of Wildlife Management, 47, 893-901.

von Wehrden, H., Abson, D.J., Beckmann, M., Cord, A.F., Klotz, S. & Seppelt, R. (2014) Realigning the land-sharing/land-sparing debate to match conservation needs: considering diversity scales and land-use history. Landscape Ecology, 29, 941-948.

Watkinson, A.R. & Sutherland, W.J. (1995) Sources, sinks and pseudo-sinks. Journal of Animal Ecology, 64, 126-130.

Wolfe, J.D., Ryder, T. & Pyle, P. (2010) Using molt cycles to categorize the age of tropical birds: an integrative new system. Journal of Field Ornithology, 81, 186-194.

Supporting Information

Sanchez-Clavijo_etal2019_SuppInf_Part1.pdf

Sanchez-Clavijo_etal2019_SuppInf_Part2.pdf

Habitat selection in transformed landscapes and the role of forest remnants and shade coffee in the conservation of resident birds.

Sánchez-Clavijo, L.M., Bayly, N.J., and Quintana-Ascencio P.F. (2019). *Journal of Animal Ecology* **V**(i): pp.

Supporting Information - Part 1: supplementary details, tables and figures for Materials and Methods, Results and Discussion.

Table of Contents

1. Materials and Methods

1.1. Study area & sampling scheme

Hacienda La Victoria is an 800-hectare agricultural estate devoted to coffee production and forest conservation in the Sierra Nevada de Santa Marta in northern Colombia (Fig. S1A). All coffee was grown in moderate to steep slopes, underneath cultivated shade dominated by *Inga codonantha* and *Albizia carbonaria*, with occasional interspersed trees of other edible and ornamental species, and could be classified as a commercial polyculture (Moguel & Toledo 1999). Canopy height in the plots where sampling took place (Fig. S1B) was generally between 10 and 15m, and canopy percent cover varied greatly around a mean of 60%. Coffee shrub density and height varied according to when plots were last renewed (cut down) or replanted, and groundcover depended on the time of year (high after the dry season, cleared out when the rainy season intensified). Coffee production was the main economic activity of the farm at the time sampling took place, but most plots were not managed intensively, and experienced cycles of temporal local abandonment followed by increases in intensification, and cycles of coffee leaf rust propagation followed by renewal of the coffee shrubs. Plant diversity in remnant forest patches was much higher, with a dominance of species from Lauraceae, Melastomataceae, Araliaceae, Euphorbiaceae, Rubiaceae and Leguminosae. Canopy heights in the forest areas where sampling took place (Fig. S1B) ranged from 15 to 30 m and canopy cover had low variance around a mean of 80%. Most forest sites had a dense understory of palms, ferns, Heliconiaceae and other understory shrubs, including occasional coffee plants either left over from previous plantings or that dispersed naturally from nearby crops. At the time sampling took place forests were only being used for biological research, low-intensity tourism and occasionally for wood extraction.

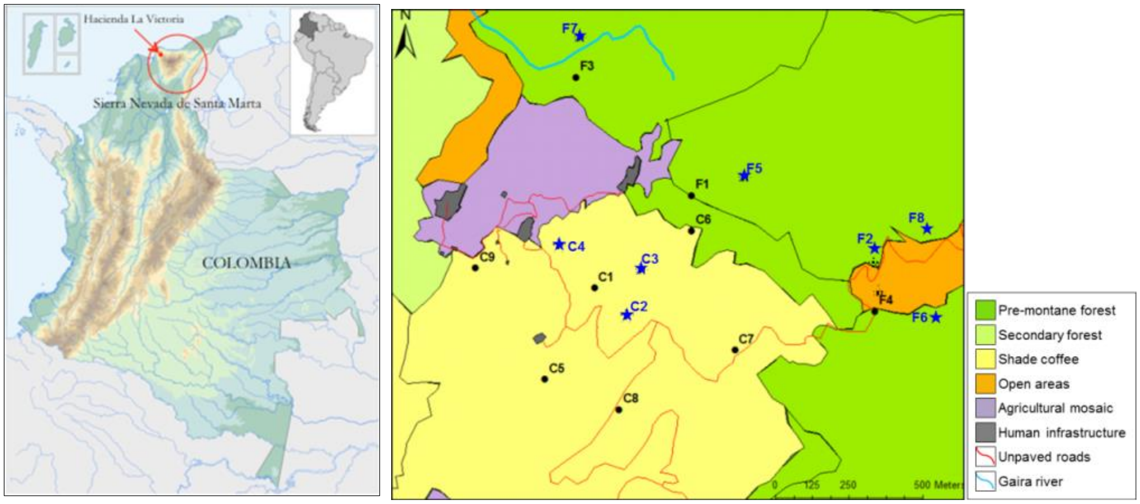


Figure S1. A) Location of Hacienda La Victoria in northern Colombia. B) Schematic map of study site showing the approximate location of banding stations and vegetation cover (F: banding stations in forest, C: banding stations in coffee, black points shows stations where both mist-netting and observations took place, blue stars show stations where only mist-netting took place).

1.2. Focal species

According to the literature our focal species represent a gradient of distribution range sizes, affinity towards habitats with different levels of tree cover, diet and social behaviors; however, none are classified as highly sensitive to human activity or as having high conservation or research priorities (Table S1).

Table S1. Taxonomical, ecological and behavioral characteristics for 12 focal species of resident birds present in native forest and shade coffee plantations in the Sierra Nevada de Santa Marta, Colombia.

Family	**Species**[1]	**Distribution**[2]	**Habitat**[3]			**Diet**[3]		**Social behavior**[3]	**Sensitivity to human activity**[4]	**Conservation priority**[4]	**Research priority**[4]
			Forest	**Edge or Woody**	**Scrub**	**Fruit**	**Insects**				
Tyrannidae	*Mionectes olivaceus galbinus*	Restricted	X			X	X	Joins mixed flocks	Medium	Low	Low
Tyrannidae	*Mionectes oleagineus parcus*	Continuous	X	X		X	X	Joins mixed flocks	Medium	Low	Low
Turdidae	*Turdus flavipes venezuelensis*	Discontinuous	X	X		X	X	Seasonal migrations	Medium	Low	Medium
Turdidae	*Turdus albicollis phaeopygoides*	Discontinuous	X			X	X	Follows ant swarms	Medium	Low	Medium
Thraupidae	*Ramphocelus dimidiatus dimidiatus*	Continuous		X	X	X		Conspecific pairs/groups	Low	Low	Low
Thraupidae	*Tangara gyrola toddi*	Discontinuous	X	X		X	X	Joins mixed flocks	Medium	Low	Low
Thraupidae	*Saltator maximus maximus*	Continuous		X	X	X	X	Joins mixed flocks	Low	Low	Low
Thraupidae	*Saltator striatipectus perstriatus*	Continuous		X	X	X	X	Conspecific pairs/groups	Low	Low	Low
Parulidae	*Myiothlypis conspicillata*	Restricted	X				X	Conspecific pairs/groups	Medium	Medium	Low
Parulidae	*Basileuterus rufifrons mesochrysus*	Continuous		X	X		X	Conspecific pairs/groups	Low	Low	Low
Parulidae	*Myioborus miniatus sanctaemartae*	Restricted	X	X			X	Joins mixed flocks	Low	Low	Low
Fringillidae	*Euphonia laniirostris crassirostris*	Continuous		X	X	X		Joins mixed flocks	Low	Low	Low

[1] Subspecies found in the Sierra Nevada de Santa Marta (Ayerbe-Quiñones 2018).
[2] *Continuous*: the subspecies found in the Sierra Nevada de Santa Marta has a continuous distribution throughout the rest of northern Colombia and/or the Andes; *Discontinuous*: the subspecies found in the Sierra Nevada de Santa Marta is only found in a few and disjoint populations in northern Colombia; *Restricted*: the subspecies is endemic to the Sierra Nevada de Santa Marta (Ayerbe-Quiñones 2018).
[3] *Sources*: Parker *et al.* 1996; Ayerbe-Quiñones 2018; Schulenberg 2019 (see references for authorship of species accounts).
[4] Parker *et al.* 1996

1.3. Level 1: Separate indicators of habitat preference and performance

This section contains a detailed account of the data collection, processing, and analysis protocols carried out for the ten chosen indicators of habitat preference and performance.

1.3.1. Occurrence

Data collection – estimations of occupancy were based on 16 complementary observation sessions that were carried out in and near our banding stations during 2013 and 2014. Observations took place for two to four hours after sunrise or before sunset and were always carried out by a single observer. Although the initial aim of these sessions was to accumulate resights of color banded birds, observers recorded all detected individuals of the focal species. During some of these sessions, playback was used to increase bird detectability (we looped over a playlist that featured calls and songs from all focal species, plus a

Neotropical owl mix - courtesy of the Cornell Lab of Ornithology). Although the total time spent birdwatching and the use of playback varied among occasions, it was kept constant for each site within occasions and amounted to a mean total of 36 hours per site.

Data processing – a detection/non-detection matrix was generated for each species that contained 9 rows (one per banding site) and 16 columns (one per sampling occasion). Additionally, we included the type of habitat (coffee or forest) and the altitude for each site.

Data analysis – to determine whether habitat had an effect on the probability of occurrence we used the following two models:

Observation model for replicated detection/non-detection observations

$\text{logit}(p) = \alpha 1 + \beta 1 * \text{habitat}(i)$

Ecological model for true occurrence

$\text{logit}(\psi i) = \alpha 2 + \beta 2 * \text{habitat}(i) + \beta 3 * \text{altitude} + \beta 4 * \text{altitude}^2$

The effect of habitat on the probability of observation (**p**) was included because having a lower and more open canopy means that visibility in shade coffee is usually much higher than in forest remnants, and we wanted to differentiate this from habitat effects on true occurrence, which was our main interest. We did not include the effect of season, year, effort (in number of hours) and method (with or without playback) on **p** because our species were common enough that while these variations probably increased the number of individuals detected per species, we would not expect a clear effect on whether or not they were detected. We included a quadratic effect of altitude on the probability of occurrence (ψ) because in tropical mountains it is very common for bird species to have narrow altitudinal ranges (Kattan & Franco 2004; Gómez *et al*. 2015).

We followed a Bayesian implementation of occupancy models using the code available at http://www.vogelwarte.ch/de/projekte/publikationen/bpa/code-for-running-bpa-using-jags.html (Kéry & Schaub 2012). Analyses were run using R (R Core Team 2016), JAGS (Plummer 2016) and the "jagsui" package (Kellner 2016). After checking model outputs for convergence, we considered the effect of habitat on ψ as statistically clear (Dushoff *et al*. 2019) when parameter estimates for $\beta 2$ did not include 0 in their 95% credibility intervals (because of the way we set up the models, positive values of this coefficient indicated higher expected occupancy in coffee, and negative values higher expected occupancy in forest). We also plotted occupancy probability as a function of altitude and habitat to help us interpret results.

1.3.2. Abundance

Data collection – because all captured individuals were banded with either a uniquely-coded metal ring or a unique combination of color bands, instead of assuming abundances from species counts, we were able to use capture-mark-recapture analyses. Even though we kept the places where we set up mist nets consistent among sampling seasons, there was a lot of variation in effort (Table S2), and therefore in sample sizes according to species, habitat and method, which had to be accounted for during data analysis (Table S3).

Table S2. Capture effort in standardized mist-net hours (Mist-netting sites - C: banding stations in shade coffee, F: banding stations in native forest; Sampling events - DW: "dry-wet" seasons (March-May), MW: "mid-wet" seasons (June-August), PW: "peak-wet" (September-November), followed by year of sampling; differences in effort stem from different lengths of sampling occasions, numbers of mist nets set up per site, and/or duration of sampling per day).

		Sampling events											
		PW09	**DW10**	**PW10**	**DW11**	**MW11**	**PW11**	**DW12**	**DW13**	**MW13**	**DW14**	**MW14**	**DW15**
Mist-netting sites	**C1**	152	1,245	415	1,062	277	-	663	832	174	126	168	109
	C2	-	-	-	755	-	-	484	-	-	-	-	-
	C3	-	-	-	-	248	-	-	-	-	-	-	-
	C4	-	-	-	-	-	-	156	-	-	-	-	-
	C5	-	-	-	-	-	-	-	599	141	133	179	-
	C6	-	-	-	-	-	-	-	113	143	126	164	-
	C7	-	-	-	-	-	-	-	142	164	135	179	-
	C8	-	-	-	-	-	-	-	129	172	126	175	-
	C9	-	-	-	-	-	-	-	137	148	117	210	-
	F1	1,144	2,072	928	2,846	256	1,008	2,448	1,266	147	548	167	1,007
	F2	-	-	-	1,183	-	-	878	245	-	82	-	-
	F3	-	-	-	-	262	657	775	625	147	373	178	619
	F4	-	-	-	-	-	-	1,001	591	170	392	168	-
	F5	-	-	-	-	-	-	-	434	-	372	-	448
	F6	-	-	-	-	-	-	-	610	-	570	-	834
	F7	-	-	-	-	-	-	-	342	-	366	-	479
	F8	-	-	-	-	-	-	-	-	-	-	-	443

Table S3. Summary of banding data available for capture-mark-recapture analyses for 12 species of resident birds present in native forest and shade coffee plantations in the Sierra Nevada de Santa Marta, Colombia.

Species	**Habitat**	**Captures**	**Individuals(I)**	**Recaptures(R)**	**Ratio R/I**
Mionectes olivaceus	Coffee	124	117	7	0.06
	Forest	577	462	115	0.25
Mionectes oleagineus	Coffee	95	66	29	0.44
	Forest	318	235	83	0.35
Turdus flavipes	Coffee	223	195	28	0.14
	Forest	392	339	53	0.16
Turdus albicollis	Coffee	19	19	0	0.00
	Forest	330	244	86	0.35
Ramphocelus dimidiatus	Coffee	126	101	25	0.25
	Forest	119	88	31	0.35
Tangara gyrola	Coffee	182	138	44	0.32
	Forest	398	267	131	0.49
Saltator maximus	Coffee	91	74	17	0.23
	Forest	92	71	21	0.30
Saltator striatipectus	Coffee	70	60	10	0.17
	Forest	34	33	1	0.03
Myiothlypis conspicillata	Coffee	86	64	22	0.34
	Forest	247	188	59	0.31
Basileuterus rufifrons	Coffee	174	131	43	0.33
	Forest	83	61	22	0.36
Myioborus miniatus	Coffee	90	62	28	0.45
	Forest	46	30	16	0.53
Euphonia laniirostris	Coffee	95	80	15	0.19
	Forest	97	89	8	0.09

Data processing – to improve precision in habitat-specific demographic estimates we pooled together data from all sites into two habitat classes, and data from each mist-net day into twelve primary sampling events. For each species we produced two data matrices, one for coffee and one for forest, that contained one row for each individual that was identified during the whole sampling time, and one column for each primary sampling event, and simply displayed whether the individual was captured (1) or not (0) during that occasion in that habitat.

Data analysis – because of differences in recapture rates among species and habitats, we had to use two different types of models to estimate total abundance over the whole sampling time. For species that had very low recapture rates in either one or the two habitats (*M. olivaceus*, *T. flavipes*, *T. albicollis*, *S. maximus*, *S. striatipectus* and *E. laniirostris*) we used a closed population capture-recapture model (CP), built within a Bayesian framework and taking advantage of parameter-expanded data augmentation (Kéry & Schaub 2012). Data augmentation was introduced to capture–recapture models by Royle *et al.* (2007) and consists of "adding an arbitrary number of zeroes to the dataset and (then) analyzing a reparametrized version of the original model. Essentially, it converts the closed-population model into an occupancy model and turns the problem of estimating abundance N into that of estimating occupancy(ψ)" (Kéry & Schaub 2012). Following the guidelines of the latter authors, to diagnose if data augmentation was enough, we looked at the posterior distributions of N and they were truncated, we repeated the analysis with a larger number of added zeroes.

For species with relatively high recapture rates for both habitats (*M. oleagineus, R. dimidiatus, T. gyrola, M. conspicillata, B. rufifrons* and *M. miniatus*) we used a Jolly-Seber (JS) population model parameterized as a multistate model (Royle & Dorazio 2008; Kéry & Schaub 2012), which again was built within a Bayesian framework with data augmentation, and which allowed for the simultaneous estimation of population size and apparent survival. While some model assumptions were probably not met, we assumed that violations would lead to similar inaccuracies in both habitats, and since we were interested in comparing estimated abundance between coffee and forest, rather than on calculating species densities with precision, we chose the models that could best be parameterized given our data.

We modified code available at http://www.vogelwarte.ch/de/projekte/publikationen/bpa/code-for-running-bpa-using-jags.html for both models by introducing a quadratic effect of sampling effort (scaled number of standardized mist net hours per habitat, per occasion) on detection probabilities (**p**). This allowed is to account for the fact that effort was uneven between occasions, and we assumed a quadratic relationship because more mist-netting days are expected to yield more captured individuals up to the point where further effort becomes less effective due to individuals learning to avoid the nets. Additionally, for JS models, apparent survival (**Φ**) was allowed to vary randomly by occasion.

Estimates of the number of individuals alive per occasion (**N**) and over the whole sampling time (**Nsuper**) were calculated as derived population parameters. These analyses were run using R (R Core Team 2016), JAGS (Plummer 2016) and the "jagsui" package (Kellner 2016) and involved running from 3,000 to 300,000 iterations to achieve adequate convergence of all model parameters. After checking model outputs for convergence, we considered species estimations of overall abundance (**Nsuper**) as different between habitats when there was no overlap in their 50% credibility intervals, and plotted their posterior distributions together to visually asses overlap (using package "ggplot2" by Wickham 2016). While parameters were not estimated with the same method for all species, we made sure to always keep the model we used, the number of augmented individuals and the simulation conditions constant for both habitats within each species to make fair comparisons.

Inference from Bayesian population models was considered reliable when Rhat (the potential scale reduction factor) was less than 1.1 and n.eff (measure of effective sample size) was higher or equal than 30. We ran all models with 300 effective iterations, but because certain species: habitat combinations required more iterations to find a reasonable solution, this value was increased by an order of magnitude for each new run until chains showed adequate convergence. Where this was never reached, tables feature an NA in the results (for example abundance in coffee for *T. albicollis* and in forest for *S. striatipectus* for which there were not enough recaptures to adequately run a CRC model).

1.3.3. Fidelity

Data collection and processing – we used the same datasets that we used to estimate abundance.

Data analysis – for species with low recapture rates in either one or the two habitats (*M. olivaceus, T. flavipes, T. albicollis, S. maximus, S. striatipectus* and *E. laniirostris*) we used a Cormack-Jolly-Seber (CJS) model to calculate apparent survival (**Φ**) per occasion (Royle & Dorazio 2008; Kéry & Schaub 2012). Again, we introduced a quadratic effect of sampling effort on detection probabilities (**p**) to modify the available code for this model. These type of models are widely used for the joint estimation of recapture and survival probabilities in animal populations (Kéry & Schaub 2012), but do not allow for the simultaneous estimation of abundance. For species with high recapture rates in both habitats (*M. oleagineus, R. dimidiatus, T. gyrola, M. conspicillata, B. rufifrons* and *M. miniatus*) we used **Φ** estimates from the Jolly-Seber (JS) population models. After checking for convergence in estimated parameters, we used model outputs to calculate mean **Φ** between occasions for each iteration, and then derived the mean and standard deviation for all iterations to assess differences in site fidelity between habitats. Differences were considered statistically clear when there was no overlap in habitat-specific mean phi +/- standard deviation. We plotted posterior distributions for both habitats together to assess overlap visually as well.

1.3.4. Inter-seasonal variance

Data collection and processing – we used the same datasets that we used to estimate abundance.

Data analysis – this analysis could only be carried out for the six species for which we found stable solutions for the Jolly-Serber model (*M. oleagineus, R. dimidiatus, T. gyrola, M. conspicillata, B. rufifrons* and *M. miniatus*), as it allows for the derived estimation of population size during n-1 of the sampling occasions (Kéry & Schaub 2012). After running the models and checking for parameter convergence, we calculated the coefficient of variance between abundance per occasion for each iteration, and then derived the mean and standard deviation for all iterations to get an estimate of seasonal variance in abundance for each species and habitat combination. We considered differences as statistically clear when there was no overlap of the mean +/- the standard deviation. Since models already accounted for differences in effort, we assumed differences accounted for actual variations in abundance per habitat.

1.3.5. Age

Data collection – all age information came from the processing of individuals captured via mist-netting. Classification according to age was done following guidelines by Pyle *et al*. 1987, Wolfe *et al*. 2010, and SELVA's unpublished ageing guide for species in the region. The main characteristics used to classify individuals were plumage color, shape, quality, and contrast between flight feathers, aided by secondary features such as body feather density, beak commissure, eye color and cranium, depending on the species. Since SELVA researchers have been working at this site for a long time, all participants of this study received training to appropriately age individuals of our focal species.

The following five categories were used:

0: unknown – age could not be determined for the individual at that particular moment
1: fledgling – very young birds that had not completed their first molt
2: juvenile – young birds that already completed their first molt
3: immature – birds that have gone through an incomplete pre-formative molt
4: adult – all birds that have gone through at least one complete basic molt

Data processing – individual capture histories were checked one by one to ensure that age information was consistent (for example that an individual classified as an adult in one season was not classified as an immature in the following season), and to complete missing information that could be gathered from other captures (for example an individual classified as unknown that had already been captured two years before could be determined *post hoc* to be an adult). We excluded *M. olivaceus* and *M. oleagineus* from this analysis because they do not go through an incomplete pre-formative molt and because age determination criteria were not clear throughout our study period. To focus on dominant vs. subordinate individuals, we restricted the dataset from the ten remaining species to all captured individuals that were classified as immature or adult. We recoded this data matrix to show a value of 1 when the individual was an adult and a value of 0 when it was an immature (Table S4 shows sample sizes available for this analysis).

Table S4. Sample size (n) represented by the number of captures for each species according to age category and habitat.

Species	Age category	Coffee (n)	Forest (n)
Turdus flavipes	3 (immature)	52	123
	4 (adult)	205	265
Turdus albicollis	3 (immature)	13	154
	4 (adult)	7	267
Ramphocelus dimidiatus	3 (immature)	31	32
	4 (adult)	106	102
Tangara gyrola	3 (immature)	63	117
	4 (adult)	149	328
Saltator maximus	3 (immature)	34	31
	4 (adult)	64	59
Saltator striatipectus	3 (immature)	46	22
	4 (adult)	33	8
Myiothlypis conspicillata	3 (immature)	28	126
	4 (adult)	60	184
Basileuterus rufifrons	3 (immature)	85	55
	4 (adult)	117	47
Myioborus miniatus	3 (immature)	39	19
	4 (adult)	72	38
Euphonia laniirostris	3 (immature)	34	37
	4 (adult)	61	54

Data analysis – since age was transformed into a binary response, to test for differences in the distribution of individuals between habitats according to age, we used the following set of generalized linear models (with binomial errors and logit links):

AGE ~ 1 (null model)
AGE ~ DAY+DAY^2 (considers only the quadratic effect of day of year)
AGE ~ HABITAT (considers only the effect of habitat)
AGE ~ DAY+DAY^2+HABITAT (considers day of year and habitat)

Day of year was included as a quadratic variable because most bird species at our study site breed only after the start of the rainy season, and therefore we expected a strong seasonal response in most of our variables. After running the models, we used R (R Core Team 2016) and package "AICcmodavg" to perform AICc model averaging (Mazerolle 2016), and to calculate the model-averaged estimate and unconditional standard error for the habitat coefficient. When 95% confidence intervals for this estimate did not include zero, we concluded that there was higher probability of capturing an adult over an immature individual in one vs. the other habitat (positive coefficients indicated higher probability in forest, while negative coefficients indicated higher probability in coffee). We also plotted the probability of capturing an adult over an immature individual as a function of day of year and habitat to help us interpret results.

Even though the effort which led to the number of records available for age and all following variables was uneven between habitats, seasons and years; we believe that samples sizes were generally large enough to overcome these effects, and for species: habitat combinations where sample sizes were smaller, this would be reflected in wider confidence intervals and/or standard errors which were taken into account at the next level of analysis.

1.3.6. Body condition

Data collection – body mass and wing chord length of all captured individuals were measured using portable electronic balances and standard wing rules, respectively, and following standardized banding station protocols that allow for minimization of measuring error. Repeated measures from individuals were treated as independent because we assume they vary within individuals based on temporal noise and individuals were never processed twice in the same day. Therefore, we assumed their body mass at the time of weighing was a result of the habitat they were captured in, and assumed because sampling took place at the same time period in both habitats, that temporal noise would be the same in coffee and forest.

Data processing – body mass and wing chord data was checked for outliers following Tukey's method (Tukey 1949), and records defined as extreme values according to [< Q25 - k(IQR) or > Q75 + k(IQR), with k=3] were removed. We chose Peig & Green's scaled mass index as our index of body condition because it aims to correct mass with a body size indicator (in this case wing chord length), recognizes that standard major axis regression is more appropriate than ordinary least squares regression in cases where both variables are measured with error, and is supposedly capable of accounting for the effects of growth and size dimorphism (Green 2001; Peig & Green 2009). To calculate this index, we ran a standard major axis regression between log-transformed wing chord and body mass, and then used the following formula on the residuals (Figure S2 shows the distribution of data for the body condition index per species):

$$\widehat{\mathrm{M}}\mathrm{i}=\mathrm{Mi}\left[\frac{\mathrm{L0}}{\mathrm{Li}}\right]^{\mathrm{b}_{\mathrm{SMA}}}$$

where,

Mˆi: the predicted body mass for individual i when linear body measure is standardized to L0
Mi: body mass measurement of individual i
L0: arithmetic mean value for the study population
Li: linear body measurement of individual i
bSMA: scaling exponent estimated by the SMA regression of M on L

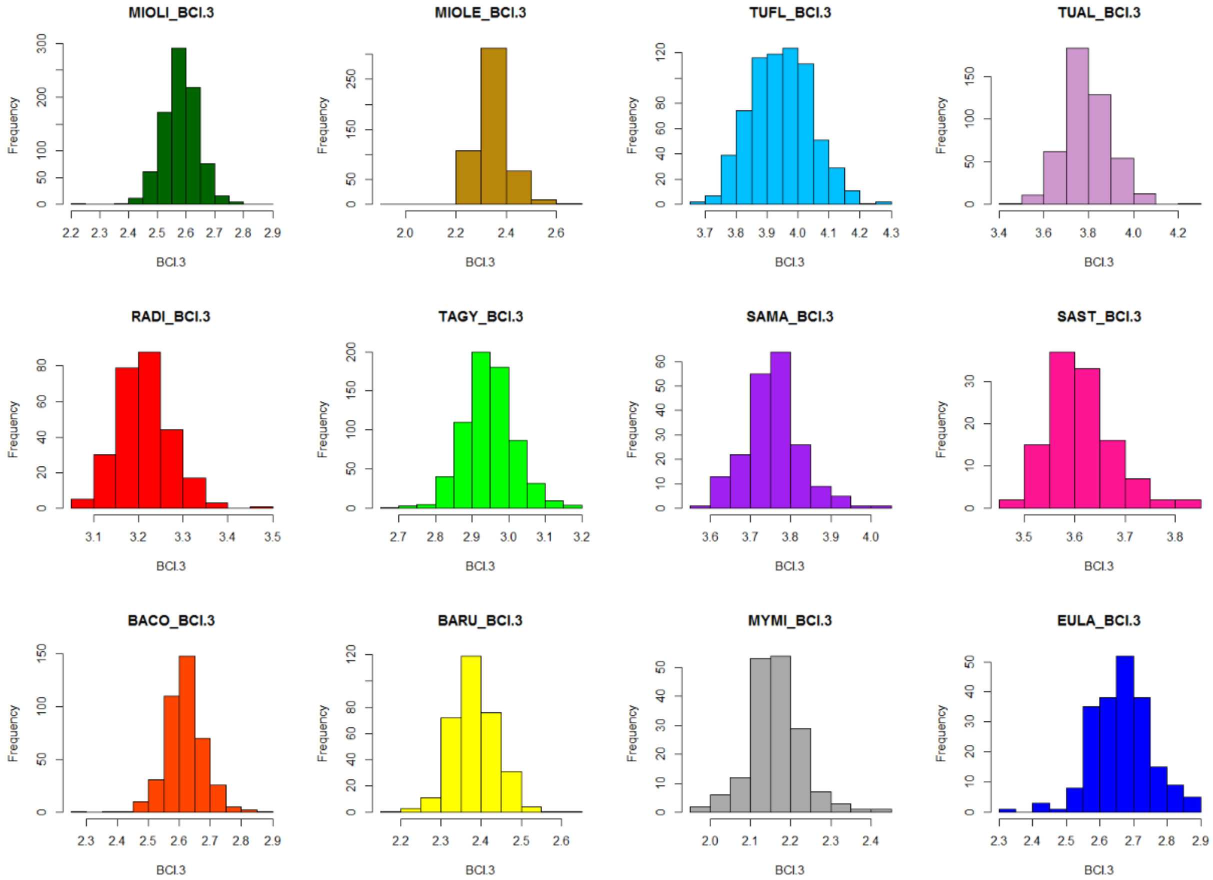


Figure S2. Histograms for body condition index per species (from left to right starting at the top: *Mionectes olivaceus*, *Mionectes oleagineus*, *Turdus flavipes*, *Turdus albicollis*, *Ramphocelus dimidiatus*, *Tangara gyrola*, *Saltator maximus*, *Saltator striatipectus*, *Myiothlypis conspicillata*, *Basileuterus rufifrons*, *Myioborus miniatus* and *Euphonia laniirostris*).

Data analysis – since the body condition index (BCI) was a normally-distributed continuous response, to test for differences in the distribution of individuals between habitats according to age, we used the following set of generalized linear models (with normal errors and identity links) and then used the same process described for age to calculate the model-averaged estimate and unconditional standard error for the habitat coefficient:

BCI ~ 1 (null model)
BCI ~ DAY+DAY^2 (considers only the quadratic effect of day of year)
BCI ~ HABITAT (considers only the effect of habitat)
BCI ~ DAY+DAY^2+HABITAT (considers day of year and habitat)

When 95% confidence intervals for this estimate did not include zero, we concluded that there was a clear statistical difference in mean body condition between habitats (positive coefficients indicated higher condition in forest, while negative coefficients indicated higher condition in coffee). We also plotted BCI as a function of day of year and habitat to help us interpret results.

1.3.7. Muscle

Data collection – muscle scores for captured individuals were determined following guidelines by Pyle *et al.* 1987 and ranged from 0 (a highly-wasted breast muscle that looks concave from the breast plate) to 3 (a healthy muscle that forms a convex curve from the breast plate). For adult and immature tropical residents, it usually varies only between scores of 2 and 3, which all station researchers were trained to differentiate.

Data processing – we restricted the dataset from all species to all captured individuals that were classified as having muscle scores of 2 or 3, and then recoded this data matrix to show a value of 1 when the score was 3 and a value of 0 when it was 2 (Table S5 shows sample sizes available for this analysis).

Table S5. Sample size (n) represented by the number of captures for each species according to muscle score and habitat.

Species	Muscle score	Coffee (n)	Forest (n)
Mionectes olivaceus	2	37	240
	3	95	456
Mionectes oleagineus	2	35	166
	3	64	212
Turdus flavipes	2	152	250
	3	107	155
Turdus albicollis	2	12	256
	3	7	172
Ramphocelus dimidiatus	2	82	59
	3	50	73
Tangara gyrola	2	55	160
	3	154	299
Saltator maximus	2	74	66
	3	23	27
Saltator striatipectus	2	54	19
	3	27	12
Myiothlypis conspicillata	2	35	105
	3	63	208
Basileuterus rufifrons	2	77	33
	3	133	72
Myioborus miniatus	2	55	16
	3	56	41
Euphonia laniirostris	2	55	56
	3	49	44

Data analysis – since muscle score was transformed into a binary response, to test for prevalence of higher muscle scores between habitats, we used the following set of generalized linear models (with binomial errors and logit links) and then used the same process described for age to calculate the model-averaged estimate and unconditional standard error for the habitat coefficient:

MUSCLE ~ 1 (null model)
MUSCLE ~ DAY+DAY^2 (considers only the quadratic effect of day of year)
MUSCLE ~ HABITAT (considers only the effect of habitat)
MUSCLE ~ DAY+DAY^2+HABITAT (considers day of year and habitat)

When 95% confidence intervals for this estimate did not include zero, we concluded that there was a clear statistical difference in muscle scores between habitats (positive coefficients indicated higher condition in forest, while negative coefficients indicated higher condition in coffee). We also plotted the probability of capturing an individual with score 3 over one with score 2 as a function as a function of day of year and habitat to help us interpret results. Because muscle score could be related to age and therefore mix signals of habitat preference and quality, for all species that showed clear statistical differences we used a chi-square test to check for independence between these two binary variables. Both tests were only statistically clear for *M. miniatus*, so we re-ran the muscle analysis using data for adult individuals only.

1.3.8. Primary molt

Data collection – primary plumage for all captured individuals was examined to determine the number of plumage generations, in order to assist with age classification. Because primary plumage molting is so easy to detect, we recorded whether individuals were undergoing any of the three following processes: post-juvenile molt (code 2 - when they go from juveniles to immatures), pre-adult molt (code 4 - when they go from juveniles to immatures), and their annual adult primary plumage molt (code 6).

Data processing – we restricted the dataset from all species to all captured individuals that were classified as immature or adults to focus on individuals that were assumed to be settled in a habitat, then recoded the data matrix to show a value of 0 when there was no evidence of complete primary plumage molt and a value of 1 when individuals were classified with plumage codes 4 and 6 (Table S6 shows sample sizes available for this analysis, and as can be noted, they could not be performed for *M. oleagineus* or *E. laniirostris*).

Table S6. Sample size (n) represented by the number of captures for each species according to primary plumage molt and habitat.

Species	Primary Molt	Coffee (n)	Forest (n)
Mionectes olivaceus	ACTIVE	8	35
	STATIC	68	318
Mionectes oleagineus	ACTIVE	0	5
	STATIC	30	80
Turdus flavipes	ACTIVE	9	53
	STATIC	254	374
Turdus albicollis	ACTIVE	1	33
	STATIC	19	406
Ramphocelus dimidiatus	ACTIVE	15	14
	STATIC	125	123
Tangara gyrola	ACTIVE	51	94
	STATIC	165	373
Saltator maximus	ACTIVE	13	17
	STATIC	90	74
Saltator striatipectus	ACTIVE	10	3
	STATIC	72	29
Myiothlypis conspicillata	ACTIVE	2	10
	STATIC	88	305
Basileuterus rufifrons	ACTIVE	23	6
	STATIC	190	102
Myioborus miniatus	ACTIVE	11	1
	STATIC	102	56
Euphonia laniirostris	ACTIVE	2	2
	STATIC	94	91

Data analysis – since primary plumage molt classification was transformed into a binary response, to test for prevalence of individuals undergoing complete primary plumage (PP) molts between habitats, we used the following set of generalized linear models (with binomial errors and logit links) and then used the same process described for age to calculate the model-averaged estimate and unconditional standard error for the habitat coefficient:

PPMolt ~ 1 (null model)
PPMolt ~ DAY+DAY^2 (considers only the quadratic effect of day of year)
PPMolt ~ HABITAT (considers only the effect of habitat)
PPMolt ~ DAY+DAY^2+HABITAT (considers day of year and habitat)

When 95% confidence intervals for this estimate did not include zero, we concluded that there was a clear statistical difference in the prevalence of primary molt between habitats (positive coefficients indicated higher condition in forest, while negative coefficients indicated higher condition in coffee). We also plotted the probability of capturing an individual with active molt over one with inactive molt as a function as a function of day of year and habitat to help us interpret results.

1.3.9. Breeding

Data collection – when birds were processed we recorded the presence and state of their cloacal protuberances (ranging from 0 to 3) and their incubation patches (ranging from 0 to 5) by visually assessing them according to standardized criteria. Individuals were classified as male if their cloacal protuberance had a score of either 2 or 3, and as female if their incubation patch score had a score between 2 and 4, but both of these characteristic are also an indicator that the individual could be actively involved in breeding activities (copulation for males and egg incubating for females).

Data processing – we removed individuals that were not processed for evidence of breeding and then recoded our data matrix to show a value of 0 when there was no evidence of active breeding (cloacal protuberance 0-1 or incubation patch <2 or >4) and a value of 1 when individuals showed evidence of active breeding (cloacal protuberance 2-3 or incubation patch 2-4) (Table S7 shows sample sizes available for this analysis).

Table S7. Sample size (n) represented by the number of captures for each species according to evidence of active breeding and habitat.

Species	Breeding Evidence	Coffee (n)	Forest (n)
Mionectes olivaceus	NO	130	645
	YES	8	36
Mionectes oleagineus	NO	89	345
	YES	12	31
Turdus flavipes	NO	86	214
	YES	177	184
Turdus albicollis	NO	16	252
	YES	4	165
Ramphocelus dimidiatus	NO	104	99
	YES	30	30
Tangara gyrola	NO	82	263
	YES	131	192
Saltator maximus	NO	78	69
	YES	24	29
Saltator striatipectus	NO	56	29
	YES	21	4
Myiothlypis conspicillata	NO	64	208
	YES	33	100
Basileuterus rufifrons	NO	141	76
	YES	76	34
Myioborus miniatus	NO	51	17
	YES	61	39
Euphonia laniirostris	NO	78	58
	YES	24	41

Data analysis – since evidence of active breeding was transformed into a binary response, to test for prevalence of individuals undergoing active breeding between habitats, we used the following set of generalized linear models (with binomial errors and logit links) and then used the same process described for age to calculate the model-averaged estimate and unconditional standard error for the habitat coefficient:

BREEDING ~ 1 (null model)
BREEDING ~ DAY+DAY^2 (considers only the quadratic effect of day of year)
BREEDING ~ HABITAT (considers only the effect of habitat)
BREEDING ~ DAY+DAY^2+HABITAT (considers day of year and habitat)

When 95% confidence intervals for this estimate did not include zero, we concluded that there was a clear statistical difference in the prevalence of breeding individuals between habitats (positive coefficients indicated higher condition in forest, while negative coefficients indicated higher condition in coffee). We also plotted the probability of capturing an individual with active breeding over one with inactive breeding as a function as a function of day of year and habitat to help us interpret results.

1.3.10. Juveniles

Data collection and processing – for details on data collection see the section on age. As with analyses of adults to immatures, *M. oleagineus* and *M. olivaceus* were not taken into account because aging criteria was not consistent among banders and seasons. We restricted the dataset to individuals that could be classified by age, and then recoded this data matrix to show a value of 1 when the individual was a juvenile and a value of 0 when it was an immature or adult (Table S8 shows sample sizes available for this analysis, and as can be noted, they could not be performed for *M. miniatus* or *T. albicollis*).

Table S8. Sample size (n) represented by the number of juveniles captured for each species according to habitat.

Species	Age category	Coffee (n)	Forest (n)
Turdus flavipes	2 (juvenile)	6	39
Turdus albicollis	2 (juvenile)	0	18
Ramphocelus dimidiatus	2 (juvenile)	3	3
Tangara gyrola	2 (juvenile)	4	22
Saltator maximus	2 (juvenile)	5	2
Saltator striatipectus	2 (juvenile)	3	3
Myiothlypis conspicillata	2 (juvenile)	2	5
Basileuterus rufifrons	2 (juvenile)	11	7
Myioborus miniatus	2 (juvenile)	2	0
Euphonia laniirostris	2 (juvenile)	1	2

Data analysis – since juveniles captured were transformed into a binary response, to test for prevalence of juveniles between habitats, we used the following set of generalized linear models (with binomial errors and logit links) and then used the same process described for age to calculate the model-averaged estimate and unconditional standard error for the habitat coefficient:

JUVENILES ~ 1 (null model)
JUVENILES ~ DAY+DAY^2 (considers only the quadratic effect of day of year)
JUVENILES ~ HABITAT (considers only the effect of habitat)
JUVENILES ~ DAY+DAY^2+HABITAT (considers day of year and habitat)

All 95% confidence intervals for this estimate included zero, so we concluded that there were no statistically clear differences in the prevalence of juveniles between habitats for the eight species we tested, probably because sample sizes were too small. We also plotted the probability of capturing a juvenile over an immature or adult as a function of day of year and habitat.

1.4. Level 2: Composite indexes of habitat preference and performance

1.4.1. Habitat preference

Because all analyses of preference were different, to get a quantitative value of the overall preference for a particular habitat, we subtracted the number of times evidence showed coffee was preferred, from the number of times forest was preferred.

1.4.2. Habitat performance

Because all analyses of performance used the same predictors, the coefficients of the effect of habitat are directly interpretable and comparable (with larger, positive values indicating higher outcome probability in forest, larger, negative values indicating higher outcome probability in coffee, and values close to zero indicating no evidence of habitat differences). To get a quantitative estimate of the overall differences between habitats, we calculated the mean of effects sizes weighted by their standard deviation, in a manner akin to a meta-analysis using the inverse-variance method (rma function with fixed effects in package “metafor”), which creates linear effects models in which the variances of the error terms are known (Viechtbauer 2010). Confidence intervals were narrowed from 95% to 90% to decrease the probability of making a type II error (false negative) since there were many unmeasured variables affecting our response.

2. Results

2.1. Level 1: Separate indicators of habitat preference and performance

This section contains numerical results and plots for all analyses carried out for the ten chosen indicators of habitat preference and performance. In plot panels species always appear in taxonomic order, in the same position and labelled according to the following species codes (first 2 letters of their genera, followed by first 2-3 letters of the species epithet):

MIOLI – *Mionectes olivaceus*
MIOLE – *Mionectes oleagineus*
TUFL – *Turdus flavipes*
TUAL – *Turdus albicollis*
RADI – *Ramphocelus dimidiatus*
TAGY – *Tangara gyrola*
SAMA – *Saltator maximus*
SAST – *Saltator striatipectus*
MYCO – *Myiothlypis conspicillata*
BARU – *Basileuterus rufifrons*
MYMI – *Myioborus miniatus*
EULA – *Euphonia laniirostris*

Space was left blank when a variable was not tested for a species, plots with a black outline mean the response was clearly higher in forest, and plots with a red outline mean the response was clearly higher in coffee.

2.3.1. Occurrence

Table S9. Numerical outputs for occupancy modelling (**beta1.psi** is the coefficient for the effect of habitat on the probability of occurrence ψ). Rhat is the potential scale reduction factor (at convergence, Rhat=1); successful convergence based on Rhat values (all < 1.1), n.eff is a crude measure of effective sample size, overlap0 checks if 0 falls in the parameter's 95% credible interval. f is the proportion of the posterior with the same sign as the mean; i.e., our confidence that the parameter is positive or negative. For this analysis, coffee was the reference habitat.

Coefficient	**Mean**	**SD**	**2.50%**	**50%**	**97.50%**	**Overlap0**	**f**	**Rhat**	**n.eff**
Mionectes olivaceus									
alpha.psi	10.309	7.023	-1.983	9.737	24.797	TRUE	0.947	1.001	1847
beta1.psi	**4.722**	**8.012**	**-9.874**	**4.137**	**22.068**	**TRUE**	**0.715**	**1.000**	**3000**
beta2.psi	-0.525	7.324	-14.672	-0.702	14.925	TRUE	0.542	1.002	1151
beta4.psi	8.215	7.082	-3.625	7.612	23.702	TRUE	0.888	1.000	3000
psi.site[1]	0.988	0.053	0.859	1.000	1.000	FALSE	1.000	1.000	3000
psi.site[2]	0.990	0.051	0.885	1.000	1.000	FALSE	1.000	1.001	3000
psi.site[3]	0.991	0.050	0.911	1.000	1.000	FALSE	1.000	1.033	1157
psi.site[4]	0.997	0.027	0.970	1.000	1.000	FALSE	1.000	1.028	1984
psi.site[5]	0.994	0.043	0.958	1.000	1.000	FALSE	1.000	1.004	2664
psi.site[6]	0.995	0.044	0.971	1.000	1.000	FALSE	1.000	1.032	2182
psi.site[7]	0.975	0.101	0.687	1.000	1.000	FALSE	1.000	1.007	2876
psi.site[8]	0.988	0.075	0.895	1.000	1.000	FALSE	1.000	1.038	1548
psi.site[9]	0.983	0.084	0.794	1.000	1.000	FALSE	1.000	1.007	1670
alpha.p	-1.639	0.381	-2.469	-1.625	-0.952	FALSE	1.000	1.000	3000
beta1.p	-0.333	0.489	-1.287	-0.353	0.669	TRUE	0.760	1.002	1948
occ.fs	9.000	0	9.000	9.000	9.000	FALSE	1.000	NaN	1
deviance	117.496	1.892	115.635	116.918	122.450	FALSE	1.000	1.001	1827
Mionectes oleagineus									
alpha.psi	10.39	5.659	0.426	9.997	22.47	FALSE	0.981	1.002	1234
beta1.psi	**-5.876**	**6.888**	**-17.453**	**-6.491**	**11.976**	**TRUE**	**0.864**	**1.000**	**3000**
beta2.psi	-6.437	5.355	-17.581	-6.126	5.224	TRUE	0.927	1.000	3000
beta4.psi	2.517	5.306	-6.157	1.826	14.882	TRUE	0.672	1.000	3000
psi.site[1]	0.743	0.281	0.101	0.855	1.000	FALSE	1.000	1.000	3000
psi.site[2]	0.611	0.339	0.032	0.65	1.000	FALSE	1.000	1.000	3000
psi.site[3]	0.931	0.136	0.484	0.992	1.000	FALSE	1.000	1.002	3000
psi.site[4]	0.312	0.370	0	0.121	1.000	FALSE	1.000	1.000	3000
psi.site[5]	0.291	0.386	0	0.057	1.000	FALSE	1.000	1.000	3000
psi.site[6]	0.973	0.098	0.658	1.000	1.000	FALSE	1.000	1.000	3000
psi.site[7]	0.994	0.047	0.959	1.000	1.000	FALSE	1.000	1.018	3000
psi.site[8]	0.991	0.066	0.945	1.000	1.000	FALSE	1.000	1.015	3000
psi.site[9]	0.859	0.239	0.127	0.985	1.000	FALSE	1.000	1.001	3000
alpha.p	-0.525	0.305	-1.113	-0.519	0.063	TRUE	0.961	1.000	3000
beta1.p	-1.095	0.555	-2.210	-1.090	-0.049	FALSE	0.980	1.001	3000
occ.fs	6.791	1.080	6.000	6.000	9.000	FALSE	1.000	1.001	2179
deviance	119.015	5.882	112.735	117.181	130.963	FALSE	1.000	1.000	2756
Turdus flavipes									
alpha.psi	10.397	7.109	-1.328	9.792	25.564	TRUE	0.951	1.000	3000
beta1.psi	**4.696**	**7.968**	**-9.976**	**4.270**	**22.020**	**TRUE**	**0.718**	**1.000**	**3000**
beta2.psi	-0.646	7.280	-15.160	-0.730	14.140	TRUE	0.546	1.001	1591
beta4.psi	8.257	7.098	-3.896	7.522	23.769	TRUE	0.896	1.001	3000
psi.site[1]	0.990	0.047	0.884	1.000	1.000	FALSE	1.000	1.008	2268
psi.site[2]	0.991	0.044	0.895	1.000	1.000	FALSE	1.000	1.021	2533
psi.site[3]	0.992	0.046	0.909	1.000	1.000	FALSE	1.000	1.013	2971
psi.site[4]	0.996	0.032	0.974	1.000	1.000	FALSE	1.000	1.006	3000
psi.site[5]	0.993	0.053	0.957	1.000	1.000	FALSE	1.000	1.035	3000
psi.site[6]	0.995	0.04	0.976	1.000	1.000	FALSE	1.000	1.076	1050
psi.site[7]	0.976	0.095	0.673	1.000	1.000	FALSE	1.000	1.021	730
psi.site[8]	0.989	0.074	0.905	1.000	1.000	FALSE	1.000	1.025	2359
psi.site[9]	0.982	0.091	0.770	1.000	1.000	FALSE	1.000	1.029	876
alpha.p	-0.252	0.297	-0.852	-0.250	0.336	TRUE	0.805	1.003	643
beta1.p	0.295	0.364	-0.418	0.288	1.032	TRUE	0.788	1.001	1501
occ.fs	9.000	0	9.000	9.000	9.000	FALSE	1.000	NaN	1
deviance	200.873	2.035	198.896	200.261	206.384	FALSE	1.000	1.000	3000
Turdus albicollis									
alpha.psi	10.951	5.447	2.098	10.331	22.925	FALSE	0.994	1.000	3000
beta1.psi	**1.441**	**8.477**	**-13.674**	**0.888**	**19.433**	**TRUE**	**0.543**	**1.001**	**1172**
beta2.psi	9.041	6.179	-1.977	8.623	22.211	TRUE	0.946	1.000	3000

beta4.psi	-3.733	5.694	-15.019	-3.648	7.692	TRUE	0.778	1.001	1224
psi.site[1]	0.934	0.195	0.152	1.000	1.000	FALSE	1.000	1.004	3000
psi.site[2]	0.968	0.121	0.546	1.000	1.000	FALSE	1.000	1.008	2026
psi.site[3]	0.811	0.348	0.001	1.000	1.000	FALSE	1.000	1.000	3000
psi.site[4]	0.993	0.046	0.927	1.000	1.000	FALSE	1.000	1.007	3000
psi.site[5]	0.975	0.106	0.618	1.000	1.000	FALSE	1.000	1.014	1533
psi.site[6]	0.407	0.455	0	0.070	1.000	FALSE	1.000	1.000	3000
psi.site[7]	0.886	0.213	0.207	0.993	1.000	FALSE	1.000	1.000	3000
psi.site[8]	0.080	0.235	0	0	1.000	FALSE	1.000	1.001	3000
psi.site[9]	0.978	0.096	0.705	1.000	1.000	FALSE	1.000	1.000	3000
alpha.p	-1.015	0.417	-1.881	-0.995	-0.243	FALSE	0.994	1.000	3000
beta1.p	-2.888	0.910	-4.847	-2.815	-1.231	FALSE	0.999	1.000	2815
occ.fs	7.147	0.965	5.000	7.000	9.000	FALSE	1.000	1.000	3000
deviance	59.146	2.868	55.376	58.377	67.486	FALSE	1.000	1.001	3000
Ramphocelus dimidiatus									
alpha.psi	10.337	7.017	-1.574	9.814	25.804	TRUE	0.949	1.002	892
beta1.psi	**4.549**	**8.034**	**-10.545**	**4.092**	**21.516**	**TRUE**	**0.718**	**1.002**	**1316**
beta2.psi	-0.937	7.161	-15.282	-0.758	12.911	TRUE	0.545	1.000	3000
beta4.psi	8.011	6.879	-3.559	7.481	22.420	TRUE	0.888	1.002	1026
psi.site[1]	0.989	0.053	0.860	1.000	1.000	FALSE	1.000	1.005	3000
psi.site[2]	0.990	0.049	0.888	1.000	1.000	FALSE	1.000	1.001	3000
psi.site[3]	0.991	0.048	0.898	1.000	1.000	FALSE	1.000	1.012	3000
psi.site[4]	0.996	0.029	0.976	1.000	1.000	FALSE	1.000	1.021	3000
psi.site[5]	0.994	0.046	0.959	1.000	1.000	FALSE	1.000	1.008	2622
psi.site[6]	0.995	0.039	0.978	1.000	1.000	FALSE	1.000	1.054	1403
psi.site[7]	0.975	0.098	0.651	1.000	1.000	FALSE	1.000	1.024	755
psi.site[8]	0.991	0.062	0.937	1.000	1.000	FALSE	1.000	1.013	1922
psi.site[9]	0.984	0.086	0.809	1.000	1.000	FALSE	1.000	1.005	3000
alpha.p	0.172	0.290	-0.391	0.166	0.735	TRUE	0.723	1.000	3000
beta1.p	0.477	0.354	-0.215	0.476	1.168	TRUE	0.908	1.000	3000
occ.fs	9.000	0	9.000	9.000	9.000	FALSE	1.000	NaN	1
deviance	191.733	1.921	189.812	191.158	197.028	FALSE	1.000	1.002	2467
Tangara gyrola									
alpha.psi	10.129	7.048	-1.612	9.477	25.387	TRUE	0.943	1.000	2819
beta1.psi	**4.804**	**7.928**	**-10.813**	**4.448**	**21.679**	**TRUE**	**0.730**	**1.000**	**3000**
beta2.psi	-0.466	7.412	-15.270	-0.614	13.941	TRUE	0.532	1.001	1198
beta4.psi	8.335	7.043	-3.781	7.777	23.950	TRUE	0.896	1.000	3000
psi.site[1]	0.988	0.056	0.854	1.000	1.000	FALSE	1.000	1.012	2896
psi.site[2]	0.989	0.052	0.874	1.000	1.000	FALSE	1.000	1.004	3000
psi.site[3]	0.989	0.059	0.889	1.000	1.000	FALSE	1.000	1.009	3000
psi.site[4]	0.995	0.038	0.957	1.000	1.000	FALSE	1.000	1.013	2733
psi.site[5]	0.994	0.046	0.940	1.000	1.000	FALSE	1.000	1.011	2830
psi.site[6]	0.994	0.047	0.972	1.000	1.000	FALSE	1.000	1.006	3000
psi.site[7]	0.971	0.113	0.619	1.000	1.000	FALSE	1.000	1.000	3000
psi.site[8]	0.987	0.081	0.888	1.000	1.000	FALSE	1.000	1.010	2022
psi.site[9]	0.980	0.090	0.721	1.000	1.000	FALSE	1.000	1.010	2523
alpha.p	2.025	0.452	1.200	2.003	2.988	FALSE	1.000	1.000	3000
beta1.p	-0.666	0.519	-1.754	-0.660	0.307	TRUE	0.902	1.000	3000
occ.fs	9.000	0	9.000	9.000	9.000	FALSE	1.000	NaN	1
deviance	136.455	2.085	134.471	135.804	142.243	FALSE	1.000	1.001	3000
Saltator maximus									
alpha.psi	10.092	6.928	-1.751	9.413	24.977	TRUE	0.941	1.000	3000
beta1.psi	**4.736**	**7.834**	**-9.497**	**4.297**	**21.324**	**TRUE**	**0.715**	**1.000**	**3000**
beta2.psi	-0.454	7.294	-15.222	-0.466	13.811	TRUE	0.524	1.000	3000
beta4.psi	8.224	6.979	-3.911	7.469	23.385	TRUE	0.898	1.001	2427
psi.site[1]	0.987	0.061	0.833	1.000	1.000	FALSE	1.000	1.011	3000
psi.site[2]	0.989	0.055	0.869	1.000	1.000	FALSE	1.000	1.001	3000
psi.site[3]	0.989	0.058	0.879	1.000	1.000	FALSE	1.000	1.027	2715
psi.site[4]	0.996	0.030	0.967	1.000	1.000	FALSE	1.000	1.008	2046
psi.site[5]	0.994	0.047	0.963	1.000	1.000	FALSE	1.000	1.012	3000
psi.site[6]	0.996	0.039	0.980	1.000	1.000	FALSE	1.000	1.029	3000
psi.site[7]	0.970	0.111	0.641	1.000	1.000	FALSE	1.000	1.002	3000
psi.site[8]	0.99	0.072	0.927	1.000	1.000	FALSE	1.000	1.039	1112
psi.site[9]	0.98	0.096	0.752	1.000	1.000	FALSE	1.000	1.011	1892
alpha.p	-0.616	0.297	-1.227	-0.609	-0.049	FALSE	0.983	1.001	1579
beta1.p	0.695	0.363	-0.011	0.681	1.427	TRUE	0.973	1.001	2424
occ.fs	9.000	0	9.000	9.000	9.000	FALSE	1.000	NaN	1
deviance	197.332	2.046	195.369	196.692	202.784	FALSE	1.000	1.000	3000
Saltator striatipectus									

alpha.psi	10.238	7.122	-1.993	9.700	25.489	TRUE	0.943	1.001	1413
beta1.psi	**4.658**	**7.964**	**-9.938**	**4.279**	**21.617**	**TRUE**	**0.705**	**1.000**	**3000**
beta2.psi	-0.348	7.362	-14.890	-0.484	14.790	TRUE	0.531	1.000	3000
beta4.psi	8.129	7.021	-3.286	7.290	24.162	TRUE	0.892	1.000	3000
psi.site[1]	0.988	0.057	0.881	1.000	1.000	FALSE	1.000	1.031	1099
psi.site[2]	0.990	0.050	0.895	1.000	1.000	FALSE	1.000	1.042	1098
psi.site[3]	0.990	0.057	0.881	1.000	1.000	FALSE	1.000	1.018	2133
psi.site[4]	0.996	0.025	0.975	1.000	1.000	FALSE	1.000	1.023	2413
psi.site[5]	0.994	0.048	0.970	1.000	1.000	FALSE	1.000	1.012	3000
psi.site[6]	0.994	0.053	0.966	1.000	1.000	FALSE	1.000	1.014	3000
psi.site[7]	0.973	0.098	0.652	1.000	1.000	FALSE	1.000	1.008	3000
psi.site[8]	0.988	0.075	0.907	1.000	1.000	FALSE	1.000	1.040	1174
psi.site[9]	0.982	0.086	0.770	1.000	1.000	FALSE	1.000	1.008	2320
alpha.p	-0.343	0.297	-0.913	-0.343	0.228	TRUE	0.876	1.000	3000
beta1.p	0.470	0.366	-0.234	0.468	1.182	TRUE	0.897	1.000	3000
occ.fs	9.000	0	9.000	9.000	9.000	FALSE	1.000	NaN	1
deviance	199.976	2.027	197.968	199.428	205.178	FALSE	1.000	1.003	3000
Myiothlypis conspicillata									
alpha.psi	10.174	6.985	-1.601	9.563	25.194	TRUE	0.948	1.000	3000
beta1.psi	**4.643**	**7.713**	**-9.336**	**4.225**	**20.629**	**TRUE**	**0.719**	**1.001**	**1444**
beta2.psi	-0.398	7.256	-14.189	-0.525	14.119	TRUE	0.533	1.000	3000
beta4.psi	7.994	6.889	-3.824	7.421	22.893	TRUE	0.882	1.000	3000
psi.site[1]	0.989	0.050	0.867	1.000	1.000	FALSE	1.000	1.002	3000
psi.site[2]	0.989	0.052	0.877	1.000	1.000	FALSE	1.000	1.001	3000
psi.site[3]	0.992	0.043	0.921	1.000	1.000	FALSE	1.000	1.029	1895
psi.site[4]	0.996	0.031	0.969	1.000	1.000	FALSE	1.000	1.017	3000
psi.site[5]	0.994	0.048	0.957	1.000	1.000	FALSE	1.000	1.027	2602
psi.site[6]	0.995	0.045	0.975	1.000	1.000	FALSE	1.000	1.024	3000
psi.site[7]	0.974	0.104	0.651	1.000	1.000	FALSE	1.000	1.001	3000
psi.site[8]	0.988	0.072	0.869	1.000	1.000	FALSE	1.000	1.028	1344
psi.site[9]	0.981	0.089	0.750	1.000	1.000	FALSE	1.000	1.002	3000
alpha.p	-0.426	0.296	-1.011	-0.429	0.142	TRUE	0.927	1.001	3000
beta1.p	-0.139	0.365	-0.851	-0.140	0.580	TRUE	0.644	1.001	1538
occ.fs	9.000	0	9.000	9.000	9.000	FALSE	1.000	NaN	1
deviance	192.380	1.977	190.447	191.783	197.668	FALSE	1.000	1.001	1932
Basileuterus rufifrons									
alpha.psi	10.115	7.010	-1.775	9.586	25.039	TRUE	0.940	1.001	1245
beta1.psi	**4.710**	**7.687**	**-9.389**	**4.269**	**20.935**	**TRUE**	**0.720**	**1.000**	**3000**
beta2.psi	-0.670	7.331	-15.371	-0.828	13.952	TRUE	0.550	1.000	3000
beta4.psi	8.156	6.853	-3.664	7.712	22.937	TRUE	0.893	1.000	3000
psi.site[1]	0.988	0.054	0.866	1.000	1.000	FALSE	1.000	1.022	3000
psi.site[2]	0.990	0.054	0.888	1.000	1.000	FALSE	1.000	1.015	3000
psi.site[3]	0.991	0.053	0.902	1.000	1.000	FALSE	1.000	1.018	3000
psi.site[4]	0.996	0.027	0.971	1.000	1.000	FALSE	1.000	1.038	2480
psi.site[5]	0.993	0.053	0.955	1.000	1.000	FALSE	1.000	1.017	3000
psi.site[6]	0.995	0.040	0.969	1.000	1.000	FALSE	1.000	1.004	3000
psi.site[7]	0.971	0.110	0.621	1.000	1.000	FALSE	1.000	1.002	3000
psi.site[8]	0.990	0.063	0.896	1.000	1.000	FALSE	1.000	1.000	3000
psi.site[9]	0.983	0.084	0.794	1.000	1.000	FALSE	1.000	1.004	3000
alpha.p	-0.090	0.287	-0.667	-0.082	0.477	TRUE	0.623	1.004	472
beta1.p	1.575	0.381	0.816	1.569	2.344	FALSE	1.000	1.003	813
occ.fs	9.000	0	9.000	9.000	9.000	FALSE	1.000	NaN	1
deviance	161.068	1.961	159.158	160.460	166.152	FALSE	1.000	1.000	3000
Myioborus miniatus									
alpha.psi	-0.308	4.526	-10.303	0.049	7.698	TRUE	0.494	1.000	3000
beta1.psi	**14.423**	**6.203**	**4.070**	**13.916**	**27.918**	**FALSE**	**0.999**	**1.000**	**3000**
beta2.psi	9.473	4.937	2.066	8.649	21.098	FALSE	0.998	1.000	3000
beta4.psi	1.392	4.257	-7.371	1.581	9.377	TRUE	0.648	1.000	2303
psi.site[1]	0.997	0.024	0.971	1.000	1.000	FALSE	1.000	1.024	3000
psi.site[2]	0.998	0.014	0.989	1.000	1.000	FALSE	1.000	1.076	2343
psi.site[3]	0.985	0.064	0.829	1.000	1.000	FALSE	1.000	1.014	1751
psi.site[4]	1.000	0.005	0.999	1.000	1.000	FALSE	1.000	1.075	2373
psi.site[5]	1.000	0.006	1.000	1.000	1.000	FALSE	1.000	1.055	3000
psi.site[6]	0.880	0.217	0.178	0.989	1.000	FALSE	1.000	1.000	3000
psi.site[7]	0.149	0.242	0	0.022	0.859	FALSE	1.000	1.002	2305
psi.site[8]	0.060	0.166	0	0	0.681	FALSE	1.000	1.001	3000
psi.site[9]	0.948	0.148	0.432	1.000	1.000	FALSE	1.000	1.000	3000
alpha.p	1.600	0.688	0.387	1.537	3.143	FALSE	0.996	1.000	3000
beta1.p	-0.994	0.720	-2.607	-0.943	0.290	TRUE	0.930	1.000	3000

occ.fs	7.000	0	7.000	7.000	7.000	FALSE	1.000	NaN	1
deviance	142.343	2.112	140.294	141.683	148.352	FALSE	1.000	1.001	3000
Euphonia laniirostris									
alpha.psi	13.849	6.533	1.848	13.415	27.187	FALSE	0.987	1.001	2269
beta1.psi	**-2.631**	**6.304**	**-13.398**	**-3.195**	**13.787**	**TRUE**	**0.743**	**1.000**	**3000**
beta2.psi	-6.037	5.732	-17.464	-5.867	7.372	TRUE	0.909	1.000	2499
beta4.psi	0.020	6.104	-9.571	-0.945	16.388	TRUE	0.429	1.002	3000
psi.site[1]	0.987	0.049	0.853	1.000	1.000	FALSE	1.000	1.010	3000
psi.site[2]	0.978	0.069	0.764	1.000	1.000	FALSE	1.000	1.002	3000
psi.site[3]	0.995	0.031	0.953	1.000	1.000	FALSE	1.000	1.035	2353
psi.site[4]	0.827	0.234	0.185	0.945	1.000	FALSE	1.000	1.001	2053
psi.site[5]	0.447	0.384	0.001	0.348	1.000	FALSE	1.000	1.000	3000
psi.site[6]	0.991	0.052	0.902	1.000	1.000	FALSE	1.000	1.034	974
psi.site[7]	0.993	0.054	0.958	1.000	1.000	FALSE	1.000	1.022	3000
psi.site[8]	0.979	0.097	0.728	1.000	1.000	FALSE	1.000	1.003	3000
psi.site[9]	0.877	0.222	0.177	0.991	1.000	FALSE	1.000	1.000	3000
alpha.p	-0.900	0.327	-1.547	-0.893	-0.289	FALSE	0.997	1.001	2673
beta1.p	0.053	0.434	-0.813	0.050	0.884	TRUE	0.545	1.000	3000
occ.fs	8.192	0.394	8.000	8.000	9.000	FALSE	1.000	1.000	3000
deviance	161.461	4.710	157.403	159.345	172.170	FALSE	1.000	1.000	3000

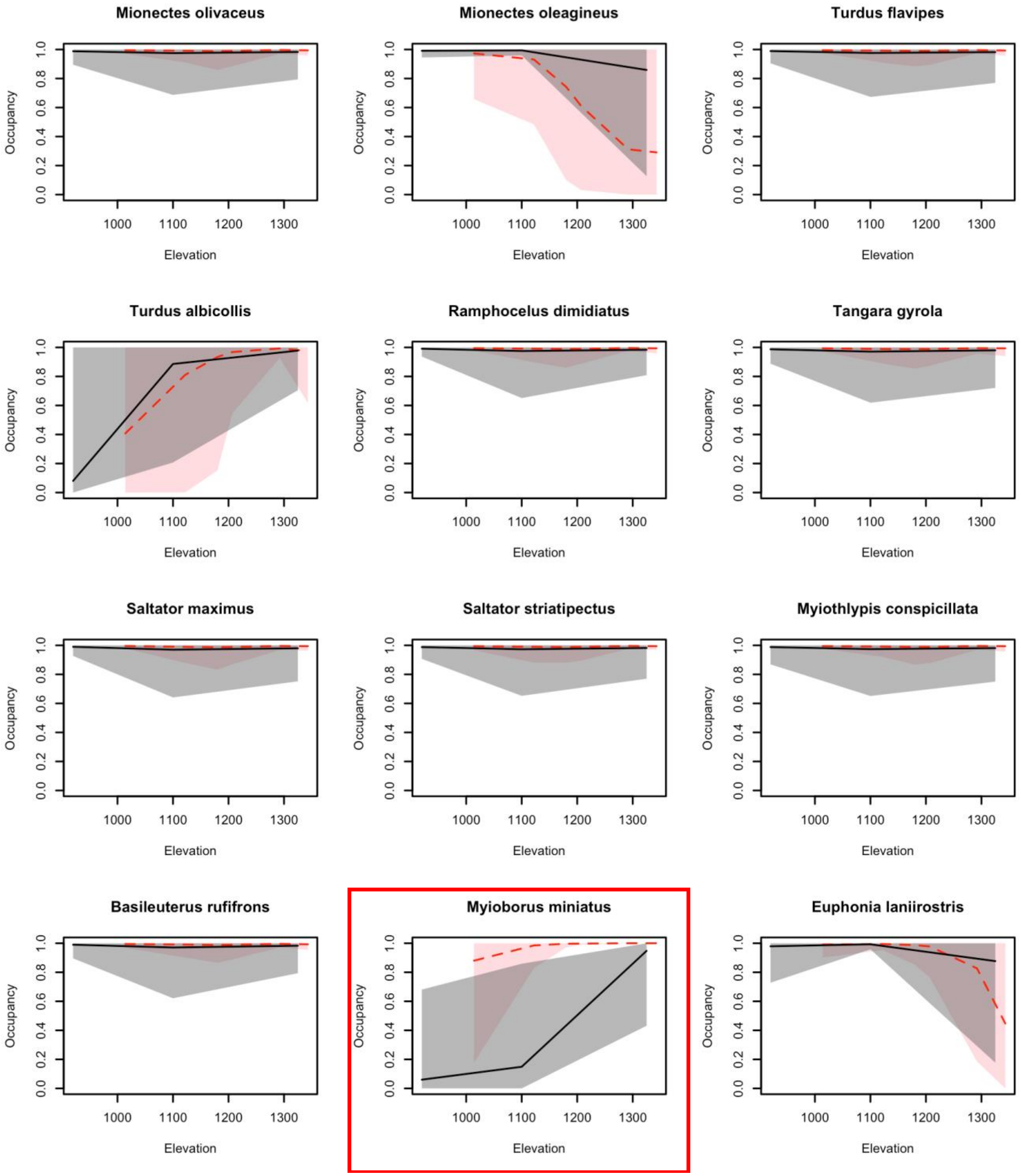


Figure S3. Occupancy estimates for each species according to elevation (masl) and habitat (coffee in red and forest in black). Lines are included for heuristic purposes and show a fitted regression model of quadratic effects of elevation + habitat (solid lines) together with their 95% confidence intervals (dotted lines).

2.3.2. Abundance

Table S10. Numerical outputs for abundance modelling (**N** is the total number of individuals estimated for the whole study period). Rhat is the potential scale reduction factor (at convergence, Rhat=1); successful convergence based on Rhat values (all < 1.1), n.eff is a crude measure of effective sample size, over0 checks if 0 falls in the parameter's 95% credible interval. f is the proportion of the posterior with the same sign as the mean; i.e., our confidence that the parameter is positive or negative.

A) *Mionectes olivaceus* - Closed Population Model											
COFFEE											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
N	**1257**	**571**	**548**	**862**	**1132**	**1482**	**2989**	**1.10**	**35**	**NO**	**1.00**
p.est[1]	0.0025	0.0012	0.00078	0.001583	0.0022	0.0031	0.0055	1.02	85	NO	1.00
p.est[2]	0.0172	0.0071	0.0061	0.0121	0.0159	0.0213	0.0333	1.04	63	NO	1.00
p.est[3]	0.0052	0.0023	0.0018	0.0036	0.0048	0.0065	0.0109	1.03	67	NO	1.00
p.est[4]	0.0132	0.0057	0.0046	0.0091	0.0123	0.0162	0.0266	1.03	72	NO	1.00
p.est[5]	0.0068	0.0029	0.0024	0.0048	0.0063	0.0084	0.0138	1.03	64	NO	1.00
p.est[6]	0.0015	0.0008	0.0004	0.0009	0.0013	0.0019	0.0037	1.02	104	NO	1.00
p.est[7]	0.0174	0.0072	0.0061	0.0123	0.0161	0.0216	0.0339	1.03	64	NO	1.00
p.est[8]	0.0110	0.0050	0.0036	0.0074	0.0101	0.0137	0.0232	1.03	79	NO	1.00
p.est[9]	0.0138	0.0057	0.0049	0.0098	0.0128	0.0171	0.0273	1.04	62	NO	1.00
p.est[10]	0.0108	0.0045	0.0038	0.0076	0.0101	0.0134	0.0215	1.04	62	NO	1.00
p.est[11]	0.0157	0.0065	0.0055	0.0112	0.0145	0.0194	0.0308	1.04	63	NO	1.00
p.est[12]	0.0021	0.0011	0.0007	0.0014	0.0019	0.0027	0.0050	1.02	90	NO	1.00
mean.p	0.0124	0.0052	0.0044	0.0088	0.0115	0.0154	0.0247	1.04	62	NO	1.00
beta1	0.8945	0.1586	0.5979	0.7834	0.8923	1.0003	1.2126	1.00	3000	NO	1.00
beta2	-0.5811	0.1277	-0.8428	-0.6648	-0.5787	-0.4948	-0.3322	1.00	1078	NO	1.00
psi	0.3057	0.1387	0.1320	0.2102	0.2748	0.3617	0.7198	1.10	34	NO	1.00
deviance	1369	102	1184	1297	1365	1433	1607	1.07	41	NO	1.00
FOREST											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
N	**1173**	**91**	**1015**	**1110**	**1170**	**1231**	**1367**	**1.01**	**419**	**NO**	**1.00**
p.est[1]	0.0409	0.0038	0.0341	0.0383	0.0408	0.0434	0.0485	1.00	721	NO	1.00
p.est[2]	0.0453	0.0045	0.0368	0.0422	0.0451	0.0483	0.0547	1.00	764	NO	1.00
p.est[3]	0.0396	0.0037	0.0328	0.0371	0.0394	0.0419	0.0470	1.00	758	NO	1.00
p.est[4]	0.0439	0.0043	0.0357	0.0409	0.0437	0.0466	0.0529	1.00	506	NO	1.00
p.est[5]	0.0367	0.0039	0.0296	0.0340	0.0365	0.0392	0.0446	1.00	985	NO	1.00
p.est[6]	0.0437	0.0042	0.0360	0.0408	0.0436	0.0465	0.0522	1.00	735	NO	1.00
p.est[7]	0.0377	0.0055	0.0277	0.0338	0.0375	0.0412	0.0489	1.00	773	NO	1.00
p.est[8]	0.0435	0.0043	0.0354	0.0405	0.0433	0.0463	0.0526	1.00	502	NO	1.00
p.est[9]	0.0363	0.0039	0.0292	0.0335	0.0361	0.0389	0.0443	1.00	1036	NO	1.00
p.est[10]	0.0465	0.0048	0.0376	0.0431	0.0464	0.0497	0.0565	1.00	737	NO	1.00
p.est[11]	0.0367	0.0039	0.0296	0.0339	0.0365	0.0392	0.0446	1.00	990	NO	1.00
p.est[12]	0.0447	0.0044	0.0364	0.0416	0.0446	0.0476	0.0538	1.00	525	NO	1.00
mean.p	0.0458	0.0047	0.0372	0.0426	0.0456	0.0489	0.0556	1.00	767	NO	1.00
beta1	0.0905	0.0506	-0.0106	0.0577	0.0902	0.1226	0.1906	1.00	3000	YES	0.96
beta2	-0.1232	0.0642	-0.2532	-0.1659	-0.1222	-0.0802	0.0012	1.00	3000	YES	0.97
psi	0.2632	0.0215	0.2238	0.2482	0.2620	0.2763	0.3089	1.00	429	NO	1.00
deviance	4812	91	4643	4750	4811	4871	4994	1.00	435	NO	1.00

B) *Mionectes oleagineus* - Jolly-Seber Model											
COFFEE											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
psi	0.1278	0.0322	0.0801	0.1047	0.1223	0.1449	0.2057	1.01	326	0	1.00
Ncoffee	**253**	**65**	**158**	**206**	**241**	**287**	**411**	**1.01**	**312**	**0**	**1.00**
p[1]	0.1357	0.0400	0.0706	0.1069	0.1315	0.1597	0.2259	1.01	529	0	1.00
p[2]	0.2595	0.0873	0.1226	0.1958	0.2480	0.3110	0.4609	1.00	1103	0	1.00
p[3]	0.1086	0.0332	0.0554	0.0846	0.1047	0.1282	0.1843	1.01	577	0	1.00
p[4]	0.1972	0.0568	0.1036	0.1564	0.1912	0.2315	0.3247	1.00	612	0	1.00
p[5]	0.0965	0.0352	0.0431	0.0712	0.0914	0.1162	0.1792	1.00	1063	0	1.00
p[6]	0.1776	0.0500	0.0944	0.1417	0.1728	0.2082	0.2891	1.01	544	0	1.00
p[7]	0.3067	0.1153	0.1283	0.2211	0.2908	0.3763	0.5716	1.00	1751	0	1.00
p[8]	0.1059	0.0324	0.0541	0.0825	0.1021	0.1251	0.1799	1.01	583	0	1.00
p[9]	0.0988	0.0418	0.0386	0.0689	0.0917	0.1209	0.1998	1.00	1602	0	1.00
p[10]	0.1283	0.0384	0.0662	0.1006	0.1241	0.1512	0.2152	1.01	541	0	1.00
p[11]	0.1455	0.0420	0.0764	0.1152	0.1413	0.1709	0.2398	1.01	519	0	1.00
p[12]	0.1184	0.0360	0.0606	0.0924	0.1143	0.1397	0.2004	1.01	558	0	1.00
p[13]	0.2720	0.0945	0.1247	0.2027	0.2592	0.3278	0.4902	1.00	1251	0	1.00
alpha.p	-1.8933	0.3431	-2.5775	-2.1227	-1.8877	-1.6602	-1.2317	1.01	474	0	1.00
beta1.p	-0.5379	0.2261	-1.0060	-0.6850	-0.5286	-0.3812	-0.1211	1.00	30571	0	1.00

beta2.p	0.1776	0.1936	-0.1972	0.0464	0.1760	0.3061	0.5638	1.00	22501	1	0.82
phi[1]	**0.5001**	**0.2882**	**0.0246**	**0.2507**	**0.5005**	**0.7492**	**0.9752**	**1.00**	**3.00E+05**	**0**	**1.00**
phi[2]	**0.6205**	**0.2437**	**0.1311**	**0.4368**	**0.6472**	**0.8271**	**0.9827**	**1.00**	**5844**	**0**	**1.00**
phi[3]	**0.7641**	**0.1692**	**0.3814**	**0.6528**	**0.7944**	**0.9037**	**0.9907**	**1.00**	**89325**	**0**	**1.00**
phi[4]	**0.5133**	**0.1799**	**0.2149**	**0.3784**	**0.4942**	**0.6310**	**0.9077**	**1.00**	**8655**	**0**	**1.00**
phi[5]	**0.8111**	**0.1410**	**0.4840**	**0.7217**	**0.8393**	**0.9266**	**0.9931**	**1.00**	**209783**	**0**	**1.00**
phi[6]	**0.7191**	**0.1705**	**0.3692**	**0.5965**	**0.7324**	**0.8584**	**0.9842**	**1.00**	**49913**	**0**	**1.00**
phi[7]	**0.8720**	**0.1085**	**0.5983**	**0.8148**	**0.9003**	**0.9568**	**0.9961**	**1.00**	**182527**	**0**	**1.00**
phi[8]	**0.8105**	**0.1454**	**0.4651**	**0.7221**	**0.8419**	**0.9285**	**0.9933**	**1.00**	**11322**	**0**	**1.00**
phi[9]	**0.7473**	**0.1649**	**0.3964**	**0.6319**	**0.7668**	**0.8838**	**0.9881**	**1.00**	**11789**	**0**	**1.00**
phi[10]	**0.8212**	**0.1389**	**0.4896**	**0.7378**	**0.8518**	**0.9337**	**0.9938**	**1.00**	**75726**	**0**	**1.00**
phi[11]	**0.4608**	**0.1911**	**0.1588**	**0.3165**	**0.4347**	**0.5821**	**0.8923**	**1.00**	**51732**	**0**	**1.00**
phi[12]	**0.4021**	**0.2357**	**0.0563**	**0.2143**	**0.3624**	**0.5602**	**0.9204**	**1.00**	**35021**	**0**	**1.00**
b[1]	0.0895	0.0511	0.0184	0.0516	0.0801	0.1174	0.2136	1.00	6144	0	1.00
b[2]	0.1593	0.0785	0.0264	0.1020	0.1520	0.2093	0.3302	1.00	28650	0	1.00
b[3]	0.1369	0.0811	0.0100	0.0747	0.1288	0.1890	0.3159	1.00	4336	0	1.00
b[4]	0.0377	0.0321	0.0012	0.0131	0.0295	0.0540	0.1192	1.00	24273	0	1.00
b[5]	0.0217	0.0218	0.0005	0.0062	0.0150	0.0299	0.0803	1.00	23909	0	1.00
b[6]	0.0205	0.0206	0.0005	0.0059	0.0142	0.0284	0.0760	1.00	54997	0	1.00
b[7]	0.0784	0.0588	0.0041	0.0340	0.0655	0.1094	0.2254	1.00	11757	0	1.00
b[8]	0.2026	0.0939	0.0315	0.1353	0.1988	0.2652	0.3962	1.00	9946	0	1.00
b[9]	0.0661	0.0569	0.0021	0.0224	0.0513	0.0947	0.2115	1.00	26684	0	1.00
b[10]	0.0956	0.0707	0.0039	0.0392	0.0819	0.1378	0.2627	1.00	22402	0	1.00
b[11]	0.0422	0.0369	0.0013	0.0142	0.0324	0.0601	0.1370	1.00	126937	0	1.00
b[12]	0.0493	0.0424	0.0016	0.0174	0.0383	0.0698	0.1584	1.00	162233	0	1.00
B[1]	23	15	5	12	19	30	61	1.01	831	0	1.00
B[2]	40	21	7	25	37	52	91	1.00	1292	0	1.00
B[3]	36	25	2	18	31	48	97	1.01	774	0	1.00
B[4]	9	8	0	3	7	13	29	1.00	8030	1	1.00
B[5]	5	5	0	1	3	7	19	1.00	6909	1	1.00
B[6]	4	5	0	1	3	6	18	1.00	5662	1	1.00
B[7]	19	15	1	8	16	26	56	1.00	13117	0	1.00
B[8]	53	29	8	33	49	69	121	1.00	2267	0	1.00
B[9]	17	16	0	5	12	23	58	1.00	6564	1	1.00
B[10]	25	21	0	9	20	35	78	1.00	3166	1	1.00
B[11]	10	10	0	3	7	14	38	1.00	5700	1	1.00
B[12]	13	13	0	4	9	17	47	1.00	4221	1	1.00
N[1]	**23**	**15**	**5**	**12**	**19**	**30**	**61**	**1.01**	**831**	**0**	**1.00**
N[2]	**55**	**22**	**25**	**39**	**51**	**66**	**108**	**1.01**	**747**	**0**	**1.00**
N[3]	**77**	**26**	**40**	**59**	**73**	**91**	**144**	**1.01**	**351**	**0**	**1.00**
N[4]	**47**	**16**	**25**	**36**	**44**	**55**	**86**	**1.00**	**778**	**0**	**1.00**
N[5]	**43**	**15**	**22**	**32**	**40**	**50**	**79**	**1.00**	**842**	**0**	**1.00**
N[6]	**35**	**13**	**16**	**26**	**33**	**42**	**68**	**1.00**	**891**	**0**	**1.00**
N[7]	**50**	**19**	**25**	**36**	**46**	**59**	**98**	**1.00**	**1437**	**0**	**1.00**
N[8]	**94**	**30**	**50**	**73**	**89**	**110**	**166**	**1.00**	**830**	**0**	**1.00**
N[9]	**87**	**31**	**41**	**65**	**82**	**103**	**162**	**1.00**	**852**	**0**	**1.00**
N[10]	**96**	**31**	**51**	**74**	**91**	**112**	**172**	**1.01**	**619**	**0**	**1.00**
N[11]	**53**	**24**	**21**	**36**	**49**	**65**	**113**	**1.00**	**951**	**0**	**1.00**
N[12]	**33**	**20**	**8**	**19**	**28**	**42**	**82**	**1.00**	**1305**	**0**	**1.00**
gamma[1]	0.0115	0.0076	0.0021	0.0061	0.0098	0.0150	0.0309	1.01	927	0	1.00
gamma[2]	0.0202	0.0109	0.0035	0.0125	0.0186	0.0261	0.0462	1.00	1331	0	1.00
gamma[3]	0.0182	0.0126	0.0012	0.0091	0.0160	0.0246	0.0497	1.01	785	0	1.00
gamma[4]	0.0049	0.0043	0.0002	0.0017	0.0038	0.0070	0.0160	1.00	7261	0	1.00
gamma[5]	0.0029	0.0030	0.0001	0.0008	0.0020	0.0040	0.0110	1.00	7371	0	1.00
gamma[6]	0.0027	0.0029	0.0001	0.0008	0.0019	0.0038	0.0105	1.00	5224	0	1.00
gamma[7]	0.0103	0.0079	0.0006	0.0045	0.0085	0.0140	0.0303	1.00	10270	0	1.00
gamma[8]	0.0280	0.0156	0.0040	0.0170	0.0257	0.0364	0.0648	1.00	1996	0	1.00
gamma[9]	0.0094	0.0088	0.0003	0.0030	0.0069	0.0130	0.0322	1.00	5656	0	1.00
gamma[10]	0.0139	0.0118	0.0005	0.0052	0.0110	0.0193	0.0440	1.00	2703	0	1.00
gamma[11]	0.0062	0.0061	0.0002	0.0019	0.0045	0.0086	0.0225	1.00	4795	0	1.00
gamma[12]	0.0075	0.0076	0.0002	0.0023	0.0053	0.0102	0.0275	1.00	3441	0	1.00
deviance	530	51	437	495	528	563	637	1.01	400	0	1.00
FOREST											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
psi	0.3058	0.0382	0.2377	0.2793	0.3036	0.3294	0.3862	1.02	218	0	1.00
Nforest	**674**	**83**	**527**	**616**	**669**	**725**	**848**	**1.02**	**204**	**0**	**1.00**
p[1]	0.1512	0.0278	0.1039	0.1316	0.1488	0.1682	0.2129	1.01	385	0	1.00
p[2]	0.2197	0.0355	0.1569	0.1947	0.2174	0.2421	0.2956	1.01	489	0	1.00
p[3]	0.1593	0.0287	0.1101	0.1390	0.1569	0.1769	0.2227	1.01	382	0	1.00

p[4]	0.2399	0.0391	0.1705	0.2123	0.2374	0.2647	0.3232	1.01	607	0	1.00
p[5]	0.1168	0.0225	0.0785	0.1008	0.1148	0.1306	0.1665	1.00	812	0	1.00
p[6]	0.2862	0.0508	0.1967	0.2502	0.2829	0.3185	0.3947	1.00	1189	0	1.00
p[7]	0.1812	0.0309	0.1275	0.1594	0.1789	0.2003	0.2483	1.01	390	0	1.00
p[8]	0.1286	0.0414	0.0643	0.0985	0.1230	0.1526	0.2246	1.00	7830	0	1.00
p[9]	0.1168	0.0230	0.0778	0.1004	0.1147	0.1309	0.1675	1.00	924	0	1.00
p[10]	0.2933	0.0529	0.2001	0.2558	0.2899	0.3270	0.4062	1.00	1334	0	1.00
p[11]	0.1359	0.0256	0.0927	0.1178	0.1336	0.1514	0.1928	1.01	400	0	1.00
p[12]	0.2870	0.0510	0.1971	0.2508	0.2837	0.3194	0.3959	1.00	1203	0	1.00
p[13]	0.1174	0.0219	0.0801	0.1018	0.1155	0.1308	0.1656	1.01	636	0	1.00
alpha.p	-1.7410	0.2157	-2.1544	-1.8870	-1.7442	-1.5986	-1.3073	1.01	362	0	1.00
beta1.p	-0.5292	0.1383	-0.8060	-0.6213	-0.5267	-0.4341	-0.2643	1.00	16270	0	1.00
beta2.p	0.2324	0.1475	-0.0578	0.1330	0.2327	0.3324	0.5196	1.00	1565	1	0.94
phi[1]	**0.4999**	**0.2885**	**0.0252**	**0.2501**	**0.5000**	**0.7500**	**0.9752**	**1.00**	**104596**	**0**	**1.00**
phi[2]	**0.7253**	**0.1510**	**0.4203**	**0.6182**	**0.7315**	**0.8432**	**0.9788**	**1.00**	**2973**	**0**	**1.00**
phi[3]	**0.7370**	**0.1530**	**0.4236**	**0.6279**	**0.7470**	**0.8593**	**0.9828**	**1.00**	**23557**	**0**	**1.00**
phi[4]	**0.5287**	**0.1286**	**0.3107**	**0.4364**	**0.5169**	**0.6086**	**0.8150**	**1.00**	**6371**	**0**	**1.00**
phi[5]	**0.8001**	**0.1411**	**0.4820**	**0.7076**	**0.8234**	**0.9160**	**0.9917**	**1.00**	**15964**	**0**	**1.00**
phi[6]	**0.5710**	**0.1417**	**0.3276**	**0.4684**	**0.5586**	**0.6617**	**0.8817**	**1.00**	**26344**	**0**	**1.00**
phi[7]	**0.9153**	**0.0742**	**0.7239**	**0.8784**	**0.9357**	**0.9723**	**0.9975**	**1.00**	**132076**	**0**	**1.00**
phi[8]	**0.5307**	**0.1566**	**0.2836**	**0.4150**	**0.5085**	**0.6258**	**0.8956**	**1.00**	**1551**	**0**	**1.00**
phi[9]	**0.7873**	**0.1386**	**0.4905**	**0.6912**	**0.8041**	**0.9011**	**0.9896**	**1.00**	**5956**	**0**	**1.00**
phi[10]	**0.6309**	**0.1548**	**0.3553**	**0.5163**	**0.6214**	**0.7392**	**0.9450**	**1.00**	**17840**	**0**	**1.00**
phi[11]	**0.7387**	**0.1414**	**0.4582**	**0.6366**	**0.7432**	**0.8491**	**0.9794**	**1.00**	**4546**	**0**	**1.00**
phi[12]	**0.8736**	**0.1032**	**0.6190**	**0.8158**	**0.8991**	**0.9555**	**0.9959**	**1.00**	**57684**	**0**	**1.00**
b[1]	0.2204	0.0433	0.1419	0.1900	0.2184	0.2485	0.3110	1.00	4211	0	1.00
b[2]	0.0474	0.0339	0.0021	0.0202	0.0414	0.0682	0.1263	1.00	73647	0	1.00
b[3]	0.0723	0.0383	0.0073	0.0437	0.0699	0.0977	0.1533	1.00	9305	0	1.00
b[4]	0.0151	0.0137	0.0004	0.0048	0.0112	0.0214	0.0509	1.00	30847	0	1.00
b[5]	0.1153	0.0428	0.0379	0.0855	0.1130	0.1425	0.2060	1.00	15438	0	1.00
b[6]	0.0200	0.0176	0.0006	0.0067	0.0152	0.0284	0.0651	1.00	16568	0	1.00
b[7]	0.2978	0.0524	0.1972	0.2621	0.2970	0.3325	0.4024	1.00	3495	0	1.00
b[8]	0.0434	0.0369	0.0014	0.0151	0.0339	0.0619	0.1369	1.00	5301	0	1.00
b[9]	0.0252	0.0215	0.0008	0.0086	0.0196	0.0360	0.0800	1.00	23593	0	1.00
b[10]	0.0273	0.0208	0.0011	0.0108	0.0230	0.0393	0.0774	1.00	10160	0	1.00
b[11]	0.0182	0.0168	0.0005	0.0057	0.0133	0.0257	0.0627	1.00	56425	0	1.00
b[12]	0.0978	0.0360	0.0302	0.0732	0.0965	0.1208	0.1729	1.00	2880	0	1.00
B[1]	150	36	91	125	147	172	231	1.01	426	0	1.00
B[2]	31	23	1	13	27	45	86	1.00	7038	0	1.00
B[3]	48	26	5	29	46	65	105	1.00	1956	0	1.00
B[4]	9	9	0	3	7	13	33	1.00	37844	1	1.00
B[5]	78	30	27	57	75	95	143	1.00	2529	0	1.00
B[6]	13	11	0	4	10	18	42	1.00	186583	1	1.00
B[7]	204	46	126	172	200	231	305	1.01	380	0	1.00
B[8]	29	25	0	10	22	41	91	1.00	30871	1	1.00
B[9]	16	14	0	5	13	23	53	1.00	10463	1	1.00
B[10]	18	13	0	7	15	25	50	1.00	7368	1	1.00
B[11]	12	11	0	3	8	16	41	1.00	11863	1	1.00
B[12]	66	25	21	49	64	81	120	1.00	11864	0	1.00
N[1]	**150**	**36**	**91**	**125**	**147**	**172**	**231**	**1.01**	**426**	**0**	**1.00**
N[2]	**140**	**29**	**91**	**119**	**137**	**157**	**205**	**1.00**	**709**	**0**	**1.00**
N[3]	**152**	**32**	**99**	**129**	**149**	**171**	**223**	**1.01**	**470**	**0**	**1.00**
N[4]	**88**	**20**	**56**	**74**	**86**	**100**	**135**	**1.00**	**1064**	**0**	**1.00**
N[5]	**149**	**33**	**96**	**125**	**145**	**168**	**223**	**1.00**	**831**	**0**	**1.00**
N[6]	**95**	**21**	**62**	**80**	**93**	**108**	**144**	**1.00**	**1281**	**0**	**1.00**
N[7]	**292**	**52**	**205**	**256**	**287**	**323**	**407**	**1.01**	**332**	**0**	**1.00**
N[8]	**181**	**50**	**105**	**145**	**173**	**209**	**298**	**1.00**	**3988**	**0**	**1.00**
N[9]	**156**	**36**	**99**	**130**	**152**	**177**	**240**	**1.00**	**2571**	**0**	**1.00**
N[10]	**114**	**22**	**78**	**98**	**111**	**127**	**163**	**1.00**	**1133**	**0**	**1.00**
N[11]	**95**	**23**	**57**	**79**	**93**	**109**	**147**	**1.00**	**971**	**0**	**1.00**
N[12]	**150**	**30**	**102**	**129**	**147**	**167**	**218**	**1.00**	**1446**	**0**	**1.00**
gamma[1]	0.0677	0.0169	0.0394	0.0556	0.0660	0.0779	0.1056	1.01	477	0	1.00
gamma[2]	0.0155	0.0113	0.0007	0.0065	0.0134	0.0221	0.0423	1.00	5816	0	1.00
gamma[3]	0.0240	0.0131	0.0025	0.0143	0.0228	0.0322	0.0528	1.00	1817	0	1.00
gamma[4]	0.0051	0.0047	0.0001	0.0016	0.0038	0.0072	0.0175	1.00	28841	0	1.00
gamma[5]	0.0394	0.0154	0.0131	0.0287	0.0380	0.0485	0.0737	1.00	2038	0	1.00
gamma[6]	0.0071	0.0062	0.0002	0.0024	0.0054	0.0100	0.0233	1.00	63317	0	1.00
gamma[7]	0.1077	0.0261	0.0639	0.0895	0.1052	0.1232	0.1657	1.01	335	0	1.00
gamma[8]	0.0172	0.0146	0.0006	0.0061	0.0136	0.0244	0.0543	1.00	47734	0	1.00

gamma[9]	0.0103	0.0090	0.0003	0.0035	0.0080	0.0147	0.0335	1.00	6324	0	1.00
gamma[10]	0.0112	0.0085	0.0005	0.0045	0.0094	0.0160	0.0318	1.00	4578	0	1.00
gamma[11]	0.0077	0.0073	0.0002	0.0023	0.0055	0.0107	0.0273	1.00	6628	0	1.00
gamma[12]	0.0413	0.0163	0.0130	0.0301	0.0398	0.0509	0.0778	1.00	4065	0	1.00
deviance	1612	97	1423	1547	1612	1677	1804	1.01	402	0	1.00

C) *Turdus flavipes* - Closed Population Model											
COFFEE											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
N	**766**	**149**	**546**	**662**	**742**	**838**	**1131**	**1.01**	**385**	**NO**	**1.00**
p.est[1]	0.0022	0.0008	0.000968	0.001614	0.0021	0.0027	0.0042	1.00	511	NO	1.00
p.est[2]	0.0482	0.0093	0.0307	0.0419	0.0477	0.0541	0.0679	1.00	389	NO	1.00
p.est[3]	0.0067	0.0018	0.0037	0.0054	0.0065	0.0079	0.0106	1.01	343	NO	1.00
p.est[4]	0.0484	0.0098	0.0306	0.0415	0.0479	0.0544	0.0689	1.00	402	NO	1.00
p.est[5]	0.0100	0.0024	0.0057	0.0083	0.0098	0.0116	0.0151	1.01	306	NO	1.00
p.est[6]	0.0011	0.0005	0.0004	0.0007	0.0010	0.0013	0.0023	1.00	664	NO	1.00
p.est[7]	0.0506	0.0097	0.0323	0.0441	0.0502	0.0569	0.0712	1.00	402	NO	1.00
p.est[8]	0.0415	0.0092	0.0255	0.0351	0.0409	0.0472	0.0613	1.00	395	NO	1.00
p.est[9]	0.0308	0.0061	0.0196	0.0267	0.0306	0.0347	0.0437	1.01	311	NO	1.00
p.est[10]	0.0205	0.0042	0.0127	0.0175	0.0202	0.0232	0.0292	1.01	284	NO	1.00
p.est[11]	0.0390	0.0076	0.0248	0.0339	0.0386	0.0437	0.0551	1.01	344	NO	1.00
p.est[12]	0.0018	0.0007	0.0007	0.0013	0.0017	0.0022	0.0036	1.00	550	NO	1.00
mean.p	0.0258	0.0052	0.0163	0.0223	0.0255	0.0291	0.0367	1.01	295	NO	1.00
beta1	1.5231	0.1712	1.1990	1.4038	1.5160	1.6376	1.8802	1.00	2500	NO	1.00
beta2	-0.7327	0.1118	-0.9585	-0.8076	-0.7290	-0.6549	-0.5153	1.00	1614	NO	1.00
psi	0.1828	0.0364	0.1282	0.1578	0.1776	0.1999	0.2718	1.01	417	NO	1.00
deviance	1931	84	1785	1873	1926	1980	2116	1.01	347	NO	1.00
FOREST											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
N	**1239**	**153**	**970**	**1135**	**1228**	**1333**	**1568**	**1.00**	**1331**	**NO**	**1.00**
p.est[1]	0.0206	0.0029	0.0154	0.0187	0.0204	0.0225	0.0268	1.00	3000	NO	1.00
p.est[2]	0.0296	0.0042	0.0220	0.0267	0.0293	0.0322	0.0386	1.00	3000	NO	1.00
p.est[3]	0.0186	0.0027	0.0137	0.0167	0.0184	0.0203	0.0243	1.00	3000	NO	1.00
p.est[4]	0.0381	0.0052	0.0289	0.0345	0.0378	0.0413	0.0495	1.00	3000	NO	1.00
p.est[5]	0.0149	0.0024	0.0106	0.0132	0.0147	0.0164	0.0200	1.00	3000	NO	1.00
p.est[6]	0.0258	0.0036	0.0192	0.0233	0.0255	0.0280	0.0334	1.00	3000	NO	1.00
p.est[7]	0.0331	0.0060	0.0228	0.0290	0.0326	0.0367	0.0465	1.00	1855	NO	1.00
p.est[8]	0.0379	0.0052	0.0287	0.0343	0.0376	0.0411	0.0493	1.00	3000	NO	1.00
p.est[9]	0.0144	0.0024	0.0102	0.0127	0.0142	0.0159	0.0196	1.00	3000	NO	1.00
p.est[10]	0.0345	0.0050	0.0256	0.0312	0.0342	0.0376	0.0454	1.00	3000	NO	1.00
p.est[11]	0.0148	0.0024	0.0106	0.0131	0.0147	0.0164	0.0200	1.00	3000	NO	1.00
p.est[12]	0.0383	0.0052	0.0290	0.0347	0.0379	0.0414	0.0499	1.00	3000	NO	1.00
mean.p	0.0312	0.0045	0.0232	0.0281	0.0309	0.0340	0.0408	1.00	3000	NO	1.00
beta1	0.4604	0.0683	0.3280	0.4146	0.4593	0.5058	0.5983	1.00	3000	NO	1.00
beta2	-0.2480	0.0775	-0.4008	-0.3002	-0.2470	-0.1964	-0.0963	1.00	1782	NO	1.00
psi	0.2857	0.0357	0.2227	0.2614	0.2834	0.3079	0.3601	1.00	1120	NO	1.00
deviance	3570	97	3380	3506	3569	3634	3762	1.00	1524	NO	1.00

D) *Turdus albicollis* - Closed Population Model											
COFFEE											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
N	**2157**	**1062**	**192**	**1406**	**2191**	**3019**	**3927**	**1.48**	**8**	**NO**	**1.00**
p.est[1]	0.0004	0.0009	<0.0001	<0.0001	0.0002	0.0003	0.0020	1.31	30	NO	1.00
p.est[2]	0.0019	0.0037	0.0003	0.0006	0.0009	0.0016	0.0118	1.27	22	NO	1.00
p.est[3]	0.0005	0.0011	<0.0001	0.0001	0.0002	0.0004	0.0031	1.31	24	NO	1.00
p.est[4]	0.0038	0.0075	0.0007	0.0013	0.0018	0.0030	0.0219	1.26	23	NO	1.00
p.est[5]	0.0006	0.0013	0.0001	0.0002	0.0003	0.0005	0.0038	1.31	23	NO	1.00
p.est[6]	0.0003	0.0009	0.0000	0.0000	0.0001	0.0003	0.0017	1.29	36	NO	1.00
p.est[7]	0.0021	0.0040	0.0004	0.0007	0.0010	0.0017	0.0124	1.27	22	NO	1.00
p.est[8]	0.0045	0.0091	0.0007	0.0014	0.0021	0.0037	0.0252	1.25	24	NO	1.00
p.est[9]	0.0012	0.0024	0.0002	0.0004	0.0006	0.0010	0.0074	1.27	22	NO	1.00
p.est[10]	0.0009	0.0018	0.0001	0.0003	0.0004	0.0007	0.0057	1.29	22	NO	1.00
p.est[11]	0.0015	0.0029	0.0002	0.0005	0.0007	0.0012	0.0089	1.27	22	NO	1.00
p.est[12]	0.0003	0.0009	<0.0001	0.0001	0.0001	0.0003	0.0020	1.30	32	NO	1.00
mean.p	0.0011	0.0021	0.0002	0.0003	0.0005	0.0008	0.0066	1.28	22	NO	1.00
beta1	1.1009	0.4594	0.3642	0.7729	1.0527	1.3827	2.1116	1.00	3000	NO	1.00
beta2	-0.1452	0.3292	-0.8286	-0.3509	-0.1408	0.0894	0.4664	1.00	1420	YES	0.66
psi	0.5366	0.2640	0.0465	0.3484	0.5458	0.7515	0.9773	1.48	8	NO	1.00
deviance	294	30	208	285	302	314	326	1.47	9	NO	1.00

FOREST

par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
N	**482**	**41**	**411**	**452**	**478**	**508**	**575**	**1.00**	**1441**	**NO**	**1.00**
p.est[1]	0.0390	0.0047	0.0304	0.0358	0.0388	0.0419	0.0490	1.00	827	NO	1.00
p.est[2]	0.0595	0.0070	0.0467	0.0546	0.0591	0.0641	0.0737	1.00	973	NO	1.00
p.est[3]	0.0346	0.0044	0.0265	0.0316	0.0343	0.0374	0.0441	1.00	892	NO	1.00
p.est[4]	0.0891	0.0094	0.0709	0.0828	0.0888	0.0953	0.1075	1.00	1434	NO	1.00
p.est[5]	0.0270	0.0042	0.0196	0.0241	0.0267	0.0296	0.0360	1.00	1200	NO	1.00
p.est[6]	0.0504	0.0058	0.0397	0.0463	0.0502	0.0541	0.0623	1.00	854	NO	1.00
p.est[7]	0.0858	0.0133	0.0617	0.0764	0.0849	0.0942	0.1151	1.00	3000	NO	1.00
p.est[8]	0.0894	0.0095	0.0712	0.0831	0.0891	0.0956	0.1079	1.00	1488	NO	1.00
p.est[9]	0.0260	0.0042	0.0187	0.0232	0.0258	0.0286	0.0351	1.00	1264	NO	1.00
p.est[10]	0.0727	0.0086	0.0569	0.0666	0.0724	0.0782	0.0908	1.00	1169	NO	1.00
p.est[11]	0.0269	0.0042	0.0195	0.0240	0.0266	0.0295	0.0359	1.00	1207	NO	1.00
p.est[12]	0.0880	0.0094	0.0701	0.0816	0.0876	0.0942	0.1068	1.00	1353	NO	1.00
mean.p	0.0636	0.0075	0.0499	0.0583	0.0632	0.0685	0.0791	1.00	1035	NO	1.00
beta1	0.6012	0.0768	0.4569	0.5479	0.6013	0.6528	0.7486	1.00	3000	NO	1.00
beta2	-0.2414	0.0829	-0.4053	-0.2958	-0.2405	-0.1864	-0.0787	1.00	3000	NO	1.00
psi	0.1139	0.0110	0.0945	0.1060	0.1133	0.1208	0.1368	1.00	697	NO	1.00
deviance	2461	58	2354	2419	2457	2499	2584	1.00	1523	NO	1.00

E) *Ramphocelus dimidiatus* - Jolly-Seber Model

COFFEE

par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
psi	0.1224	0.0326	0.0704	0.0964	0.1190	0.1455	0.1926	1.04	109	NO	1.00
Ncoffee	**613**	**165**	**352**	**481**	**595**	**731**	**972**	**1.04**	**106**	**NO**	**1.00**
p[1]	0.0876	0.0284	0.0454	0.0663	0.0834	0.1046	0.1535	1.04	80	NO	1.00
p[2]	0.2086	0.0725	0.0959	0.1547	0.2001	0.2523	0.3729	1.02	150	NO	1.00
p[3]	0.0618	0.0205	0.0320	0.0464	0.0585	0.0740	0.1099	1.04	73	NO	1.00
p[4]	0.1462	0.0454	0.0750	0.1120	0.1414	0.1738	0.2487	1.03	95	NO	1.00
p[5]	0.0460	0.0186	0.0202	0.0323	0.0426	0.0558	0.0910	1.03	99	NO	1.00
p[6]	0.1273	0.0392	0.0664	0.0976	0.1229	0.1514	0.2160	1.03	86	NO	1.00
p[7]	0.2582	0.0990	0.1057	0.1845	0.2454	0.3184	0.4847	1.01	213	NO	1.00
p[8]	0.0592	0.0197	0.0307	0.0444	0.0560	0.0708	0.1049	1.04	72	NO	1.00
p[9]	0.0453	0.0215	0.0171	0.0299	0.0409	0.0558	0.0984	1.02	134	NO	1.00
p[10]	0.0806	0.0264	0.0416	0.0608	0.0765	0.0964	0.1424	1.04	79	NO	1.00
p[11]	0.0968	0.0308	0.0504	0.0735	0.0925	0.1153	0.1682	1.04	80	NO	1.00
p[12]	0.0712	0.0236	0.0367	0.0535	0.0674	0.0853	0.1268	1.04	77	NO	1.00
p[13]	0.2216	0.0792	0.0989	0.1630	0.2120	0.2691	0.4016	1.01	166	NO	1.00
alpha.p	-2.3936	0.3495	-3.0469	-2.6452	-2.3975	-2.1476	-1.7071	1.03	102	NO	1.00
beta1.p	-0.7366	0.2001	-1.1435	-0.8667	-0.7300	-0.6001	-0.3611	1.00	1156	NO	1.00
beta2.p	0.1709	0.1849	-0.1863	0.0454	0.1694	0.2936	0.5429	1.00	1429	YES	0.83
phi[1]	**0.4986**	**0.2890**	**0.0256**	**0.2479**	**0.4979**	**0.7506**	**0.9743**	**1.00**	**6661**	**NO**	**1.00**
phi[2]	**0.6622**	**0.2360**	**0.1510**	**0.4965**	**0.7001**	**0.8623**	**0.9868**	**1.00**	**588**	**NO**	**1.00**
phi[3]	**0.8577**	**0.1151**	**0.5720**	**0.7937**	**0.8864**	**0.9491**	**0.9951**	**1.00**	**2213**	**NO**	**1.00**
phi[4]	**0.8617**	**0.1119**	**0.5876**	**0.7984**	**0.8885**	**0.9504**	**0.9953**	**1.00**	**11662**	**NO**	**1.00**
phi[5]	**0.8053**	**0.1477**	**0.4544**	**0.7134**	**0.8364**	**0.9254**	**0.9931**	**1.00**	**4809**	**NO**	**1.00**
phi[6]	**0.3599**	**0.1543**	**0.1365**	**0.2482**	**0.3324**	**0.4420**	**0.7473**	**1.00**	**12703**	**NO**	**1.00**
phi[7]	**0.8416**	**0.1320**	**0.5112**	**0.7700**	**0.8755**	**0.9459**	**0.9950**	**1.00**	**7001**	**NO**	**1.00**
phi[8]	**0.7511**	**0.1812**	**0.3417**	**0.6298**	**0.7846**	**0.9027**	**0.9909**	**1.00**	**1165**	**NO**	**1.00**
phi[9]	**0.5916**	**0.1937**	**0.2518**	**0.4431**	**0.5788**	**0.7384**	**0.9613**	**1.01**	**340**	**NO**	**1.00**
phi[10]	**0.7745**	**0.1684**	**0.3820**	**0.6691**	**0.8098**	**0.9121**	**0.9913**	**1.00**	**8600**	**NO**	**1.00**
phi[11]	**0.4466**	**0.1980**	**0.1191**	**0.2977**	**0.4260**	**0.5768**	**0.8807**	**1.01**	**348**	**NO**	**1.00**
phi[12]	**0.1760**	**0.1616**	**0.0052**	**0.0569**	**0.1297**	**0.2457**	**0.6149**	**1.00**	**4315**	**NO**	**1.00**
b[1]	0.0412	0.0298	0.0048	0.0196	0.0344	0.0553	0.1168	1.00	797	NO	1.00
b[2]	0.1378	0.0519	0.0459	0.1013	0.1339	0.1708	0.2479	1.01	207	NO	1.00
b[3]	0.0422	0.0339	0.0015	0.0158	0.0345	0.0607	0.1263	1.00	1536	NO	1.00
b[4]	0.0487	0.0362	0.0020	0.0200	0.0417	0.0699	0.1347	1.00	892	NO	1.00
b[5]	0.0441	0.0409	0.0012	0.0138	0.0325	0.0621	0.1531	1.01	486	NO	1.00
b[6]	0.0129	0.0131	0.0003	0.0036	0.0089	0.0179	0.0478	1.00	1465	NO	1.00
b[7]	0.0574	0.0432	0.0035	0.0265	0.0485	0.0776	0.1663	1.00	2773	NO	1.00
b[8]	0.3780	0.0966	0.1885	0.3129	0.3772	0.4439	0.5679	1.01	332	NO	1.00
b[9]	0.0462	0.0444	0.0012	0.0139	0.0328	0.0649	0.1637	1.01	963	NO	1.00
b[10]	0.0843	0.0646	0.0031	0.0321	0.0706	0.1228	0.2376	1.00	1224	NO	1.00
b[11]	0.0698	0.0499	0.0030	0.0299	0.0610	0.1008	0.1848	1.00	683	NO	1.00
b[12]	0.0375	0.0316	0.0014	0.0136	0.0297	0.0529	0.1182	1.00	4571	NO	1.00
B[1]	25	21	3	11	19	33	79	1.01	509	NO	1.00
B[2]	84	36	28	59	78	102	171	1.01	188	NO	1.00
B[3]	25	22	0	9	20	36	81	1.00	1821	YES	1.00

B[4]	29	23	1	11	24	41	88	1.00	30000	NO	1.00
B[5]	27	27	0	8	18	36	102	1.01	481	YES	1.00
B[6]	7	8	0	2	4	10	28	1.00	7584	YES	1.00
B[7]	33	26	2	16	28	44	100	1.01	966	NO	1.00
B[8]	237	92	96	167	224	297	443	1.02	105	NO	1.00
B[9]	28	29	0	7	19	38	105	1.01	341	YES	1.00
B[10]	53	46	1	18	40	74	173	1.01	651	NO	1.00
B[11]	43	35	1	17	35	61	133	1.02	267	NO	1.00
B[12]	23	23	0	7	17	32	83	1.00	750	YES	1.00
N[1]	**25**	**21**	**3**	**11**	**19**	**33**	**79**	**1.01**	**509**	**NO**	**1.00**
N[2]	**100**	**37**	**49**	**74**	**93**	**119**	**191**	**1.02**	**163**	**NO**	**1.00**
N[3]	**111**	**38**	**57**	**84**	**104**	**132**	**204**	**1.01**	**174**	**NO**	**1.00**
N[4]	**125**	**40**	**69**	**96**	**118**	**147**	**220**	**1.01**	**275**	**NO**	**1.00**
N[5]	**127**	**47**	**61**	**93**	**118**	**151**	**241**	**1.01**	**218**	**NO**	**1.00**
N[6]	**51**	**23**	**19**	**34**	**46**	**62**	**109**	**1.01**	**325**	**NO**	**1.00**
N[7]	**76**	**34**	**34**	**53**	**68**	**91**	**162**	**1.01**	**270**	**NO**	**1.00**
N[8]	**295**	**96**	**147**	**221**	**282**	**359**	**509**	**1.03**	**91**	**NO**	**1.00**
N[9]	**199**	**81**	**77**	**139**	**185**	**245**	**390**	**1.02**	**146**	**NO**	**1.00**
N[10]	**203**	**71**	**96**	**152**	**192**	**244**	**366**	**1.02**	**178**	**NO**	**1.00**
N[11]	**133**	**55**	**54**	**92**	**123**	**163**	**265**	**1.01**	**234**	**NO**	**1.00**
N[12]	**44**	**30**	**7**	**23**	**37**	**59**	**123**	**1.00**	**549**	**NO**	**1.00**
gamma[1]	0.0051	0.0041	0.0005	0.0022	0.0040	0.0067	0.0160	1.01	527	NO	1.00
gamma[2]	0.0166	0.0073	0.0055	0.0115	0.0154	0.0204	0.0343	1.01	192	NO	1.00
gamma[3]	0.0053	0.0046	0.0002	0.0019	0.0041	0.0074	0.0169	1.00	1897	NO	1.00
gamma[4]	0.0060	0.0048	0.0003	0.0024	0.0049	0.0084	0.0182	1.00	30000	NO	1.00
gamma[5]	0.0056	0.0057	0.0001	0.0017	0.0039	0.0076	0.0211	1.01	481	NO	1.00
gamma[6]	0.0016	0.0017	0.0000	0.0004	0.0011	0.0022	0.0062	1.00	7406	NO	1.00
gamma[7]	0.0070	0.0055	0.0005	0.0033	0.0058	0.0092	0.0213	1.01	926	NO	1.00
gamma[8]	0.0489	0.0193	0.0194	0.0341	0.0461	0.0613	0.0925	1.02	112	NO	1.00
gamma[9]	0.0062	0.0065	0.0001	0.0018	0.0042	0.0086	0.0238	1.01	347	NO	1.00
gamma[10]	0.0117	0.0102	0.0004	0.0040	0.0089	0.0164	0.0386	1.01	604	NO	1.00
gamma[11]	0.0098	0.0081	0.0004	0.0038	0.0079	0.0137	0.0303	1.02	251	NO	1.00
gamma[12]	0.0054	0.0053	0.0002	0.0017	0.0039	0.0074	0.0195	1.00	731	NO	1.00
deviance	808	74	668	755	805	863	948	1.03	82	NO	1.00
FOREST											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
psi	0.0668	0.0130	0.0441	0.0580	0.0658	0.0746	0.0958	1.08	36	NO	1.00
Nforest	**329**	**64**	**216**	**286**	**323**	**366**	**473**	**1.09**	**33**	**NO**	**1.00**
p[1]	0.1387	0.0385	0.0782	0.1115	0.1335	0.1602	0.2293	1.03	77	NO	1.00
p[2]	0.1878	0.0437	0.1160	0.1571	0.1827	0.2129	0.2878	1.03	73	NO	1.00
p[3]	0.1463	0.0394	0.0838	0.1185	0.1412	0.1682	0.2388	1.03	75	NO	1.00
p[4]	0.1983	0.0466	0.1220	0.1655	0.1931	0.2254	0.3050	1.03	81	NO	1.00
p[5]	0.0762	0.0235	0.0401	0.0595	0.0729	0.0892	0.1307	1.02	100	NO	1.00
p[6]	0.2198	0.0577	0.1262	0.1786	0.2132	0.2538	0.3508	1.02	124	NO	1.00
p[7]	0.1638	0.0409	0.0977	0.1352	0.1588	0.1866	0.2590	1.03	71	NO	1.00
p[8]	0.0529	0.0270	0.0180	0.0342	0.0471	0.0650	0.1220	1.01	427	NO	1.00
p[9]	0.0739	0.0232	0.0383	0.0574	0.0706	0.0867	0.1277	1.02	106	NO	1.00
p[10]	0.2228	0.0599	0.1259	0.1801	0.2159	0.2582	0.3591	1.02	133	NO	1.00
p[11]	0.1210	0.0352	0.0667	0.0961	0.1161	0.1407	0.2040	1.03	81	NO	1.00
p[12]	0.2201	0.0579	0.1263	0.1788	0.2134	0.2543	0.3517	1.02	125	NO	1.00
p[13]	0.0820	0.0246	0.0441	0.0644	0.0786	0.0957	0.1391	1.03	91	NO	1.00
alpha.p	-1.8621	0.3166	-2.4668	-2.0751	-1.8702	-1.6567	-1.2123	1.04	69	NO	1.00
beta1.p	-0.5838	0.1782	-0.9406	-0.7033	-0.5811	-0.4637	-0.2373	1.00	11082	NO	1.00
beta2.p	-0.0451	0.2071	-0.4484	-0.1842	-0.0464	0.0927	0.3654	1.00	2157	YES	0.59
phi[1]	**0.5009**	**0.2876**	**0.0256**	**0.2528**	**0.5033**	**0.7483**	**0.9756**	**1.00**	**30000**	**NO**	**1.00**
phi[2]	**0.6633**	**0.1959**	**0.2785**	**0.5158**	**0.6706**	**0.8230**	**0.9804**	**1.00**	**1373**	**NO**	**1.00**
phi[3]	**0.6557**	**0.1957**	**0.2699**	**0.5113**	**0.6639**	**0.8140**	**0.9768**	**1.00**	**6201**	**NO**	**1.00**
phi[4]	**0.8147**	**0.1475**	**0.4579**	**0.7275**	**0.8504**	**0.9331**	**0.9940**	**1.00**	**30000**	**NO**	**1.00**
phi[5]	**0.6795**	**0.1952**	**0.2843**	**0.5368**	**0.6953**	**0.8405**	**0.9825**	**1.00**	**971**	**NO**	**1.00**
phi[6]	**0.7866**	**0.1522**	**0.4430**	**0.6873**	**0.8122**	**0.9122**	**0.9919**	**1.00**	**14910**	**NO**	**1.00**
phi[7]	**0.9058**	**0.0843**	**0.6903**	**0.8648**	**0.9295**	**0.9700**	**0.9974**	**1.00**	**5070**	**NO**	**1.00**
phi[8]	**0.7348**	**0.1832**	**0.3387**	**0.6064**	**0.7630**	**0.8886**	**0.9892**	**1.00**	**1809**	**NO**	**1.00**
phi[9]	**0.4679**	**0.1768**	**0.1985**	**0.3355**	**0.4398**	**0.5739**	**0.8859**	**1.00**	**5289**	**NO**	**1.00**
phi[10]	**0.7659**	**0.1645**	**0.3994**	**0.6567**	**0.7935**	**0.9019**	**0.9909**	**1.00**	**1203**	**NO**	**1.00**
phi[11]	**0.7880**	**0.1497**	**0.4528**	**0.6901**	**0.8132**	**0.9114**	**0.9917**	**1.00**	**9371**	**NO**	**1.00**
phi[12]	**0.8558**	**0.1184**	**0.5654**	**0.7895**	**0.8854**	**0.9491**	**0.9952**	**1.00**	**9026**	**NO**	**1.00**
b[1]	0.1269	0.0443	0.0561	0.0949	0.1214	0.1527	0.2288	1.00	28302	NO	1.00
b[2]	0.0263	0.0227	0.0008	0.0090	0.0204	0.0376	0.0841	1.00	3418	NO	1.00
b[3]	0.0189	0.0184	0.0005	0.0056	0.0134	0.0265	0.0685	1.00	13970	NO	1.00

b[4]	0.0615	0.0387	0.0042	0.0323	0.0565	0.0850	0.1500	1.00	10422	NO	1.00
b[5]	0.0849	0.0515	0.0069	0.0467	0.0781	0.1157	0.2026	1.00	1361	NO	1.00
b[6]	0.0357	0.0320	0.0011	0.0119	0.0269	0.0505	0.1199	1.00	2993	NO	1.00
b[7]	0.3129	0.0803	0.1564	0.2579	0.3128	0.3674	0.4699	1.01	332	NO	1.00
b[8]	0.0489	0.0485	0.0012	0.0140	0.0338	0.0679	0.1791	1.00	30000	NO	1.00
b[9]	0.0322	0.0290	0.0009	0.0104	0.0241	0.0459	0.1075	1.00	2061	NO	1.00
b[10]	0.0351	0.0293	0.0011	0.0125	0.0279	0.0502	0.1095	1.00	1237	NO	1.00
b[11]	0.0502	0.0428	0.0016	0.0174	0.0390	0.0718	0.1599	1.00	4540	NO	1.00
b[12]	0.1664	0.0747	0.0299	0.1138	0.1630	0.2158	0.3219	1.00	4104	NO	1.00
B[1]	42	16	19	30	39	51	81	1.02	148	NO	1.00
B[2]	8	8	0	2	6	11	27	1.01	992	YES	1.00
B[3]	5	6	0	1	4	8	22	1.01	551	YES	1.00
B[4]	20	13	1	10	18	27	51	1.01	332	NO	1.00
B[5]	28	18	2	15	25	37	69	1.00	983	NO	1.00
B[6]	11	11	0	3	8	16	39	1.00	2568	YES	1.00
B[7]	105	32	50	83	103	125	176	1.07	42	NO	1.00
B[8]	16	17	0	4	10	22	62	1.00	908	YES	1.00
B[9]	10	10	0	3	7	14	35	1.01	361	YES	1.00
B[10]	11	10	0	4	8	16	35	1.00	4299	YES	1.00
B[11]	16	15	0	5	12	23	53	1.00	1463	YES	1.00
B[12]	56	30	9	36	52	73	127	1.01	412	NO	1.00
N[1]	**42**	**16**	**19**	**30**	**39**	**51**	**81**	**1.02**	**148**	**NO**	**1.00**
N[2]	**35**	**12**	**17**	**26**	**33**	**42**	**65**	**1.02**	**132**	**NO**	**1.00**
N[3]	**28**	**11**	**11**	**20**	**26**	**34**	**55**	**1.02**	**125**	**NO**	**1.00**
N[4]	**43**	**15**	**22**	**33**	**41**	**51**	**78**	**1.03**	**96**	**NO**	**1.00**
N[5]	**57**	**20**	**28**	**44**	**54**	**68**	**106**	**1.02**	**160**	**NO**	**1.00**
N[6]	**56**	**18**	**29**	**43**	**53**	**66**	**99**	**1.01**	**195**	**NO**	**1.00**
N[7]	**157**	**36**	**96**	**132**	**154**	**178**	**239**	**1.09**	**34**	**NO**	**1.00**
N[8]	**130**	**42**	**59**	**100**	**127**	**157**	**223**	**1.03**	**95**	**NO**	**1.00**
N[9]	**68**	**25**	**32**	**50**	**64**	**81**	**129**	**1.03**	**99**	**NO**	**1.00**
N[10]	**62**	**18**	**34**	**49**	**59**	**71**	**103**	**1.02**	**128**	**NO**	**1.00**
N[11]	**65**	**21**	**32**	**49**	**62**	**77**	**115**	**1.02**	**150**	**NO**	**1.00**
N[12]	**113**	**33**	**63**	**89**	**107**	**130**	**193**	**1.02**	**125**	**NO**	**1.00**
gamma[1]	0.0085	0.0034	0.0034	0.0060	0.0079	0.0104	0.0167	1.02	177	NO	1.00
gamma[2]	0.0018	0.0016	0.0001	0.0006	0.0013	0.0025	0.0059	1.00	1208	NO	1.00
gamma[3]	0.0013	0.0013	0.0000	0.0004	0.0009	0.0018	0.0047	1.01	739	NO	1.00
gamma[4]	0.0041	0.0028	0.0003	0.0021	0.0037	0.0057	0.0107	1.01	318	NO	1.00
gamma[5]	0.0057	0.0037	0.0005	0.0030	0.0051	0.0077	0.0145	1.00	1147	NO	1.00
gamma[6]	0.0024	0.0023	0.0001	0.0008	0.0018	0.0034	0.0083	1.00	4128	NO	1.00
gamma[7]	0.0214	0.0068	0.0097	0.0166	0.0208	0.0255	0.0364	1.07	44	NO	1.00
gamma[8]	0.0034	0.0036	0.0001	0.0010	0.0023	0.0047	0.0133	1.00	838	NO	1.00
gamma[9]	0.0022	0.0021	0.0001	0.0007	0.0017	0.0032	0.0078	1.01	362	NO	1.00
gamma[10]	0.0025	0.0021	0.0001	0.0009	0.0019	0.0035	0.0079	1.00	6516	NO	1.00
gamma[11]	0.0035	0.0031	0.0001	0.0012	0.0027	0.0050	0.0115	1.00	1314	NO	1.00
gamma[12]	0.0119	0.0064	0.0020	0.0075	0.0110	0.0154	0.0272	1.01	359	NO	1.00
deviance	658	54	547	623	659	694	764	1.05	53	NO	1.00

F) ***Tangara gyrola*** **- Jolly-Seber Model**

COFFEE

par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
psi	0.2654	0.0498	0.1826	0.2288	0.2620	0.2966	0.3712	1.06	50	NO	1.00
Ncoffee	**558**	**105**	**385**	**479**	**551**	**624**	**778**	**1.06**	**49**	**NO**	**1.00**
p[1]	0.1489	0.0324	0.0949	0.1259	0.1455	0.1685	0.2217	1.03	81	NO	1.00
p[2]	0.2470	0.0629	0.1409	0.2021	0.2411	0.2858	0.3856	1.01	355	NO	1.00
p[3]	0.1353	0.0300	0.0862	0.1137	0.1318	0.1534	0.2025	1.03	79	NO	1.00
p[4]	0.1951	0.0414	0.1233	0.1660	0.1919	0.2209	0.2852	1.02	128	NO	1.00
p[5]	0.1535	0.0468	0.0812	0.1200	0.1470	0.1799	0.2629	1.01	239	NO	1.00
p[6]	0.1797	0.0373	0.1150	0.1533	0.1767	0.2027	0.2612	1.02	103	NO	1.00
p[7]	0.2885	0.0852	0.1472	0.2265	0.2801	0.3415	0.4765	1.00	853	NO	1.00
p[8]	0.1349	0.0300	0.0859	0.1134	0.1315	0.1530	0.2021	1.03	81	NO	1.00
p[9]	0.1666	0.0602	0.0769	0.1236	0.1571	0.1996	0.3105	1.01	426	NO	1.00
p[10]	0.1443	0.0318	0.0917	0.1216	0.1408	0.1634	0.2156	1.03	80	NO	1.00
p[11]	0.1556	0.0333	0.0995	0.1319	0.1522	0.1758	0.2300	1.03	84	NO	1.00
p[12]	0.1388	0.0308	0.0882	0.1168	0.1353	0.1574	0.2081	1.03	78	NO	1.00
p[13]	0.2578	0.0685	0.1429	0.2086	0.2513	0.3002	0.4088	1.00	446	NO	1.00
alpha.p	-1.7656	0.2544	-2.2552	-1.9380	-1.7706	-1.5961	-1.2555	1.03	75	NO	1.00
beta1.p	-0.3249	0.1707	-0.6698	-0.4380	-0.3215	-0.2080	0.0009	1.00	2352	YES	0.97
beta2.p	0.2266	0.1687	-0.1051	0.1146	0.2260	0.3379	0.5618	1.00	1067	YES	0.91
phi[1]	**0.5008**	**0.2885**	**0.0261**	**0.2514**	**0.5005**	**0.7510**	**0.9755**	**1.00**	**120000**	**NO**	**1.00**

phi[2]	**0.6569**	**0.2384**	**0.1514**	**0.4849**	**0.6950**	**0.8596**	**0.9866**	**1.00**	**4753**	**NO**	**1.00**
phi[3]	**0.8816**	**0.0993**	**0.6319**	**0.8284**	**0.9071**	**0.9596**	**0.9963**	**1.00**	**67412**	**NO**	**1.00**
phi[4]	**0.8174**	**0.1305**	**0.5201**	**0.7339**	**0.8400**	**0.9239**	**0.9925**	**1.00**	**4842**	**NO**	**1.00**
phi[5]	**0.5704**	**0.1608**	**0.3021**	**0.4511**	**0.5527**	**0.6741**	**0.9229**	**1.00**	**120000**	**NO**	**1.00**
phi[6]	**0.7519**	**0.1591**	**0.4180**	**0.6380**	**0.7696**	**0.8836**	**0.9877**	**1.00**	**120000**	**NO**	**1.00**
phi[7]	**0.9098**	**0.0798**	**0.7032**	**0.8707**	**0.9320**	**0.9709**	**0.9973**	**1.00**	**30549**	**NO**	**1.00**
phi[8]	**0.8861**	**0.0981**	**0.6363**	**0.8358**	**0.9125**	**0.9622**	**0.9966**	**1.00**	**16877**	**NO**	**1.00**
phi[9]	**0.2853**	**0.1006**	**0.1363**	**0.2155**	**0.2693**	**0.3370**	**0.5271**	**1.00**	**1163**	**NO**	**1.00**
phi[10]	**0.7488**	**0.1748**	**0.3656**	**0.6295**	**0.7762**	**0.8941**	**0.9898**	**1.00**	**3364**	**NO**	**1.00**
phi[11]	**0.4866**	**0.1862**	**0.1760**	**0.3480**	**0.4666**	**0.6084**	**0.8946**	**1.00**	**3891**	**NO**	**1.00**
phi[12]	**0.0999**	**0.1044**	**0.0024**	**0.0276**	**0.0665**	**0.1367**	**0.3826**	**1.00**	**28456**	**NO**	**1.00**
b[1]	0.0254	0.0184	0.0031	0.0120	0.0211	0.0342	0.0723	1.00	3115	NO	1.00
b[2]	0.1092	0.0392	0.0417	0.0816	0.1058	0.1335	0.1948	1.00	1782	NO	1.00
b[3]	0.0519	0.0343	0.0026	0.0247	0.0472	0.0738	0.1289	1.00	2276	NO	1.00
b[4]	0.0466	0.0320	0.0023	0.0213	0.0414	0.0661	0.1209	1.00	1541	NO	1.00
b[5]	0.0130	0.0122	0.0004	0.0040	0.0095	0.0182	0.0450	1.00	9533	NO	1.00
b[6]	0.0088	0.0089	0.0002	0.0025	0.0061	0.0121	0.0324	1.00	9330	NO	1.00
b[7]	0.0314	0.0265	0.0012	0.0121	0.0249	0.0433	0.0996	1.00	634	NO	1.00
b[8]	0.5730	0.0726	0.4223	0.5253	0.5758	0.6239	0.7061	1.00	636	NO	1.00
b[9]	0.0300	0.0281	0.0008	0.0093	0.0219	0.0422	0.1031	1.00	2217	NO	1.00
b[10]	0.0622	0.0434	0.0029	0.0278	0.0551	0.0890	0.1627	1.00	120000	NO	1.00
b[11]	0.0355	0.0275	0.0013	0.0138	0.0297	0.0508	0.1028	1.00	9576	NO	1.00
b[12]	0.0132	0.0130	0.0003	0.0038	0.0092	0.0183	0.0480	1.00	120000	NO	1.00
B[1]	14	11	2	6	11	18	41	1.03	273	NO	1.00
B[2]	60	21	25	45	58	72	109	1.01	334	NO	1.00
B[3]	29	20	1	13	25	40	74	1.01	257	NO	1.00
B[4]	25	17	1	12	22	35	64	1.01	2240	NO	1.00
B[5]	6	6	0	2	4	9	23	1.00	1822	YES	1.00
B[6]	4	4	0	1	3	6	16	1.00	2770	YES	1.00
B[7]	16	13	0	6	13	22	50	1.00	10135	YES	1.00
B[8]	328	82	189	267	321	382	499	1.04	65	NO	1.00
B[9]	16	16	0	5	11	22	57	1.00	28633	YES	1.00
B[10]	35	26	1	15	30	49	96	1.00	932	NO	1.00
B[11]	19	16	0	7	16	28	59	1.00	1946	YES	1.00
B[12]	7	7	0	1	4	9	27	1.00	1710	YES	1.00
N[1]	**14**	**11**	**2**	**6**	**11**	**18**	**41**	**1.03**	**273**	**NO**	**1.00**
N[2]	**69**	**21**	**37**	**54**	**66**	**81**	**118**	**1.02**	**209**	**NO**	**1.00**
N[3]	**90**	**22**	**55**	**74**	**87**	**102**	**141**	**1.04**	**86**	**NO**	**1.00**
N[4]	**99**	**22**	**65**	**84**	**96**	**111**	**149**	**1.04**	**116**	**NO**	**1.00**
N[5]	**62**	**18**	**35**	**49**	**59**	**72**	**104**	**1.01**	**233**	**NO**	**1.00**
N[6]	**50**	**14**	**29**	**40**	**48**	**57**	**82**	**1.01**	**203**	**NO**	**1.00**
N[7]	**62**	**18**	**37**	**49**	**59**	**71**	**107**	**1.01**	**604**	**NO**	**1.00**
N[8]	**384**	**84**	**243**	**321**	**377**	**438**	**562**	**1.04**	**61**	**NO**	**1.00**
N[9]	**124**	**45**	**58**	**92**	**116**	**147**	**233**	**1.00**	**483**	**NO**	**1.00**
N[10]	**125**	**33**	**73**	**101**	**120**	**143**	**201**	**1.02**	**127**	**NO**	**1.00**
N[11]	**79**	**27**	**38**	**59**	**75**	**94**	**142**	**1.02**	**159**	**NO**	**1.00**
N[12]	**13**	**11**	**1**	**5**	**11**	**18**	**41**	**1.00**	**817**	**NO**	**1.00**
gamma[1]	0.0068	0.0053	0.0008	0.0031	0.0055	0.0090	0.0203	1.02	315	NO	1.00
gamma[2]	0.0287	0.0106	0.0113	0.0213	0.0275	0.0348	0.0529	1.01	384	NO	1.00
gamma[3]	0.0143	0.0100	0.0007	0.0065	0.0127	0.0202	0.0374	1.01	262	NO	1.00
gamma[4]	0.0127	0.0087	0.0007	0.0059	0.0113	0.0178	0.0330	1.01	1877	NO	1.00
gamma[5]	0.0036	0.0034	0.0001	0.0011	0.0026	0.0050	0.0126	1.00	1722	NO	1.00
gamma[6]	0.0025	0.0025	0.0001	0.0007	0.0017	0.0034	0.0091	1.00	2872	NO	1.00
gamma[7]	0.0086	0.0071	0.0004	0.0035	0.0069	0.0118	0.0267	1.00	13828	NO	1.00
gamma[8]	0.1657	0.0430	0.0939	0.1340	0.1622	0.1934	0.2566	1.05	61	NO	1.00
gamma[9]	0.0102	0.0099	0.0003	0.0031	0.0073	0.0143	0.0363	1.00	4709	NO	1.00
gamma[10]	0.0217	0.0165	0.0010	0.0093	0.0185	0.0304	0.0622	1.01	492	NO	1.00
gamma[11]	0.0127	0.0106	0.0005	0.0048	0.0102	0.0179	0.0394	1.01	844	NO	1.00
gamma[12]	0.0049	0.0052	0.0001	0.0013	0.0032	0.0066	0.0190	1.01	901	NO	1.00
deviance	991	71	854	943	991	1038	1134	1.04	69	NO	1.00
FOREST											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
psi	0.2654	0.0230	0.2233	0.2497	0.2641	0.2800	0.3145	1.02	187	NO	1.00
Nforest	**591**	**48**	**504**	**559**	**588**	**621**	**696**	**1.03**	**155**	**NO**	**1.00**
p[1]	0.2137	0.0280	0.1628	0.1942	0.2124	0.2318	0.2725	1.01	483	NO	1.00
p[2]	0.2806	0.0299	0.2255	0.2598	0.2795	0.3001	0.3420	1.00	611	NO	1.00
p[3]	0.2228	0.0280	0.1716	0.2033	0.2215	0.2408	0.2814	1.01	478	NO	1.00
p[4]	0.2974	0.0330	0.2366	0.2744	0.2960	0.3189	0.3654	1.00	815	NO	1.00
p[5]	0.1557	0.0223	0.1161	0.1400	0.1542	0.1698	0.2038	1.01	435	NO	1.00

p[6]	0.3331	0.0445	0.2520	0.3020	0.3312	0.3620	0.4257	1.00	1950	NO	1.00
p[7]	0.2454	0.0277	0.1941	0.2262	0.2444	0.2635	0.3030	1.01	475	NO	1.00
p[8]	0.1421	0.0325	0.0892	0.1193	0.1384	0.1607	0.2166	1.00	1252	NO	1.00
p[9]	0.1541	0.0224	0.1146	0.1383	0.1526	0.1681	0.2024	1.01	446	NO	1.00
p[10]	0.3383	0.0466	0.2532	0.3057	0.3363	0.3686	0.4354	1.00	2251	NO	1.00
p[11]	0.1945	0.0273	0.1455	0.1754	0.1930	0.2120	0.2520	1.01	483	NO	1.00
p[12]	0.3337	0.0447	0.2521	0.3024	0.3318	0.3627	0.4267	1.00	1980	NO	1.00
p[13]	0.1600	0.0227	0.1196	0.1440	0.1586	0.1744	0.2085	1.01	425	NO	1.00
alpha.p	-1.3107	0.1667	-1.6379	-1.4233	-1.3107	-1.1984	-0.9820	1.01	437	NO	1.00
beta1.p	-0.4725	0.1227	-0.7168	-0.5545	-0.4706	-0.3892	-0.2356	1.00	3918	NO	1.00
beta2.p	0.1019	0.1265	-0.1440	0.0162	0.1014	0.1871	0.3514	1.00	9277	YES	0.79
phi[1]	**0.4998**	**0.2892**	**0.0250**	**0.2484**	**0.5002**	**0.7497**	**0.9752**	**1.00**	**120000**	**NO**	**1.00**
phi[2]	**0.6564**	**0.1087**	**0.4576**	**0.5799**	**0.6515**	**0.7275**	**0.8838**	**1.00**	**2946**	**NO**	**1.00**
phi[3]	**0.8376**	**0.1102**	**0.5915**	**0.7649**	**0.8540**	**0.9276**	**0.9924**	**1.00**	**15363**	**NO**	**1.00**
phi[4]	**0.5088**	**0.0974**	**0.3367**	**0.4401**	**0.5026**	**0.5706**	**0.7153**	**1.00**	**5155**	**NO**	**1.00**
phi[5]	**0.8336**	**0.1021**	**0.6144**	**0.7648**	**0.8436**	**0.9147**	**0.9900**	**1.00**	**7316**	**NO**	**1.00**
phi[6]	**0.9025**	**0.0765**	**0.7183**	**0.8579**	**0.9197**	**0.9637**	**0.9966**	**1.00**	**7912**	**NO**	**1.00**
phi[7]	**0.9372**	**0.0541**	**0.8004**	**0.9096**	**0.9518**	**0.9789**	**0.9981**	**1.00**	**9093**	**NO**	**1.00**
phi[8]	**0.8526**	**0.1122**	**0.5883**	**0.7837**	**0.8765**	**0.9435**	**0.9948**	**1.00**	**70236**	**NO**	**1.00**
phi[9]	**0.3087**	**0.0825**	**0.1787**	**0.2502**	**0.2978**	**0.3556**	**0.5000**	**1.00**	**120000**	**NO**	**1.00**
phi[10]	**0.7125**	**0.1591**	**0.3979**	**0.5970**	**0.7178**	**0.8380**	**0.9793**	**1.00**	**3717**	**NO**	**1.00**
phi[11]	**0.6844**	**0.1563**	**0.3853**	**0.5703**	**0.6837**	**0.8020**	**0.9689**	**1.00**	**48465**	**NO**	**1.00**
phi[12]	**0.8447**	**0.1221**	**0.5502**	**0.7731**	**0.8724**	**0.9430**	**0.9947**	**1.00**	**120000**	**NO**	**1.00**
b[1]	0.3243	0.0440	0.2432	0.2935	0.3226	0.3530	0.4150	1.00	7553	NO	1.00
b[2]	0.0144	0.0136	0.0004	0.0044	0.0104	0.0203	0.0504	1.00	97434	NO	1.00
b[3]	0.0947	0.0414	0.0183	0.0654	0.0933	0.1219	0.1799	1.00	20575	NO	1.00
b[4]	0.0606	0.0313	0.0066	0.0375	0.0590	0.0813	0.1262	1.00	3094	NO	1.00
b[5]	0.0388	0.0290	0.0016	0.0157	0.0329	0.0556	0.1086	1.00	30814	NO	1.00
b[6]	0.0910	0.0421	0.0145	0.0610	0.0892	0.1184	0.1790	1.00	6437	NO	1.00
b[7]	0.1332	0.0462	0.0414	0.1019	0.1336	0.1647	0.2230	1.00	9571	NO	1.00
b[8]	0.0620	0.0452	0.0028	0.0264	0.0534	0.0883	0.1700	1.00	2753	NO	1.00
b[9]	0.0097	0.0091	0.0003	0.0030	0.0070	0.0136	0.0337	1.00	14429	NO	1.00
b[10]	0.0128	0.0106	0.0004	0.0046	0.0102	0.0183	0.0395	1.00	120000	NO	1.00
b[11]	0.0112	0.0108	0.0003	0.0034	0.0080	0.0156	0.0401	1.00	32031	NO	1.00
b[12]	0.1474	0.0334	0.0870	0.1242	0.1457	0.1687	0.2183	1.00	3582	NO	1.00
B[1]	194	30	144	174	191	212	263	1.02	343	NO	1.00
B[2]	8	8	0	2	5	11	28	1.00	43392	YES	1.00
B[3]	56	25	11	39	55	72	107	1.00	1923	NO	1.00
B[4]	35	18	4	22	35	47	72	1.00	7669	NO	1.00
B[5]	22	17	0	9	19	32	63	1.00	22237	YES	1.00
B[6]	54	24	9	37	53	69	105	1.00	120000	NO	1.00
B[7]	79	27	25	61	79	98	133	1.00	1458	NO	1.00
B[8]	37	28	1	15	31	52	106	1.00	1212	NO	1.00
B[9]	5	5	0	1	3	7	18	1.00	3446	YES	1.00
B[10]	7	6	0	2	5	10	21	1.00	14048	YES	1.00
B[11]	6	6	0	1	4	8	22	1.00	12367	YES	1.00
B[12]	88	21	53	74	87	101	134	1.00	11651	NO	1.00
N[1]	**194**	**30**	**144**	**174**	**191**	**212**	**263**	**1.02**	**343**	**NO**	**1.00**
N[2]	**134**	**22**	**97**	**119**	**133**	**148**	**181**	**1.00**	**1628**	**NO**	**1.00**
N[3]	**169**	**26**	**124**	**151**	**167**	**186**	**226**	**1.01**	**557**	**NO**	**1.00**
N[4]	**121**	**17**	**91**	**109**	**120**	**132**	**159**	**1.00**	**1005**	**NO**	**1.00**
N[5]	**124**	**21**	**88**	**109**	**122**	**137**	**169**	**1.00**	**965**	**NO**	**1.00**
N[6]	**166**	**23**	**127**	**149**	**164**	**180**	**218**	**1.00**	**1983**	**NO**	**1.00**
N[7]	**236**	**26**	**189**	**218**	**234**	**252**	**290**	**1.01**	**426**	**NO**	**1.00**
N[8]	**238**	**40**	**161**	**211**	**237**	**264**	**320**	**1.01**	**459**	**NO**	**1.00**
N[9]	**77**	**18**	**50**	**64**	**74**	**86**	**118**	**1.00**	**804**	**NO**	**1.00**
N[10]	**60**	**10**	**43**	**53**	**59**	**66**	**83**	**1.00**	**1640**	**NO**	**1.00**
N[11]	**47**	**11**	**28**	**39**	**46**	**53**	**71**	**1.00**	**2322**	**NO**	**1.00**
N[12]	**128**	**22**	**92**	**113**	**126**	**142**	**178**	**1.00**	**3085**	**NO**	**1.00**
gamma[1]	0.0861	0.0144	0.0616	0.0761	0.0848	0.0948	0.1183	1.01	399	NO	1.00
gamma[2]	0.0042	0.0040	0.0001	0.0013	0.0030	0.0059	0.0147	1.00	36972	NO	1.00
gamma[3]	0.0276	0.0124	0.0053	0.0189	0.0270	0.0356	0.0537	1.00	1764	NO	1.00
gamma[4]	0.0180	0.0092	0.0020	0.0113	0.0175	0.0241	0.0375	1.00	9859	NO	1.00
gamma[5]	0.0118	0.0089	0.0005	0.0048	0.0100	0.0169	0.0331	1.00	18602	NO	1.00
gamma[6]	0.0279	0.0129	0.0046	0.0188	0.0273	0.0362	0.0553	1.00	120000	NO	1.00
gamma[7]	0.0423	0.0150	0.0134	0.0321	0.0420	0.0521	0.0724	1.00	1190	NO	1.00
gamma[8]	0.0207	0.0155	0.0009	0.0087	0.0176	0.0293	0.0587	1.00	1112	NO	1.00
gamma[9]	0.0033	0.0031	0.0001	0.0010	0.0024	0.0046	0.0115	1.00	3588	NO	1.00
gamma[10]	0.0043	0.0036	0.0002	0.0016	0.0035	0.0062	0.0133	1.00	8601	NO	1.00

gamma[11]	0.0038	0.0038	0.0001	0.0012	0.0027	0.0053	0.0138	1.00	9978	NO	1.00
gamma[12]	0.0507	0.0129	0.0289	0.0417	0.0495	0.0585	0.0793	1.00	3710	NO	1.00
deviance	1800	81	1644	1744	1799	1855	1961	1.01	332	NO	1.00

G) *Saltator maximus* - Closed Population Model											
COFFEE											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
N	**208**	**48**	**139**	**175**	**199**	**232**	**320**	**1.00**	**1398**	**NO**	**1.00**
p.est[1]	0.0047	0.0025	0.001423	0.002921	0.0042	0.0059	0.0108	1.00	3000	NO	1.00
p.est[2]	0.0718	0.0177	0.0415	0.0591	0.0708	0.0830	0.1092	1.00	3000	NO	1.00
p.est[3]	0.0126	0.0045	0.0057	0.0094	0.0120	0.0152	0.0230	1.00	3000	NO	1.00
p.est[4]	0.0681	0.0186	0.0369	0.0549	0.0663	0.0794	0.1088	1.00	2933	NO	1.00
p.est[5]	0.0179	0.0056	0.0090	0.0139	0.0173	0.0213	0.0307	1.00	3000	NO	1.00
p.est[6]	0.0025	0.0016	0.0005	0.0013	0.0021	0.0032	0.0068	1.00	3000	NO	1.00
p.est[7]	0.0747	0.0184	0.0430	0.0615	0.0735	0.0865	0.1134	1.00	3000	NO	1.00
p.est[8]	0.0585	0.0182	0.0291	0.0455	0.0563	0.0692	0.0999	1.00	3000	NO	1.00
p.est[9]	0.0490	0.0123	0.0279	0.0403	0.0482	0.0569	0.0757	1.00	3000	NO	1.00
p.est[10]	0.0341	0.0090	0.0189	0.0276	0.0334	0.0395	0.0536	1.00	3000	NO	1.00
p.est[11]	0.0601	0.0150	0.0346	0.0494	0.0593	0.0693	0.0918	1.00	3000	NO	1.00
p.est[12]	0.0039	0.0022	0.0011	0.0024	0.0035	0.0050	0.0095	1.00	3000	NO	1.00
mean.p	0.0419	0.0107	0.0234	0.0342	0.0412	0.0487	0.0652	1.00	3000	NO	1.00
beta1	1.3753	0.2509	0.9126	1.2012	1.3687	1.5347	1.8954	1.00	1047	NO	1.00
beta2	-0.6979	0.1718	-1.0547	-0.8068	-0.6952	-0.5843	-0.3626	1.00	2400	NO	1.00
psi	0.0514	0.0122	0.0330	0.0428	0.0495	0.0576	0.0802	1.00	1305	NO	1.00
deviance	721	40	648	693	717	746	806	1.00	1549	NO	1.00
FOREST											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
N	**165**	**31**	**117**	**143**	**160**	**182**	**241**	**1.01**	**692**	**NO**	**1.00**
p.est[1]	0.0292	0.0071	0.0169	0.0242	0.0285	0.0338	0.0441	1.00	1409	NO	1.00
p.est[2]	0.0445	0.0107	0.0259	0.0371	0.0435	0.0512	0.0680	1.00	1678	NO	1.00
p.est[3]	0.0262	0.0067	0.0148	0.0214	0.0255	0.0305	0.0407	1.00	1481	NO	1.00
p.est[4]	0.0774	0.0169	0.0473	0.0657	0.0762	0.0881	0.1135	1.00	1420	NO	1.00
p.est[5]	0.0211	0.0065	0.0107	0.0164	0.0203	0.0251	0.0355	1.00	1852	NO	1.00
p.est[6]	0.0374	0.0088	0.0220	0.0313	0.0366	0.0429	0.0564	1.00	1491	NO	1.00
p.est[7]	0.0890	0.0251	0.0472	0.0715	0.0864	0.1038	0.1440	1.00	1873	NO	1.00
p.est[8]	0.0785	0.0171	0.0480	0.0668	0.0772	0.0892	0.1151	1.00	1392	NO	1.00
p.est[9]	0.0205	0.0065	0.0102	0.0158	0.0197	0.0244	0.0350	1.00	1927	NO	1.00
p.est[10]	0.0559	0.0137	0.0326	0.0463	0.0547	0.0645	0.0860	1.00	1879	NO	1.00
p.est[11]	0.0210	0.0065	0.0106	0.0163	0.0203	0.0250	0.0354	1.00	1860	NO	1.00
p.est[12]	0.0746	0.0166	0.0449	0.0631	0.0733	0.0850	0.1104	1.00	1508	NO	1.00
mean.p	0.0478	0.0116	0.0280	0.0398	0.0466	0.0551	0.0733	1.00	1761	NO	1.00
beta1	0.6534	0.1551	0.3659	0.5470	0.6480	0.7554	0.9679	1.00	3000	NO	1.00
beta2	-0.1581	0.1551	-0.4618	-0.2618	-0.1591	-0.0512	0.1475	1.00	3000	YES	0.85
psi	0.0408	0.0083	0.0277	0.0349	0.0399	0.0455	0.0594	1.01	557	NO	1.00
deviance	718	34	656	694	716	740	792	1.00	946	NO	1.00

H) *Saltator striatipectus* - Closed Population Model											
COFFEE											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
N	**235**	**82**	**135**	**178**	**216**	**271**	**430**	**1.03**	**148**	**NO**	**1.00**
p.est[1]	0.0100	0.0045	0.003427	0.006847	0.0093	0.0125	0.0209	1.01	340	NO	1.00
p.est[2]	0.0338	0.0114	0.0153	0.0254	0.0327	0.0413	0.0592	1.01	314	NO	1.00
p.est[3]	0.0135	0.0049	0.0056	0.0099	0.0128	0.0164	0.0245	1.01	280	NO	1.00
p.est[4]	0.0591	0.0196	0.0268	0.0446	0.0571	0.0717	0.1013	1.01	216	NO	1.00
p.est[5]	0.0153	0.0054	0.0066	0.0113	0.0146	0.0185	0.0273	1.01	279	NO	1.00
p.est[6]	0.0086	0.0045	0.0024	0.0054	0.0077	0.0108	0.0199	1.01	434	NO	1.00
p.est[7]	0.0359	0.0121	0.0164	0.0270	0.0347	0.0437	0.0627	1.01	305	NO	1.00
p.est[8]	0.0671	0.0237	0.0289	0.0499	0.0640	0.0813	0.1194	1.01	215	NO	1.00
p.est[9]	0.0245	0.0084	0.0109	0.0183	0.0235	0.0298	0.0428	1.01	322	NO	1.00
p.est[10]	0.0201	0.0069	0.0089	0.0150	0.0193	0.0243	0.0354	1.01	303	NO	1.00
p.est[11]	0.0283	0.0097	0.0127	0.0212	0.0272	0.0345	0.0496	1.01	326	NO	1.00
p.est[12]	0.0096	0.0045	0.0031	0.0064	0.0088	0.0120	0.0204	1.01	361	NO	1.00
mean.p	0.0223	0.0077	0.0099	0.0167	0.0215	0.0271	0.0393	1.01	314	NO	1.00
beta1	0.7404	0.1843	0.4043	0.6102	0.7348	0.8638	1.1095	1.00	3000	NO	1.00
beta2	-0.0364	0.1491	-0.3407	-0.1332	-0.0360	0.0669	0.2448	1.00	1010	YES	0.60
psi	0.0580	0.0203	0.0324	0.0440	0.0537	0.0673	0.1078	1.03	156	NO	1.00
deviance	621	44	547	588	616	649	713	1.02	153	NO	1.00
FOREST											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**

N	**2072**	**1058**	**270**	**1054**	**2317**	**2971**	**3679**	**1.11**	**23**	**NO**	**1.00**
p.est[1]	0.0011	0.0014	0.0002	0.0004	0.0006	0.0011	0.0051	1.07	64	NO	1.00
p.est[2]	0.0020	0.0025	0.0004	0.0007	0.0010	0.0021	0.0090	1.09	54	NO	1.00
p.est[3]	0.0010	0.0013	0.0002	0.0003	0.0005	0.0010	0.0045	1.06	68	NO	1.00
p.est[4]	0.0045	0.0056	0.0011	0.0017	0.0023	0.0047	0.0205	1.10	48	NO	1.00
p.est[5]	0.0007	0.0011	0.0001	0.0002	0.0004	0.0007	0.0036	1.06	82	NO	1.00
p.est[6]	0.0015	0.0020	0.0003	0.0006	0.0008	0.0016	0.0070	1.08	57	NO	1.00
p.est[7]	0.0059	0.0080	0.0011	0.0021	0.0031	0.0060	0.0262	1.09	58	NO	1.00
p.est[8]	0.0046	0.0057	0.0011	0.0017	0.0023	0.0048	0.0206	1.10	48	NO	1.00
p.est[9]	0.0007	0.0010	0.0001	0.0002	0.0004	0.0007	0.0036	1.05	85	NO	1.00
p.est[10]	0.0027	0.0034	0.0006	0.0010	0.0014	0.0029	0.0124	1.09	51	NO	1.00
p.est[11]	0.0007	0.0011	0.0001	0.0002	0.0004	0.0007	0.0036	1.06	82	NO	1.00
p.est[12]	0.0042	0.0052	0.0010	0.0016	0.0022	0.0045	0.0190	1.10	48	NO	1.00
mean.p	0.0022	0.0027	0.0005	0.0008	0.0011	0.0023	0.0100	1.09	53	NO	1.00
beta1	0.9027	0.2878	0.3693	0.7030	0.8890	1.0927	1.4943	1.00	2335	NO	1.00
beta2	-0.1946	0.2533	-0.6951	-0.3658	-0.1871	-0.0206	0.2952	1.00	3000	YES	0.77
psi	0.5138	0.2621	0.0674	0.2627	0.5736	0.7348	0.9125	1.11	23	NO	1.00
deviance	487	52	363	456	509	526	541	1.09	29	NO	1.00

I) *Myiothlypis conspicillata* - Jolly-Seber Model

COFFEE

par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
psi	0.1590	0.0474	0.0903	0.1261	0.1519	0.1817	0.2718	1.08	58	0	1.00
Ncoffee	**317**	**97**	**178**	**250**	**302**	**363**	**546**	**1.08**	**56**	**0**	**1.00**
p[1]	0.1472	0.0485	0.0697	0.1125	0.1410	0.1752	0.2590	1.03	100	0	1.00
p[2]	0.1530	0.0666	0.0572	0.1045	0.1414	0.1891	0.3141	1.03	134	0	1.00
p[3]	0.1069	0.0370	0.0489	0.0805	0.1019	0.1279	0.1933	1.03	111	0	1.00
p[4]	0.1615	0.0550	0.0744	0.1220	0.1543	0.1935	0.2884	1.04	94	0	1.00
p[5]	0.0431	0.0202	0.0148	0.0287	0.0395	0.0535	0.0924	1.02	189	0	1.00
p[6]	0.1616	0.0528	0.0768	0.1238	0.1551	0.1925	0.2821	1.04	90	0	1.00
p[7]	0.1445	0.0774	0.0424	0.0881	0.1282	0.1835	0.3381	1.02	187	0	1.00
p[8]	0.0998	0.0348	0.0454	0.0750	0.0950	0.1194	0.1810	1.03	112	0	1.00
p[9]	0.0329	0.0184	0.0090	0.0199	0.0290	0.0417	0.0793	1.01	264	0	1.00
p[10]	0.1403	0.0468	0.0659	0.1068	0.1342	0.1671	0.2483	1.03	104	0	1.00
p[11]	0.1536	0.0500	0.0733	0.1179	0.1474	0.1826	0.2681	1.03	96	0	1.00
p[12]	0.1269	0.0432	0.0588	0.0961	0.1212	0.1515	0.2272	1.03	108	0	1.00
p[13]	0.1508	0.0694	0.0533	0.1002	0.1380	0.1878	0.3200	1.02	147	0	1.00
alpha.p	-1.8093	0.3904	-2.5908	-2.0651	-1.8066	-1.5492	-1.0512	1.04	89	0	1.00
beta1.p	-0.4050	0.2501	-0.9056	-0.5712	-0.4023	-0.2349	0.0762	1.00	1983	1	0.95
beta2.p	-0.3643	0.2249	-0.8176	-0.5129	-0.3593	-0.2110	0.0624	1.00	13711	1	0.95
phi[1]	**0.5000**	**0.2886**	**0.0252**	**0.2499**	**0.5002**	**0.7502**	**0.9753**	**1.00**	**3.00E+05**	**0**	**1.00**
phi[2]	**0.4638**	**0.2864**	**0.0205**	**0.2134**	**0.4467**	**0.7045**	**0.9687**	**1.00**	**3.00E+05**	**0**	**1.00**
phi[3]	**0.6271**	**0.2107**	**0.2272**	**0.4662**	**0.6331**	**0.7987**	**0.9767**	**1.00**	**8520**	**0**	**1.00**
phi[4]	**0.8130**	**0.1474**	**0.4560**	**0.7265**	**0.8469**	**0.9315**	**0.9938**	**1.00**	**57180**	**0**	**1.00**
phi[5]	**0.5466**	**0.2093**	**0.1974**	**0.3823**	**0.5262**	**0.7016**	**0.9585**	**1.00**	**23240**	**0**	**1.00**
phi[6]	**0.6541**	**0.2086**	**0.2499**	**0.4946**	**0.6654**	**0.8288**	**0.9821**	**1.00**	**41155**	**0**	**1.00**
phi[7]	**0.8472**	**0.1277**	**0.5274**	**0.7780**	**0.8801**	**0.9478**	**0.9953**	**1.00**	**150451**	**0**	**1.00**
phi[8]	**0.8466**	**0.1280**	**0.5255**	**0.7772**	**0.8796**	**0.9472**	**0.9953**	**1.00**	**99877**	**0**	**1.00**
phi[9]	**0.7809**	**0.1526**	**0.4437**	**0.6778**	**0.8055**	**0.9072**	**0.9909**	**1.00**	**31684**	**0**	**1.00**
phi[10]	**0.6661**	**0.1860**	**0.3115**	**0.5251**	**0.6693**	**0.8162**	**0.9786**	**1.00**	**6667**	**0**	**1.00**
phi[11]	**0.7755**	**0.1503**	**0.4478**	**0.6733**	**0.7958**	**0.8993**	**0.9898**	**1.00**	**22127**	**0**	**1.00**
phi[12]	**0.0972**	**0.1001**	**0.0024**	**0.0273**	**0.0661**	**0.1335**	**0.3691**	**1.00**	**68919**	**0**	**1.00**
b[1]	0.0464	0.0332	0.0055	0.0220	0.0386	0.0624	0.1309	1.00	53231	0	1.00
b[2]	0.1857	0.0768	0.0615	0.1306	0.1763	0.2314	0.3616	1.00	3272	0	1.00
b[3]	0.0432	0.0379	0.0013	0.0143	0.0330	0.0618	0.1406	1.00	64970	0	1.00
b[4]	0.0945	0.0589	0.0064	0.0491	0.0872	0.1314	0.2276	1.00	1962	0	1.00
b[5]	0.0228	0.0242	0.0005	0.0063	0.0153	0.0311	0.0882	1.00	5692	0	1.00
b[6]	0.0186	0.0189	0.0005	0.0053	0.0127	0.0256	0.0695	1.00	38591	0	1.00
b[7]	0.0845	0.0733	0.0033	0.0300	0.0641	0.1179	0.2770	1.00	9949	0	1.00
b[8]	0.3277	0.1257	0.0665	0.2441	0.3331	0.4158	0.5606	1.00	2417	0	1.00
b[9]	0.0703	0.0634	0.0020	0.0227	0.0527	0.0996	0.2364	1.00	9089	0	1.00
b[10]	0.0486	0.0427	0.0015	0.0161	0.0370	0.0694	0.1587	1.00	7938	0	1.00
b[11]	0.0314	0.0298	0.0009	0.0095	0.0226	0.0441	0.1102	1.00	57011	0	1.00
b[12]	0.0261	0.0260	0.0007	0.0075	0.0182	0.0363	0.0960	1.00	112952	0	1.00
B[1]	14	12	2	6	11	19	45	1.01	359	0	1.00
B[2]	60	32	18	38	53	74	142	1.03	152	0	1.00
B[3]	13	13	0	4	9	18	47	1.01	544	1	1.00
B[4]	30	21	2	15	26	40	82	1.02	251	0	1.00
B[5]	7	8	0	1	4	9	29	1.01	589	1	1.00

B[6]	5	6	0	1	3	7	22	1.01	588	1	1.00
B[7]	27	26	1	9	19	36	96	1.01	622	0	1.00
B[8]	107	54	21	70	100	135	238	1.03	156	0	1.00
B[9]	22	24	0	6	16	31	84	1.01	606	1	1.00
B[10]	15	15	0	4	11	21	54	1.01	943	1	1.00
B[11]	9	11	0	2	6	13	38	1.01	635	1	1.00
B[12]	8	10	0	2	5	11	33	1.01	678	1	1.00
N[1]	**14**	**12**	**2**	**6**	**11**	**19**	**45**	**1.01**	**359**	**0**	**1.00**
N[2]	**67**	**33**	**26**	**44**	**59**	**81**	**151**	**1.03**	**126**	**0**	**1.00**
N[3]	**53**	**24**	**20**	**36**	**49**	**65**	**112**	**1.04**	**115**	**0**	**1.00**
N[4]	**73**	**28**	**36**	**54**	**68**	**86**	**143**	**1.05**	**83**	**0**	**1.00**
N[5]	**46**	**23**	**15**	**29**	**41**	**57**	**105**	**1.03**	**142**	**0**	**1.00**
N[6]	**33**	**17**	**12**	**22**	**30**	**41**	**75**	**1.04**	**130**	**0**	**1.00**
N[7]	**56**	**32**	**19**	**33**	**47**	**69**	**138**	**1.02**	**198**	**0**	**1.00**
N[8]	**155**	**55**	**78**	**116**	**145**	**180**	**294**	**1.06**	**81**	**0**	**1.00**
N[9]	**143**	**56**	**66**	**105**	**133**	**169**	**282**	**1.05**	**96**	**0**	**1.00**
N[10]	**107**	**40**	**53**	**79**	**100**	**126**	**205**	**1.05**	**104**	**0**	**1.00**
N[11]	**92**	**36**	**43**	**67**	**85**	**109**	**181**	**1.04**	**108**	**0**	**1.00**
N[12]	**16**	**14**	**1**	**6**	**12**	**21**	**53**	**1.01**	**437**	**0**	**1.00**
gamma[1]	0.0074	0.0060	0.0008	0.0032	0.0058	0.0098	0.0232	1.01	400	0	1.00
gamma[2]	0.0298	0.0161	0.0086	0.0187	0.0264	0.0371	0.0709	1.03	160	0	1.00
gamma[3]	0.0071	0.0068	0.0002	0.0022	0.0052	0.0099	0.0249	1.01	533	0	1.00
gamma[4]	0.0156	0.0112	0.0010	0.0076	0.0134	0.0210	0.0432	1.02	249	0	1.00
gamma[5]	0.0039	0.0046	0.0001	0.0010	0.0024	0.0051	0.0161	1.01	596	0	1.00
gamma[6]	0.0032	0.0035	0.0001	0.0008	0.0020	0.0042	0.0127	1.01	591	0	1.00
gamma[7]	0.0144	0.0142	0.0005	0.0048	0.0102	0.0195	0.0520	1.01	580	0	1.00
gamma[8]	0.0565	0.0293	0.0112	0.0368	0.0523	0.0710	0.1279	1.04	135	0	1.00
gamma[9]	0.0131	0.0137	0.0003	0.0038	0.0091	0.0178	0.0490	1.02	465	0	1.00
gamma[10]	0.0090	0.0088	0.0003	0.0028	0.0065	0.0124	0.0322	1.01	621	0	1.00
gamma[11]	0.0060	0.0067	0.0001	0.0017	0.0040	0.0081	0.0235	1.02	473	0	1.00
gamma[12]	0.0051	0.0061	0.0001	0.0013	0.0032	0.0067	0.0212	1.02	495	0	1.00
deviance	531	54	429	494	529	565	644	1.05	66	0	1.00
FOREST											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
psi	0.2805	0.0465	0.2025	0.2477	0.2768	0.3081	0.3853	1.03	138	0	1.00
Nforest	**604**	**100**	**438**	**533**	**596**	**663**	**831**	**1.03**	**131**	**0**	**1.00**
p[1]	0.1146	0.0281	0.0684	0.0945	0.1114	0.1314	0.1781	1.01	312	0	1.00
p[2]	0.1955	0.0376	0.1304	0.1688	0.1923	0.2189	0.2770	1.01	274	0	1.00
p[3]	0.1220	0.0291	0.0740	0.1013	0.1188	0.1394	0.1872	1.01	299	0	1.00
p[4]	0.2254	0.0423	0.1519	0.1954	0.2221	0.2519	0.3173	1.01	308	0	1.00
p[5]	0.1140	0.0269	0.0702	0.0948	0.1109	0.1299	0.1752	1.01	558	0	1.00
p[6]	0.3016	0.0579	0.2006	0.2607	0.2973	0.3379	0.4266	1.01	516	0	1.00
p[7]	0.1453	0.0316	0.0921	0.1228	0.1422	0.1647	0.2150	1.01	272	0	1.00
p[8]	0.1936	0.0609	0.1014	0.1491	0.1844	0.2285	0.3369	1.00	9664	0	1.00
p[9]	0.1172	0.0277	0.0721	0.0974	0.1140	0.1336	0.1802	1.01	611	0	1.00
p[10]	0.3140	0.0608	0.2077	0.2710	0.3095	0.3522	0.4451	1.01	570	0	1.00
p[11]	0.1033	0.0264	0.0607	0.0845	0.1002	0.1189	0.1632	1.01	343	0	1.00
p[12]	0.3029	0.0582	0.2013	0.2618	0.2986	0.3394	0.4286	1.01	522	0	1.00
p[13]	0.1079	0.0256	0.0662	0.0896	0.1049	0.1231	0.1661	1.01	475	0	1.00
alpha.p	-2.0737	0.2755	-2.6109	-2.2596	-2.0764	-1.8884	-1.5292	1.01	247	0	1.00
beta1.p	-0.5866	0.1513	-0.8906	-0.6864	-0.5841	-0.4842	-0.2957	1.00	172331	0	1.00
beta2.p	0.5437	0.1736	0.2161	0.4246	0.5393	0.6582	0.8958	1.00	1507	0	1.00
phi[1]	**0.4999**	**0.2886**	**0.0249**	**0.2507**	**0.4993**	**0.7490**	**0.9751**	**1.00**	**300000**	**0**	**1.00**
phi[2]	**0.6489**	**0.2036**	**0.2420**	**0.4996**	**0.6602**	**0.8134**	**0.9782**	**1.00**	**3118**	**0**	**1.00**
phi[3]	**0.6308**	**0.1902**	**0.2725**	**0.4891**	**0.6292**	**0.7775**	**0.9698**	**1.00**	**55939**	**0**	**1.00**
phi[4]	**0.6886**	**0.1905**	**0.2991**	**0.5503**	**0.7042**	**0.8450**	**0.9833**	**1.00**	**12738**	**0**	**1.00**
phi[5]	**0.4095**	**0.1315**	**0.2024**	**0.3161**	**0.3919**	**0.4837**	**0.7206**	**1.00**	**47735**	**0**	**1.00**
phi[6]	**0.7992**	**0.1486**	**0.4552**	**0.7049**	**0.8282**	**0.9212**	**0.9926**	**1.00**	**48997**	**0**	**1.00**
phi[7]	**0.9056**	**0.0835**	**0.6901**	**0.8644**	**0.9287**	**0.9696**	**0.9973**	**1.00**	**57761**	**0**	**1.00**
phi[8]	**0.6290**	**0.1768**	**0.3171**	**0.4935**	**0.6187**	**0.7612**	**0.9654**	**1.00**	**1347**	**0**	**1.00**
phi[9]	**0.3972**	**0.1172**	**0.2144**	**0.3126**	**0.3812**	**0.4645**	**0.6700**	**1.00**	**2548**	**0**	**1.00**
phi[10]	**0.8154**	**0.1334**	**0.5105**	**0.7298**	**0.8397**	**0.9246**	**0.9928**	**1.00**	**43610**	**0**	**1.00**
phi[11]	**0.7965**	**0.1362**	**0.4974**	**0.7043**	**0.8152**	**0.9085**	**0.9906**	**1.00**	**7026**	**0**	**1.00**
phi[12]	**0.7637**	**0.1549**	**0.4315**	**0.6561**	**0.7822**	**0.8914**	**0.9888**	**1.00**	**21312**	**0**	**1.00**
b[1]	0.1243	0.0399	0.0577	0.0957	0.1204	0.1485	0.2127	1.00	1487	0	1.00
b[2]	0.0502	0.0323	0.0028	0.0247	0.0463	0.0709	0.1223	1.00	56043	0	1.00
b[3]	0.0398	0.0308	0.0016	0.0159	0.0331	0.0568	0.1155	1.00	17333	0	1.00
b[4]	0.1117	0.0417	0.0293	0.0838	0.1116	0.1393	0.1952	1.00	10937	0	1.00
b[5]	0.0122	0.0115	0.0003	0.0037	0.0088	0.0171	0.0423	1.00	86042	0	1.00

b[6]	0.0203	0.0165	0.0008	0.0076	0.0165	0.0289	0.0614	1.00	6551	0	1.00
b[7]	0.4396	0.0620	0.3160	0.3980	0.4403	0.4820	0.5590	1.00	3748	0	1.00
b[8]	0.0496	0.0464	0.0013	0.0152	0.0360	0.0702	0.1721	1.00	3791	0	1.00
b[9]	0.0178	0.0159	0.0005	0.0058	0.0135	0.0254	0.0587	1.00	6659	0	1.00
b[10]	0.0280	0.0216	0.0010	0.0108	0.0233	0.0404	0.0801	1.00	7305	0	1.00
b[11]	0.0371	0.0290	0.0014	0.0144	0.0308	0.0534	0.1080	1.00	27713	0	1.00
b[12]	0.0693	0.0356	0.0075	0.0433	0.0674	0.0926	0.1446	1.00	2593	0	1.00
B[1]	76	29	33	55	71	91	147	1.02	259	0	1.00
B[2]	30	20	1	14	27	42	76	1.00	1540	0	1.00
B[3]	24	19	0	9	19	33	72	1.00	1627	1	1.00
B[4]	67	26	18	50	66	83	123	1.00	1128	0	1.00
B[5]	6	7	0	2	5	9	24	1.00	6079	1	1.00
B[6]	11	9	0	4	9	16	35	1.00	58401	1	1.00
B[7]	271	64	167	225	264	309	415	1.02	193	0	1.00
B[8]	29	28	0	9	21	41	104	1.00	23055	1	1.00
B[9]	10	9	0	3	7	14	33	1.00	67720	1	1.00
B[10]	16	12	0	6	13	23	46	1.00	49643	1	1.00
B[11]	22	18	0	8	18	32	66	1.00	2170	1	1.00
B[12]	41	21	4	26	40	54	88	1.00	26384	0	1.00
N[1]	**76**	**29**	**33**	**55**	**71**	**91**	**147**	**1.02**	**259**	**0**	**1.00**
N[2]	**78**	**22**	**44**	**62**	**75**	**90**	**129**	**1.01**	**304**	**0**	**1.00**
N[3]	**73**	**26**	**34**	**54**	**69**	**87**	**134**	**1.01**	**425**	**0**	**1.00**
N[4]	**117**	**27**	**75**	**98**	**114**	**133**	**179**	**1.01**	**293**	**0**	**1.00**
N[5]	**53**	**17**	**28**	**41**	**51**	**63**	**94**	**1.01**	**601**	**0**	**1.00**
N[6]	**54**	**14**	**33**	**44**	**52**	**61**	**86**	**1.01**	**641**	**0**	**1.00**
N[7]	**321**	**69**	**209**	**271**	**314**	**361**	**475**	**1.02**	**180**	**0**	**1.00**
N[8]	**227**	**65**	**125**	**179**	**219**	**266**	**373**	**1.00**	**3185**	**0**	**1.00**
N[9]	**96**	**26**	**56**	**78**	**93**	**110**	**155**	**1.00**	**815**	**0**	**1.00**
N[10]	**93**	**19**	**63**	**80**	**91**	**104**	**137**	**1.01**	**577**	**0**	**1.00**
N[11]	**97**	**25**	**56**	**79**	**94**	**112**	**155**	**1.01**	**480**	**0**	**1.00**
N[12]	**115**	**26**	**74**	**97**	**112**	**131**	**174**	**1.01**	**572**	**0**	**1.00**
gamma[1]	0.0352	0.0139	0.0145	0.0253	0.0330	0.0426	0.0686	1.02	282	0	1.00
gamma[2]	0.0146	0.0098	0.0008	0.0070	0.0131	0.0204	0.0375	1.00	1512	0	1.00
gamma[3]	0.0118	0.0096	0.0005	0.0045	0.0095	0.0167	0.0361	1.00	1501	0	1.00
gamma[4]	0.0331	0.0132	0.0089	0.0242	0.0322	0.0410	0.0619	1.00	982	0	1.00
gamma[5]	0.0037	0.0036	0.0001	0.0011	0.0027	0.0052	0.0131	1.00	5010	0	1.00
gamma[6]	0.0062	0.0051	0.0002	0.0023	0.0050	0.0088	0.0189	1.00	31207	0	1.00
gamma[7]	0.1382	0.0353	0.0817	0.1130	0.1342	0.1588	0.2184	1.03	176	0	1.00
gamma[8]	0.0176	0.0165	0.0005	0.0055	0.0129	0.0246	0.0611	1.00	22990	0	1.00
gamma[9]	0.0065	0.0059	0.0002	0.0021	0.0049	0.0092	0.0219	1.00	10618	0	1.00
gamma[10]	0.0102	0.0079	0.0004	0.0040	0.0085	0.0145	0.0294	1.00	8318	0	1.00
gamma[11]	0.0141	0.0118	0.0005	0.0052	0.0113	0.0200	0.0436	1.00	1245	0	1.00
gamma[12]	0.0260	0.0140	0.0030	0.0162	0.0247	0.0342	0.0575	1.00	4038	0	1.00
deviance	1253	90	1078	1192	1253	1314	1430	1.01	251	0	1.00

J) *Basileuterus rufifrons* - Jolly-Seber Model

COFFEE

par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
psi	0.2306	0.0450	0.1597	0.1974	0.2250	0.2583	0.3311	1.04	160	0	1.00
Ncoffee	**481**	**94**	**335**	**411**	**469**	**539**	**692**	**1.04**	**153**	**0**	**1.00**
p[1]	0.1444	0.0338	0.0880	0.1200	0.1411	0.1652	0.2187	1.01	598	0	1.00
p[2]	0.3269	0.0817	0.1865	0.2681	0.3202	0.3786	0.5038	1.00	1299	0	1.00
p[3]	0.1102	0.0272	0.0657	0.0905	0.1074	0.1268	0.1707	1.01	606	0	1.00
p[4]	0.2328	0.0518	0.1435	0.1958	0.2286	0.2654	0.3450	1.01	716	0	1.00
p[5]	0.1004	0.0284	0.0548	0.0800	0.0970	0.1170	0.1652	1.00	821	0	1.00
p[6]	0.2038	0.0447	0.1269	0.1719	0.2002	0.2319	0.3008	1.01	632	0	1.00
p[7]	0.3977	0.1068	0.2113	0.3201	0.3905	0.4678	0.6246	1.00	2051	0	1.00
p[8]	0.1072	0.0264	0.0639	0.0881	0.1045	0.1234	0.1663	1.01	602	0	1.00
p[9]	0.1045	0.0336	0.0520	0.0804	0.1000	0.1236	0.1824	1.00	1117	0	1.00
p[10]	0.1345	0.0321	0.0813	0.1113	0.1313	0.1543	0.2054	1.01	605	0	1.00
p[11]	0.1577	0.0360	0.0970	0.1318	0.1545	0.1801	0.2366	1.01	592	0	1.00
p[12]	0.1219	0.0297	0.0729	0.1003	0.1188	0.1400	0.1880	1.01	611	0	1.00
p[13]	0.3458	0.0884	0.1936	0.2820	0.3388	0.4022	0.5367	1.00	1472	0	1.00
alpha.p	-1.8059	0.2733	-2.3388	-1.9926	-1.8059	-1.6199	-1.2731	1.01	407	0	1.00
beta1.p	-0.6829	0.1919	-1.0711	-0.8094	-0.6788	-0.5521	-0.3188	1.00	12325	0	1.00
beta2.p	0.2672	0.1545	-0.0345	0.1634	0.2666	0.3700	0.5729	1.00	10109	1	0.96
phi[1]	**0.4989**	**0.2884**	**0.0247**	**0.2491**	**0.4993**	**0.7483**	**0.9745**	**1.00**	**3.00E+05**	**0**	**1.00**
phi[2]	**0.7948**	**0.1656**	**0.3896**	**0.6989**	**0.8354**	**0.9278**	**0.9934**	**1.00**	**50482**	**0**	**1.00**
phi[3]	**0.5692**	**0.1762**	**0.2612**	**0.4382**	**0.5564**	**0.6912**	**0.9332**	**1.00**	**8868**	**0**	**1.00**

phi[4]	**0.8234**	**0.1360**	**0.5006**	**0.7404**	**0.8530**	**0.9339**	**0.9938**	**1.00**	**30121**	**0**	**1.00**
phi[5]	**0.7920**	**0.1475**	**0.4613**	**0.6945**	**0.8170**	**0.9139**	**0.9917**	**1.00**	**34096**	**0**	**1.00**
phi[6]	**0.4905**	**0.1564**	**0.2377**	**0.3758**	**0.4714**	**0.5858**	**0.8507**	**1.00**	**14127**	**0**	**1.00**
phi[7]	**0.8912**	**0.0938**	**0.6525**	**0.8427**	**0.9166**	**0.9639**	**0.9967**	**1.00**	**280830**	**0**	**1.00**
phi[8]	**0.7895**	**0.1545**	**0.4324**	**0.6911**	**0.8191**	**0.9160**	**0.9918**	**1.00**	**46451**	**0**	**1.00**
phi[9]	**0.5498**	**0.1472**	**0.3076**	**0.4428**	**0.5326**	**0.6398**	**0.8869**	**1.00**	**11309**	**0**	**1.00**
phi[10]	**0.8042**	**0.1443**	**0.4724**	**0.7117**	**0.8322**	**0.9228**	**0.9926**	**1.00**	**28493**	**0**	**1.00**
phi[11]	**0.7255**	**0.1626**	**0.3905**	**0.6101**	**0.7368**	**0.8561**	**0.9830**	**1.00**	**85965**	**0**	**1.00**
phi[12]	**0.0883**	**0.0837**	**0.0025**	**0.0280**	**0.0642**	**0.1227**	**0.3106**	**1.00**	**102345**	**0**	**1.00**
b[1]	0.0592	0.0298	0.0159	0.0373	0.0544	0.0759	0.1302	1.00	75030	0	1.00
b[2]	0.1122	0.0481	0.0268	0.0785	0.1088	0.1421	0.2161	1.00	7070	0	1.00
b[3]	0.0353	0.0278	0.0013	0.0135	0.0291	0.0507	0.1032	1.00	94653	0	1.00
b[4]	0.0570	0.0338	0.0043	0.0311	0.0536	0.0787	0.1318	1.00	6490	0	1.00
b[5]	0.0501	0.0360	0.0025	0.0222	0.0433	0.0705	0.1365	1.00	4225	0	1.00
b[6]	0.0085	0.0085	0.0002	0.0024	0.0059	0.0118	0.0314	1.00	17352	0	1.00
b[7]	0.0246	0.0210	0.0009	0.0091	0.0194	0.0343	0.0781	1.00	10304	0	1.00
b[8]	0.4953	0.0773	0.3410	0.4434	0.4963	0.5485	0.6431	1.00	2013	0	1.00
b[9]	0.0329	0.0303	0.0009	0.0103	0.0242	0.0465	0.1117	1.00	21063	0	1.00
b[10]	0.0409	0.0351	0.0013	0.0138	0.0316	0.0588	0.1305	1.00	17531	0	1.00
b[11]	0.0561	0.0416	0.0023	0.0230	0.0481	0.0806	0.1545	1.00	15224	0	1.00
b[12]	0.0280	0.0231	0.0011	0.0106	0.0222	0.0392	0.0870	1.00	221606	0	1.00
B[1]	28	15	8	17	25	36	66	1.00	1318	0	1.00
B[2]	53	23	14	38	51	66	105	1.00	2489	0	1.00
B[3]	16	14	0	6	13	23	50	1.00	3538	1	1.00
B[4]	27	16	2	15	25	36	62	1.00	5772	0	1.00
B[5]	23	18	1	10	20	33	67	1.00	11597	0	1.00
B[6]	3	4	0	1	2	4	13	1.00	16469	1	1.00
B[7]	11	9	0	4	9	15	34	1.00	56817	1	1.00
B[8]	245	68	140	196	235	286	403	1.03	190	0	1.00
B[9]	15	15	0	4	11	22	54	1.00	5845	1	1.00
B[10]	19	18	0	6	14	27	65	1.00	2232	1	1.00
B[11]	27	21	1	10	22	38	80	1.00	1344	0	1.00
B[12]	13	12	0	4	10	18	45	1.00	3407	1	1.00
N[1]	**28**	**15**	**8**	**17**	**25**	**36**	**66**	**1.00**	**1318**	**0**	**1.00**
N[2]	**76**	**22**	**45**	**61**	**73**	**88**	**128**	**1.01**	**810**	**0**	**1.00**
N[3]	**59**	**20**	**28**	**45**	**57**	**71**	**106**	**1.01**	**615**	**0**	**1.00**
N[4]	**75**	**19**	**46**	**62**	**73**	**86**	**119**	**1.01**	**585**	**0**	**1.00**
N[5]	**83**	**23**	**48**	**67**	**80**	**96**	**138**	**1.01**	**869**	**0**	**1.00**
N[6]	**42**	**13**	**24**	**33**	**40**	**49**	**73**	**1.01**	**968**	**0**	**1.00**
N[7]	**49**	**14**	**30**	**39**	**46**	**56**	**84**	**1.00**	**1356**	**0**	**1.00**
N[8]	**285**	**71**	**175**	**233**	**274**	**328**	**448**	**1.03**	**179**	**0**	**1.00**
N[9]	**169**	**50**	**93**	**133**	**162**	**196**	**288**	**1.01**	**436**	**0**	**1.00**
N[10]	**153**	**40**	**91**	**125**	**148**	**175**	**245**	**1.02**	**367**	**0**	**1.00**
N[11]	**138**	**39**	**77**	**110**	**132**	**160**	**227**	**1.01**	**351**	**0**	**1.00**
N[12]	**24**	**16**	**4**	**13**	**21**	**32**	**65**	**1.00**	**1486**	**0**	**1.00**
gamma[1]	0.0137	0.0075	0.0034	0.0082	0.0122	0.0176	0.0321	1.00	1490	0	1.00
gamma[2]	0.0257	0.0113	0.0065	0.0179	0.0245	0.0321	0.0515	1.00	2601	0	1.00
gamma[3]	0.0084	0.0069	0.0003	0.0031	0.0068	0.0120	0.0255	1.00	3534	0	1.00
gamma[4]	0.0135	0.0082	0.0010	0.0074	0.0126	0.0184	0.0321	1.00	5271	0	1.00
gamma[5]	0.0122	0.0091	0.0006	0.0053	0.0103	0.0169	0.0345	1.00	10982	0	1.00
gamma[6]	0.0021	0.0021	0.0001	0.0006	0.0014	0.0029	0.0077	1.00	14576	0	1.00
gamma[7]	0.0059	0.0050	0.0002	0.0023	0.0047	0.0082	0.0185	1.00	40532	0	1.00
gamma[8]	0.1252	0.0361	0.0692	0.0989	0.1198	0.1467	0.2088	1.03	186	0	1.00
gamma[9]	0.0094	0.0089	0.0003	0.0029	0.0068	0.0132	0.0330	1.00	3340	0	1.00
gamma[10]	0.0119	0.0109	0.0004	0.0038	0.0089	0.0168	0.0402	1.00	1389	0	1.00
gamma[11]	0.0166	0.0134	0.0007	0.0064	0.0136	0.0233	0.0502	1.01	876	0	1.00
gamma[12]	0.0086	0.0080	0.0003	0.0030	0.0064	0.0117	0.0294	1.01	1663	0	1.00
deviance	936	72	801	885	934	983	1083	1.02	320	0	1.00
FOREST											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
psi	0.1598	0.0560	0.0803	0.1195	0.1490	0.1884	0.2999	1.01	872	0	1.00
Nforest	**319**	**115**	**157**	**236**	**296**	**377**	**607**	**1.01**	**861**	**0**	**1.00**
p[1]	0.0935	0.0443	0.0333	0.0617	0.0849	0.1157	0.2031	1.00	3562	0	1.00
p[2]	0.1451	0.0618	0.0569	0.1005	0.1342	0.1779	0.2952	1.00	3389	0	1.00
p[3]	0.0986	0.0462	0.0355	0.0655	0.0897	0.1219	0.2128	1.00	3470	0	1.00
p[4]	0.1632	0.0687	0.0646	0.1135	0.1512	0.2000	0.3298	1.00	3561	0	1.00
p[5]	0.0851	0.0373	0.0333	0.0582	0.0783	0.1043	0.1770	1.00	6123	0	1.00
p[6]	0.2092	0.0887	0.0813	0.1448	0.1940	0.2574	0.4238	1.00	4214	0	1.00
p[7]	0.1140	0.0514	0.0426	0.0770	0.1044	0.1405	0.2401	1.00	3327	0	1.00

p[8]	0.1290	0.0813	0.0336	0.0727	0.1087	0.1624	0.3432	1.00	14223	0	1.00
p[9]	0.0867	0.0383	0.0337	0.0591	0.0796	0.1062	0.1814	1.00	6535	0	1.00
p[10]	0.2168	0.0923	0.0835	0.1495	0.2009	0.2671	0.4397	1.00	4334	0	1.00
p[11]	0.0848	0.0402	0.0303	0.0560	0.0770	0.1049	0.1847	1.00	3828	0	1.00
p[12]	0.2100	0.0891	0.0815	0.1453	0.1947	0.2584	0.4255	1.00	4226	0	1.00
p[13]	0.0823	0.0359	0.0322	0.0564	0.0760	0.1010	0.1705	1.00	5376	0	1.00
alpha.p	-2.3756	0.5098	-3.3668	-2.7213	-2.3778	-2.0341	-1.3668	1.00	3519	0	1.00
beta1.p	-0.5045	0.2358	-0.9915	-0.6555	-0.4972	-0.3449	-0.0606	1.00	27479	0	0.99
beta2.p	0.3930	0.2708	-0.1225	0.2106	0.3869	0.5688	0.9441	1.00	28023	1	0.93
phi[1]	**0.5002**	**0.2887**	**0.0251**	**0.2501**	**0.5001**	**0.7505**	**0.9750**	**1.00**	**211101**	**0**	**1.00**
phi[2]	**0.4982**	**0.2342**	**0.1163**	**0.3104**	**0.4754**	**0.6745**	**0.9546**	**1.00**	**6470**	**0**	**1.00**
phi[3]	**0.5012**	**0.2359**	**0.1112**	**0.3122**	**0.4807**	**0.6802**	**0.9562**	**1.00**	**23463**	**0**	**1.00**
phi[4]	**0.6593**	**0.2226**	**0.2012**	**0.4960**	**0.6851**	**0.8471**	**0.9848**	**1.00**	**62273**	**0**	**1.00**
phi[5]	**0.6936**	**0.2127**	**0.2310**	**0.5464**	**0.7278**	**0.8714**	**0.9875**	**1.00**	**102014**	**0**	**1.00**
phi[6]	**0.7073**	**0.1933**	**0.2967**	**0.5704**	**0.7317**	**0.8681**	**0.9867**	**1.00**	**18877**	**0**	**1.00**
phi[7]	**0.7694**	**0.1674**	**0.3882**	**0.6606**	**0.8006**	**0.9069**	**0.9912**	**1.00**	**21578**	**0**	**1.00**
phi[8]	**0.5914**	**0.2272**	**0.1795**	**0.4108**	**0.5914**	**0.7791**	**0.9756**	**1.00**	**44190**	**0**	**1.00**
phi[9]	**0.6314**	**0.2103**	**0.2294**	**0.4706**	**0.6384**	**0.8032**	**0.9777**	**1.00**	**53904**	**0**	**1.00**
phi[10]	**0.4959**	**0.2154**	**0.1496**	**0.3270**	**0.4699**	**0.6490**	**0.9411**	**1.00**	**30028**	**0**	**1.00**
phi[11]	**0.7846**	**0.1593**	**0.4158**	**0.6834**	**0.8163**	**0.9151**	**0.9919**	**1.00**	**227946**	**0**	**1.00**
phi[12]	**0.7438**	**0.1811**	**0.3391**	**0.6226**	**0.7739**	**0.8942**	**0.9896**	**1.00**	**14334**	**0**	**1.00**
b[1]	0.1702	0.0768	0.0567	0.1139	0.1576	0.2134	0.3549	1.00	3161	0	1.00
b[2]	0.0361	0.0325	0.0011	0.0120	0.0273	0.0507	0.1206	1.00	112732	0	1.00
b[3]	0.0262	0.0263	0.0007	0.0076	0.0181	0.0361	0.0971	1.00	151614	0	1.00
b[4]	0.0417	0.0350	0.0016	0.0154	0.0330	0.0586	0.1312	1.00	80103	0	1.00
b[5]	0.1499	0.0753	0.0233	0.0952	0.1432	0.1967	0.3164	1.00	6042	0	1.00
b[6]	0.0784	0.0614	0.0029	0.0303	0.0648	0.1125	0.2293	1.00	13488	0	1.00
b[7]	0.1350	0.0818	0.0102	0.0720	0.1255	0.1868	0.3182	1.00	10811	0	1.00
b[8]	0.1132	0.0993	0.0035	0.0379	0.0857	0.1608	0.3735	1.00	12697	0	1.00
b[9]	0.0851	0.0624	0.0038	0.0364	0.0733	0.1206	0.2354	1.00	13651	0	1.00
b[10]	0.0430	0.0359	0.0014	0.0154	0.0342	0.0615	0.1333	1.00	24019	0	1.00
b[11]	0.0429	0.0378	0.0013	0.0142	0.0325	0.0614	0.1398	1.00	98142	0	1.00
b[12]	0.0782	0.0550	0.0041	0.0358	0.0683	0.1093	0.2103	1.00	24966	0	1.00
B[1]	57	37	15	31	47	72	161	1.01	1201	0	1.00
B[2]	11	13	0	3	7	15	44	1.01	4348	1	1.00
B[3]	8	10	0	2	5	10	34	1.00	5036	1	1.00
B[4]	13	13	0	4	9	17	47	1.00	6129	1	1.00
B[5]	48	31	7	27	42	63	127	1.00	1758	0	1.00
B[6]	24	22	0	9	19	34	81	1.00	3471	1	1.00
B[7]	44	32	3	21	37	58	126	1.00	2381	0	1.00
B[8]	36	37	1	11	25	48	138	1.00	6821	0	1.00
B[9]	27	23	1	10	21	37	86	1.00	7312	0	1.00
B[10]	13	12	0	4	10	18	45	1.00	12937	1	1.00
B[11]	13	14	0	4	9	18	50	1.00	5862	1	1.00
B[12]	25	21	1	10	20	33	80	1.00	5824	0	1.00
N[1]	**57**	**37**	**15**	**31**	**47**	**72**	**161**	**1.01**	**1201**	**0**	**1.00**
N[2]	**36**	**22**	**11**	**21**	**31**	**45**	**94**	**1.01**	**1673**	**0**	**1.00**
N[3]	**25**	**17**	**5**	**13**	**20**	**32**	**70**	**1.01**	**2286**	**0**	**1.00**
N[4]	**29**	**18**	**8**	**16**	**24**	**36**	**75**	**1.00**	**2569**	**0**	**1.00**
N[5]	**69**	**34**	**24**	**44**	**61**	**85**	**157**	**1.01**	**1326**	**0**	**1.00**
N[6]	**72**	**33**	**29**	**49**	**65**	**88**	**155**	**1.01**	**1408**	**0**	**1.00**
N[7]	**100**	**44**	**41**	**68**	**90**	**121**	**211**	**1.01**	**1324**	**0**	**1.00**
N[8]	**93**	**51**	**28**	**57**	**82**	**116**	**223**	**1.00**	**2418**	**0**	**1.00**
N[9]	**84**	**41**	**31**	**55**	**75**	**103**	**189**	**1.00**	**2715**	**0**	**1.00**
N[10]	**51**	**24**	**20**	**34**	**46**	**62**	**114**	**1.00**	**2367**	**0**	**1.00**
N[11]	**54**	**27**	**20**	**35**	**48**	**66**	**121**	**1.00**	**2006**	**0**	**1.00**
N[12]	**65**	**32**	**25**	**43**	**58**	**79**	**146**	**1.00**	**2137**	**0**	**1.00**
gamma[1]	0.0281	0.0185	0.0068	0.0152	0.0231	0.0356	0.0790	1.01	1229	0	1.00
gamma[2]	0.0061	0.0066	0.0002	0.0018	0.0041	0.0081	0.0232	1.01	4147	0	1.00
gamma[3]	0.0044	0.0052	0.0001	0.0011	0.0028	0.0058	0.0187	1.00	4945	0	1.00
gamma[4]	0.0070	0.0068	0.0002	0.0023	0.0050	0.0094	0.0250	1.00	5442	0	1.00
gamma[5]	0.0251	0.0163	0.0035	0.0137	0.0217	0.0327	0.0669	1.00	1686	0	1.00
gamma[6]	0.0133	0.0120	0.0005	0.0047	0.0102	0.0183	0.0445	1.00	3100	0	1.00
gamma[7]	0.0236	0.0181	0.0017	0.0110	0.0196	0.0314	0.0699	1.01	1875	0	1.00
gamma[8]	0.0199	0.0202	0.0006	0.0063	0.0138	0.0264	0.0758	1.00	4923	0	1.00
gamma[9]	0.0154	0.0134	0.0006	0.0060	0.0121	0.0209	0.0504	1.00	4545	0	1.00
gamma[10]	0.0078	0.0075	0.0003	0.0026	0.0058	0.0106	0.0274	1.00	8518	0	1.00
gamma[11]	0.0082	0.0087	0.0002	0.0024	0.0056	0.0110	0.0312	1.00	3462	0	1.00
gamma[12]	0.0148	0.0132	0.0007	0.0060	0.0115	0.0196	0.0492	1.00	3320	0	1.00

deviance	492	65	367	447	490	535	623	1.00	2299	0	1.00

K) *Myioborus miniatus* - Jolly-Seber Model

COFFEE

par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
psi	0.1175	0.0353	0.0695	0.0931	0.1105	0.1344	0.2097	1.03	192	0	1.00
Ncoffee	**231**	**72**	**136**	**182**	**216**	**265**	**420**	**1.03**	**185**	**0**	**1.00**
p[1]	0.1936	0.0590	0.0954	0.1512	0.1876	0.2294	0.3256	1.01	465	0	1.00
p[2]	0.4357	0.1233	0.2184	0.3460	0.4281	0.5178	0.6940	1.00	2782	0	1.00
p[3]	0.1326	0.0440	0.0615	0.1009	0.1274	0.1586	0.2331	1.01	401	0	1.00
p[4]	0.3219	0.0861	0.1720	0.2603	0.3157	0.3768	0.5070	1.00	876	0	1.00
p[5]	0.0936	0.0404	0.0346	0.0644	0.0869	0.1154	0.1902	1.00	685	0	1.00
p[6]	0.2825	0.0763	0.1503	0.2281	0.2767	0.3310	0.4477	1.01	661	0	1.00
p[7]	0.5091	0.1497	0.2356	0.3992	0.5046	0.6153	0.8045	1.00	7143	0	1.00
p[8]	0.1262	0.0421	0.0583	0.0959	0.1212	0.1511	0.2223	1.01	395	0	1.00
p[9]	0.0917	0.0472	0.0279	0.0579	0.0824	0.1154	0.2082	1.00	1064	0	1.00
p[10]	0.1774	0.0557	0.0858	0.1373	0.1713	0.2108	0.3027	1.01	449	0	1.00
p[11]	0.2148	0.0631	0.1084	0.1696	0.2090	0.2536	0.3544	1.01	491	0	1.00
p[12]	0.1552	0.0504	0.0733	0.1190	0.1495	0.1851	0.2699	1.01	426	0	1.00
p[13]	0.4562	0.1307	0.2241	0.3608	0.4489	0.5446	0.7266	1.00	3566	0	1.00
alpha.p	-1.4710	0.3851	-2.2500	-1.7251	-1.4655	-1.2118	-0.7281	1.01	387	0	1.00
beta1.p	-0.8889	0.2708	-1.4494	-1.0638	-0.8788	-0.7032	-0.3841	1.00	2480	0	1.00
beta2.p	0.1941	0.2400	-0.2766	0.0337	0.1929	0.3532	0.6700	1.00	5549	1	0.79
phi[1]	**0.5001**	**0.2879**	**0.0249**	**0.2510**	**0.5002**	**0.7486**	**0.9745**	**1.00**	**3.00E+05**	**0**	**1.00**
phi[2]	**0.7879**	**0.1683**	**0.3794**	**0.6885**	**0.8277**	**0.9238**	**0.9931**	**1.00**	**9981**	**0**	**1.00**
phi[3]	**0.7429**	**0.1680**	**0.3800**	**0.6271**	**0.7636**	**0.8808**	**0.9874**	**1.00**	**8410**	**0**	**1.00**
phi[4]	**0.8227**	**0.1351**	**0.5036**	**0.7401**	**0.8515**	**0.9322**	**0.9936**	**1.00**	**76966**	**0**	**1.00**
phi[5]	**0.7216**	**0.1823**	**0.3398**	**0.5906**	**0.7428**	**0.8741**	**0.9873**	**1.00**	**57155**	**0**	**1.00**
phi[6]	**0.4287**	**0.1801**	**0.1546**	**0.2941**	**0.4004**	**0.5361**	**0.8544**	**1.00**	**50671**	**0**	**1.00**
phi[7]	**0.8186**	**0.1447**	**0.4669**	**0.7338**	**0.8525**	**0.9354**	**0.9940**	**1.00**	**32881**	**0**	**1.00**
phi[8]	**0.8455**	**0.1287**	**0.5233**	**0.7751**	**0.8784**	**0.9473**	**0.9951**	**1.00**	**35792**	**0**	**1.00**
phi[9]	**0.4221**	**0.1823**	**0.1509**	**0.2870**	**0.3901**	**0.5267**	**0.8636**	**1.00**	**9288**	**0**	**1.00**
phi[10]	**0.7067**	**0.1981**	**0.2882**	**0.5647**	**0.7341**	**0.8736**	**0.9878**	**1.00**	**26583**	**0**	**1.00**
phi[11]	**0.3972**	**0.2001**	**0.0929**	**0.2451**	**0.3666**	**0.5204**	**0.8640**	**1.00**	**10821**	**0**	**1.00**
phi[12]	**0.3976**	**0.2409**	**0.0506**	**0.2025**	**0.3560**	**0.5622**	**0.9242**	**1.00**	**106636**	**0**	**1.00**
b[1]	0.0839	0.0401	0.0234	0.0543	0.0780	0.1072	0.1776	1.00	9107	0	1.00
b[2]	0.0724	0.0480	0.0047	0.0359	0.0648	0.1002	0.1856	1.00	1667	0	1.00
b[3]	0.0611	0.0413	0.0034	0.0290	0.0546	0.0857	0.1577	1.00	14017	0	1.00
b[4]	0.0511	0.0377	0.0022	0.0215	0.0438	0.0727	0.1418	1.00	4307	0	1.00
b[5]	0.0357	0.0336	0.0010	0.0112	0.0260	0.0498	0.1256	1.00	9692	0	1.00
b[6]	0.0139	0.0140	0.0003	0.0040	0.0096	0.0192	0.0517	1.00	12410	0	1.00
b[7]	0.0399	0.0329	0.0020	0.0166	0.0321	0.0542	0.1242	1.00	2028	0	1.00
b[8]	0.4647	0.1010	0.2639	0.3967	0.4661	0.5347	0.6570	1.00	748	0	1.00
b[9]	0.0540	0.0493	0.0016	0.0174	0.0403	0.0762	0.1820	1.00	30951	0	1.00
b[10]	0.0495	0.0429	0.0015	0.0168	0.0383	0.0708	0.1583	1.00	14740	0	1.00
b[11]	0.0449	0.0354	0.0018	0.0177	0.0371	0.0637	0.1327	1.00	18032	0	1.00
b[12]	0.0288	0.0282	0.0007	0.0084	0.0202	0.0401	0.1044	1.00	103022	0	1.00
B[1]	19	10	6	12	17	24	44	1.01	823	0	1.00
B[2]	16	10	1	8	14	21	39	1.00	47620	0	1.00
B[3]	14	10	0	6	12	19	37	1.00	2005	1	1.00
B[4]	11	8	0	5	9	15	30	1.00	5430	1	1.00
B[5]	8	8	0	2	5	10	29	1.00	2052	1	1.00
B[6]	2	3	0	0	1	3	10	1.00	8714	1	1.00
B[7]	8	6	0	4	7	11	24	1.00	91344	1	1.00
B[8]	115	51	48	80	104	138	248	1.03	203	0	1.00
B[9]	12	13	0	3	8	17	46	1.01	1561	1	1.00
B[10]	11	11	0	3	8	15	40	1.00	2982	1	1.00
B[11]	10	9	0	4	8	14	33	1.00	2365	1	1.00
B[12]	6	8	0	1	4	8	27	1.00	2701	1	1.00
N[1]	**19**	**10**	**6**	**12**	**17**	**24**	**44**	**1.01**	**823**	**0**	**1.00**
N[2]	**31**	**10**	**17**	**24**	**29**	**36**	**56**	**1.00**	**1782**	**0**	**1.00**
N[3]	**37**	**12**	**19**	**28**	**35**	**43**	**66**	**1.01**	**734**	**0**	**1.00**
N[4]	**42**	**12**	**25**	**34**	**40**	**47**	**70**	**1.01**	**609**	**0**	**1.00**
N[5]	**38**	**14**	**17**	**28**	**35**	**45**	**72**	**1.01**	**692**	**0**	**1.00**
N[6]	**17**	**7**	**8**	**12**	**16**	**21**	**35**	**1.00**	**1113**	**0**	**1.00**
N[7]	**23**	**8**	**13**	**17**	**20**	**26**	**44**	**1.00**	**3639**	**0**	**1.00**
N[8]	**135**	**52**	**67**	**99**	**123**	**158**	**270**	**1.03**	**195**	**0**	**1.00**
N[9]	**67**	**34**	**25**	**44**	**59**	**82**	**153**	**1.01**	**476**	**0**	**1.00**
N[10]	**56**	**23**	**26**	**40**	**51**	**66**	**113**	**1.01**	**415**	**0**	**1.00**

N[11]	**31**	**15**	**12**	**21**	**28**	**38**	**68**	**1.01**	**646**	**0**	**1.00**
N[12]	**18**	**12**	**3**	**9**	**15**	**23**	**49**	**1.01**	**1038**	**0**	**1.00**
gamma[1]	0.0097	0.0053	0.0025	0.0059	0.0088	0.0124	0.0226	1.01	1023	0	1.00
gamma[2]	0.0081	0.0052	0.0006	0.0042	0.0073	0.0110	0.0205	1.00	85508	0	1.00
gamma[3]	0.0072	0.0052	0.0004	0.0033	0.0062	0.0099	0.0198	1.00	2339	0	1.00
gamma[4]	0.0059	0.0044	0.0003	0.0025	0.0050	0.0082	0.0165	1.00	5716	0	1.00
gamma[5]	0.0043	0.0043	0.0001	0.0013	0.0030	0.0058	0.0158	1.00	2185	0	1.00
gamma[6]	0.0016	0.0017	0.0000	0.0005	0.0011	0.0023	0.0061	1.00	11223	0	1.00
gamma[7]	0.0045	0.0036	0.0003	0.0020	0.0037	0.0060	0.0136	1.00	160940	0	1.00
gamma[8]	0.0585	0.0267	0.0232	0.0402	0.0529	0.0706	0.1272	1.03	205	0	1.00
gamma[9]	0.0071	0.0075	0.0002	0.0021	0.0049	0.0096	0.0265	1.01	1310	0	1.00
gamma[10]	0.0066	0.0065	0.0002	0.0020	0.0047	0.0090	0.0233	1.01	2224	0	1.00
gamma[11]	0.0059	0.0053	0.0002	0.0022	0.0046	0.0081	0.0196	1.00	1867	0	1.00
gamma[12]	0.0040	0.0046	0.0001	0.0010	0.0025	0.0053	0.0162	1.00	2114	0	1.00
deviance	432	50	343	398	429	464	539	1.01	355	0	1.00
FOREST											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
psi	0.1176	0.0532	0.0504	0.0800	0.1043	0.1424	0.2597	1.07	57	0	1.00
Nforest	**227**	**107**	**93**	**152**	**200**	**278**	**516**	**1.07**	**56**	**0**	**1.00**
p[1]	0.0833	0.0441	0.0248	0.0515	0.0745	0.1053	0.1934	1.06	67	0	1.00
p[2]	0.1040	0.0498	0.0339	0.0675	0.0952	0.1309	0.2253	1.06	63	0	1.00
p[3]	0.0852	0.0443	0.0257	0.0531	0.0765	0.1076	0.1956	1.06	65	0	1.00
p[4]	0.1117	0.0540	0.0360	0.0720	0.1021	0.1409	0.2430	1.05	69	0	1.00
p[5]	0.0861	0.0424	0.0272	0.0550	0.0783	0.1087	0.1897	1.05	74	0	1.00
p[6]	0.1320	0.0692	0.0385	0.0812	0.1183	0.1680	0.3029	1.04	95	0	1.00
p[7]	0.0912	0.0454	0.0288	0.0582	0.0828	0.1148	0.2030	1.06	62	0	1.00
p[8]	0.1202	0.0752	0.0290	0.0668	0.1021	0.1536	0.3150	1.02	214	0	1.00
p[9]	0.0874	0.0431	0.0276	0.0559	0.0795	0.1104	0.1923	1.05	76	0	1.00
p[10]	0.1354	0.0721	0.0386	0.0825	0.1208	0.1727	0.3144	1.04	101	0	1.00
p[11]	0.0805	0.0433	0.0235	0.0492	0.0717	0.1019	0.1889	1.05	70	0	1.00
p[12]	0.1323	0.0695	0.0385	0.0813	0.1186	0.1685	0.3042	1.04	96	0	1.00
p[13]	0.0836	0.0416	0.0261	0.0531	0.0758	0.1055	0.1853	1.05	71	0	1.00
alpha.p	-2.5302	0.5726	-3.6730	-2.9132	-2.5194	-2.1397	-1.4280	1.05	66	0	1.00
beta1.p	-0.2243	0.2590	-0.7470	-0.3947	-0.2196	-0.0488	0.2690	1.00	165550	1	0.81
beta2.p	0.2527	0.2940	-0.3076	0.0533	0.2466	0.4450	0.8482	1.00	2393	1	0.81
phi[1]	**0.4996**	**0.2887**	**0.0248**	**0.2490**	**0.5001**	**0.7493**	**0.9747**	**1.00**	**1.38E+05**	**0**	**1.00**
phi[2]	**0.4339**	**0.2808**	**0.0187**	**0.1908**	**0.4015**	**0.6605**	**0.9610**	**1.00**	**4423**	**0**	**1.00**
phi[3]	**0.3745**	**0.2688**	**0.0136**	**0.1455**	**0.3226**	**0.5700**	**0.9401**	**1.00**	**72975**	**0**	**1.00**
phi[4]	**0.4206**	**0.2783**	**0.0168**	**0.1789**	**0.3859**	**0.6410**	**0.9564**	**1.00**	**43457**	**0**	**1.00**
phi[5]	**0.7591**	**0.1726**	**0.3721**	**0.6445**	**0.7900**	**0.9019**	**0.9906**	**1.00**	**5604**	**0**	**1.00**
phi[6]	**0.8286**	**0.1386**	**0.4887**	**0.7496**	**0.8623**	**0.9396**	**0.9944**	**1.00**	**16435**	**0**	**1.00**
phi[7]	**0.8867**	**0.1007**	**0.6258**	**0.8375**	**0.9150**	**0.9637**	**0.9967**	**1.00**	**186968**	**0**	**1.00**
phi[8]	**0.6558**	**0.2158**	**0.2309**	**0.4909**	**0.6732**	**0.8387**	**0.9840**	**1.00**	**2871**	**0**	**1.00**
phi[9]	**0.4662**	**0.2095**	**0.1429**	**0.3032**	**0.4352**	**0.6054**	**0.9255**	**1.00**	**7466**	**0**	**1.00**
phi[10]	**0.7285**	**0.1914**	**0.3073**	**0.5974**	**0.7606**	**0.8886**	**0.9895**	**1.00**	**12940**	**0**	**1.00**
phi[11]	**0.6943**	**0.2021**	**0.2684**	**0.5500**	**0.7193**	**0.8637**	**0.9868**	**1.00**	**49999**	**0**	**1.00**
phi[12]	**0.6878**	**0.2113**	**0.2397**	**0.5371**	**0.7174**	**0.8655**	**0.9867**	**1.00**	**3196**	**0**	**1.00**
b[1]	0.1086	0.0715	0.0139	0.0548	0.0938	0.1472	0.2842	1.00	850	0	1.00
b[2]	0.1017	0.0707	0.0063	0.0480	0.0886	0.1408	0.2735	1.00	4653	0	1.00
b[3]	0.0928	0.0731	0.0040	0.0368	0.0759	0.1313	0.2754	1.00	6877	0	1.00
b[4]	0.1498	0.0799	0.0180	0.0920	0.1420	0.1978	0.3290	1.00	2875	0	1.00
b[5]	0.0276	0.0284	0.0007	0.0077	0.0187	0.0380	0.1045	1.00	26591	0	1.00
b[6]	0.0404	0.0424	0.0009	0.0109	0.0269	0.0554	0.1565	1.00	51459	0	1.00
b[7]	0.2784	0.1152	0.0585	0.1974	0.2765	0.3573	0.5076	1.00	8889	0	1.00
b[8]	0.0667	0.0681	0.0016	0.0184	0.0450	0.0921	0.2529	1.00	3360	0	1.00
b[9]	0.0280	0.0279	0.0007	0.0081	0.0195	0.0387	0.1029	1.00	34510	0	1.00
b[10]	0.0344	0.0334	0.0009	0.0104	0.0245	0.0478	0.1232	1.00	7582	0	1.00
b[11]	0.0316	0.0321	0.0008	0.0089	0.0216	0.0436	0.1190	1.00	34905	0	1.00
b[12]	0.0401	0.0410	0.0010	0.0111	0.0271	0.0553	0.1515	1.00	26690	0	1.00
B[1]	26	24	2	10	19	33	90	1.05	119	0	1.00
B[2]	24	22	1	9	18	31	85	1.03	181	0	1.00
B[3]	22	23	0	7	15	29	83	1.02	222	1	1.00
B[4]	34	25	4	18	28	44	99	1.02	191	0	1.00
B[5]	6	8	0	1	3	7	26	1.01	384	1	1.00
B[6]	9	12	0	2	5	11	40	1.02	387	1	1.00
B[7]	65	40	12	37	56	82	168	1.04	107	0	1.00
B[8]	15	18	0	3	9	19	65	1.01	552	1	1.00
B[9]	6	8	0	1	3	7	26	1.02	333	1	1.00
B[10]	7	9	0	1	4	9	32	1.01	491	1	1.00

B[11]	7	9	0	1	4	9	32	1.01	485	1	1.00
B[12]	9	13	0	2	5	11	43	1.01	556	1	1.00
N[1]	**26**	**24**	**2**	**10**	**19**	**33**	**90**	**1.05**	**119**	**0**	**1.00**
N[2]	**34**	**25**	**6**	**17**	**27**	**43**	**103**	**1.04**	**116**	**0**	**1.00**
N[3]	**33**	**28**	**4**	**15**	**26**	**43**	**108**	**1.03**	**138**	**0**	**1.00**
N[4]	**48**	**29**	**15**	**28**	**40**	**59**	**124**	**1.04**	**108**	**0**	**1.00**
N[5]	**41**	**24**	**13**	**24**	**35**	**51**	**106**	**1.04**	**111**	**0**	**1.00**
N[6]	**43**	**27**	**13**	**25**	**36**	**53**	**113**	**1.04**	**118**	**0**	**1.00**
N[7]	**104**	**49**	**43**	**69**	**91**	**126**	**233**	**1.05**	**69**	**0**	**1.00**
N[8]	**81**	**45**	**26**	**50**	**70**	**100**	**197**	**1.03**	**117**	**0**	**1.00**
N[9]	**41**	**26**	**12**	**23**	**34**	**50**	**109**	**1.03**	**125**	**0**	**1.00**
N[10]	**36**	**22**	**12**	**21**	**30**	**44**	**94**	**1.03**	**127**	**0**	**1.00**
N[11]	**31**	**21**	**9**	**18**	**26**	**39**	**87**	**1.03**	**141**	**0**	**1.00**
N[12]	**30**	**22**	**7**	**16**	**24**	**38**	**89**	**1.03**	**167**	**0**	**1.00**
gamma[1]	0.0131	0.0120	0.0012	0.0052	0.0098	0.0170	0.0455	1.04	124	0	1.00
gamma[2]	0.0123	0.0113	0.0006	0.0047	0.0092	0.0163	0.0434	1.03	186	0	1.00
gamma[3]	0.0115	0.0119	0.0004	0.0037	0.0080	0.0152	0.0438	1.02	222	0	1.00
gamma[4]	0.0181	0.0133	0.0020	0.0091	0.0149	0.0233	0.0532	1.03	185	0	1.00
gamma[5]	0.0034	0.0042	0.0001	0.0008	0.0021	0.0045	0.0149	1.01	391	0	1.00
gamma[6]	0.0051	0.0066	0.0001	0.0012	0.0030	0.0065	0.0228	1.02	368	0	1.00
gamma[7]	0.0346	0.0221	0.0064	0.0195	0.0294	0.0441	0.0927	1.04	103	0	1.00
gamma[8]	0.0085	0.0104	0.0002	0.0021	0.0052	0.0110	0.0375	1.01	471	0	1.00
gamma[9]	0.0037	0.0048	0.0001	0.0009	0.0023	0.0048	0.0163	1.03	300	0	1.00
gamma[10]	0.0046	0.0057	0.0001	0.0012	0.0028	0.0059	0.0197	1.02	414	0	1.00
gamma[11]	0.0044	0.0058	0.0001	0.0010	0.0025	0.0055	0.0199	1.02	423	0	1.00
gamma[12]	0.0057	0.0079	0.0001	0.0012	0.0032	0.0071	0.0264	1.02	470	0	1.00
deviance	306	42	231	276	304	334	393	1.06	56	0	1.00

L) *Euphonia laniirostris* - Closed Population Model											
COFFEE											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
N	**249**	**58**	**164**	**207**	**240**	**282**	**392**	**1.00**	**1022**	**NO**	**1.00**
p.est[1]	0.0001	0.0002	<0.0001	<0.0001	0.0001	0.0002	0.0007	1.00	1023	NO	1.00
p.est[2]	0.0695	0.0177	0.0389	0.0566	0.0678	0.0805	0.1085	1.00	1118	NO	1.00
p.est[3]	0.0011	0.0009	0.0001	0.0005	0.0008	0.0014	0.0033	1.00	894	NO	1.00
p.est[4]	0.0950	0.0238	0.0549	0.0783	0.0931	0.1099	0.1483	1.00	2907	NO	1.00
p.est[5]	0.0023	0.0015	0.0005	0.0012	0.0020	0.0029	0.0061	1.00	1016	NO	1.00
p.est[6]	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	1.00	1	NO	1.00
p.est[7]	0.0789	0.0201	0.0443	0.0646	0.0771	0.0913	0.1231	1.00	1136	NO	1.00
p.est[8]	0.0764	0.0214	0.0415	0.0612	0.0735	0.0895	0.1247	1.00	1632	NO	1.00
p.est[9]	0.0245	0.0072	0.0129	0.0191	0.0237	0.0290	0.0406	1.00	1848	NO	1.00
p.est[10]	0.0100	0.0039	0.0042	0.0071	0.0096	0.0123	0.0191	1.00	1808	NO	1.00
p.est[11]	0.0417	0.0109	0.0234	0.0338	0.0406	0.0483	0.0652	1.00	1328	NO	1.00
p.est[12]	0.0001	0.0001	<0.0001	<0.0001	0.0001	0.0001	0.0005	1.00	1109	NO	1.00
mean.p	0.0165	0.0055	0.0080	0.0125	0.0159	0.0198	0.0286	1.00	2048	NO	1.00
beta1	3.3987	0.6257	2.2767	2.9606	3.3572	3.7926	4.7046	1.00	945	NO	1.00
beta2	-1.4503	0.3297	-2.1337	-1.6693	-1.4279	-1.2202	-0.8623	1.00	599	NO	1.00
psi	0.0613	0.0147	0.0389	0.0506	0.0591	0.0695	0.0962	1.01	949	NO	1.00
deviance	712	44	635	681	710	743	807	1.00	1324	NO	1.00
FOREST											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
N	**606**	**224**	**309**	**444**	**553**	**721**	**1176**	**1.06**	**52**	**NO**	**1.00**
p.est[1]	0.0060	0.0024	0.0024	0.0042	0.0057	0.0074	0.0119	1.02	107	NO	1.00
p.est[2]	0.0162	0.0060	0.0069	0.0117	0.0154	0.0198	0.0302	1.03	83	NO	1.00
p.est[3]	0.0045	0.0019	0.0017	0.0031	0.0042	0.0056	0.0093	1.02	124	NO	1.00
p.est[4]	0.0303	0.0108	0.0131	0.0222	0.0291	0.0370	0.0552	1.03	74	NO	1.00
p.est[5]	0.0025	0.0012	0.0008	0.0016	0.0022	0.0031	0.0057	1.01	189	NO	1.00
p.est[6]	0.0111	0.0042	0.0047	0.0079	0.0106	0.0135	0.0207	1.02	87	NO	1.00
p.est[7]	0.0192	0.0084	0.0073	0.0130	0.0178	0.0239	0.0399	1.02	112	NO	1.00
p.est[8]	0.0298	0.0107	0.0129	0.0218	0.0286	0.0365	0.0544	1.03	75	NO	1.00
p.est[9]	0.0023	0.0011	0.0007	0.0014	0.0020	0.0028	0.0053	1.01	202	NO	1.00
p.est[10]	0.0245	0.0091	0.0106	0.0178	0.0234	0.0299	0.0451	1.03	81	NO	1.00
p.est[11]	0.0025	0.0012	0.0008	0.0016	0.0022	0.0030	0.0056	1.01	190	NO	1.00
p.est[12]	0.0311	0.0111	0.0135	0.0228	0.0299	0.0378	0.0562	1.03	75	NO	1.00
mean.p	0.0187	0.0069	0.0080	0.0134	0.0178	0.0228	0.0345	1.03	82	NO	1.00
beta1	1.2315	0.1907	0.8766	1.0990	1.2240	1.3562	1.6264	1.00	2046	NO	1.00
beta2	-0.7123	0.1733	-1.0638	-0.8252	-0.7131	-0.5898	-0.3894	1.00	3000	NO	1.00
psi	0.1484	0.0551	0.0749	0.1087	0.1353	0.1766	0.2881	1.06	52	NO	1.00
deviance	961	69	841	912	955	1007	1103	1.04	54	NO	1.00

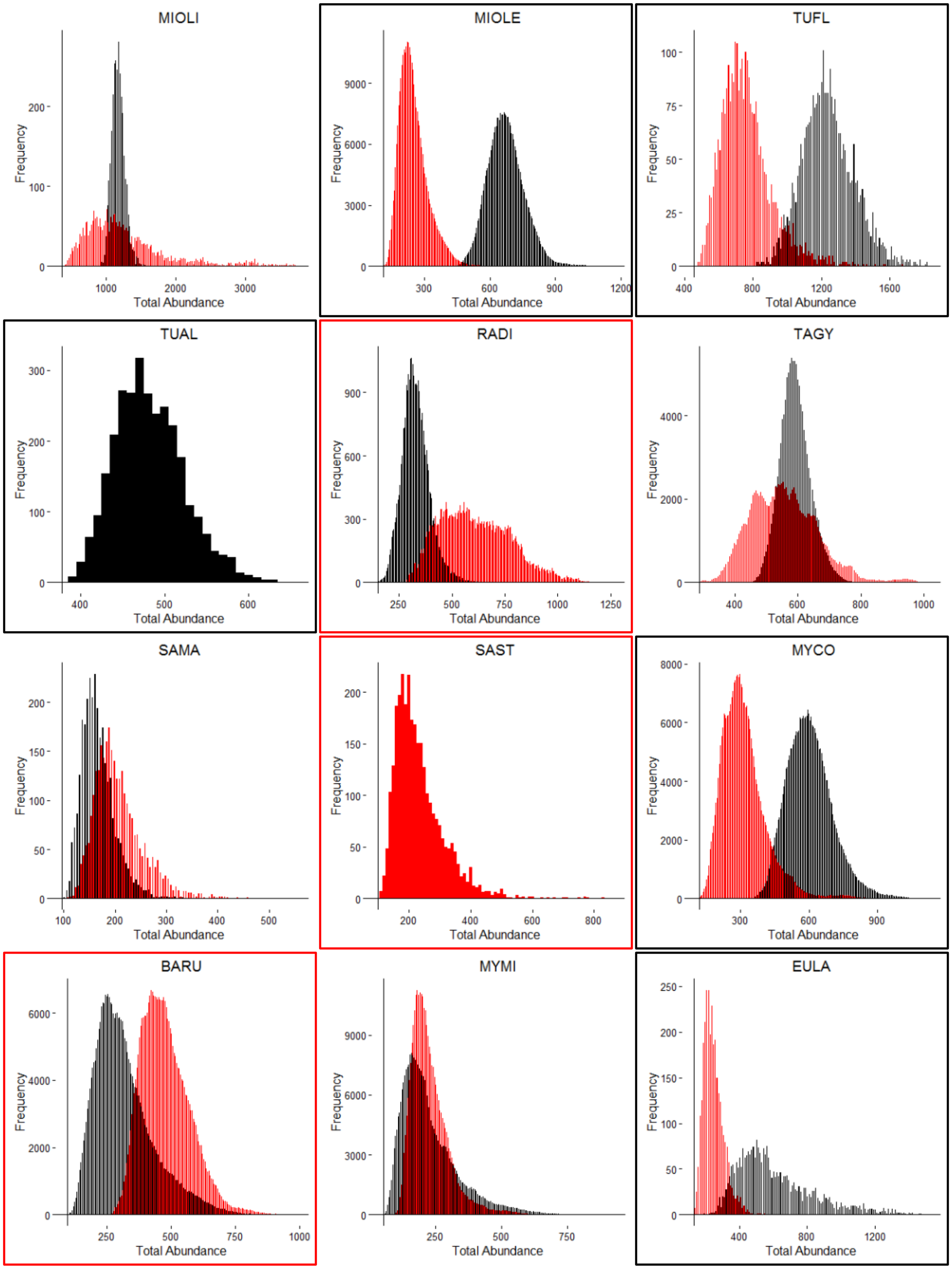


Figure S4. Posterior distributions for the estimates of total abundance for the twelve focal species in coffee (red bars) and forest (black bars); less overlap means higher probability of differences between habitats. Estimation method and simulations conditions varied among species but not between habitats within a species. There was not enough data to make estimations for *T. albicollis* in coffee and *S. striatipectus* in forest.

2.3.3. Fidelity

Table S11. Numerical outputs for Cormack-Jolly-Seber models of species with low recapture probabilities (for species with high recapture probabilities see Table S10b, e, f, i, j and k) (**phi** is the parameter for apparent survival). Rhat is the potential scale reduction factor (at convergence, Rhat=1); successful convergence based on Rhat values (all < 1.1), n.eff is a crude measure of effective sample size, over0 checks if 0 falls in the parameter's 95% credible interval. f is the proportion of the posterior with the same sign as the mean; i.e., our confidence that the parameter is positive or negative.

A) *Mionectes olivaceus* - Cormack-Jolly-Seber											
COFFEE											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
phi.occ[1]	**0.4936**	**0.2929**	**0.0262**	**0.2304**	**0.4882**	**0.7509**	**0.9753**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[2]	**0.4151**	**0.2815**	**0.0180**	**0.1667**	**0.3820**	**0.6398**	**0.9544**	**1.00**	**1317**	**NO**	**1.00**
phi.occ[3]	**0.2298**	**0.2250**	**0.0053**	**0.0613**	**0.1507**	**0.3213**	**0.8587**	**1.01**	**286**	**NO**	**1.00**
phi.occ[4]	**0.4063**	**0.2539**	**0.0475**	**0.1955**	**0.3637**	**0.5896**	**0.9455**	**1.00**	**778**	**NO**	**1.00**
phi.occ[5]	**0.4676**	**0.2536**	**0.0795**	**0.2536**	**0.4445**	**0.6675**	**0.9549**	**1.01**	**145**	**NO**	**1.00**
phi.occ[6]	**0.6452**	**0.2329**	**0.1710**	**0.4627**	**0.6728**	**0.8426**	**0.9849**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[7]	**0.6891**	**0.2204**	**0.2001**	**0.5348**	**0.7276**	**0.8751**	**0.9862**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[8]	**0.5544**	**0.2559**	**0.0901**	**0.3471**	**0.5618**	**0.7677**	**0.9737**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[9]	**0.4727**	**0.2632**	**0.0672**	**0.2538**	**0.4374**	**0.6877**	**0.9659**	**1.00**	**445**	**NO**	**1.00**
phi.occ[10]	**0.5684**	**0.2509**	**0.1091**	**0.3646**	**0.5763**	**0.7791**	**0.9785**	**1.00**	**545**	**NO**	**1.00**
phi.occ[11]	**0.3984**	**0.2849**	**0.0130**	**0.1408**	**0.3510**	**0.6255**	**0.9575**	**1.00**	**619**	**NO**	**1.00**
p.est[1]	0.3281	0.2502	0.0286	0.1286	0.2544	0.4704	0.9182	1.00	453	NO	1.00
p.est[2]	0.0452	0.0336	0.0070	0.0217	0.0367	0.0589	0.1345	1.00	960	NO	1.00
p.est[3]	0.2192	0.1641	0.0376	0.1012	0.1707	0.2847	0.6745	1.00	454	NO	1.00
p.est[4]	0.0268	0.0404	0.0002	0.0043	0.0141	0.0338	0.1267	1.01	2524	NO	1.00
p.est[5]	0.1797	0.1321	0.0352	0.0880	0.1437	0.2287	0.5512	1.00	481	NO	1.00
p.est[6]	0.3890	0.2934	0.0198	0.1366	0.3138	0.6073	0.9749	1.00	497	NO	1.00
p.est[7]	0.0408	0.0311	0.0053	0.0188	0.0332	0.0534	0.1224	1.00	1063	NO	1.00
p.est[8]	0.0300	0.0561	0.0000	0.0025	0.0110	0.0341	0.1742	1.00	3000	NO	1.00
p.est[9]	0.0811	0.0592	0.0160	0.0420	0.0669	0.1038	0.2192	1.01	623	NO	1.00
p.est[10]	0.1145	0.0829	0.0245	0.0592	0.0931	0.1454	0.3238	1.01	548	NO	1.00
p.est[11]	0.0625	0.0455	0.0116	0.0316	0.0513	0.0794	0.1820	1.01	722	NO	1.00
mean.p	0.0953	0.0694	0.0196	0.0490	0.0781	0.1217	0.2689	1.01	584	NO	1.00
beta1	-1.4148	0.8803	-3.4641	-1.9425	-1.3183	-0.8060	0.0335	1.00	945	YES	0.97
beta2	0.0002	0.7476	-1.5673	-0.4663	0.0331	0.4918	1.4661	1.00	3000	YES	0.52
deviance	63	5	54	60	63	67	74	1.00	438	NO	1.00
FOREST											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
phi.occ[1]	**0.5090**	**0.1459**	**0.2564**	**0.4054**	**0.4998**	**0.6044**	**0.8233**	**1.00**	**643**	**NO**	**1.00**
phi.occ[2]	**0.8553**	**0.1112**	**0.5833**	**0.7902**	**0.8794**	**0.9432**	**0.9940**	**1.00**	**2029**	**NO**	**1.00**
phi.occ[3]	**0.4833**	**0.1143**	**0.2891**	**0.4019**	**0.4722**	**0.5534**	**0.7300**	**1.01**	**429**	**NO**	**1.00**
phi.occ[4]	**0.6326**	**0.1460**	**0.3786**	**0.5235**	**0.6209**	**0.7319**	**0.9326**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[5]	**0.8565**	**0.1078**	**0.5998**	**0.7919**	**0.8749**	**0.9444**	**0.9953**	**1.01**	**431**	**NO**	**1.00**
phi.occ[6]	**0.8037**	**0.1226**	**0.5511**	**0.7160**	**0.8154**	**0.9020**	**0.9900**	**1.02**	**103**	**NO**	**1.00**
phi.occ[7]	**0.3817**	**0.1316**	**0.1955**	**0.2912**	**0.3590**	**0.4430**	**0.7265**	**1.02**	**147**	**NO**	**1.00**
phi.occ[8]	**0.7010**	**0.1579**	**0.3980**	**0.5865**	**0.7055**	**0.8228**	**0.9782**	**1.00**	**1854**	**NO**	**1.00**
phi.occ[9]	**0.7963**	**0.1299**	**0.5251**	**0.7065**	**0.8124**	**0.9015**	**0.9873**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[10]	**0.5761**	**0.1677**	**0.2906**	**0.4523**	**0.5615**	**0.6864**	**0.9387**	**1.00**	**2081**	**NO**	**1.00**
phi.occ[11]	**0.6271**	**0.1802**	**0.2965**	**0.4906**	**0.6176**	**0.7588**	**0.9616**	**1.01**	**331**	**NO**	**1.00**
p.est[1]	0.1774	0.0265	0.1305	0.1584	0.1761	0.1943	0.2358	1.00	3000	NO	1.00
p.est[2]	0.1308	0.0273	0.0856	0.1111	0.1278	0.1477	0.1910	1.00	1902	NO	1.00
p.est[3]	0.1963	0.0285	0.1450	0.1760	0.1947	0.2146	0.2570	1.00	2847	NO	1.00
p.est[4]	0.1448	0.0298	0.0927	0.1237	0.1428	0.1637	0.2106	1.00	3000	NO	1.00
p.est[5]	0.2446	0.0406	0.1737	0.2154	0.2418	0.2702	0.3317	1.00	605	NO	1.00
p.est[6]	0.1455	0.0266	0.1003	0.1258	0.1430	0.1624	0.2038	1.00	3000	NO	1.00
p.est[7]	0.2377	0.0766	0.1125	0.1809	0.2300	0.2870	0.4042	1.00	448	NO	1.00
p.est[8]	0.1490	0.0311	0.0942	0.1266	0.1469	0.1691	0.2170	1.00	3000	NO	1.00
p.est[9]	0.2525	0.0433	0.1763	0.2211	0.2493	0.2801	0.3452	1.00	550	NO	1.00
p.est[10]	0.1208	0.0273	0.0769	0.1013	0.1178	0.1377	0.1818	1.00	1962	NO	1.00
p.est[11]	0.2454	0.0409	0.1739	0.2161	0.2427	0.2713	0.3330	1.00	598	NO	1.00
mean.p	0.1264	0.0275	0.0811	0.1065	0.1235	0.1434	0.1883	1.00	1770	NO	1.00
beta1	-0.3178	0.1568	-0.6319	-0.4244	-0.3128	-0.2085	-0.0213	1.00	2935	NO	0.98
beta2	0.4348	0.1975	0.0393	0.3035	0.4363	0.5681	0.8120	1.01	328	NO	0.98
deviance	788	13	762	779	788	797	813	1.00	1812	NO	1.00

C) *Turdus flavipes* - Cormack-Jolly-Seber											
COFFEE											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
phi.occ[1]	**0.5041**	**0.2910**	**0.0250**	**0.2499**	**0.5128**	**0.7564**	**0.9755**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[2]	**0.5517**	**0.2270**	**0.1619**	**0.3729**	**0.5391**	**0.7293**	**0.9668**	**1.00**	**2324**	**NO**	**1.00**
phi.occ[3]	**0.5905**	**0.2303**	**0.1745**	**0.4076**	**0.5855**	**0.7883**	**0.9746**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[4]	**0.5774**	**0.2041**	**0.2164**	**0.4165**	**0.5638**	**0.7320**	**0.9602**	**1.00**	**1594**	**NO**	**1.00**
phi.occ[5]	**0.7104**	**0.1836**	**0.3243**	**0.5767**	**0.7276**	**0.8606**	**0.9857**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[6]	**0.8160**	**0.1454**	**0.4576**	**0.7319**	**0.8515**	**0.9318**	**0.9944**	**1.00**	**1754**	**NO**	**1.00**
phi.occ[7]	**0.8449**	**0.1211**	**0.5495**	**0.7717**	**0.8712**	**0.9411**	**0.9951**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[8]	**0.6862**	**0.1903**	**0.3074**	**0.5418**	**0.6941**	**0.8464**	**0.9863**	**1.00**	**711**	**NO**	**1.00**
phi.occ[9]	**0.7059**	**0.1875**	**0.3179**	**0.5716**	**0.7247**	**0.8607**	**0.9858**	**1.00**	**715**	**NO**	**1.00**
phi.occ[10]	**0.4947**	**0.2047**	**0.1669**	**0.3391**	**0.4678**	**0.6448**	**0.9291**	**1.00**	**1300**	**NO**	**1.00**
phi.occ[11]	**0.4125**	**0.2473**	**0.0574**	**0.2122**	**0.3631**	**0.5761**	**0.9484**	**1.01**	**473**	**NO**	**1.00**
p.est[1]	0.3417	0.1245	0.1368	0.2499	0.3267	0.4231	0.6082	1.00	457	NO	1.00
p.est[2]	0.0655	0.0231	0.0306	0.0488	0.0621	0.0787	0.1210	1.00	2282	NO	1.00
p.est[3]	0.2069	0.0663	0.0982	0.1582	0.2004	0.2467	0.3539	1.00	974	NO	1.00
p.est[4]	0.0585	0.0280	0.0198	0.0385	0.0533	0.0729	0.1272	1.00	2593	NO	1.00
p.est[5]	0.1688	0.0528	0.0833	0.1302	0.1632	0.2007	0.2894	1.00	1772	NO	1.00
p.est[6]	0.4437	0.1663	0.1590	0.3187	0.4325	0.5615	0.7759	1.00	414	NO	1.00
p.est[7]	0.0628	0.0221	0.0293	0.0468	0.0598	0.0752	0.1161	1.00	2048	NO	1.00
p.est[8]	0.0640	0.0372	0.0164	0.0375	0.0555	0.0823	0.1557	1.00	3000	NO	1.00
p.est[9]	0.0892	0.0306	0.0427	0.0666	0.0848	0.1070	0.1623	1.00	3000	NO	1.00
p.est[10]	0.1139	0.0371	0.0563	0.0862	0.1090	0.1363	0.2013	1.00	3000	NO	1.00
p.est[11]	0.0766	0.0268	0.0360	0.0569	0.0725	0.0916	0.1416	1.00	3000	NO	1.00
mean.p	0.0994	0.0333	0.0477	0.0748	0.0946	0.1191	0.1802	1.00	3000	NO	1.00
beta1	-1.0018	0.3352	-1.6546	-1.2263	-0.9927	-0.7733	-0.3671	1.00	456	NO	1.00
beta2	0.3897	0.2824	-0.1528	0.1946	0.3861	0.5738	0.9483	1.00	825	YES	0.92
deviance	225	6	213	221	225	229	238	1.00	1198	NO	1.00
FOREST											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
phi.occ[1]	**0.3321**	**0.1753**	**0.0878**	**0.2027**	**0.2991**	**0.4374**	**0.7754**	**1.02**	**140**	**NO**	**1.00**
phi.occ[2]	**0.7024**	**0.1764**	**0.3472**	**0.5701**	**0.7137**	**0.8467**	**0.9807**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[3]	**0.7520**	**0.1645**	**0.3915**	**0.6343**	**0.7716**	**0.8871**	**0.9878**	**1.00**	**1046**	**NO**	**1.00**
phi.occ[4]	**0.7374**	**0.1599**	**0.4073**	**0.6246**	**0.7498**	**0.8681**	**0.9865**	**1.00**	**2539**	**NO**	**1.00**
phi.occ[5]	**0.7262**	**0.1667**	**0.4007**	**0.5992**	**0.7386**	**0.8653**	**0.9859**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[6]	**0.8480**	**0.1175**	**0.5647**	**0.7784**	**0.8735**	**0.9423**	**0.9946**	**1.00**	**822**	**NO**	**1.00**
phi.occ[7]	**0.6595**	**0.1761**	**0.3445**	**0.5271**	**0.6577**	**0.7963**	**0.9720**	**1.00**	**700**	**NO**	**1.00**
phi.occ[8]	**0.6826**	**0.1701**	**0.3625**	**0.5530**	**0.6834**	**0.8176**	**0.9760**	**1.00**	**526**	**NO**	**1.00**
phi.occ[9]	**0.6185**	**0.1809**	**0.2927**	**0.4786**	**0.6133**	**0.7542**	**0.9584**	**1.01**	**351**	**NO**	**1.00**
phi.occ[10]	**0.8254**	**0.1287**	**0.5324**	**0.7426**	**0.8497**	**0.9309**	**0.9935**	**1.01**	**635**	**NO**	**1.00**
phi.occ[11]	**0.8607**	**0.1134**	**0.5848**	**0.7991**	**0.8898**	**0.9506**	**0.9948**	**1.00**	**667**	**NO**	**1.00**
p.est[1]	0.0857	0.0201	0.0521	0.0714	0.0838	0.0976	0.1299	1.00	905	NO	1.00
p.est[2]	0.0546	0.0170	0.0276	0.0423	0.0525	0.0648	0.0926	1.00	3000	NO	1.00
p.est[3]	0.0999	0.0229	0.0615	0.0834	0.0983	0.1136	0.1518	1.00	707	NO	1.00
p.est[4]	0.0630	0.0181	0.0345	0.0503	0.0611	0.0732	0.1048	1.00	1566	NO	1.00
p.est[5]	0.1405	0.0362	0.0822	0.1151	0.1364	0.1616	0.2203	1.00	621	NO	1.00
p.est[6]	0.0638	0.0177	0.0351	0.0510	0.0621	0.0745	0.1028	1.00	2072	NO	1.00
p.est[7]	0.1338	0.0556	0.0566	0.0944	0.1226	0.1623	0.2707	1.01	667	NO	1.00
p.est[8]	0.0657	0.0188	0.0361	0.0525	0.0636	0.0762	0.1095	1.00	1372	NO	1.00
p.est[9]	0.1477	0.0392	0.0851	0.1200	0.1430	0.1706	0.2348	1.00	628	NO	1.00
p.est[10]	0.0486	0.0162	0.0234	0.0367	0.0465	0.0582	0.0848	1.00	3000	NO	1.00
p.est[11]	0.1412	0.0365	0.0826	0.1157	0.1371	0.1625	0.2217	1.00	621	NO	1.00
mean.p	0.0519	0.0167	0.0254	0.0398	0.0499	0.0619	0.0894	1.00	3000	NO	1.00
beta1	-0.4338	0.1989	-0.8375	-0.5653	-0.4320	-0.3041	-0.0404	1.00	1149	NO	0.98
beta2	0.5918	0.2416	0.1285	0.4284	0.5856	0.7457	1.0882	1.00	2118	NO	1.00
deviance	439	8	425	434	439	444	454	1.00	529	NO	1.00

D) *Turdus albicollis* - Cormack-Jolly-Seber											
COFFEE											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
phi.occ[1]	**0.4979**	**0.2875**	**0.0235**	**0.2513**	**0.4954**	**0.7436**	**0.9719**	**1.00**	**2870**	**NO**	**1.00**
phi.occ[2]	**0.4922**	**0.2900**	**0.0220**	**0.2424**	**0.4892**	**0.7372**	**0.9753**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[3]	**0.4972**	**0.2867**	**0.0248**	**0.2527**	**0.4986**	**0.7421**	**0.9718**	**1.00**	**1771**	**NO**	**1.00**
phi.occ[4]	**0.5030**	**0.2856**	**0.0307**	**0.2579**	**0.5080**	**0.7500**	**0.9752**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[5]	**0.5036**	**0.2865**	**0.0252**	**0.2547**	**0.5170**	**0.7468**	**0.9710**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[6]	**0.4983**	**0.2888**	**0.0231**	**0.2468**	**0.5095**	**0.7416**	**0.9753**	**1.00**	**1221**	**NO**	**1.00**
phi.occ[7]	**0.5036**	**0.2918**	**0.0263**	**0.2454**	**0.5059**	**0.7561**	**0.9768**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[8]	**0.4967**	**0.2917**	**0.0230**	**0.2393**	**0.5012**	**0.7432**	**0.9750**	**1.00**	**1613**	**NO**	**1.00**

phi.occ[9]	**0.4831**	**0.2913**	**0.0193**	**0.2284**	**0.4767**	**0.7377**	**0.9710**	**1.00**	**1328**	**NO**	**1.00**
phi.occ[10]	**0.4941**	**0.2900**	**0.0250**	**0.2477**	**0.4886**	**0.7411**	**0.9801**	**1.00**	**1112**	**NO**	**1.00**
phi.occ[11]	**0.4962**	**0.2903**	**0.0233**	**0.2444**	**0.4866**	**0.7441**	**0.9765**	**1.00**	**3000**	**NO**	**1.00**
p.est[1]	0.0193	0.1226	<0.0001	<0.0001	<0.0001	<0.0001	0.1599	1.02	2036	NO	1.00
p.est[2]	0.0017	0.0239	<0.0001	<0.0001	<0.0001	<0.0001	0.0049	1.09	3000	NO	1.00
p.est[3]	0.0080	0.0709	<0.0001	<0.0001	<0.0001	<0.0001	0.0275	1.05	1512	NO	1.00
p.est[4]	0.0046	0.0570	<0.0001	<0.0001	<0.0001	<0.0001	0.0065	1.09	1394	NO	1.00
p.est[5]	0.0060	0.0579	<0.0001	<0.0001	<0.0001	<0.0001	0.0193	1.08	1158	NO	1.00
p.est[6]	0.0306	0.1581	<0.0001	<0.0001	<0.0001	<0.0001	0.7019	1.00	3000	NO	1.00
p.est[7]	0.0016	0.0228	<0.0001	<0.0001	<0.0001	<0.0001	0.0047	1.12	3000	NO	1.00
p.est[8]	0.0112	0.0859	<0.0001	<0.0001	<0.0001	<0.0001	0.0572	1.02	2608	NO	1.00
p.est[9]	0.0033	0.0362	<0.0001	<0.0001	<0.0001	<0.0001	0.0096	1.06	2042	NO	1.00
p.est[10]	0.0039	0.0411	<0.0001	<0.0001	<0.0001	<0.0001	0.0205	1.09	1305	NO	1.00
p.est[11]	0.0026	0.0305	<0.0001	<0.0001	<0.0001	<0.0001	0.0071	1.02	3000	NO	1.00
mean.p	0.0036	0.0388	<0.0001	<0.0001	<0.0001	<0.0001	0.0154	1.08	1573	NO	1.00
beta1	-0.6842	5.6036	-9.5923	-5.5339	-1.0143	4.0625	9.3889	1.00	3000	YES	0.55
beta2	-1.5233	5.3965	-9.6026	-6.1098	-2.1459	2.6795	8.8916	1.00	3000	YES	0.62
deviance	0	0	0	0	0	0	1	1.02	3000	YES	1.00
FOREST											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
phi.occ[1]	**0.2449**	**0.0957**	**0.0945**	**0.1762**	**0.2313**	**0.3016**	**0.4566**	**1.01**	**1110**	**NO**	**1.00**
phi.occ[2]	**0.8327**	**0.1258**	**0.5377**	**0.7542**	**0.8578**	**0.9356**	**0.9945**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[3]	**0.8165**	**0.1313**	**0.5122**	**0.7355**	**0.8374**	**0.9227**	**0.9925**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[4]	**0.7827**	**0.1380**	**0.4851**	**0.6884**	**0.7979**	**0.8932**	**0.9875**	**1.00**	**2597**	**NO**	**1.00**
phi.occ[5]	**0.6711**	**0.1455**	**0.3989**	**0.5629**	**0.6685**	**0.7800**	**0.9557**	**1.00**	**872**	**NO**	**1.00**
phi.occ[6]	**0.8383**	**0.1109**	**0.5985**	**0.7651**	**0.8551**	**0.9306**	**0.9930**	**1.00**	**1867**	**NO**	**1.00**
phi.occ[7]	**0.5583**	**0.1442**	**0.3219**	**0.4495**	**0.5402**	**0.6501**	**0.8780**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[8]	**0.6986**	**0.1554**	**0.4071**	**0.5789**	**0.6981**	**0.8207**	**0.9770**	**1.00**	**515**	**NO**	**1.00**
phi.occ[9]	**0.6734**	**0.1661**	**0.3755**	**0.5440**	**0.6653**	**0.8061**	**0.9734**	**1.00**	**498**	**NO**	**1.00**
phi.occ[10]	**0.8491**	**0.1101**	**0.5968**	**0.7767**	**0.8673**	**0.9414**	**0.9941**	**1.01**	**443**	**NO**	**1.00**
phi.occ[11]	**0.8455**	**0.1135**	**0.5868**	**0.7738**	**0.8654**	**0.9386**	**0.9940**	**1.00**	**1175**	**NO**	**1.00**
p.est[1]	0.2370	0.0393	0.1654	0.2096	0.2343	0.2618	0.3192	1.00	677	NO	1.00
p.est[2]	0.1266	0.0302	0.0750	0.1044	0.1245	0.1453	0.1928	1.00	2100	NO	1.00
p.est[3]	0.2842	0.0448	0.2020	0.2539	0.2819	0.3125	0.3800	1.00	610	NO	1.00
p.est[4]	0.1142	0.0259	0.0680	0.0958	0.1124	0.1299	0.1711	1.00	1226	NO	1.00
p.est[5]	0.4042	0.0646	0.2810	0.3599	0.4015	0.4458	0.5373	1.00	719	NO	1.00
p.est[6]	0.1603	0.0331	0.1016	0.1370	0.1582	0.1808	0.2321	1.00	1238	NO	1.00
p.est[7]	0.2295	0.0739	0.1098	0.1754	0.2205	0.2754	0.3967	1.00	738	NO	1.00
p.est[8]	0.1185	0.0269	0.0708	0.0995	0.1168	0.1348	0.1776	1.00	1090	NO	1.00
p.est[9]	0.4232	0.0682	0.2949	0.3764	0.4205	0.4681	0.5614	1.00	754	NO	1.00
p.est[10]	0.1009	0.0264	0.0569	0.0817	0.0988	0.1166	0.1592	1.00	3000	NO	1.00
p.est[11]	0.4063	0.0650	0.2822	0.3618	0.4035	0.4482	0.5398	1.00	723	NO	1.00
mean.p	0.1163	0.0290	0.0674	0.0949	0.1143	0.1339	0.1813	1.00	2598	NO	1.00
beta1	-0.8054	0.1889	-1.1849	-0.9307	-0.7992	-0.6787	-0.4520	1.00	1408	NO	1.00
beta2	0.7372	0.2174	0.3197	0.5905	0.7338	0.8742	1.1767	1.00	3000	NO	1.00
deviance	512	13	486	503	513	522	538	1.00	1876	NO	1.00

G) *Saltator maximus* - Cormack-Jolly-Seber											
COFFEE											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
phi.occ[1]	**0.3742**	**0.2702**	**0.0125**	**0.1407**	**0.3276**	**0.5715**	**0.9382**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[2]	**0.5323**	**0.2151**	**0.1679**	**0.3675**	**0.5156**	**0.6923**	**0.9460**	**1.00**	**1182**	**NO**	**1.00**
phi.occ[3]	**0.7287**	**0.1963**	**0.2976**	**0.5902**	**0.7687**	**0.8904**	**0.9901**	**1.00**	**2234**	**NO**	**1.00**
phi.occ[4]	**0.6702**	**0.1980**	**0.2860**	**0.5205**	**0.6845**	**0.8316**	**0.9815**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[5]	**0.6283**	**0.2036**	**0.2410**	**0.4746**	**0.6308**	**0.7897**	**0.9754**	**1.00**	**2621**	**NO**	**1.00**
phi.occ[6]	**0.7683**	**0.1732**	**0.3661**	**0.6570**	**0.8031**	**0.9088**	**0.9919**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[7]	**0.6823**	**0.2024**	**0.2696**	**0.5298**	**0.7100**	**0.8519**	**0.9852**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[8]	**0.6608**	**0.2098**	**0.2425**	**0.5058**	**0.6796**	**0.8354**	**0.9854**	**1.00**	**1354**	**NO**	**1.00**
phi.occ[9]	**0.6176**	**0.2236**	**0.1913**	**0.4464**	**0.6176**	**0.8037**	**0.9801**	**1.00**	**2292**	**NO**	**1.00**
phi.occ[10]	**0.6307**	**0.2175**	**0.2071**	**0.4666**	**0.6408**	**0.8098**	**0.9786**	**1.00**	**2874**	**NO**	**1.00**
phi.occ[11]	**0.5382**	**0.2568**	**0.0821**	**0.3320**	**0.5395**	**0.7503**	**0.9737**	**1.00**	**700**	**NO**	**1.00**
p.est[1]	0.4502	0.1671	0.1692	0.3268	0.4349	0.5584	0.8018	1.00	3000	NO	1.00
p.est[2]	0.0957	0.0421	0.0349	0.0655	0.0879	0.1204	0.1964	1.00	1228	NO	1.00
p.est[3]	0.2956	0.1052	0.1338	0.2185	0.2796	0.3587	0.5334	1.00	3000	NO	1.00
p.est[4]	0.0813	0.0492	0.0166	0.0457	0.0704	0.1064	0.2054	1.00	3000	NO	1.00
p.est[5]	0.2456	0.0874	0.1093	0.1815	0.2327	0.2985	0.4474	1.00	3000	NO	1.00
p.est[6]	0.5474	0.2008	0.1752	0.3947	0.5501	0.6989	0.9132	1.00	3000	NO	1.00
p.est[7]	0.0913	0.0403	0.0329	0.0621	0.0840	0.1145	0.1896	1.00	1296	NO	1.00
p.est[8]	0.0895	0.0654	0.0124	0.0424	0.0722	0.1204	0.2592	1.00	3000	NO	1.00

p.est[9]	0.1328	0.0554	0.0502	0.0917	0.1229	0.1649	0.2629	1.00	1271	NO	1.00
p.est[10]	0.1691	0.0655	0.0685	0.1214	0.1581	0.2084	0.3188	1.00	1773	NO	1.00
p.est[11]	0.1134	0.0489	0.0418	0.0771	0.1049	0.1418	0.2306	1.00	1175	NO	1.00
mean.p	0.1480	0.0598	0.0584	0.1040	0.1375	0.1832	0.2879	1.00	1423	NO	1.00
beta1	-1.0776	0.4426	-2.0003	-1.3600	-1.0527	-0.7850	-0.2669	1.00	3000	NO	1.00
beta2	0.3722	0.3934	-0.3694	0.1100	0.3675	0.6274	1.1763	1.00	1377	YES	0.83
deviance	124	6	112	120	124	128	136	1.00	3000	NO	1.00
FOREST											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
phi.occ[1]	**0.7106**	**0.1969**	**0.2893**	**0.5739**	**0.7371**	**0.8744**	**0.9864**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[2]	**0.6758**	**0.1960**	**0.2935**	**0.5290**	**0.6902**	**0.8377**	**0.9818**	**1.00**	**839**	**NO**	**1.00**
phi.occ[3]	**0.6304**	**0.2122**	**0.2245**	**0.4633**	**0.6427**	**0.8027**	**0.9761**	**1.00**	**813**	**NO**	**1.00**
phi.occ[4]	**0.5596**	**0.2132**	**0.1902**	**0.3880**	**0.5453**	**0.7249**	**0.9677**	**1.01**	**240**	**NO**	**1.00**
phi.occ[5]	**0.7373**	**0.1811**	**0.3410**	**0.6132**	**0.7648**	**0.8867**	**0.9891**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[6]	**0.8031**	**0.1485**	**0.4562**	**0.7106**	**0.8346**	**0.9237**	**0.9925**	**1.00**	**964**	**NO**	**1.00**
phi.occ[7]	**0.7131**	**0.1842**	**0.3385**	**0.5761**	**0.7316**	**0.8675**	**0.9892**	**1.00**	**1761**	**NO**	**1.00**
phi.occ[8]	**0.5516**	**0.2171**	**0.1764**	**0.3774**	**0.5394**	**0.7193**	**0.9572**	**1.00**	**530**	**NO**	**1.00**
phi.occ[9]	**0.6739**	**0.2102**	**0.2368**	**0.5172**	**0.6991**	**0.8521**	**0.9809**	**1.00**	**1921**	**NO**	**1.00**
phi.occ[10]	**0.7328**	**0.1907**	**0.3193**	**0.6037**	**0.7653**	**0.8913**	**0.9907**	**1.00**	**1706**	**NO**	**1.00**
phi.occ[11]	**0.7352**	**0.1927**	**0.3010**	**0.6096**	**0.7683**	**0.8945**	**0.9924**	**1.00**	**3000**	**NO**	**1.00**
p.est[1]	0.2018	0.0625	0.0995	0.1555	0.1957	0.2411	0.3426	1.00	664	NO	1.00
p.est[2]	0.1446	0.0615	0.0531	0.0996	0.1352	0.1796	0.2863	1.00	416	NO	1.00
p.est[3]	0.2255	0.0691	0.1135	0.1743	0.2180	0.2666	0.3784	1.00	1068	NO	1.00
p.est[4]	0.1385	0.0559	0.0529	0.0987	0.1299	0.1710	0.2701	1.00	729	NO	1.00
p.est[5]	0.2863	0.0999	0.1267	0.2133	0.2741	0.3470	0.5084	1.00	3000	NO	1.00
p.est[6]	0.1627	0.0603	0.0679	0.1188	0.1547	0.1991	0.3010	1.00	437	NO	1.00
p.est[7]	0.2168	0.1135	0.0563	0.1344	0.1960	0.2787	0.4953	1.00	2354	NO	1.00
p.est[8]	0.1414	0.0567	0.0545	0.1009	0.1326	0.1741	0.2769	1.00	831	NO	1.00
p.est[9]	0.2962	0.1059	0.1261	0.2195	0.2829	0.3616	0.5321	1.00	3000	NO	1.00
p.est[10]	0.1297	0.0610	0.0414	0.0854	0.1187	0.1646	0.2739	1.01	418	NO	1.00
p.est[11]	0.2874	0.1005	0.1267	0.2140	0.2748	0.3486	0.5123	1.00	3000	NO	1.00
mean.p	0.1388	0.0617	0.0472	0.0935	0.1286	0.1733	0.2837	1.01	414	NO	1.00
beta1	-0.4522	0.3442	-1.1371	-0.6824	-0.4400	-0.2247	0.1955	1.00	3000	YES	0.91
beta2	0.4347	0.3934	-0.3202	0.1624	0.4269	0.7050	1.2159	1.00	731	YES	0.87
deviance	149	7	136	144	149	153	162	1.00	2081	NO	1.00

H) *Saltator striatipectus* - Cormack-Jolly-Seber											
COFFEE											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
phi.occ[1]	**0.6852**	**0.2173**	**0.2167**	**0.5360**	**0.7188**	**0.8701**	**0.9868**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[2]	**0.5660**	**0.2388**	**0.1271**	**0.3795**	**0.5665**	**0.7553**	**0.9773**	**1.01**	**188**	**NO**	**1.00**
phi.occ[3]	**0.7274**	**0.1991**	**0.2756**	**0.5970**	**0.7662**	**0.8932**	**0.9885**	**1.00**	**989**	**NO**	**1.00**
phi.occ[4]	**0.6235**	**0.2345**	**0.1730**	**0.4385**	**0.6427**	**0.8236**	**0.9815**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[5]	**0.6373**	**0.2320**	**0.1733**	**0.4630**	**0.6562**	**0.8356**	**0.9838**	**1.01**	**215**	**NO**	**1.00**
phi.occ[6]	**0.6894**	**0.2185**	**0.2168**	**0.5365**	**0.7274**	**0.8738**	**0.9864**	**1.01**	**257**	**NO**	**1.00**
phi.occ[7]	**0.7383**	**0.1824**	**0.3324**	**0.6177**	**0.7671**	**0.8891**	**0.9883**	**1.00**	**1420**	**NO**	**1.00**
phi.occ[8]	**0.7232**	**0.1888**	**0.3171**	**0.5841**	**0.7465**	**0.8832**	**0.9913**	**1.00**	**429**	**NO**	**1.00**
phi.occ[9]	**0.7301**	**0.1853**	**0.3314**	**0.5977**	**0.7603**	**0.8860**	**0.9890**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[10]	**0.6817**	**0.2133**	**0.2384**	**0.5251**	**0.7098**	**0.8620**	**0.9872**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[11]	**0.7032**	**0.2138**	**0.2345**	**0.5507**	**0.7402**	**0.8859**	**0.9869**	**1.00**	**1567**	**NO**	**1.00**
p.est[1]	0.1259	0.0915	0.0142	0.0584	0.1039	0.1705	0.3602	1.00	447	NO	1.00
p.est[2]	0.0846	0.0434	0.0252	0.0532	0.0755	0.1080	0.1894	1.01	425	NO	1.00
p.est[3]	0.1269	0.0633	0.0355	0.0805	0.1162	0.1615	0.2792	1.01	374	NO	1.00
p.est[4]	0.0371	0.0327	0.0025	0.0139	0.0282	0.0501	0.1232	1.01	614	NO	1.00
p.est[5]	0.1271	0.0585	0.0420	0.0849	0.1176	0.1596	0.2655	1.00	402	NO	1.00
p.est[6]	0.1277	0.1184	0.0062	0.0427	0.0938	0.1723	0.4552	1.00	546	NO	1.00
p.est[7]	0.0787	0.0414	0.0225	0.0487	0.0703	0.1007	0.1782	1.01	405	NO	1.00
p.est[8]	0.0314	0.0342	0.0009	0.0084	0.0204	0.0424	0.1239	1.01	773	NO	1.00
p.est[9]	0.1123	0.0526	0.0378	0.0741	0.1021	0.1411	0.2403	1.00	551	NO	1.00
p.est[10]	0.1224	0.0551	0.0434	0.0831	0.1120	0.1519	0.2566	1.00	528	NO	1.00
p.est[11]	0.1014	0.0491	0.0322	0.0655	0.0920	0.1274	0.2223	1.00	504	NO	1.00
mean.p	0.1177	0.0540	0.0399	0.0786	0.1081	0.1466	0.2508	1.00	554	NO	1.00
beta1	-0.3925	0.5471	-1.4358	-0.7656	-0.3975	-0.0483	0.7472	1.00	1939	YES	0.78
beta2	-0.4437	0.5142	-1.5620	-0.7724	-0.4030	-0.0997	0.4964	1.00	1555	YES	0.81
deviance	97	5	88	93	96	100	107	1.00	3000	NO	1.00
FOREST											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
phi.occ[1]	**0.5073**	**0.2909**	**0.0300**	**0.2530**	**0.5146**	**0.7615**	**0.9730**	**1.00**	**2557**	**0**	**1.00**
phi.occ[2]	**0.4933**	**0.2850**	**0.0304**	**0.2442**	**0.4932**	**0.7370**	**0.9713**	**1.00**	**3000**	**0**	**1.00**

phi.occ[3]	**0.4909**	**0.2889**	**0.0237**	**0.2388**	**0.4853**	**0.7423**	**0.9725**	**1.00**	**3000**	**0**	**1.00**
phi.occ[4]	**0.4839**	**0.2878**	**0.0212**	**0.2394**	**0.4744**	**0.7267**	**0.9777**	**1.00**	**3000**	**0**	**1.00**
phi.occ[5]	**0.4669**	**0.2859**	**0.0239**	**0.2226**	**0.4471**	**0.7094**	**0.9692**	**1.00**	**737**	**0**	**1.00**
phi.occ[6]	**0.4882**	**0.2900**	**0.0224**	**0.2412**	**0.4790**	**0.7360**	**0.9741**	**1.00**	**3000**	**0**	**1.00**
phi.occ[7]	**0.4788**	**0.2939**	**0.0257**	**0.2199**	**0.4590**	**0.7366**	**0.9748**	**1.00**	**386**	**0**	**1.00**
phi.occ[8]	**0.6318**	**0.2485**	**0.1254**	**0.4444**	**0.6694**	**0.8506**	**0.9864**	**1.00**	**784**	**0**	**1.00**
phi.occ[9]	**0.6120**	**0.2511**	**0.1174**	**0.4128**	**0.6364**	**0.8315**	**0.9838**	**1.00**	**2653**	**0**	**1.00**
phi.occ[10]	**0.6579**	**0.2387**	**0.1360**	**0.4965**	**0.6985**	**0.8550**	**0.9855**	**1.00**	**2860**	**0**	**1.00**
phi.occ[11]	**0.6410**	**0.2435**	**0.1377**	**0.4526**	**0.6760**	**0.8461**	**0.9835**	**1.00**	**3000**	**0**	**1.00**
p.est[1]	0.0359	0.0894	<0.0001	0.0002	0.0029	0.0260	0.3101	1.00	1737	0	1.00
p.est[2]	0.0168	0.0667	<0.0001	<0.0001	0.0001	0.0036	0.1733	1.00	3000	0	1.00
p.est[3]	0.0383	0.0805	<0.0001	0.0010	0.0074	0.0374	0.2706	1.00	1506	0	1.00
p.est[4]	0.0010	0.0092	<0.0001	<0.0001	<0.0001	<0.0001	0.0079	1.06	3000	0	1.00
p.est[5]	0.0863	0.1038	0.0015	0.0186	0.0489	0.1150	0.3791	1.00	3000	0	1.00
p.est[6]	0.0277	0.0890	<0.0001	<0.0001	0.0003	0.0100	0.2883	1.00	3000	0	1.00
p.est[7]	0.0332	0.1492	<0.0001	<0.0001	<0.0001	0.0002	0.6120	1.04	381	0	1.00
p.est[8]	0.0014	0.0134	<0.0001	<0.0001	<0.0001	<0.0001	0.0086	1.04	2552	0	1.00
p.est[9]	0.1121	0.1294	0.0019	0.0239	0.0650	0.1518	0.4760	1.00	2736	0	1.00
p.est[10]	0.0048	0.0292	<0.0001	<0.0001	<0.0001	0.0005	0.0382	1.03	3000	0	1.00
p.est[11]	0.0887	0.1060	0.0015	0.0194	0.0506	0.1174	0.3891	1.00	3000	0	1.00
mean.p	0.0121	0.0546	<0.0001	<0.0001	<0.0001	0.0021	0.1241	1.00	3000	0	1.00
beta1	-5.9333	2.5793	-9.8063	-8.1456	-6.1405	-4.0003	-0.7178	1.00	2105	0	0.99
beta2	1.2717	4.4057	-7.3890	-1.8189	1.2987	4.6546	9.1068	1.00	428	1	0.61
deviance	13	2	9	11	12	14	19	1.00	3000	0	1.00

L) *Euphonia laniirostris* - Cormack-Jolly-Seber

COFFEE

par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
phi.occ[1]	**0.5037**	**0.2900**	**0.0248**	**0.2550**	**0.5078**	**0.7539**	**0.9788**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[2]	**0.6954**	**0.1941**	**0.2967**	**0.5590**	**0.7156**	**0.8574**	**0.9853**	**1.00**	**1113**	**NO**	**1.00**
phi.occ[3]	**0.7298**	**0.1881**	**0.3158**	**0.5956**	**0.7577**	**0.8882**	**0.9899**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[4]	**0.6530**	**0.2011**	**0.2649**	**0.5011**	**0.6627**	**0.8176**	**0.9780**	**1.01**	**327**	**NO**	**1.00**
phi.occ[5]	**0.7333**	**0.1812**	**0.3403**	**0.6106**	**0.7615**	**0.8849**	**0.9866**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[6]	**0.7777**	**0.1680**	**0.3949**	**0.6692**	**0.8109**	**0.9160**	**0.9931**	**1.00**	**2895**	**NO**	**1.00**
phi.occ[7]	**0.7965**	**0.1593**	**0.4098**	**0.7097**	**0.8341**	**0.9227**	**0.9926**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[8]	**0.7828**	**0.1684**	**0.3905**	**0.6801**	**0.8168**	**0.9218**	**0.9925**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[9]	**0.6495**	**0.2369**	**0.1756**	**0.4743**	**0.6807**	**0.8558**	**0.9848**	**1.01**	**353**	**NO**	**1.00**
phi.occ[10]	**0.6959**	**0.2160**	**0.2206**	**0.5494**	**0.7372**	**0.8760**	**0.9901**	**1.00**	**677**	**NO**	**1.00**
phi.occ[11]	**0.4493**	**0.2827**	**0.0179**	**0.2057**	**0.4352**	**0.6815**	**0.9605**	**1.00**	**541**	**NO**	**1.00**
p.est[1]	0.3457	0.1525	0.1135	0.2306	0.3198	0.4375	0.6956	1.00	2113	NO	1.00
p.est[2]	0.0298	0.0174	0.0076	0.0173	0.0260	0.0377	0.0728	1.00	789	NO	1.00
p.est[3]	0.1305	0.0628	0.0431	0.0849	0.1191	0.1645	0.2826	1.00	1392	NO	1.00
p.est[4]	0.0765	0.0352	0.0268	0.0518	0.0702	0.0944	0.1649	1.00	3000	NO	1.00
p.est[5]	0.0895	0.0444	0.0273	0.0576	0.0813	0.1119	0.1958	1.00	1095	NO	1.00
p.est[6]	0.5424	0.1950	0.1801	0.3951	0.5373	0.6919	0.9058	1.00	3000	NO	1.00
p.est[7]	0.0303	0.0172	0.0079	0.0180	0.0268	0.0385	0.0741	1.00	818	NO	1.00
p.est[8]	0.1232	0.0632	0.0359	0.0785	0.1117	0.1543	0.2834	1.00	3000	NO	1.00
p.est[9]	0.0353	0.0212	0.0084	0.0204	0.0308	0.0454	0.0884	1.00	742	NO	1.00
p.est[10]	0.0475	0.0267	0.0121	0.0283	0.0417	0.0609	0.1144	1.00	791	NO	1.00
p.est[11]	0.0311	0.0189	0.0076	0.0177	0.0269	0.0397	0.0793	1.00	745	NO	1.00
mean.p	0.0398	0.0233	0.0098	0.0231	0.0348	0.0510	0.0988	1.00	755	NO	1.00
beta1	-1.1805	0.4142	-2.0937	-1.4255	-1.1595	-0.8959	-0.4355	1.00	3000	NO	1.00
beta2	1.1439	0.3997	0.3747	0.8740	1.1324	1.4087	1.9820	1.00	770	NO	1.00
deviance	119	6	109	115	119	123	131	1.00	2304	NO	1.00
FOREST											
par	**mean**	**sd**	**2.50%**	**25%**	**50%**	**75%**	**97.50%**	**Rhat**	**n.eff**	**over0**	**f**
phi.occ[1]	**0.4276**	**0.2841**	**0.0165**	**0.1802**	**0.3837**	**0.6616**	**0.9577**	**1.00**	**2733**	**NO**	**1.00**
phi.occ[2]	**0.6578**	**0.2182**	**0.2095**	**0.4954**	**0.6802**	**0.8359**	**0.9853**	**1.00**	**1617**	**NO**	**1.00**
phi.occ[3]	**0.7074**	**0.2020**	**0.2657**	**0.5678**	**0.7393**	**0.8750**	**0.9880**	**1.00**	**1005**	**NO**	**1.00**
phi.occ[4]	**0.4280**	**0.2559**	**0.0489**	**0.2193**	**0.3841**	**0.6228**	**0.9429**	**1.00**	**588**	**NO**	**1.00**
phi.occ[5]	**0.5046**	**0.2625**	**0.0699**	**0.2871**	**0.4877**	**0.7233**	**0.9635**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[6]	**0.5908**	**0.2527**	**0.1101**	**0.3930**	**0.6046**	**0.8059**	**0.9788**	**1.00**	**2077**	**NO**	**1.00**
phi.occ[7]	**0.3924**	**0.2672**	**0.0359**	**0.1682**	**0.3309**	**0.6002**	**0.9405**	**1.01**	**260**	**NO**	**1.00**
phi.occ[8]	**0.3869**	**0.2510**	**0.0459**	**0.1796**	**0.3328**	**0.5567**	**0.9446**	**1.00**	**3000**	**NO**	**1.00**
phi.occ[9]	**0.4445**	**0.2564**	**0.0532**	**0.2342**	**0.4119**	**0.6407**	**0.9424**	**1.00**	**1452**	**NO**	**1.00**
phi.occ[10]	**0.6112**	**0.2342**	**0.1550**	**0.4307**	**0.6236**	**0.8090**	**0.9808**	**1.00**	**566**	**NO**	**1.00**
phi.occ[11]	**0.6481**	**0.2289**	**0.1784**	**0.4748**	**0.6739**	**0.8408**	**0.9832**	**1.00**	**3000**	**NO**	**1.00**
p.est[1]	0.1198	0.0710	0.0300	0.0691	0.1034	0.1532	0.3002	1.00	912	NO	1.00
p.est[2]	0.0578	0.0473	0.0063	0.0244	0.0456	0.0766	0.1860	1.01	299	NO	1.00

p.est[3]	0.1562	0.0889	0.0416	0.0928	0.1345	0.2008	0.3800	1.00	2998	NO	1.00
p.est[4]	0.0787	0.0835	0.0086	0.0295	0.0545	0.0961	0.3115	1.01	743	NO	1.00
p.est[5]	0.2736	0.1587	0.0613	0.1580	0.2370	0.3607	0.6728	1.00	2912	NO	1.00
p.est[6]	0.0738	0.0534	0.0113	0.0357	0.0610	0.0968	0.2101	1.01	348	NO	1.00
p.est[7]	0.2763	0.2834	0.0072	0.0642	0.1570	0.4070	0.9747	1.00	658	NO	1.00
p.est[8]	0.0866	0.0952	0.0089	0.0309	0.0575	0.1020	0.3716	1.01	798	NO	1.00
p.est[9]	0.2943	0.1705	0.0637	0.1686	0.2557	0.3898	0.7143	1.00	2151	NO	1.00
p.est[10]	0.0473	0.0413	0.0042	0.0186	0.0354	0.0634	0.1570	1.01	290	NO	1.00
p.est[11]	0.2758	0.1600	0.0615	0.1592	0.2385	0.3642	0.6784	1.00	2808	NO	1.00
mean.p	0.0533	0.0452	0.0052	0.0218	0.0408	0.0708	0.1745	1.01	292	NO	1.00
beta1	-0.8394	0.6094	-2.1336	-1.2199	-0.8059	-0.4442	0.2851	1.00	457	YES	0.93
beta2	1.1050	0.8830	-0.4276	0.5399	1.0109	1.5798	3.0750	1.01	361	YES	0.92
deviance	70	5	62	67	70	73	80	1.00	3000	NO	1.00

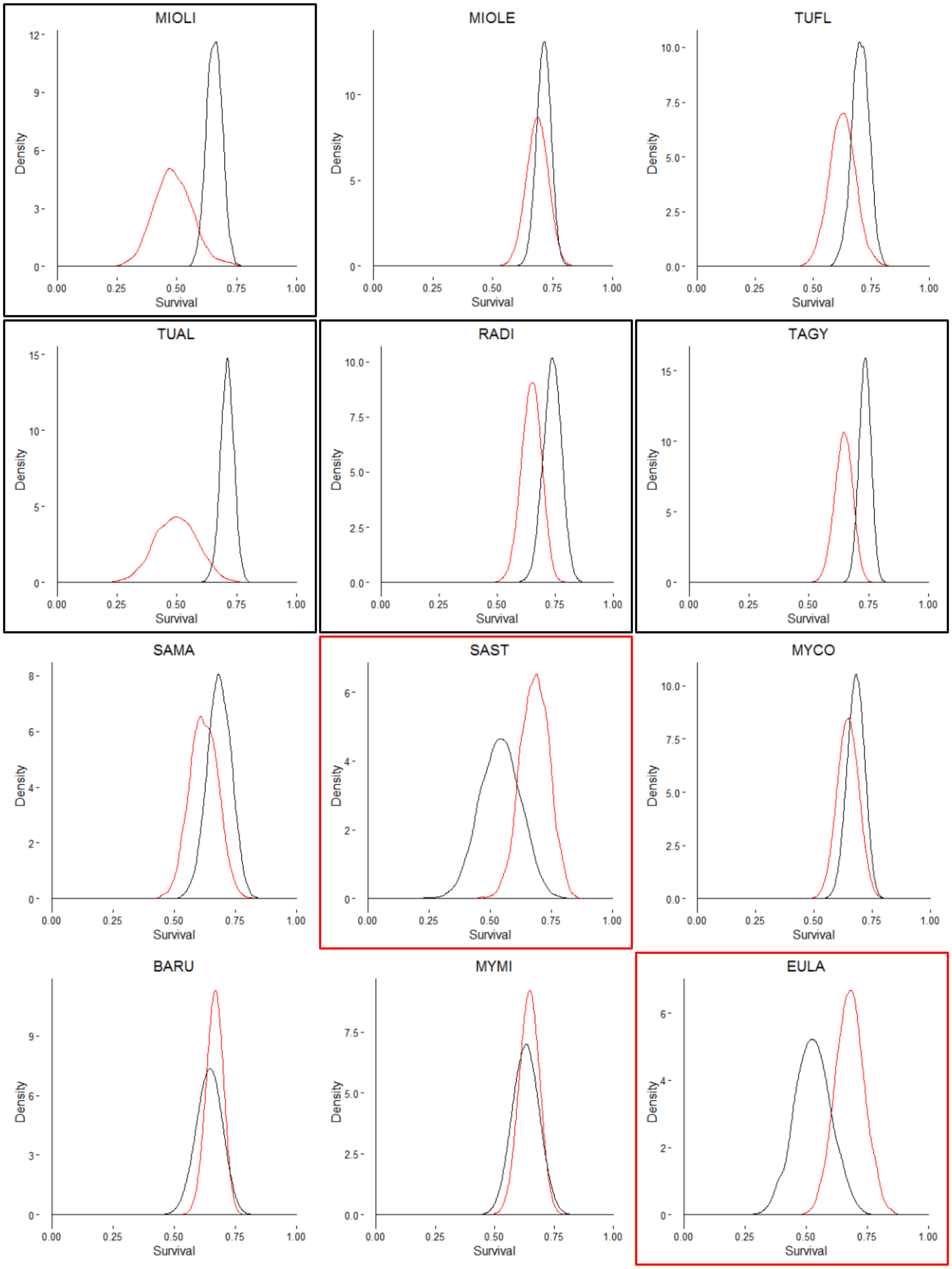


Figure S5. Posterior distributions for the estimates of apparent survival for the twelve focal species in coffee (red lines) and forest (black lines); less overlap means higher probability of differences between habitats. Estimation method and simulations conditions varied among species but not between habitats within a species.

2.3.4. Inter-seasonal variance

Inter-seasonal variance was calculated from the outputs of Jolly-Seber models (**N[i]** in Table S10b, e, f, i, j and k) for six species with high recapture rates.

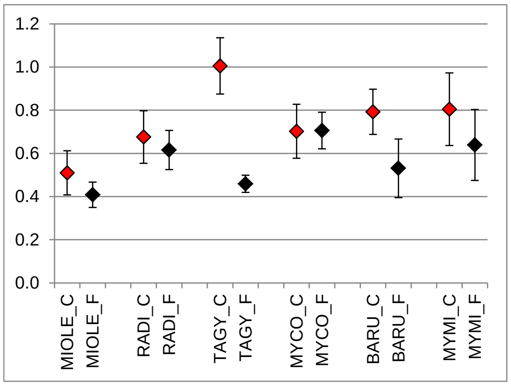


Figure S6. Mean and standard deviation for the coefficient of variation among estimates of abundance per occasion (calculated from output of the Jolly-Serber model).

2.3.5. Output from generalized linear models

Table S12. Model averaging results for generalized linear models of habitat preference and performance variables (b0 to b4 stand for coefficient estimates, values in bold were significantly different from 0). For all these analyses, forest was the reference habitat.

Response	**Species**	**b0**	**Est.**	**Err.**	**b1**	**Est.**	**Err.**	**b2**	**Est.**	**Err.**	**b3**	**Est.**	**Err.**
Age	*Turdus flavipes*	Intercept	**1.22**	0.18	DAYS	0.39	0.36	DAYS^2	**-0.75**	0.35	HABITAT	**-0.4**	0.2
Age	*Turdus albicollis*	Intercept	-0.61	0.57	DAYS	1.36	0.7	DAYS^2	**-1.88**	0.69	HABITAT	**1.29**	0.5
Age	*Ramphocelus dimidiatus*	Intercept	**1.2**	0.16	DAYS	0.06	0.59	DAYS^2	-0.02	0.59	HABITAT	-0.07	0.29
Age	*Tangara gyrola*	Intercept	**0.89**	0.16	DAYS	0.7	0.5	DAYS^2	-0.89	0.49	HABITAT	0.29	0.2
Age	*Saltator maximus*	Intercept	**0.64**	0.17	DAYS	0.7	0.67	DAYS^2	-0.58	0.67	HABITAT	0	0.31
Age	*Saltator striatipectus*	Intercept	-0.43	0.25	DAYS	0.9	0.94	DAYS^2	-1.55	1.07	HABITAT	-0.87	0.51
Age	*Basileuterus rufifrons*	Intercept	0.18	0.14	DAYS	-0.24	0.49	DAYS^2	-0.35	0.51	HABITAT	-0.26	0.26
Age	*Myiothlypis conspicillata*	Intercept	**0.63**	0.24	DAYS	0.17	0.43	DAYS^2	-0.03	0.43	HABITAT	-0.39	0.26
Age	*Myioborus miniatus*	Intercept	**0.63**	0.17	DAYS	-0.56	0.56	DAYS^2	0.4	0.56	HABITAT	0.07	0.35
Age	*Euphonia laniirostris*	Intercept	**0.53**	0.19	DAYS	0.78	0.47	DAYS^2	-0.78	0.46	HABITAT	-0.27	0.32
Body condition	*Mionectes olivaceus*	Intercept	-0.2	0.1	DAYS	0.15	0.18	DAYS^2	-0.3	0.18	HABITAT	**0.25**	0.09
Body condition	*Mionectes oleagineus*	Intercept	-0.08	0.1	DAYS	**0.69**	0.21	DAYS^2	**-0.78**	0.21	HABITAT	0.18	0.11
Body condition	*Turdus flavipes*	Intercept	0	0.05	DAYS	-0.18	0.16	DAYS^2	**0.32**	0.16	HABITAT	0.02	0.08
Body condition	*Turdus albicollis*	Intercept	0.13	0.21	DAYS	**1.07**	0.3	DAYS^2	**-0.93**	0.3	HABITAT	-0.3	0.23
Body condition	*Ramphocelus dimidiatus*	Intercept	0.11	0.09	DAYS	**0.78**	0.24	DAYS^2	**-0.57**	0.24	HABITAT	**-0.27**	0.12
Body condition	*Tangara gyrola*	Intercept	-0.03	0.07	DAYS	0.27	0.22	DAYS^2	-0.27	0.22	HABITAT	0.11	0.08
Body condition	*Saltator maximus*	Intercept	-0.04	0.1	DAYS	**0.78**	0.29	DAYS^2	**-0.69**	0.29	HABITAT	0.19	0.14
Body condition	*Saltator striatipectus*	Intercept	0.05	0.11	DAYS	0.62	0.41	DAYS^2	-0.51	0.41	HABITAT	-0.35	0.22
Body condition	*Basileuterus rufifrons*	Intercept	0	0.06	DAYS	**0.77**	0.22	DAYS^2	**-0.7**	0.22	HABITAT	0.04	0.12
Body condition	*Myiothlypis conspicillata*	Intercept	**-0.31**	0.1	DAYS	**0.47**	0.2	DAYS^2	**-0.47**	0.19	HABITAT	**0.4**	0.12
Body condition	*Myioborus miniatus*	Intercept	-0.07	0.1	DAYS	**1**	0.27	DAYS^2	**-0.95**	0.27	HABITAT	0.31	0.16
Body condition	*Euphonia laniirostris*	Intercept	**0.11**	0.11	DAYS	0.18	0.24	DAYS^2	-0.25	0.23	HABITAT	**-0.29**	0.14
Breeding	*Mionectes olivaceus*	Intercept	**-5.55**	0.85	DAYS	**11.45**	2.28	DAYS^2	**-14.61**	3.16	HABITAT	0.2	0.45
Breeding	*Mionectes oleagineus*	Intercept	**-3.81**	0.61	DAYS	**9.79**	1.96	DAYS^2	**-11.73**	2.59	HABITAT	-0.5	0.42
Breeding	*Turdus flavipes*	Intercept	0.17	0.17	DAYS	**3.98**	0.55	DAYS^2	**-6.21**	0.85	HABITAT	**-0.92**	0.19
Breeding	*Turdus albicollis*	Intercept	**-2.96**	0.59	DAYS	**9.79**	1.29	DAYS^2	**-14.88**	2.04	HABITAT	0.07	0.64
Breeding	*Ramphocelus dimidiatus*	Intercept	**-1.74**	0.27	DAYS	**3.71**	1.01	DAYS^2	**-5.54**	1.49	HABITAT	-0.31	0.33
Breeding	*Tangara gyrola*	Intercept	-0.11	0.19	DAYS	**1.45**	0.47	DAYS^2	**-2.85**	0.54	HABITAT	**-0.41**	0.18
Breeding	*Saltator maximus*	Intercept	**-1.49**	0.29	DAYS	**3.13**	1.09	DAYS^2	**-4.53**	1.57	HABITAT	0.29	0.34
Breeding	*Saltator striatipectus*	Intercept	**-1.14**	0.32	DAYS	**3.17**	1.28	DAYS^2	**-3.71**	1.78	HABITAT	**-1.47**	0.64
Breeding	*Basileuterus rufifrons*	Intercept	**-2.08**	0.3	DAYS	**10.15**	1.38	DAYS^2	**-14.36**	1.92	HABITAT	**-0.97**	0.34
Breeding	*Myiothlypis conspicillata*	Intercept	**-0.86**	0.21	DAYS	**3.26**	0.61	DAYS^2	**-3.98**	0.83	HABITAT	-0.3	0.27
Breeding	*Myioborus miniatus*	Intercept	-0.15	0.24	DAYS	**5.12**	1.05	DAYS^2	**-8.15**	1.62	HABITAT	0.33	0.4
Breeding	*Euphonia laniirostris*	Intercept	**-1.07**	0.27	DAYS	**1.3**	0.52	DAYS^2	**-1.12**	0.51	HABITAT	**0.71**	0.33

Juveniles	*Turdus flavipes*	Intercept	**-4.32**	0.6	DAYS	**4.56**	0.95	DAYS^2	**-3.01**	0.78	HABITAT	0.8	0.5
Juveniles	*Ramphocelus dimidiatus*	Intercept	**-3.81**	0.46	DAYS	-0.03	1.66	DAYS^2	0.02	1.66	HABITAT	0.02	0.83
Juveniles	*Tangara gyrola*	Intercept	**-4.04**	0.61	DAYS	**3.58**	1.15	DAYS^2	**-3.02**	1.09	HABITAT	0.99	0.58
Juveniles	*Saltator maximus*	Intercept	-15.93	15.31	DAYS	27.22	27.57	DAYS^2	-22.98	23.44	HABITAT	1.05	1.44
Juveniles	*Saltator striatipectus*	Intercept	**-3.26**	0.61	DAYS	**3.57**	1.69	DAYS^2	-3.09	1.66	HABITAT	0.78	0.88
Juveniles	*Basileuterus rufifrons*	Intercept	**-5.9**	1.28	DAYS	**10.08**	2.75	DAYS^2	**-8.25**	2.42	HABITAT	0.8	0.61
Juveniles	*Myiothlypis conspicillata*	Intercept	**-3.99**	0.52	DAYS	1.81	1.51	DAYS^2	-1.64	1.54	HABITAT	-0.34	0.85
Juveniles	*Euphonia laniirostris*	Intercept	**-4.49**	0.83	DAYS	-0.46	1.82	DAYS^2	1,06	1.52	HABITAT	0.2	1.46
Muscle	*Mionectes olivaceus*	Intercept	**0.76**	0.13	DAYS	**0.94**	0.45	DAYS^2	**-1.67**	0.45	HABITAT	-0.01	0.22
Muscle	*Mionectes oleagineus*	Intercept	**0.57**	0.25	DAYS	**1.98**	0.51	DAYS^2	**-2.18**	0.51	HABITAT	-0.44	0.24
Muscle	*Turdus flavipes*	Intercept	**-0.44**	0.1	DAYS	**0.94**	0.33	DAYS^2	**-1.18**	0.34	HABITAT	-0.04	0.17
Muscle	*Turdus albicollis*	Intercept	-0.59	0.37	DAYS	-0.01	0.68	DAYS^2	-0.49	0.69	HABITAT	0.45	0.51
Muscle	*Ramphocelus dimidiatus*	Intercept	**-0.5**	0.2	DAYS	1	0.53	DAYS^2	**-1.3**	0.55	HABITAT	**0.73**	0.26
Muscle	*Tangara gyrola*	Intercept	**0.96**	0.19	DAYS	0.53	0.51	DAYS^2	-0.61	0.51	HABITAT	**-0.4**	0.19
Muscle	*Saltator maximus*	Intercept	**-1.24**	0.24	DAYS	1.63	0.83	DAYS^2	**-2.34**	0.99	HABITAT	0.35	0.34
Muscle	*Saltator striatipectus*	Intercept	**-0.65**	0.21	DAYS	-0.04	0.85	DAYS^2	-0.29	0.88	HABITAT	0.23	0.44
Muscle	*Basileuterus rufifrons*	Intercept	**0.59**	0.14	DAYS	0.45	0.45	DAYS^2	-0.64	0.45	HABITAT	0.28	0.26
Muscle	*Myiothlypis conspicillata*	Intercept	**0.64**	0.15	DAYS	0.2	0.42	DAYS^2	-0.51	0.42	HABITAT	0.14	0.25
Muscle	*Myioborus miniatus*	Intercept	0.04	0.2	DAYS	0.32	0.57	DAYS^2	-0.4	0.58	HABITAT	**0.92**	0.35
Muscle	*Euphonia laniirostris*	Intercept	-0.15	0.17	DAYS	0.81	0.47	DAYS^2	-0.71	0.47	HABITAT	-0.19	0.3
Primary molt	*Mionectes olivaceus*	Intercept	**-6.56**	1.68	DAYS	**15.95**	4.13	DAYS^2	**-12.02**	2.96	HABITAT	-0.09	0.54
Primary molt	*Turdus flavipes*	Intercept	**-4.51**	0.56	DAYS	**5.12**	1.01	DAYS^2	**-3.39**	0.80	HABITAT	0.41	0.48
Primary molt	*Turdus albicollis*	Intercept	**-4.16**	1.19	DAYS	**9.75**	2.03	DAYS^2	**-7.94**	1.75	HABITAT	-1.24	1.50
Primary molt	*Ramphocelus dimidiatus*	Intercept	**-4.97**	1.01	DAYS	**7.00**	1.63	DAYS^2	**-4.52**	1.18	HABITAT	-0.19	0.55
Primary molt	*Tangara gyrola*	Intercept	**-2.10**	0.23	DAYS	**5.16**	0.7	DAYS^2	**-6.67**	0.94	HABITAT	0.07	0.22
Primary molt	*Saltator maximus*	Intercept	**-3.09**	0.58	DAYS	**4.12**	1.12	DAYS^2	**-3.17**	1.04	HABITAT	0.94	0.58
Primary molt	*Saltator striatipectus*	Intercept	**-3.33**	0.66	DAYS	**6.20**	1.67	DAYS^2	**-4.95**	1.47	HABITAT	-0.44	0.86
Primary molt	*Basileuterus rufifrons*	Intercept	**-2.82**	0.38	DAYS	**4.10**	0.92	DAYS^2	**-3.09**	0.88	HABITAT	**-1.15**	0.57
Primary molt	*Myiothlypis conspicillata*	Intercept	**-5.39**	1.06	DAYS	**6.20**	1.49	DAYS^2	**-5.04**	1.33	HABITAT	1.16	0.88
Primary molt	*Myioborus miniatus*	Intercept	**-4.27**	0.82	DAYS	**6.52**	1.56	DAYS^2	**-5.44**	1.58	HABITAT	-1.10	1.20

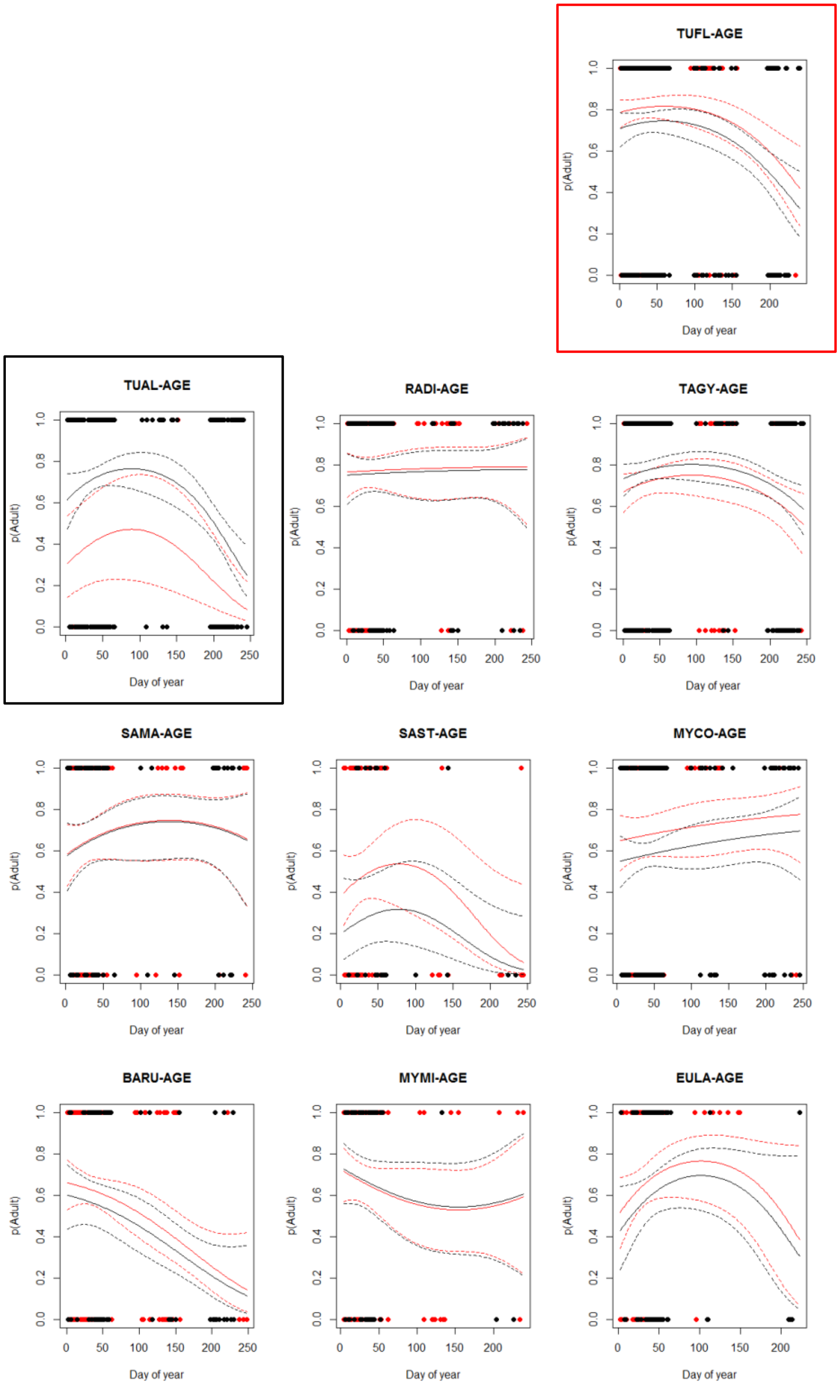


Figure S7. Effect of day of year (day 0: earliest date of sampling) and habitat (coffee in red and forest in black) in estimates for the probability of capturing an adult individual (over an immature one). Predicted model (solid line) and 95% confidence intervals (dotted lines) for the generalized linear model of DAY + DAY^2 + HABITAT with binomial error family and logit link; points show observed data.

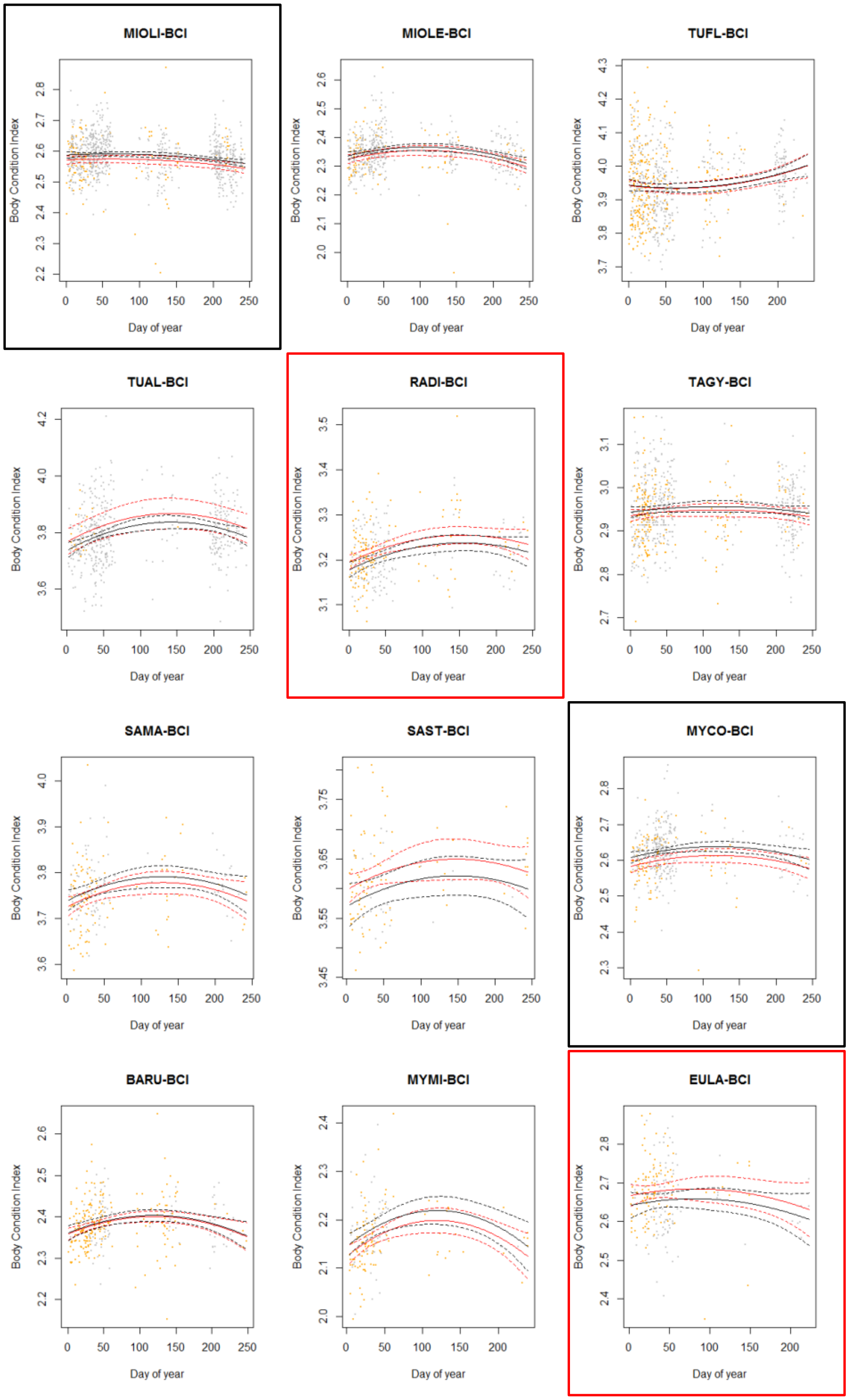


Figure S8. Effect of day of year (day 0: earliest date of sampling) and habitat (coffee in red and forest in black) on body condition index. Predicted model (solid line) and 95% confidence intervals (dotted lines) for the generalized linear model of DAY + DAY^2 + HABITAT with normal error family and identity link; orange points show observed data for coffee and grey points observed data for forest.

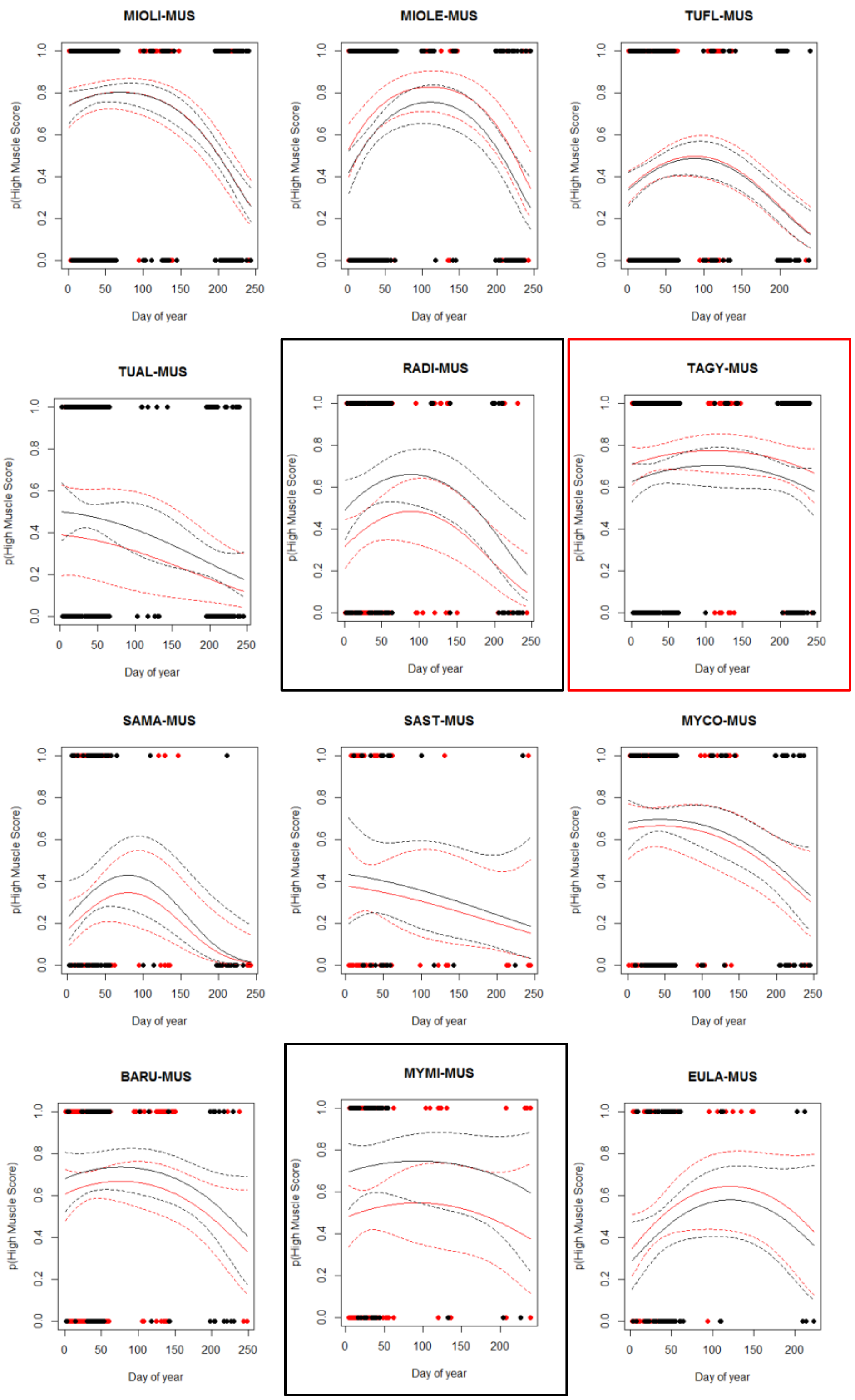


Figure S9. Effect of day of year (day 0: earliest date of sampling) and habitat (coffee in red and forest in black) in estimates for the probability of capturing an individual with high muscle score (over one with medium). Predicted model (solid line) and 95% confidence intervals (dotted lines) for the generalized linear model of DAY + DAY^2 + HABITAT with binomial error family and logit link; points show observed data.

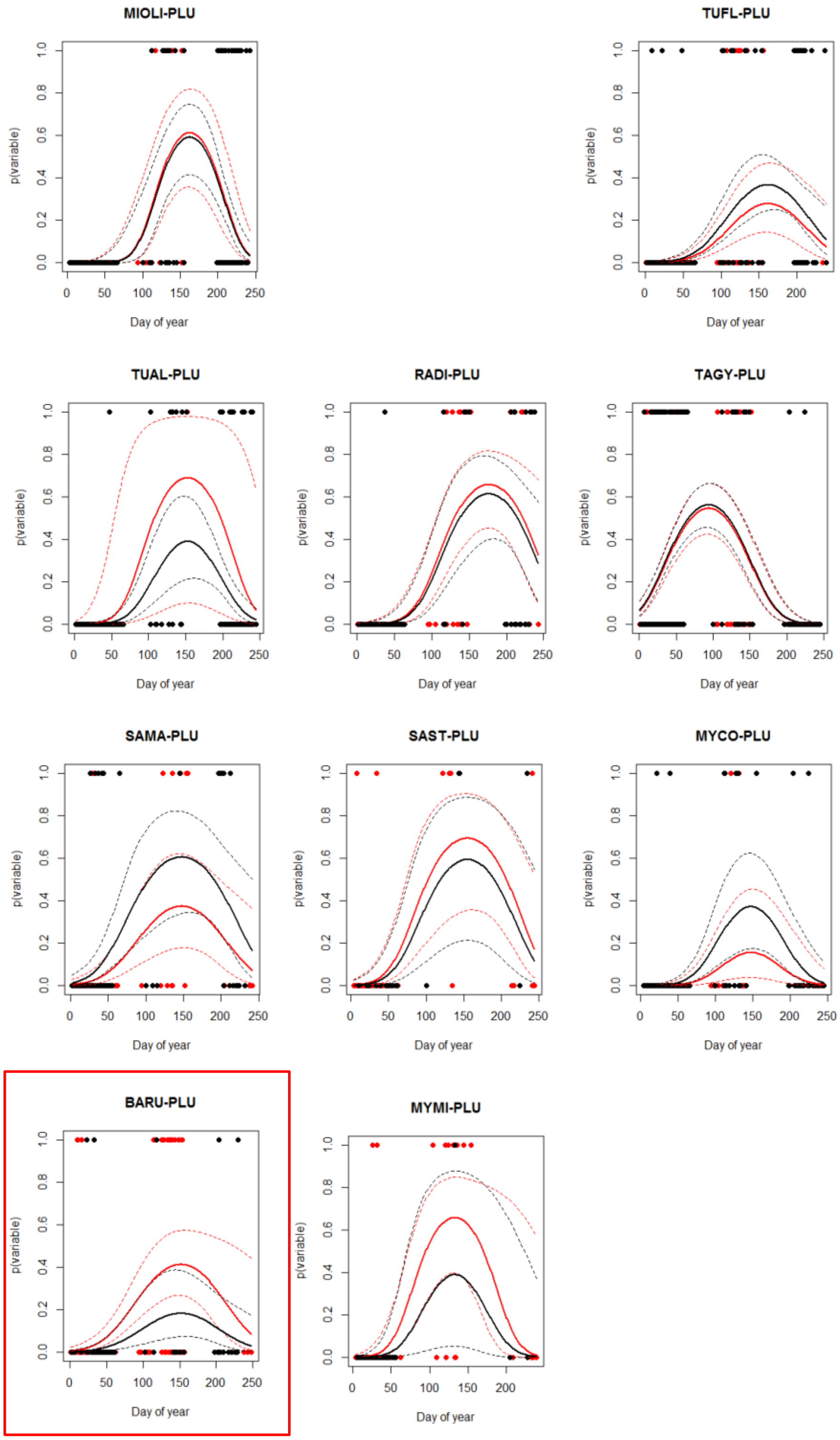


Figure S10. Effect of day of year (day 0: earliest date of sampling) and habitat (coffee in red and forest in black) in estimates for the probability of capturing an individual with active primary plumage molt (over one without). Predicted model (solid line) and 95% confidence intervals (dotted lines) for the generalized linear model of DAY + DAY^2 + HABITAT with binomial error family and logit link; points show observed data.

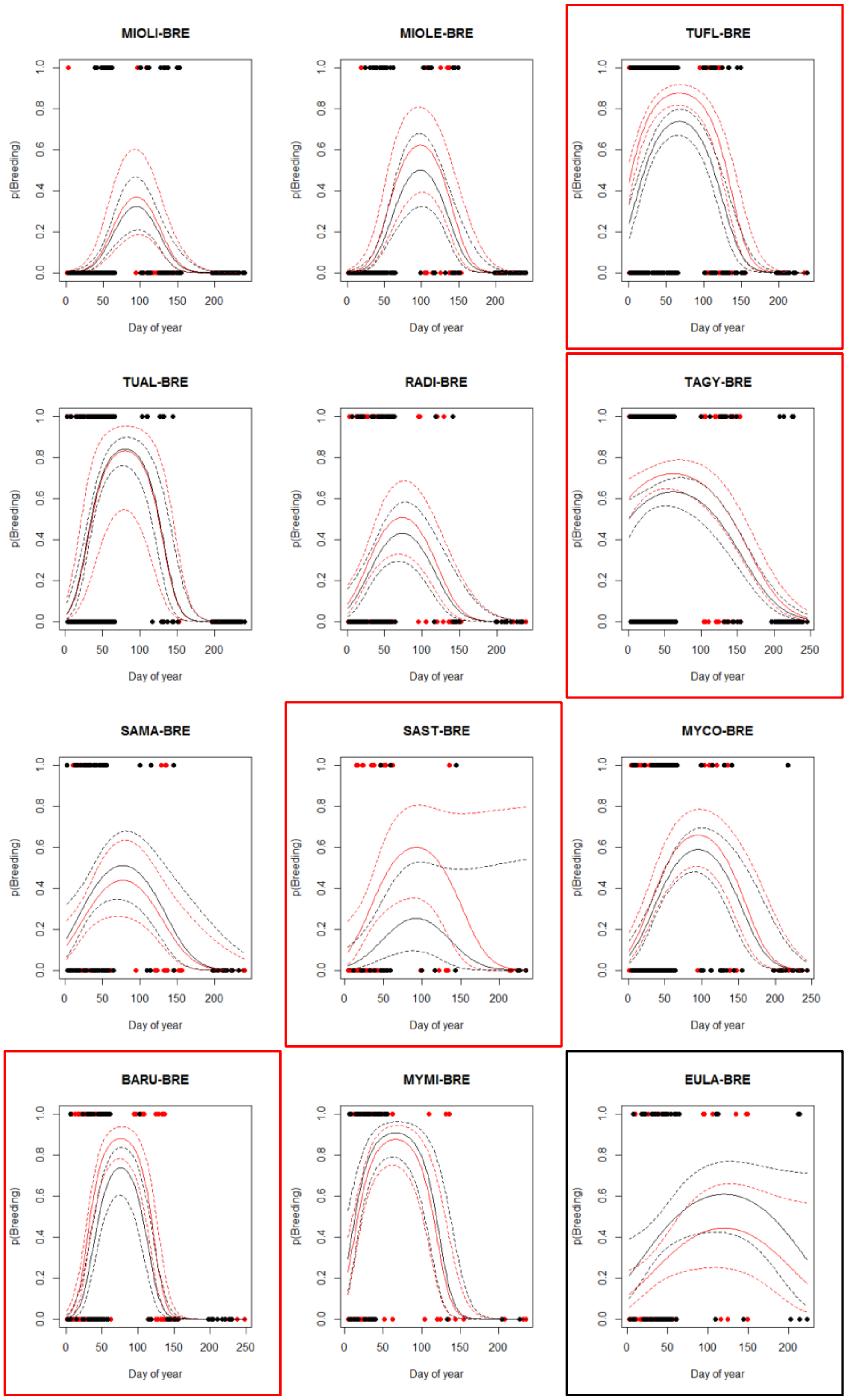


Figure S11. Effect of day of year (day 0: earliest date of sampling) and habitat (coffee in red and forest in black) in estimates for the probability of capturing an individual in active breeding (over an inactive one). Predicted model (solid line) and 95% confidence intervals (dotted lines) for the generalized linear model of DAY + DAY^2 + HABITAT with binomial error family and logit link; points show observed data.

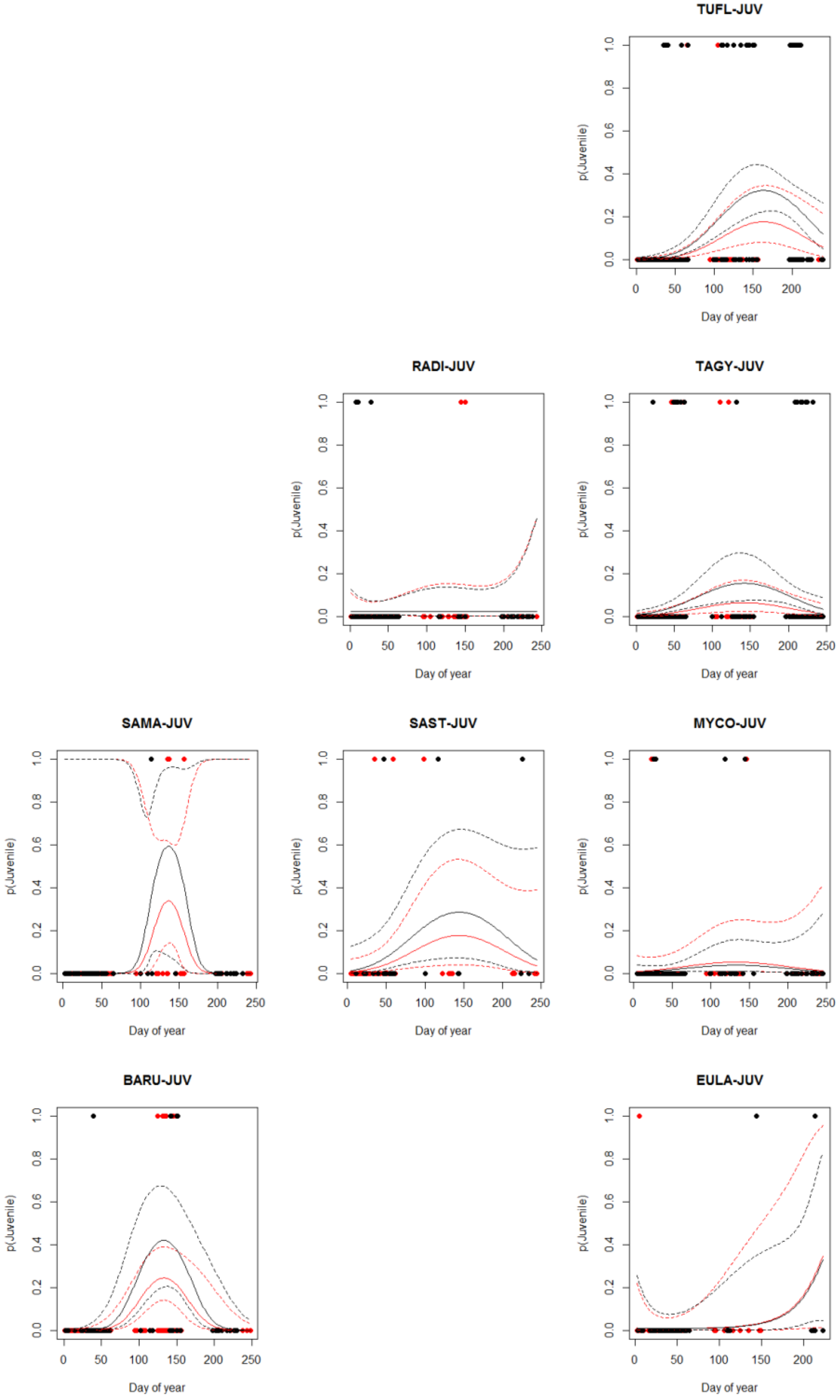


Figure S12. Effect of day of year (day 0: earliest date of sampling) and habitat (coffee in red and forest in black) in estimates for the probability of capturing a juvenile individual (over an adult or immature). Predicted model (solid line) and 95% confidence intervals (dotted lines) for the generalized linear model of DAY + DAY^2 + HABITAT with binomial error family and logit link; points show observed data.

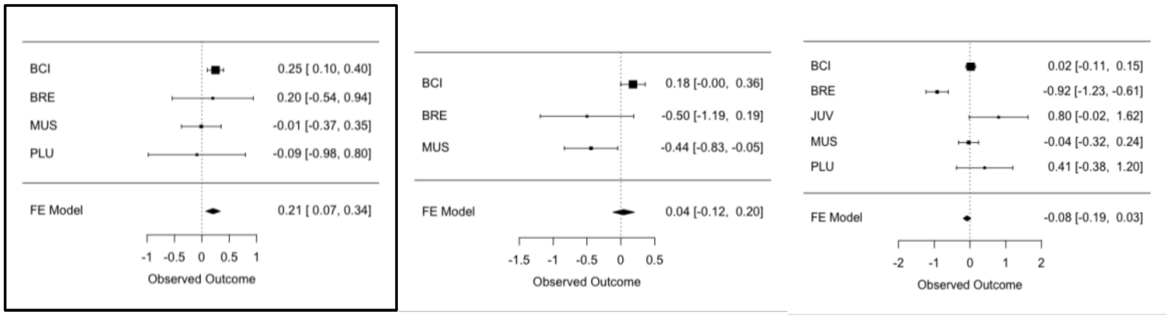
2.2. Level 2: Composite indexes of habitat preference and performance

2.2.1. Habitat preference

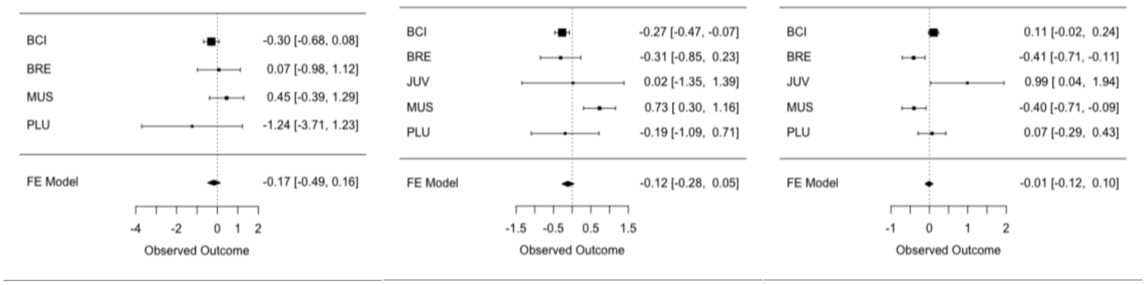
Table S13. Results for index of habitat preference.

Species	**No. indicators showing Forest (F) was preferred**	**No. indicators showing Coffee (C) was preferred**	**F-C**
Mionectes olivaceus	1	0	+1
Mionectes oleagineus	1	0	+1
Turdus flavipes	1	1	0
Turdus albicollis	3	0	+3
Ramphocelus dimidiatus	1	1	0
Tangara gyrola	2	0	+2
Saltator maximus	0	0	0
Saltator striatipectus	0	2	-2
Myiothlypis conspicillata	1	0	+1
Basileuterus rufifrons	1	1	0
Myioborus miniatus	0	1	-1
Euphonia laniirostris	1	1	0

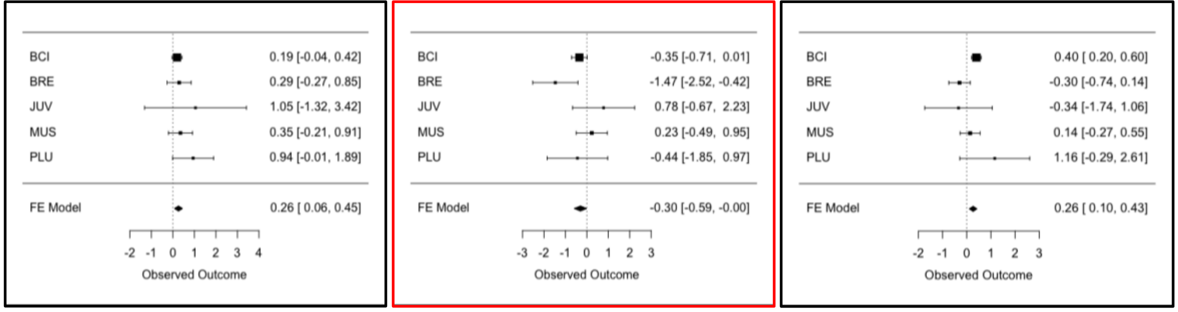
2.2.2. Habitat performance



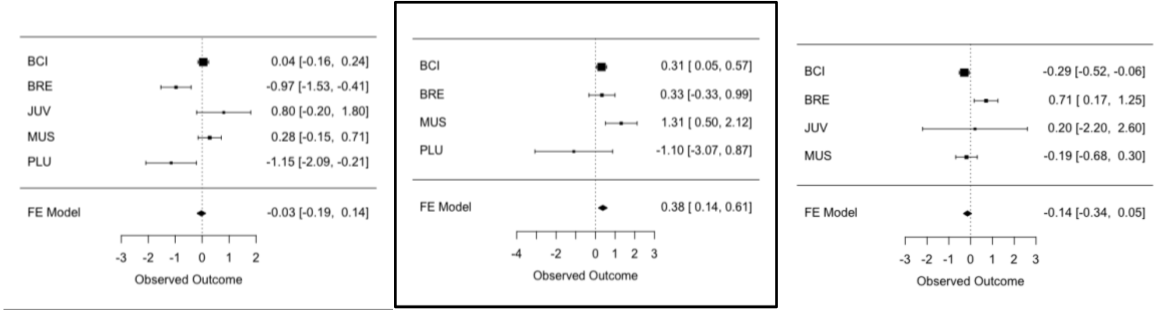
Mionectes olivaceus *Mionectes oleagineus* *Turdus flavipes*



Turdus albicollis *Ramphocelus dimidiatus* *Tangara gyrola*



Saltator maximus *Saltator striatipectus* *Myiothlypis conspicillata*



Basileuterus rufifrons *Myioborus miniatus* *Euphonia laniirostris*

Figure S13. Summary of evidence from meta-analysis of habitat performance with five separate indicators (black frame: quality clearly higher in forest, red frame: quality clearly higher in coffee, no frame: no clear differences; variables: BCI – body condition, MUS – muscle, PLU – primary molt, BRE – breeding, JUV – juveniles; squares: mid-point represents the mean effect estimate for each study, area represents weight given to it in the model, and lines represent 95% confidence intervals (negative values indicate higher performance in coffee, positive values higher performance in forest); diamond: overall effect of habitat on individual fitness with 95% confidence intervals (fixed effects model of the means weighted by the inverse of the variance).

3. Discussion

3.1. Level 1: Separate indicators of habitat preference and performance

3.1.1. Habitat preference

Despite abundance being the most informative indicator for preference, six species showed contrary evidence from other variables. For example, higher abundance in forest was contradicted in *T. flavipes* by a higher proportion of adults in coffee, and in *E. laniirostris* by a higher site fidelity. Other species showed no differences in abundance between habitats and yet for *M. olivaceus* (fidelity), *T. gyrola* (fidelity and variance) and *M. miniatus* (occupancy) there was evidence of preference for one habitat based on interpretation of other indicators. These results emphasize that abundance alone may lead to completely different conclusions about species-habitat relationships than using a suite of indicators of preference (Robertson & Hutto 2006). Occurrence was not a reliable variable in our study, probably because we did not sample enough sites to properly capture heterogeneity for our species. Nonetheless, being the only proposed indicator estimable via visual observations (Ruiz-Gutiérrez *et al.* 2010), further study into its potential as a proxy for preference is warranted. Differences in site fidelity and temporal variance in population size were not correlated with the proportion of individuals that were captured in both habitats within or between seasons (Table S13), giving support to our interpretations despite the fact that parameters were estimated at the population and not the individual level. Only the thrushes showed habitat segregation according to age, which may arise from the strong dominance hierarchies documented in this family (Brown *et al.* 2000; Smith 2001), and from differences in habitat use by age documented elsewhere (Cohen *et al.* 2004; Cohen & Lindell 2005; Verhulst *et al.* 2014).

Table S14. Percent of captured individuals which were recaptured in both habitats within and between primary sampling events.

Species	**Within**	**Between**
Mionectes olivaceus	2%	24%
Mionectes oleagineus	7%	30%
Turdus flavipes	4%	57%
Turdus albicollis	1%	4%
Ramphocelus dimidiatus	2%	32%
Tangara gyrola	1%	25%
Saltator maximus	1%	24%
Saltator striatipectus	1%	8%
Myiothlypis conspicillata	1%	7%
Basileuterus rufifrons	0%	2%
Myioborus miniatus	1%	4%
Euphonia laniirostris	8%	46%

3.1.2. Habitat performance

Considering our sample sizes, we were surprised to find so many statistically unclear results for performance variables. Other than true equal-preference or quality, statistically unclear comparisons may have resulted from aggregating variables measured on different days into occasions, and at different sites into habitat types. Given the difficulty of inferring the degree to which an individual's condition is the result of occupying the habitat where it is captured (Sherry & Holmes 1996), for future analyses it may be advisable to remove floaters by ranking individuals according to how many times they were captured at a site per occasion. As with preference, the chosen variables sometimes complemented (both breeding and primary molt signaled better performance in coffee for *B. rufifrons*, while breeding and muscle signaled better performance of *T. gyrola* in forest), and sometimes contradicted (opposing patterns of body condition and muscle for *R. dimidiatus*, and of body condition and breeding for *E. laniirostris*) each other. Opposing evidence may reflect tradeoffs between different aspects of fitness or may result from confounding variables not taken into account in our analyses (Battin 2004), and reiterates the importance of including a suite of indicators to evaluate performance. The relative frequency of juveniles in the population performed poorly in our analyses, indicating that increased effort to capture juveniles was likely needed. For four species, further research into the higher proportions of individuals showing evidence of breeding in coffee might provide insight into the complementary and supplementary use of both habitats (Dunning *et al.* 1992).

3.2. Level 2: Composite indexes of habitat preference and performance

3.2.1. Habitat preference

Habitat selection results from a variety of individual, social, behavioral, and environmental cues interacting with each other at different scales (Jones 2001; Fletcher Jr & Sieving 2010; Schmidt, Dall & Van Gils 2010; DeCesare *et al.* 2014) and since the indicators of preference used in this study reflected different components of life history, we did not expect them to necessarily provide consistent results within species. Preference classifications did seem to coincide with species habitat descriptions in the literature (Table S1), with the three species classified as being present only in forest (*M. olivaceus, T. albicollis* and *M. conspicillata*) showing the expected pattern of higher preference towards forest, the four species common in forested and woody areas (*M. oleagineus, T. flavipes, T. gyrola* and *M. miniatus*) showing all three options of preference, and the five species common in woody and scrubby vegetation (*R. dimidiatus, S. maximus, S. striatipectus, B. rufifrons* and *E. laniirostris*) showing either higher preference for coffee (*S. striatipectus*) or equal preferences (all other species). This pattern supports the idea that despite structural similarities between forest remnants and shade coffee plantations, the latter is still perceived by forest species as a less preferred habitat, but that as species criteria for selection shift towards more open habitats, differences in preference between forest and coffee are either not there or harder to detect.

However, it is noticeable that preferring coffee over forest was not a common choice, even among the species less associated with forest. Mechanistic explanations behind this pattern could be related to shade coffee in our study site not sharing enough characteristics used as selection cues with the original habitat that species evolved to select, for example having a simpler understory structure or a lower diversity of species offering food resources. Rainfall seasonality has a strong effect on many of the variables we estimated and this introduced further complexity. Forests are typically less affected by changes in precipitation than open habitats, and this leads to seasonal shifts in foraging niche, increases in site fidelity or changes in use related to the formation of mixed-species flocks (Dietsch 2003; Schmidt 2004; Jedlicka *et al.* 2006; Colorado 2011).

A logical next step will be to determine which habitat and social characteristics are being used as selection cues (Schlaepfer, Runge & Sherman 2002; Battin 2004; Robertson & Hutto 2006; Gilroy & Sutherland 2007). Previous studies in shade coffee point to the role that keystone plant species such as the genus *Inga* (which dominated shade at our study site) have in providing seasonal resources, to the importance of epiphytes for foraging and breeding, and to the presence of scattered trees in the landscape to attract habitat-sensitive species (Johnson 2000; Sekercioglu *et al.* 2007; Cruz-Angón, Sillett & Greenberg 2008). Nonetheless, to get a complete picture of habitat and landscape effects on species distribution and persistence, we need long-term demographic studies that allow the distinction of the effects that such variables can have on preference, use and/or performance.

3.2.2. Habitat performance

Ideally, habitat quality assessments should take into account survival and reproductive success, as well as individual condition, and be able to discriminate the effects of density-dependence from other causes of variation (Pulliam & Danielson 1991; Vickery, Hunter & Wells 1992; Donovan & Thompson 2001; Burel & Baudry 2005; Johnson *et al.* 2006). Although we did not have enough information to estimate these vital rates, the variables we chose for performance are all factors that could ultimately affect survival and reproduction. Furthermore, they reflect performance at shorter intervals than population-wide estimates, which can be more appropriate to answer our questions given the larger than expected home ranges we found for our study species (evidenced by very low recapture rates and by many individuals being captured in different sites and/or habitats within a sampling occasion – Table S14), and that even within the same habitat patch, wanderer and sedentary birds can experience different mortality rates (Rappole, Ramos & Winker 1989).

Differences in performance were harder to find, but two of the three forest species showed higher performance in forest (*M. olivaceus* and *M. conspicillata*), while one showed no consistent differences in performance (*T. albicollis*). Following the expected pattern for the woody area species, three showed no differences in performance and one (*M. miniatus*) showed higher performance in forest. Lastly, of the scrubby area species three showed no differences, only one had evidence of better performance in coffee (*S. striatipectus*) and surprisingly one had evidence of better performance in forest (*S. maximus*). Our findings seem to contradict previous studies in tropical agroecosystems which found that resident birds do not commute regularly to forest (Sekercioglu *et al.* 2007) but coincide with evidence for better habitat quality in forest than plantations for wintering Neotropical migrants (Bakermans *et al.* 2009; Chandler & King 2011; Bayly *et al.* 2016).

Other than methodological issues, better performance in forest for species with a range of habitat associations once again points to characteristics in the coffee plantations in our study site that may be making it a lower quality habitat than existing forest remnants. Caution should be exercised with habitat quality classifications, since the "best-quality habitat" may vary across seasons, years and individual life stages (Lindell & Smith 2003; Cohen & Lindell 2004). We need more information to understand if this apparent forest dependence is related to issues of habitat supplementation and complementation (Dunning, Danielson & Pulliam 1992), seasonality in resources and predation (Wunderle Jr & Latta 1998; Dietsch 2003; Shochat *et al.* 2005), changes in community composition brought about by the presence of migrants (Greenberg, Reitsma & Angon 1996; Jedlicka *et al*. 2006), or to varying levels of landscape heterogeneity (Tscharntke *et al*. 2012), to name just a few possible mechanisms.

4. References

Ayerbe-Quiñones, F. (2018) Guía ilustrada de la Avifauna colombiana. 1st Edition.Wildlife Conservation Society.

Bakermans, M.H., Vitz, A.C., Rodewald, A.D. & Rengifo, C.G. (2009) Migratory songbird use of shade coffee in the Venezuelan Andes with implications for conservation of cerulean warbler. Biological Conservation, 142, 2476-2483.

Battin, J., 2004. When good animals love bad habitats: Ecological traps and the conservation of animal populations. Conservation Biology 18, 1482-1491.

Bayly, N., Gómez, C., Hobson, K. & Rosenberg, K. (2016) Prioritizing tropical habitats for long-distance migratory songbirds: an assessment of habitat quality at a stopover site in Colombia. Avian Conservation and Ecology, 11, 5.

Brown, D.R., Stouffer, P.C. & Strong, C.M. (2000). Movement and territoriality of wintering Hermit Thrushes in southeastern Louisiana. The Wilson Bulletin 112:347-353.

Burel, F. & Baudry, J. (2005) Habitat quality and connectivity in agricultural landscapes: The role of land use systems at various scales in time. Ecological Indicators, 5, 305-313.

Chandler, R.B. & King, D.I. (2011) Habitat quality and habitat selection of golden-winged warblers in Costa Rica: an application of hierarchical models for open populations. Journal of Applied Ecology, 48, 1038-1047.

Cohen, E.B., Lindell, C.A. (2004) Survival, habitat use, and movements of fledgling White-Throated Robins (Turdus assimilis) in a Costa Rican agricultural landscape. Auk 121, 404-414.

Cohen, E.B. & Lindell, C.A. (2005) Habitat use of adult White-throated Robins during the breeding season in a mosaic landscape in Costa Rica. Journal of Field Ornithology, 76, 279-286.

Colorado, G.J. (2011) Ecology and conservation of Neotropical-Nearctic migratory birds and mixed-species flocks in the Andes. The Ohio State University.

Cruz-Angón, A., Sillett, T.S. & Greenberg, R. (2008) An experimental study of habitat selection by birds in a coffee plantation. Ecology, 89, 921-927.

DeCesare, N.J., Hebblewhite, M., Bradley, M., Hervieux, D., Neufeld, L. & Musiani, M. (2014) Linking habitat selection and predation risk to spatial variation in survival. Journal of Animal Ecology, 83, 343-352.

Dietsch, T.V. (2003) Conservation and ecology of birds in coffee agroecosystems of Chiapas, Mexico. University of Michigan.

Donovan, T.M. & Thompson, F.R. (2001) Modeling the ecological trap hypothesis: A habitat and demographic analysis for migrant songbirds. Ecological Applications, 11, 871-882.

Dunning, J.B., Danielson, B.J., Pulliam, H.R. (1992) Ecological processes that affect populations in complex landscapes. Oikos 65, 169-175.

Dushoff, J., Kain, M.P. & Bolker, B.M. (2019) I can see clearly now: Reinterpreting statistical significance. Methods Ecol Evol, 10, 756–759.

Fletcher Jr, R.J. & Sieving, K.E. (2010) Social-information use in heterogeneous landscapes: a prospectus. The Condor, 112, 225-234.

Gilroy, J.J. & Sutherland, W.J. (2007) Beyond ecological traps: perceptual errors and undervalued resources. Trends in Ecology & Evolution, 22, 351-356.

Gómez, C., Gómez-Bahamón, V., Cárdenas-Ortíz, L. & Bayly, N.J. (2015) Distribution of Nearctic-Neotropical migratory birds along a South American elevation gradient during spring migration. The Wilson Journal of Ornithology, 127, 72-86.

Green, A.J. (2001) Mass/length residuals: Measures of body condition or generators of spurious results? Ecology, 82, 1473-1483.

Greenberg, R., Reitsma, R. & Angon, A.C. (1996) Interspecific aggression by Yellow Warblers in a sun coffee plantation. The Condor, 98, 640-642.

Jedlicka, J.A., Greenberg, R., Perfecto, I., Philpott, S.M. & Dietsch, T.V. (2006) Seasonal shift in the foraging niche of a tropical avian resident: resource competition at work? Journal of Tropical Ecology, 22, 385-395.

Johnson, M.D. (2000) Effects of Shade-Tree Species and Crop Structure on the Winter Arthropod and Bird Communities in a Jamaican Shade Coffee Plantation1. Biotropica, 32, 133-145.

Johnson, M.D., Sherry, T.W., Holmes, R.T. & Marra, P.P. (2006) Assessing habitat quality for a migratory songbird wintering in natural and agricultural habitats. Conservation Biology, 20, 1433-1444.

Jones, J. (2001) Habitat selection studies in avian ecology: A critical review. Auk, 118, 557-562.

Kattan, G.H. & Franco, P. (2004) Bird diversity along elevational gradients in the Andes of Colombia: area and mass effects. Global Ecology and Biogeography, 13, 451-458.

Kellner, K. (2016) jagsUI: A Wrapper Around 'rjags' to Streamline 'JAGS' Analyses. R package version 1.4.2. https://CRAN.R-project.org/package=jagsUI.

Kéry, M. & Schaub, M. (2012) Bayesian population analysis using WinBUGS: a hierarchical perspective. Academic Press.

Lindell, C. & Smith, M. (2003) Nesting bird species in sun coffee, pasture, and understory forest in southern Costa Rica. Biodiversity and Conservation, 12, 423-440.

Mazerolle, M.J. (2016) AICcmodavg: Model selection and multimodel inference based on (Q)AIC(c). R package version 2.0-4. http://CRAN.R-project.org/package=AICcmodavg.

Moguel, P. & Toledo, V.M. (1999) Biodiversity conservation in traditional coffee systems of Mexico. Conservation Biology, 13, 11-21.

Parker, T.A.III, Stotz, D.F., & Fitzpatrick, J.W. (1996) Ecological and distributional databases. Pages 113-436 in Stotz, D.F., Fitzpatrick, J.W., Parker, T.A.III, & Moskovits, D.K. Neotropical birds: ecology and conservation. University of Chicago Press, Chicago, Illinois.

Peig, J. & Green, A.J. (2009) New perspectives for estimating body condition from mass/length data: the scaled mass index as an alternative method. Oikos, 118, 1883-1891.

Plummer, M. (2016) JAGS: Just another Gibbs sampler [version 4.0.0]. https://sourceforge.net/projects/mcmc-jags/.

Pulliam, H.R. & Danielson, B.J. (1991) Sources, sinks, and habitat selection - a landscape perspective on population-dynamics. American Naturalist, 137, S50-S66.

Pyle, P., Howell, S.N., Yunick, R.P. & DeSante, D.F. (1987) Identification guide to North American passerines. Slate Creek Press, Bolinas, California.

R Core Team (2016) R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.

Rappole, J.H., Ramos, M.A. & Winker, K. (1989) Wintering Wood Thrush movements and mortality in southern Veracruz. The Auk, 402-410.

Robertson, B.A. & Hutto, R.L. (2006) A framework for understanding ecological traps and an evaluation of existing evidence. Ecology, 87, 1075-1085.

Royle, J.A., Dorazio, R.M. & Link, W.A. (2007) Analysis of multinomial models with unknown index using data augmentation. J. Comput. Graph. Stat, 16, 67-85.

Royle, J.A. & Dorazio, R.M. (2008) Hierarchical modeling and inference in ecology: the analysis of data from populations, metapopulations and communities. Academic Press.

Ruiz-Gutiérrez, V., Zipkin, E.F. & Dhondt, A.A. (2010) Occupancy dynamics in a tropical bird community: unexpectedly high forest use by birds classified as non-forest species. Journal of Applied Ecology, 47, 621-630.

Schlaepfer, M.A., Runge, M.C. & Sherman, P.W. (2002) Ecological and evolutionary traps. Trends in Ecology & Evolution, 17, 474-480.

Schmidt, K.A. (2004) Site fidelity in temporally correlated environments enhances population persistence. Ecology Letters, 7, 176-184.

Schmidt, K.A., Dall, S.R. & Van Gils, J.A. (2010) The ecology of information: an overview on the ecological significance of making informed decisions. Oikos, 119, 304-316.

Schulenberg, T.S., Editor (2019) Neotropical Birds Online. Cornell Lab of Ornithology, Ithaca, NY, USA:

Burns, K. J. and C. Mireles (2010). Bay-headed Tanager (Tangara gyrola), version 1.0. In Neotropical Birds Online (T. S. Schulenberg, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/nb.bahtan1.01

Crimson-backed Tanager (Ramphocelus dimidiatus), In Neotropical Birds Online (T. S. Schulenberg, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. retrieved from Neotropical Birds Online: https://neotropical.birds.cornell.edu/Species-Account/nb/species/crbtan1

Gómez Montes, C. (2014). White-lored Warbler (Myiothlypis conspicillata), version 1.0. In Neotropical Birds Online (T. S. Schulenberg, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/nb.whlwar1.01

Harrod, W. D. and R. L. Mumme (2018). Slate-throated Redstart (Myioborus miniatus), version 1.0. In Neotropical Birds Online (T. S. Schulenberg, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/nb.sltred.01

McAfee, A. and K. J. Burns (2010). Buff-throated Saltator (Saltator maximus), version 1.0. In Neotropical Birds Online (T. S. Schulenberg, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/nb.butsal1.01

Olive-striped Flycatcher (Mionectes olivaceus), In Neotropical Birds Online (T. S. Schulenberg, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. retrieved from Neotropical Birds Online: https://neotropical.birds.cornell.edu/Species-Account/nb/species/olsfly1

Rufous-capped Warbler (Basileuterus rufifrons), In Neotropical Birds Online (T. S. Schulenberg, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. retrieved from Neotropical Birds Online: https://neotropical.birds.cornell.edu/Species-Account/nb/species/rucwar

Standish, H., E. Mayne, F. Hall, and W. Tori (2013). Ochre-bellied Flycatcher (Mionectes oleagineus), version 1.0. In Neotropical Birds Online (T. S. Schulenberg, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/nb.ocbfly1.01

Streaked Saltator (Saltator striatipectus), In Neotropical Birds Online (T. S. Schulenberg, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. retrieved from Neotropical Birds Online: https://neotropical.birds.cornell.edu/Species-Account/nb/species/strsal1

Thick-billed Euphonia (Euphonia laniirostris), In Neotropical Birds Online (T. S. Schulenberg, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. retrieved from Neotropical Birds Online: https://neotropical.birds.cornell.edu/Species-Account/nb/species/thbeup1

White-necked Thrush (Turdus albicollis), In Neotropical Birds Online (T. S. Schulenberg, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. retrieved from Neotropical Birds Online: https://neotropical.birds.cornell.edu/Species-Account/nb/species/whnrob1

Yellow-legged Thrush (Turdus flavipes), In Neotropical Birds Online (T. S. Schulenberg, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. retrieved from Neotropical Birds Online: https://neotropical.birds.cornell.edu/Species-Account/nb/species/yelthr1

Sekercioglu, C.H., Loarie, S.R., Brenes, F.O., Ehrlich, P.R. & Daily, G.C. (2007) Persistence of forest birds in the Costa Rican agricultural countryside. Conservation Biology, 21, 482-494.

Shochat, E., Patten, M.A., Morris, D.W., Reinking, D.L., Wolfe, D.H. & Sherrod, S.K. (2005) Ecological traps in isodars: effects of tallgrass prairie management on bird nest success. Oikos, 111, 159-169.

Sherry, T.W. & Holmes, R.T. (1996). Winter Habitat Quality, Population Limitation, and Conservation of Neotropical-Nearctic Migrant Birds. Ecology, 77, 36-48.

Smith, R.D., Ruxton, G.D. & Cresswell, W. (2001) Dominance and feeding interference in small groups of blackbirds. Behavioral Ecology, 12, 475–481.

Tscharntke, T., Tylianakis, J.M., Rand, T.A., Didham, R.K., Fahrig, L., Batary, P., Bengtsson, J., Clough, Y., Crist, T.O. & Dormann, C.F. (2012) Landscape moderation of biodiversity patterns and processes-eight hypotheses. Biological Reviews, 87, 661-685.

Tukey, J.W. (1949) Comparing Individual Means in the Analysis of Variance. Biometrics, 5, 99-114.

Verhulst, S., Geerdink, M., Salomons, M, & Boonekamp, J.J. (2014) Social life histories: jackdaw dominance increases with age, terminally declines and shortens lifespan. Proc Biol Sci. 281, 20141045.

Vickery, P.D., Hunter, M.L. & Wells, J.V. (1992) Use of a new reproductive index to evaluate relationship between habitat quality and breeding success. Auk, 109, 697-705.

Viechtbauer, W. (2010) Conducting meta-analyses in R with the metafor package. Journal of Statistical Software, 36, 1-48.

Wickham, H. (2016) ggplot2: Elegant Graphics for Data Analysis. R package version 2.1.0. https://CRAN.R-project/package=ggplot2.

Wolfe, J.D., Ryder, T. & Pyle, P. (2010) Using molt cycles to categorize the age of tropical birds: an integrative new system. Journal of Field Ornithology, 81, 186-194.

Wunderle Jr, J.M. & Latta, S.C. (1998) Avian resource use in Dominican shade coffee plantations. The Wilson Bulletin, 271-281.

Habitat selection in transformed landscapes and the role of forest remnants and shade coffee in the conservation of resident birds.

Sánchez-Clavijo, L.M., Bayly, N.J., and Quintana-Ascencio P.F. (2019). *Journal of Animal Ecology* **V**(i): pp.

Supporting Information - Part 2: R code used for data analysis, following the order and structure of the manuscript.

1. Level 1: Separate indicators of habitat preference and performance

1.1. Habitat preference

1.1.1. Occurrence

```
### Occupancy model with effect of habitat on p and quadratic altitude & habitat on psi
### Based on code available at
### http://www.vogelwarte.ch/de/projekte/publikationen/bpa/code-for-running-bpa-using-jags.html
### Kéry & Schaub 2012 Bayesian population analysis using WinBUGS: a hierarchical perspective.

## Part 1. Get ready

setwd("")
data<-read.table("",header=TRUE)
y<-as.matrix(data[,5:20]) #Select columns with detected (1) / not detected (0) data
habitat<-data$hab
alt<-as.vector(scale(data$altitude))
library(jagsUI)

## Part 2. Set up and run Bayesian model in JAGS

cat("
  model {

  # Priors
  alpha.psi ~ dnorm(0,0.01)
  beta1.psi ~ dnorm(0,0.01)
  beta2.psi ~ dnorm(0,0.01)
  beta4.psi ~ dnorm(0,0.01)
  alpha.p ~ dnorm(0,0.01)
  beta1.p ~ dnorm(0,0.01)

  # Likelihood

  # Ecological model for true occurrence
  for (i in 1:R) {
  z[i] ~ dbern(psi[i])
  psi[i] <- 1 / (1 + exp(-lpsi.lim[i]))
  lpsi.lim[i] <- min(999, max(-999, lpsi[i]))
  lpsi[i] <- alpha.psi + beta1.psi*habitat[i] + beta2.psi*alt[i] + beta4.psi*pow(alt[i],2)

  # Observation model for replicated detection/non-detection observations
  for (j in 1:T){
  y[i,j] ~ dbern(mu.p[i,j])
  mu.p[i,j] <- z[i] * p[i,j]
  p[i,j] <- 1 / (1+exp(-lp.lim[i,j]))
  lp.lim[i,j] <- min(999, max(-999, lp[i,j]))
  lp[i,j] <- alpha.p + beta1.p*habitat[i]
  } #j
  } #i

  # Derived quantities
  occ.fs <- sum(z[]) # Number of occupied sites
```

```
   for (s in 1:9){
   odds1[s] <- alpha.psi + beta1.psi*habitat[s] + beta2.psi*alt[s] + beta4.psi*pow(alt[s],2)
   psi.site[s] <- exp(odds1[s]) / (1+exp(odds1[s]))
   } #site

   for (i in 1:R){
   for (j in 1:T){
   odds2[i,j] <- alpha.p + beta1.p*habitat[i]
   pij[i,j] <- exp(odds2[i,j]) / (1+exp(odds2[i,j]))
   } #occasion
   } #site

   }",file="name.txt")

data<-list(y=y,R=nrow(y),T=ncol(y),habitat=habitat,alt=alt)
zst<-apply(y,1,max,na.rm=TRUE)
inits<-function(){list(z=zst,alpha.p=runif(1,-3,3),alpha.psi=runif(1,-3,3))}
params<-c("alpha.psi","beta1.psi","beta2.psi","beta4.psi","psi.site","alpha.p","beta1.p","occ.fs")
ni<-120000
nb<-20000
nt<-100
nc<-3

m=jags(data,inits,params,model="name.txt",n.chains=nc,n.thin=nt,n.iter=ni,n.burnin=nb);m

## Note: output for psi for all species was manually put together into a single file

## Part 3. Build graphs

d<-read.table("occupancy.txt",header=T)
d<-data[data$SPP=="",] # Select species to make graph
attach(d)

plot(ALT,psi_m,type="n",ylab="Occupancy",xlab="Elevation",main="Turdus flavipes",ylim=c(0.95,1.0))
points(ALT[HABITAT=="COFFEE"],psi_m[HABITAT=="COFFEE"],col="red",pch=16)
points(ALT[HABITAT=="FOREST"],psi_m[HABITAT=="FOREST"],col="black",pch=16)
ALT2<-ALT^2
m<-lm(psi_m~ALT+ALT2+HABITAT)
x<-seq(min(ALT),max(ALT),1)
one<-rep("COFFEE",length(x))
two<-rep("FOREST",length(x))
y1<-predict(m,list(ALT=x,ALT2=x^2,HABITAT=one),interval=c("confidence"),level=0.95,type="response")
y2<-predict(m,list(ALT=x,ALT2=x^2,HABITAT=two),interval=c("confidence"),level=0.95,type="response")
lines(x,y1[,1],col="red")
lines(x,y1[,2],col="red",lty=2)
lines(x,y1[,3],col="red",lty=2)
lines(x,y2[,1],col="black")
lines(x,y2[,2],col="black",lty=2)
lines(x,y2[,3],col="black",lty=2)
```

1.1.2. Abundance

```
### Closed population model with effect of quadratic effort on p
### Based on code available at
### http://www.vogelwarte.ch/de/projekte/publikationen/bpa/code-for-running-bpa-using-jags.html
### Kéry & Schaub 2012 Bayesian population analysis using WinBUGS: a hierarchical perspective.
### Forest version (code for coffee is exactly the same)
### Used for species with low recapture rates

## Part 1. Get ready

setwd("")
CH<-read.table("",header=F)
CH<-as.matrix(CH)
nz<-2000 # Set number of augmented individuals
CH.aug<-rbind(CH,matrix(0,ncol=dim(CH)[2],nrow=nz)) # Bind real data with augmented individuals
```

```
eff <- c(-0.6733507,-0.1116703,-0.8040866,1.0728217,-1.0522429,-0.3574055,1.7222646,1.1242687,-1.0855321,0.2690376,-1.0558744,0.9517698) # Vector of effort per occasion (scaled mist net hours)
library(jagsUI)

## Part 2. Set up and run Bayesian model in JAGS

cat("
        model {

        # Priors and constraints
        psi ~ dunif(0,1)
        for (t in 1:n.occ){
                logit(p[t]) <- mp + beta1*x[t] + beta2*pow(x[t],2)
                p.est[t] <- 1 / (1+exp(-mp-beta1*x[t]-beta2*pow(x[t],2)))
        } #t
        mp ~ dnorm(0,0.001)
        mean.p <- 1 / (1+exp(-mp))
        beta1 ~ dnorm(0,0.001)I(-10,10)
        beta2 ~ dnorm(0,0.001)I(-10,10)

        # Likelihood
        for (i in 1:M){
        z[i] ~ dbern(psi)
        for (t in 1:n.occ){
        y[i,t] ~ dbern(mu[i,t])
        mu[i,t] <- z[i] * p[t]
        } #t
        } #i

        # Derived quantities
        N <- sum(z[])

        }",file="name.txt")

data <- list(y=CH.aug,M=dim(CH.aug)[1],n.occ=dim(CH.aug)[2],x=eff)
inits <- function(){list(z=rep(1,dim(CH.aug)[1]),mp=rnorm(1),beta1=runif(1,-5,5),beta2=runif(1,-5,5))}
params <- c("N","p.est","mean.p","beta1","beta2","psi")
ni <- 12000
nb <- 2000
nt <- 10
nc <- 3

m=jags(data=data,inits=inits,parameters=params,model="name.txt",n.chains=nc,n.iter=ni,n.burnin=nb,n.thin=nt,parallel=TRUE)

## Part 3. Collect output

write.table(m$summary,"C:/summ.txt",sep="\t") #Saves summary statistics for all iterations
write.table(m$sims.list,"C:/sims.txt",sep="\t") #Saves complete results for each iteration
pdf("C:/plots.pdf") #Next three lines save diagnostic plots in pdf files
plot(m)
dev.off()

## Part 4. Build graphs

library(ggplot2)
C_sim<-read.table("",header=T) #Simulation file for coffee
F_sim<-read.table("",header=T) #Simulation file for forest
Ncof<-C_sim$N
Nfor<-F_sim$N
Nsup<-c(Ncof,Nfor)
type<-c(rep(1,length(Ncof)),rep(2,length(Nfor)))
p.graph<-cbind(type,Nsup)
p.graph<-as.data.frame(p.graph)
p.graph$type<-factor(p.graph$type)
levels(p.graph$type)<-c("Coffee","Forest")
ggplot(p.graph,aes(p.graph$Nsup,fill=p.graph$type))+
  geom_histogram(position="dodge",binwidth=20)+
  scale_fill_manual(values=c("red","black"))+
  xlab("Total Abundance")+
```

```
 ylab("Frequency")+
 ggtitle("SPECIES")+
 xlim(min(Nsup),max(Nsup))+
 theme_classic()+
 geom_vline(xintercept=min(Nsup))+
 geom_hline(yintercept=0)+
 theme(axis.text=element_text(size=10),axis.title=element_text(size=12))+
 theme(legend.position="none")
```

```
### Jolly-Seber model with effect of quadratic effort on p and random variation of phi per occasion
### Parameterized as a multistate model based on code available at
### http://www.vogelwarte.ch/de/projekte/publikationen/bpa/code-for-running-bpa-using-jags.html
### Kéry & Schaub 2012 Bayesian population analysis using WinBUGS: a hierarchical perspective.
### Forest version (code for coffee is exactly the same)
### Used for species with high recapture rates

### Parameters
# phi: survival probability
# gamma: removal entry probability
# p1: capture probability in coffee
# p2: capture probability in forest

### States (S)
# 1 not yet entered
# 2 alive
# 3 dead

### Observations (O)
# 1 captured
# 2 not captured

## Part 1. Get ready

setwd("")
nz<-2000 # Set number of augmented individuals
CH<-read.table("",header=F)
V0<-rep(0,dim(CH)[1])
CH.du<-cbind(V0,CH)
mat.n<-matrix(0,ncol=dim(CH.du)[2],nrow=nz) # Bind real data with augmented individuals
colnames(mat.n)<-colnames(CH.du)
CH.ms<-rbind(CH.du,mat.n)
CH.ms[CH.ms==0]<-2
eff_forest <- c(1144,2072,928,4029,518,1666,5102,4114,463,2701,512,3829) # Vector of mist net hours
e_for <- as.vector(scale(eff_forest))
eff <- c(0,e_for)
library(jagsUI)

## Part 2. Set up and run Bayesian model in JAGS

cat("model {

 # Priors and constraints
  for (t in 1:(n.occasions-1)){
  gamma[t] ~ dunif(0,1)
  phi[t] ~  dunif(0,1)
  } #t

 alpha.p ~ dnorm(0,0.001)
 beta1.p ~ dnorm(0,0.001)
 beta2.p ~ dnorm(0,0.001)

 # Define state-transition and observation matrices
  for (j in 1:M){

  # Define probabilities of state S(t+1) given S(t)
   for (t in 1:(n.occasions-1)){
   ps[1,j,t,1] <- 1-gamma[t]
   ps[1,j,t,2] <- gamma[t]
   ps[1,j,t,3] <- 0
```

```
    ps[2,j,t,1] <- 0
    ps[2,j,t,2] <- phi[t]
    ps[2,j,t,3] <- 1-phi[t]
    ps[3,j,t,1] <- 0
    ps[3,j,t,2] <- 0
    ps[3,j,t,3] <- 1

  # Define probabilities of O(t) given S(t)
    po[1,j,t,1] <- 0
    po[1,j,t,2] <- 1
    po[2,j,t,1] <- p[t]
    po[2,j,t,2] <- 1-p[t]
    po[3,j,t,1] <- 0
    po[3,j,t,2] <- 1

   } #t
  } #i

# Likelihood

for (t in 1:n.occasions){
lin.p[t] <- alpha.p + beta1.p * eff[t] + beta2.p * pow(eff[t],2)
p[t] <- exp(lin.p[t]) / (1+exp(lin.p[t]))
} #t

for (i in 1:M){

  # Define latent state at first occasion
  z[i,1] <- 1

  for (t in 2:n.occasions){

    # State process: draw S(t) given S(t-1)
    z[i,t] ~ dcat(ps[z[i,t-1], i, t-1,])

    # Observation process: draw O(t) given S(t)
    y[i,t] ~ dcat(po[z[i,t], i, t-1,])

 } #t
} #i

# Calculate derived population parameters

for (t in 1:(n.occasions-1)){
qgamma[t] <- 1-gamma[t]
} #t

cprob[1] <- gamma[1]

for (t in 2:(n.occasions-1)){
cprob[t] <- gamma[t] * prod(qgamma[1:(t-1)])
} #t

psi <- sum(cprob[])

for (t in 1:(n.occasions-1)){
b[t] <- cprob[t] / psi
} #t

for (i in 1:M){
  for (t in 2:n.occasions){
  al[i,t-1] <- equals(z[i,t], 2)
  } #t
  for (t in 1:(n.occasions-1)){
  d[i,t] <- equals(z[i,t]-al[i,t],0)
  } #t
alive[i] <- sum(al[i,])
} #i
```

```
  for (t in 1:(n.occasions-1)){
  N[t] <- sum(al[,t])
  B[t] <- sum(d[,t])
  } #t

  for (i in 1:M){
  w[i] <- 1-equals(alive[i],0)
  } #i

  Nforest <- sum(w[])

} #model
", file="name.txt")

data <- list(y=CH.ms,n.occasions=dim(CH.ms)[2],M=dim(CH.ms)[1],eff=eff)

js.multistate.init <- function(ch,nz){
  ch[ch==2] <- NA
  state <- ch
  for (i in 1:nrow(ch)){
    n1 <- min(which(ch[i,]==1))
    n2 <- max(which(ch[i,]==1))
    state[i,n1:n2] <- 2
  }
  state[state==0] <- NA
  get.first <- function(x) min(which(!is.na(x)))
  get.last <- function(x) max(which(!is.na(x)))
  f <- apply(state, 1, get.first)
  l <- apply(state, 1, get.last)
  for (i in 1:nrow(ch)){
    state[i,1:f[i]] <- 1
    if(l[i]!=ncol(ch)) state[i, (l[i]+1):ncol(ch)] <- 3
    state[i, f[i]] <- 2
  }
  m.z <- matrix(1, ncol = ncol(ch), nrow = nz)
  colnames(m.z) <- colnames(state)
  state <- rbind(state,m.z)
  state <-as.matrix(state)
  state[,1] <- NA
  return(state)
}

inits <- function(){list(z = js.multistate.init(CH.du,nz),
                         alpha.p=runif(1,-1,1),beta1.p=runif(1,-1,1),beta2.p=runif(1,-1,1),
                         phi=runif(12,0,1))}

params <- c("Nforest","p","alpha.p","beta1.p","beta2.p","phi","psi","b","B","N","gamma")

ni <- 12000
nb <- 2000
nt <- 10
nc <- 3

Jm=jags(data=data,inits=inits,parameters=params,model="name.txt",n.chains=nc,n.iter=ni,n.burnin=nb,n.thin=nt,parallel=TRUE)

## Part 3. Collect output

write.table(m$summary," C:/summ.txt",sep="\t") #Saves summary statistics for all iterations
write.table(m$sims.list," C:/summ.txt",sep="\t") #Saves complete results for each iteration
pdf("C:/plots.pdf") #Next three lines save diagnostic plots in pdf files
plot(m)
dev.off()

## Part 4. Build graphs

library(ggplot2)
C_sim<-read.table("",header=T) #Simulation file for coffee
F_sim<-read.table("",header=T) #Simulation file for forest
Ncof<-C_sim$Ncoffee
```

```
Nfor<-F_sim$Nforest
Nsup<-c(Ncof,Nfor)
type<-c(rep(1,length(Ncof)),rep(2,length(Nfor)))
p.graph<-cbind(type,Nsup)
p.graph<-as.data.frame(p.graph)
p.graph$type<-factor(p.graph$type)
levels(p.graph$type)<-c("Coffee","Forest")
ggplot(p.graph,aes(p.graph$Nsup,fill=p.graph$type))+
  geom_histogram(position="dodge",binwidth=5)+
  scale_fill_manual(values=c("red","black"))+
  xlab("Total Abundance")+
  ylab("Frequency")+
  ggtitle("MYCO")+
  xlim(min(Nsup),max(Nsup))+
  theme_classic()+
  geom_vline(xintercept=min(Nsup))+
  geom_hline(yintercept=0)+
  theme(axis.text=element_text(size=10),axis.title=element_text(size=12))+
  theme(legend.position="none")
```

1.1.3. Fidelity

```
### Cormack-Jolly-Seber model with effect of quadratic effort on p and fixed phi
### Based on code available at
### http://www.vogelwarte.ch/de/projekte/publikationen/bpa/code-for-running-bpa-using-jags.html
### Kéry & Schaub 2012 Bayesian population analysis using WinBUGS: a hierarchical perspective.
### Forest version (code for coffee is exactly the same)
### Used for species with low recapture rates

## Part 1. Get ready

setwd("")
CH<-read.table("",header=F)
CH<-as.matrix(CH)
get.first<-function(x)min(which(x!=0))
f<-apply(CH,1,get.first)
eff <- c(-0.6733507,-0.1116703,-0.8040866,1.0728217,-1.0522429,-0.3574055,1.7222646,1.1242687,-1.0855321,0.2690376,-1.0558744) # Vector of effort per occasion (scaled mist net hours)
library(jagsUI)

## Part 2. Set up and run Bayesian model in JAGS

cat("model {

        # Priors and constraints
        for (i in 1:nind){
                for (t in f[i]:(n.occasions-1)){
                phi[i,t] <- phi.occ[t]
                logit(p[i,t]) <- mu + beta1*x[t] + beta2*pow(x[t],2)
                } #t
        } #i
        for (t in 1:(n.occasions-1)){
        phi.occ[t] ~ dunif(0,1)
        p.est[t] <- 1 / (1+exp(-mu-beta1*x[t]-beta2*pow(x[t],2)))
        } #t
        mu ~ dnorm(0,0.001)
        mean.p <- 1 / (1+exp(-mu))
        beta1 ~ dnorm(0,0.001)I(-10,10)
        beta2 ~ dnorm(0,0.001)I(-10,10)

        # Likelihood
        for (i in 1:nind){

        # Define latent state at first capture
        z[i,f[i]] <-1
                for (t in (f[i]+1):n.occasions){

        # State process
```

```
        z[i,t] ~dbern(mu1[i,t])
        mu1[i,t]<-phi[i,t-1] *z[i,t-1]

        # Observation process
        y[i,t] ~dbern(mu2[i,t])
        mu2[i,t]<-p[i,t-1]*z[i,t]
                } #t
        } #i

        }",file="name.txt")

        known.state.cjs <- function(ch){
                state <- ch
                for (i in 1:dim(ch)[1]){
                n1 <- min(which(ch[i,]==1))
                n2 <- max(which(ch[i,]==1))
                state[i,n1:n2] <- 1
                state[i,n1] <- NA
                }
        state[state==0] <- NA
        return(state)
        }

data<-list(y=CH,f=f,nind=dim(CH)[1],n.occasions=dim(CH)[2],z=known.state.cjs(CH),x=eff)

        cjs.init.z <- function(ch,f){
        for (i in 1:dim(ch)[1]){
                if (sum(ch[i,])==1) next
                n2 <- max(which(ch[i,]==1))
                ch[i,f[i]:n2] <- NA
                }
        for (i in 1:dim(ch)[1]){
                ch[i,1:f[i]] <- NA
                }
        return(ch)
        }

inits <- function(){list(z=cjs.init.z(CH,f),mu=rnorm(1),beta1=runif(1,-5,5),beta2=runif(1,-5,5),phi.occ=runif(11,0,1))}
params<-c("phi.occ","p.est","mean.p","beta1","beta2")
ni <- 12
nb <- 2
nt <- 1
nc <- 3

m=jags(data=data,inits=inits,parameters=params,model="name.txt",n.chains=nc,n.iter=ni,n.burnin=nb,n.thin=nt,parallel=TRUE)

## Part 3. Collect output

write.table(m$summary,"C:/summ.txt",sep="\t") #Saves summary statistics for all iterations
write.table(m$sims.list,"C:/sims.txt",sep="\t") #Saves complete results for each iteration
pdf("C:/plots.pdf") #Next three lines save diagnostic plots in pdf files
plot(m)
dev.off()

## Part 4. Calculate summary statistics for phi and build graphs

sim<-read.table("",header=T) #Simulation file for species: habitat of interest
n.iter<-dim(sim)[1]
phi_m<-as.vector(rep(0,n.iter))
phi_v<-as.vector(rep(0,n.iter))
phi_sd<-as.vector(rep(0,n.iter))
phi_cv<-as.vector(rep(0,n.iter))
for(i in 1:n.iter){
  phi_m[i]<-mean(as.numeric(sim[i,20:30])) #20:30 are the columns in which phi [1-11] were recorded
  phi_v[i]<-var(as.numeric(sim[i,20:30]))
  phi_sd[i]<-sd(as.numeric(sim[i,20:30]))
  phi_cv[i]<-phi_sd[i]/phi_m[i]
}
phi.F<-matrix(0,2,4)
```

```
phi.F[1,1]<-round(mean(phi_m),4)
phi.F[1,2]<-round(mean(phi_v),4)
phi.F[1,3]<-round(mean(phi_sd),4)
phi.F[1,4]<-round(mean(phi_cv),4)
phi.F[2,1]<-round(var(phi_m),4)
phi.F[2,2]<-round(var(phi_v),4)
phi.F[2,3]<-round(var(phi_sd),4)
phi.F[2,4]<-round(var(phi_cv),4)

library(ggplot2)
C_sim<-read.table("",header=T) #Simulation file for coffee
F_sim<-read.table("",header=T) #Simulation file for forest

Cphi<-as.vector(rep(0,n.iter))
for(i in 1:n.iter){
  Cphi[i]<-mean(as.numeric(C_sim[i,20:30]))
}

Fphi<-as.vector(rep(0,n.iter))
for(i in 1:n.iter){
  Fphi[i]<-mean(as.numeric(F_sim[i,20:30]))
}

phi2<-c(Cphi,Fphi)
type<-c(rep(1,length(Cphi)),rep(2,length(Fphi)))
p.graph<-cbind(type,phi2)
p.graph<-as.data.frame(p.graph)
p.graph$type<-factor(p.graph$type)
levels(p.graph$type)<-c("Coffee","Forest")
ggplot(p.graph,aes(p.graph$phi2,color=p.graph$type))+
  geom_density()+
  scale_color_manual(values=c("red","black"))+
  xlab("Survival")+
  ylab("Density")+
  ggtitle("MYCO")+
  xlim(0,1)+
  theme_classic()+
  geom_vline(xintercept=0)+
  theme(axis.text=element_text(size=10),axis.title=element_text(size=12))+
  theme(legend.position="none")
```

1.1.4. Inter-seasonal variance

```
### Calculation for inter-seasonal variance per iteration uses output for Jolly-Seber model as input

F_sim<-read.table("",header=T) #Simulation file for forest
n.iter<-dim(F_sim)[1]
F_m<-as.vector(rep(0,n.iter))
F_sd<-as.vector(rep(0,n.iter))
F_CV<-as.vector(rep(0,n.iter))
for(i in 1:n.iter){
  F_m[i]<-mean(as.numeric(F_sim[i,55:66]))
  F_sd[i]<-sd(as.numeric(F_sim[i,55:66]))
  F_CV[i]<-F_sd[i]/F_m[i]
}

mean(F_CV)
sd(F_CV)

C_sim<-read.table("",header=T) #Simulation file for coffee
n.iter<-dim(C_sim)[1]
C_m<-as.vector(rep(0,n.iter))
C_sd<-as.vector(rep(0,n.iter))
C_CV<-as.vector(rep(0,n.iter))
for(i in 1:n.iter){
  C_m[i]<-mean(as.numeric(C_sim[i,55:66]))
  C_sd[i]<-sd(as.numeric(C_sim[i,55:66]))
  C_CV[i]<-C_sd[i]/C_m[i]
```

```
}

mean(C_CV)
sd(C_CV)
```

1.1.5. Age

```
### Generalized linear models for mist-net data - AGE

## Part 1. Get ready (and modify and define response)

library(AICcmodavg)
setwd("")
data<-read.table("",header=T)
d<-data[data$SP=="SSPP",] #Select species
d1<-d[d$AGE=="3" | d$AGE=="4",] #Subset to only immature and adult individuals
d1$AGE<-as.character(d1$AGE)
d1$AGE[d1$AGE=="3"] <- 0 # FAIL defined as capturing an immature individual
d1$AGE[d1$AGE=="4"] <- 1 # SUCCESS defined as capturing an adult individual
d1$AGE<-as.numeric(d1$AGE)
d1$RESP<-d1$AGE
d1$HAB<-as.factor(d1$HAB)
d1$DAY2<-d1$DAY^2
d1$DAYs<-scale(d1$DAY)
d1$DAY2s<-scale(d1$DAY2)
attach(d1)

## Part 2. Define models and run model selection

M0<-glm(RESP~1,family=binomial)
Mt<-glm(RESP~DAYs+DAY2s,family=binomial)
Mh<-glm(RESP~HAB,family=binomial)
Mth<-glm(RESP~DAYs+DAY2s+HAB,family=binomial)
summary(M0)
summary(Mt)
summary(Mh)
summary(Mth)
Cand.mods <- list(M0,Mt,Mh,Mth)
modnames<-c("M0","Mt","Mh","Mth")
aictab(Cand.mods,modnames,sort=TRUE)
modavg(Cand.mods,parm="(Intercept)",modnames)
modavg(Cand.mods,parm="DAYs",modnames)
modavg(Cand.mods,parm="DAY2s",modnames)
modavg(Cand.mods,parm="HABFOREST",modnames)

## Part 3. Build graphs

plot(DAY,RESP,type="n",ylab="p(variable)",xlab="Day of year",main="SSPP-RES",ylim=c(0,1))
points(DAY[HAB=="COFFEE"],RESP[HAB=="COFFEE"],col="red",pch=16)
points(DAY[HAB=="FOREST"],RESP[HAB=="FOREST"],col="black",pch=16)
m<-glm(RESP~DAY+DAY2+HAB,family=binomial)
plotdatc<-data.frame(DAY=min(DAY):max(DAY))
plotdatc$DAY2<-plotdatc$DAY^2
plotdatc$HAB<-"COFFEE"
preddatc<-predict(m,newdata=plotdatc,se.fit=TRUE)
with(preddatc,lines(min(DAY):max(DAY),exp(fit)/(1+exp(fit)),col="red",lwd=2))
with(preddatc,lines(min(DAY):max(DAY),exp(fit+1.96*se.fit)/(1+exp(fit+1.96*se.fit)),lty=2,col="red"))
with(preddatc,lines(min(DAY):max(DAY),exp(fit-1.96*se.fit)/(1+exp(fit-1.96*se.fit)),lty=2,col="red"))
plotdatf<-data.frame(DAY=min(DAY):max(DAY))
plotdatf$DAY2<-plotdatf$DAY^2
plotdatf$HAB<-"FOREST"
preddatf<-predict(m,newdata=plotdatf,se.fit=TRUE)
with(preddatf,lines(min(DAY):max(DAY),exp(fit)/(1+exp(fit)),col="black",lwd=2))
with(preddatf,lines(min(DAY):max(DAY),exp(fit+1.96*se.fit)/(1+exp(fit+1.96*se.fit)),lty=2))
with(preddatf,lines(min(DAY):max(DAY),exp(fit-1.96*se.fit)/(1+exp(fit-1.96*se.fit)),lty=2))
```

1.2. Habitat performance

1.2.1. Body condition

```
### Generalized linear models for mist-net data - BCI

## Part 1. Calculate Body Condition Index for each capture event following guidelines from
## Peig, J. & Green, A.J. (2009) New perspectives for estimating body condition from mass/length data: ## the scaled mass index as an alternative
method. Oikos 118:1883-1891.

library(smatr)
setwd("")
data<-read.table("",header=T) #data table with all measurements
d1<-data[!is.na(data$WC) & !is.na(data$BM),] #WC stands for wing chord, BM for body mass
attach(d1)

d2<-d1[d1$SP=="SSPP",] #select species
k<-3 #recommended value to exclude outliers that are probably mistakes but not extreme cases
QLS_WC<-quantile(d2$WC)
LQ_WC<-QLS_WC[[2]]
UQ_WC<-QLS_WC[[4]]
IQR_WC<-UQ_WC - LQ_WC
d3<-d2[d2$WC<(UQ_WC+(k*IQR_WC)) & d2$WC>(LQ_WC-(k*IQR_WC)),]
QLS_BM<-quantile(d3$BM)
LQ_BM<-QLS_BM[[2]]
UQ_BM<-QLS_BM[[4]]
IQR_BM<-UQ_BM - LQ_BM
d4<-d3[d3$BM<(UQ_BM+(k*IQR_BM)) & d3$BM>(LQ_BM-(k*IQR_BM)),] #These lines remove outliers from data

Mi.2<-log(d4$BM) #log of BM
Li.2<-log(d4$WC) #log of WC
Lo.2<-mean(Li.2)
sma_model.2<-sma(Mi.2~Li.2,method="SMA") #Standard major axis regression

M1.2<-sma_model.2$coef[[1]]
M2.2<-as.matrix(M1.2)
bSMA.2<-M2.2[2,1]
BCI.2<-Mi.2*((Lo.2/Li.2)^bSMA.2) #Apply formula suggested by Peig & Green 2009
t2<-cbind(d4,BCI.2) #Create a data vector with BCI values for each capture that had both WC and BM
write.table(t2,"",sep="\t")

## Part 2. Define generalized linear models and run model selection

library("bbmle")
library(AICcmodavg)
data<-read.table("t2.txt",header=T) #Output from previous step
attach(data)
DAY2<-DAY^2
DAYs<-scale(DAY)
DAY2s<-scale(DAY2)
BCIs<-scale(BCI.2)

M0<-lm(BCIs~1)
Mt<-lm(BCIs~DAYs+DAY2s)
Mh<-lm(BCIs~HAB)
Mth<-lm(BCIs~DAYs+DAY2s+HAB)
summary(M0)
summary(Mt)
summary(Mh)
summary(Mth)
Cand.mods <- list(M0,Mt,Mh,Mth)
modnames<-c("M0","Mt","Mh","Mth")
aictab(Cand.mods,modnames,sort=TRUE)
modavg(Cand.mods,parm="(Intercept)",modnames)
modavg(Cand.mods,parm="DAYs",modnames)
modavg(Cand.mods,parm="DAY2s",modnames)
modavg(Cand.mods,parm="HABFOREST",modnames)
```

```
## Part 3. Build graphs

DAY2<-DAY^2
m<-lm(BCI.2~DAY+DAY2+HAB)
plot(DAY,BCI.2,type="n",ylab="Body Condition Index",xlab="Day of year",main="TUFL-BCI",ylim=c(3.9,4.1))
x<-seq(min(DAY),max(DAY),1)
one<-rep("COFFEE",length(x))
two<-rep("FOREST",length(x))
y1<-predict(m,list(DAY=x,DAY2=x^2,HAB=one),interval=c("confidence"),level=0.95,type="response")
y2<-predict(m,list(DAY=x,DAY2=x^2,HAB=two),interval=c("confidence"),level=0.95,type="response")
lines(x,y1[,1],col="red",lwd=2)
lines(x,y1[,2],col="red",lty=2)
lines(x,y1[,3],col="red",lty=2)
lines(x,y2[,1],col="black",lwd=2)
lines(x,y2[,2],col="black",lty=2)
lines(x,y2[,3],col="black",lty=2)
```

1.2.2. Muscle

```
### Generalized linear models for mist-net data - MUSCLE

## Part 1. Get ready (and modify and define response)

library(AICcmodavg)
setwd("")
data<-read.table("",header=T)
d<-data[data$SP=="SSPP",] #Select species
d6<-d[d$MUS=="2" | d$MUS=="3",] #Subset to individuals with muscle score 2 and 3
d6<-d6[!is.na(d6$MUS),]
d6$MUS<-as.character(d6$MUS)
d6$MUS[d6$MUS=="2"] <- 0 # FAIL defined as individuals with medium muscle
d6$MUS[d6$MUS=="3"] <- 1 # SUCCESS defined as individuals with high muscle
d6$MUS<-as.numeric(d6$MUS)
d6$RESP<-d6$MUS
d6$HAB<-as.factor(d6$HAB)
d6$DAY2<-d6$DAY^2
d6$DAYs<-scale(d6$DAY)
d6$DAY2s<-scale(d6$DAY2)
attach(d6)

## Part 2. Define models and run model selection
############ Same code as for AGE

## Part 3. Build graphs
############ Same code as for AGE
```

1.2.3. Primary molt

```
### Generalized linear models for mist-net data – PP MOLT

## Part 1. Get ready (and modify and define response)

library(AICcmodavg)
setwd("")
data<-read.table("",header=T)
d<-data[data$SP=="SSPP",] #Select species
d4<-d[d$AGE=="3" | d$AGE=="4",] #Subset to only immature and adult individuals
d4<-d4[!is.na(d4$PLU),]
d4$PLU<-as.character(d4$PLU)
d4$PLU[d4$PLU=="2"] <- 0 # FAIL defined as individual not IN FULL PPMolting
d4$PLU[d4$PLU=="3"] <- 0 # FAIL defined as individual not IN FULL PPMolting
d4$PLU[d4$PLU=="5"] <- 0 # FAIL defined as individual not IN FULL PPMolting
d4$PLU[d4$PLU=="4"] <- 1 # SUCCESS defined as individual is IN FULL PPMolting
d4$PLU[d4$PLU=="6"] <- 1 # SUCCESS defined as individual is IN FULL PPMolting
d4$PLU<-as.numeric(d4$PLU)
```

```
d4$RESP<-d4$PLU
d4$HAB<-as.factor(d4$HAB)
d4$DAY2<-d4$DAY^2
d4$DAYs<-scale(d4$DAY)
d4$DAY2s<-scale(d4$DAY2)
attach(d4)

## Part 2. Define models and run model selection
############ Same code as for AGE

## Part 3. Build graphs
############ Same code as for AGE
```

1.2.4. Breeding

```
### Generalized linear models for mist-net data – BREEDING

## Part 1. Get ready (and modify and define response)

library(AICcmodavg)
setwd("")
data<-read.table("",header=T)
d<-data[data$SP=="SSPP",] #Select species
d3<-d[!is.na(d$BRE),]
d3$BRE<-as.character(d3$BRE)
d3$BRE[d3$BRE=="NO"] <- 0 # FAIL defined as individual not breeding
d3$BRE[d3$BRE=="YES"] <- 1 # SUCCESS defined as individual is breeding
d3$BRE<-as.numeric(d3$BRE)
d3$RESP<-d3$BRE
d3$HAB<-as.factor(d3$HAB)
d3$DAY2<-d3$DAY^2
d3$DAYs<-scale(d3$DAY)
d3$DAY2s<-scale(d3$DAY2)
attach(d3)

## Part 2. Define models and run model selection
############ Same code as for AGE

## Part 3. Build graphs
############ Same code as for AGE
```

1.2.5. Juveniles

```
### Generalized linear models for mist-net data – JUVENILES

## Part 1. Get ready (and modify and define response)

library(AICcmodavg)
setwd("")
data<-read.table("",header=T)
d<-data[data$SP=="SSPP",] #Select species
d5<-d[d$AGE!="0",] #Remove individuals with age unknown
d5$AGE<-as.character(d5$AGE)
d5$AGE[d5$AGE=="4"] <- 0 # FAIL defined as AHY individual
d5$AGE[d5$AGE=="3"] <- 0 # FAIL defined as AHY individual
d5$AGE[d5$AGE=="2"] <- 1 # SUCCESS defined as JUVENILE individual
d5$AGE<-as.numeric(d5$AGE)
d5$RESP<-d5$AGE
d5$HAB<-as.factor(d5$HAB)
d5$DAY2<-d5$DAY^2
d5$DAYs<-scale(d5$DAY)
d5$DAY2s<-scale(d5$DAY2)
attach(d5)

## Part 2. Define models and run model selection
############ Same code as for AGE
```

```
## Part 3. Build graphs
############ Same code as for AGE
```

2. Level 2: Composite indexes of habitat preference and performance

2.1. Habitat preference

No R code was used for this part of the analysis.

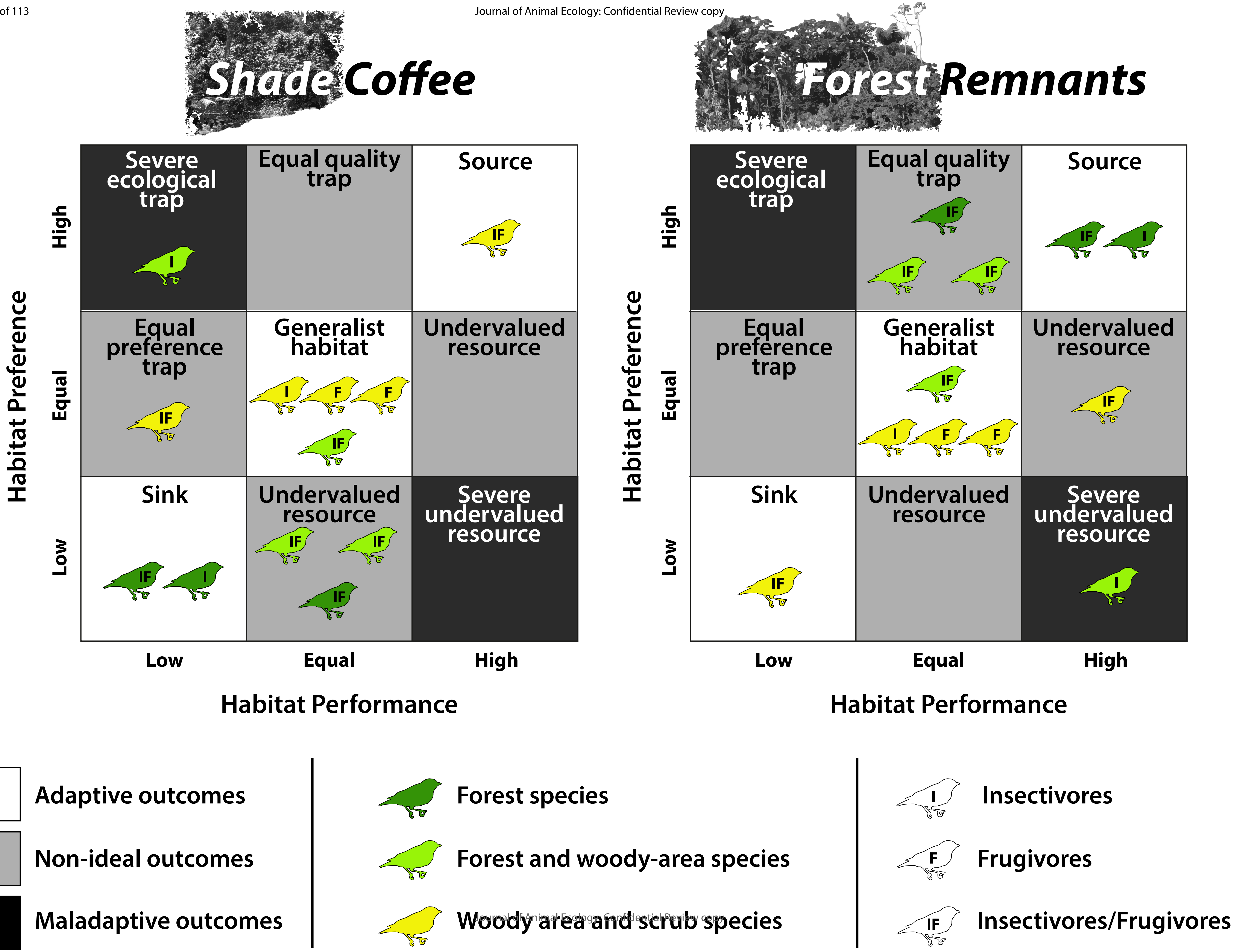
2.2. Habitat performance

```
### Meta-analysis of habitat performance

setwd("")
library("metafor")
data<-read.table("",header=T) #Read file with the mean and standard error for each species: variable
d<-data[data$SPP=="SSPP",] #Select species
d<-d[!is.na(d$MEAN),] #Remove NAs (analysis not carried out for a species)
x<-rma(yi=MEAN,sei=STE,data=d,method="FE",level=90);x
forest(x,slab=c("BCI","BRE","JUV","MUS","PLU"))
```

3. Level 3: Is habitat selection acting adaptively?

No R code was used for this part of the analysis.


Shade Coffee
Forest Remnants
Habitat Preference
High
Equal
Low
Severe ecological trap
I
Equal quality trap
Source
IF
Equal preference trap
IF
Generalist habitat
I
F
F
IF
Undervalued resource
Sink
IF
I
Undervalued resource
IF
IF
IF
Severe undervalued resource
Low
Equal
High
Habitat Performance
Severe ecological trap
Equal quality trap
IF
IF
IF
Source
IF
I
Equal preference trap
Generalist habitat
IF
I
F
F
Undervalued resource
IF
Sink
IF
Undervalued resource
Severe undervalued resource
I
Low
Equal
High
Habitat Performance
Adaptive outcomes
Non-ideal outcomes
Maladaptive outcomes
Forest species
Forest and woody-area species
Woody area and scrub species
I
Insectivores
F
Frugivores
IF
Insectivores/Frugivores