Supporting Information Appendix for

Sustaining biodiversity in tropical countryside with small forest elements: A predictive model

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Continued methods

Utilization distribution subareas and proportional analysis of ecosystem element use

Each kernel density estimate was converted into a utilization distribution, a probability density function, and divided into subareas with 10, 20, 30, 40, 50, 60, 70, 80, 90, and 99% probabilities of encountering each bird. Low-probability utilization distribution subareas are nested within higher probability ones, which must include larger, lower-usage areas of the bird's home range to increase the probability of encountering a bird. In particular, the 10% utilization distribution subarea represents the high-use areas of the home range, which is nested in the 99% subarea that encompasses the entire home range (Fig S1).

We preformed classical compositional analysis of habitat use (1) with the "adehabitat" package (2) developed for R (3) to determine ecosystem element use. Compositional analysis of habitat use employs log-ratio analysis of compositions (4) to compare habitat composition at different scales of continuously radio-tracked animals. Compositional analysis of habitat use was carried out in two steps: first the significance of habitat selection was tested using Wilks lambda. Lambda was then used to test if habitat use was significantly nonrandom by using either randomization or chi-squared goodness-of-fit tests ($\chi^2 = N * \ln(\Lambda)$, where N is the number of radio-tracked individuals) (Supplementary Tables 1 and 5). Second, a ranking matrix is built, in this case an average matrix for each species, that indicates if an ecosystem element type in each row is significantly preferred over an ecosystem element type in each column (Supplementary Tables 2-3 and 6-10). As recommended by Aebischer et al., compositional analysis of habitat use was performed at multiple levels: 1) Johnson's second-order habitat selection, or selection for a habitat relative to the entire study area, and 2) Johnson's third-order habitat selection, or selection for habitat relative to habitats in the home range of an animal— this was conducted using the animal's independent locations compared to the home range, or the 99% utilization distribution subarea (5). When zero values were recorded in the matrix of available habitats a procedure termed "weighted mean lambda" described in Aebischer et al. (Appendix 2) was used (1).

Point count surveys

Eighty point count surveys conducted at a fine-scale were used to test the efficacy of Eq. 1. Point count surveys were carried out in the mornings and repeated for three nearly consecutive days each year. Surveys were conducted from sunrise (~5:30 AM) until 9:00 AM on each day. Repeated surveys were conducted at different times within the morning period. J. R. Zook conducted 23 point counts which were loaned by V. Ruiz-Gutiérrez (6), while J. Figueroa Sandí conducting the remaining 57 point counts. Each point count was conducted for 10 minutes by Zook and 30 minutes by Sandí. Point counts were conducted during the months of May-September, within the time of year most species in the region are breeding and are more vocal and more easily detected (7). Zook sampled each year from 2004 to 2008, although not all point counts were surveyed in 2004. Sandí sampled only in 2010. All bird species seen and/or heard within a maximum distance of 50 m were recorded. Point count surveys confirmed the same community assemblage patterns observed using mist net sampling (Figs. 1A & 1B). Point count surveys conducted in the Las Cruces Forest Reserve (6 surveys) and La Amistad International Park (6 surveys located near Las Alturas Biological Station, 8° 56' 43" N, 82° 50' 00" W) served as the baseline (e.g., $M \approx 1.0$) for the community similarity index for the point counts.

Community similarity index

The community similarity index quantified species composition similarity of a sampling location on farmland with a set of sampling locations in the forest reserve or national park, which were regional baselines. We used Sørensen similarity coefficients to calculate community similarity to regional baselines. The Sørensen similarity coefficient measures similarity between sample sets, and is defined as the number of species shared between two sample sets (denoted as C) multiplied by two and then divided by the total number of species from each sample set:

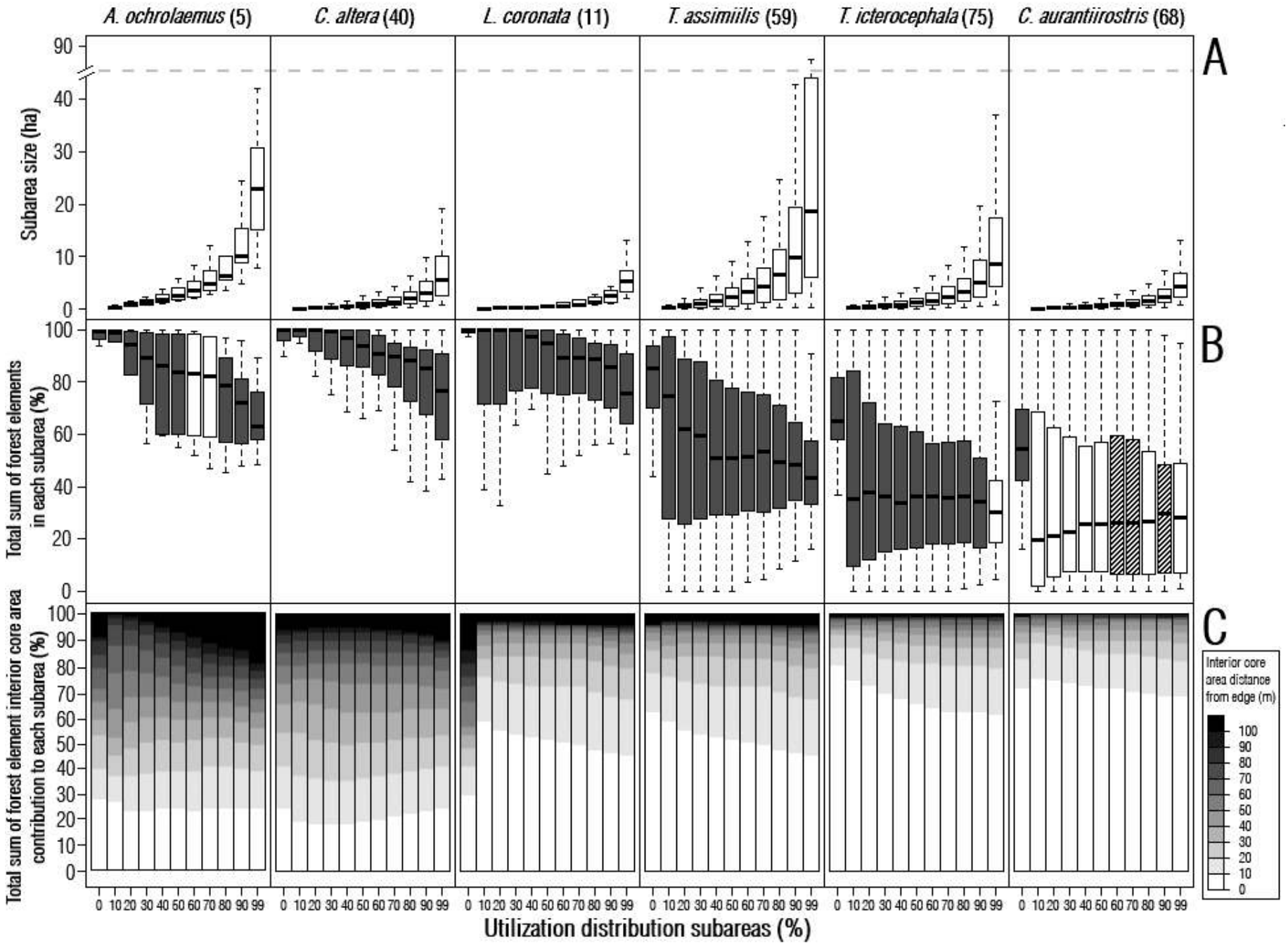
$$QS(A,B) = \frac{2C}{A+B}$$

The Sørensen similarity coefficients were calculated for each sample (denoted as k) with all baseline samples (denoted as f_i). The arithmetic mean of all Sørensen similarity coefficients for each sample with each baseline sample was calculated (denoted as Mf):

$$Mf = \frac{1}{n} \cdot \sum_{\mathrm{i}=1}^{n} QS(k, f_{\mathrm{i}})$$

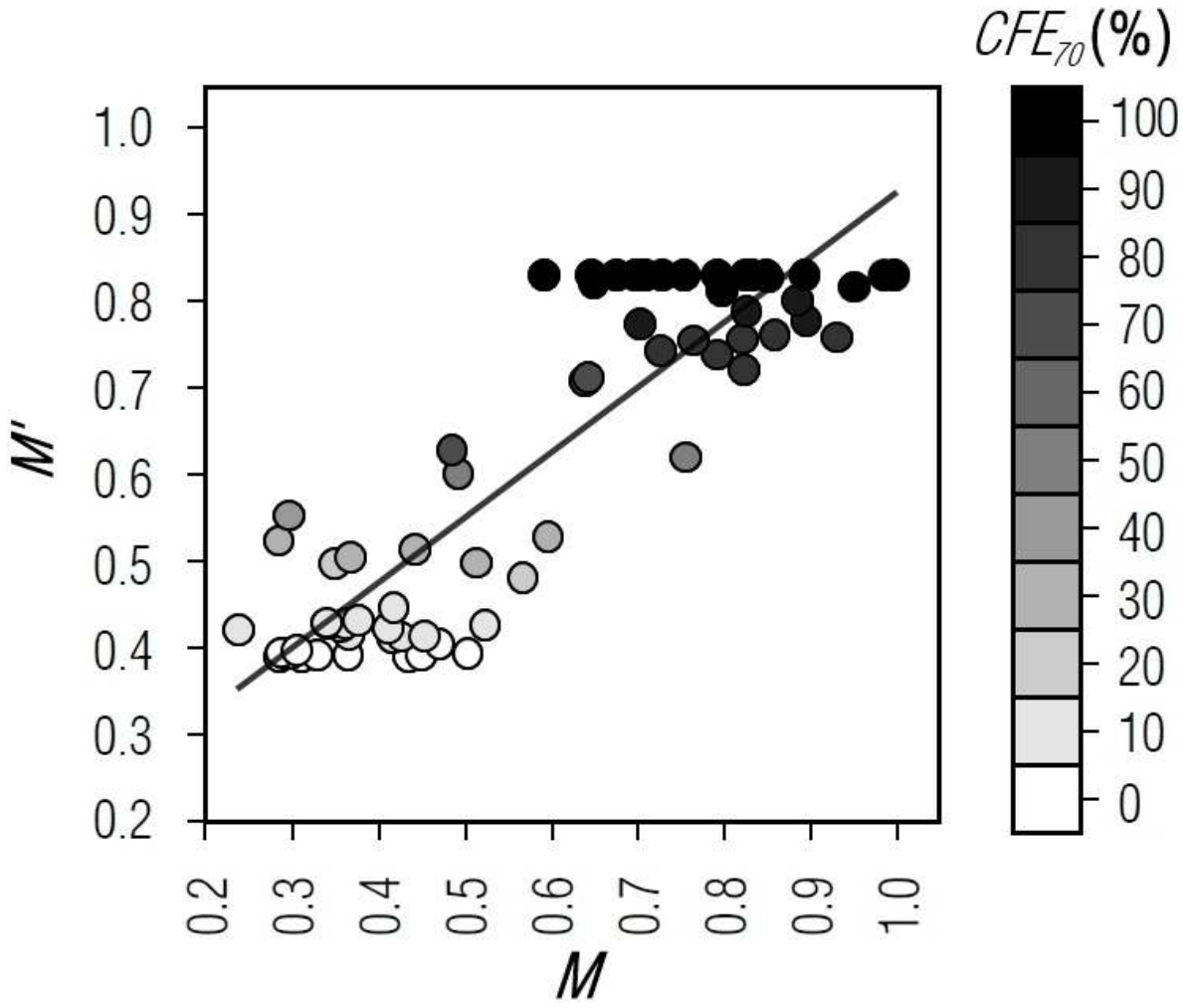
The mean Sørensen similarity coefficient for each baseline was also calculated relative to other baseline samples. Finally, we standardized all values by dividing each Mf value by the maximum Mf value (Mf_{max}):

$$M = \frac{Mf}{Mf_{\max}}$$



Supplementary Figure 1. (Figure description on next page.)

Supplementary Figure 1. Plots show the scaled use of countryside forest elements by six bird species. Bird species are in order of forest dependence. Zero-values on horizontal axes represent bird locations observed and recorded in the field (i.e. single points with no area). Sub-figures A and B show box plots of the sample maximum, minimum, upper and lower quartiles, and median. Numbers in parentheses following each species name indicate the number of radio-tracked individuals. A) Shows the size of each utilization distribution subarea (i.e. each species' average territory or home range size based on kernel density estimates of observed locations in the field). B) Summary of the proportion of countryside forest elements in each utilization distribution subarea. Additionally, each species average preference rank for countryside forest elements is indicated by shading. Dark gray bars indicates significant 1st place preference rank for countryside forest elements over all other ecosystem elements types ($P < 0.05$), white bars indicates insignificant 1st place preference rank for countryside forest elements over a 2nd place ecosystem element type (a statistical tie with one other ecosystem element, $P > 0.05$), and bars with diagonal patterns indicate insignificant 2nd place preference rank for countryside forest elements below a 1st place habitat type (also a statistical tie with one other ecosystem element, $P > 0.05$) (Supplementary Tables 1 and 5). C) Shows a breakdown of the configurations of countryside forest elements used by each species at each utilization distribution subarea. Countryside forest element configuration was measured using interior core area, which is a standard index defined as the portion of the element contained within a specified distance from the element edge, indicated by the grayscale. Specifically, if a tree is alone and isolated in a pasture or at the very edge of a forest fragment it has no core area and would be indicated in white. Whereas an area in the interior of a forest reserve or fragment may be surrounded by forest for over 100 m on all sides and would be indicated in black.



Supplementary Figure 2. Plot of actual versus predicted bird community using Eq. 1 for point counts surveys ($R^2 = 0.755$, $P < 0.001$, $n = 68$). Countryside forest elements within 70 m of a location (CTE_{70}) were used to predict the bird community. Grayscale indicates CFE_{70} for each datum.

Supplementary Table 1. Summary of habitat selection results from compositional analysis of habitat use.

Species			Habitat selection	Λ	Degrees of freedom	χ^2	*P*
A. ochrolaemus							
	Radio locations vs. HR		No	0.022	3	19	0.068
	UD subareas vs. SA	10-99%	Yes	0.000-0.091	3	11-49	all < 0.001
L. coronata							
	Radio locations vs. HR		Yes	0.042	3	127	0.020
	UD subareas vs. SA	10-99%	Yes	0.001-0.177	3	19-58	all < 0.001
C. altera							
	Radio locations vs. HR		Yes	0.094	3	95	0.002
	UD subarea vs. SA	10-99%	Yes	0.019-0.099	3	68-158	all < 0.001
C. aurantiirostris							
	Radio locations vs. HR		Yes	0.123	3	143	0.002
	UD subareas vs. SA	10-99%	Yes	0.017-0.509	3	46-121	all < 0.001
T. assimilis							
	Radio locations vs. HR		Yes	0.076	3	152	0.002
	UD subarea vs. SA	10-99%	Yes	0.258-0.643	3	26-80	all < 0.001
T. icterocephala							
	Radio locations vs. HR		Yes	0.182	3	128	0.002
	UD subarea vs. SA	10-99%	Yes	0.234-0.645	3	33-109	all < 0.001

[a]Results from third-order selection (5) or radio locations relative to the home range (HR), or the area within the 99% utilization distribution (UD) subarea. *P*-value calculated with randomization test.

[b]Results from second-order selection (5) or 10, 20, 30, 40, 50, 60, 70, 80, 90, and 99% UD subareas relative to the study area (SA). *P*-value calculated with parametric test.

Supplementary Table 2. Matrix of ecosystem element preference ranking of radio tracked species limited to the countryside forest elements.[a]

				Ecosystem Element[b]			
Species	Ecosystem Element			CFE	Pasture	Agricultural Plots	Rural Infrastructure
A.ochrolaemus							
	CFE	Radio locations vs. HR		1*	+++	+++	+++
		UD subareas vs. SA[d]	10-50, 80-99%	1*	+++	+++	+++
			60-70%	1	+	+++	+++
	Pasture	Radio locations vs. HR		---	2	+	+
		UD subareas vs. SA	10%	---	3	-	+
			20-50%	---	2	+	+
			60-70%	-	2	+	+++
			80-99%	---	2*	+	+++
	Agriculture	Radio locations vs. HR		---	-	3	+
		UD subareas vs. SA	10%	---	+	2	+
			20-80%	---	-	3	+
			90-99%	---	-	4	-
	Rural	Radio locations vs. HR		---	-	-	4
		UD subareas vs. SA	10-50%	---	-	-	4
			60-80%	---	---	-	4
			90-99%	---	---	+	3
C. altera							
	CFE	Radio locations vs. HR		1*	+++	+++	+++
		UD subareas vs. SA	10-99%	1*	+++	+++	+++
	Pasture	Radio locations vs. HR		---	3	+	-
		UD subareas vs. SA	10%	---	2	+++	+
			20-99%	---	2*	+++	+++
	Agriculture	Radio locations vs. HR		---	-	4	-
		UD subareas vs. SA	10%	---	---	4	---
			20-30%	---	---	4	-
			40-99%	---	---	3	+
	Rural	Radio locations vs. HR		---	+	+	2
		UD subareas vs. SA	10%	---	-	+++	3*
			20-30%	---	---	+	3
			40-99%	---	---	-	4
L.coronata							
	CFE	Radio locations vs. HR		1*	+++	+++	+++
		UD subareas vs. SA	10-99%	1*	+++	+++	+++
	Pasture	Radio locations vs. HR		---	4	-	---
		UD subareas vs. SA	10-70%	---	2	+	+
			80%	---	2	+	+++
			90-99%	---	2*	+++	+++
	Agriculture	Radio locations vs. HR		---	+	3	-
		UD subareas vs. SA	10-40, 70-80%	---	-	3	+
			50-60%	---	-	4	-
			90%	---	---	3	+
			99%	---	---	4	-
	Rural	Radio locations vs. HR		---	+++	+	2
		UD subareas vs. SA	10-40, 70%	---	-	-	4
			50-60%	---	-	+	3
			80-90%	---	---	-	4
			99%	---	---	+	3

[a]A plus (+) indicates row ecosystem element is preferred over the column ecosystem element. A minus (-) indicates avoidance of row ecosystem element relative to column ecosystem element. Three signs show $P < 0.05$ and one sign shows $P > 0.05$. Numbers identify the overall ecosystem element preference ranking; lower numbers illustrate a greater preference, and an asterisk (*) confirms a significant ($P < 0.05$) preference over the subsequent lower-ranked ecosystem element.

[b]Habitat elements are listed from most to least land cover in the study area. CFE indicates countryside forest elements.

[c]Results from third-order selection (5) or radio locations relative to the home range (HR), or the area within the 99% UD subarea.

[d]Results from second-order selection (5) or 10, 20, 30, 40, 50, 60, 70, 80, 90, and 99% UD subareas relative to the study area (SA).

Supplementary Table 3. Matrix of ecosystem element preference ranking of radio tracked species common in both countryside forest elements and agricultural plots.[a]

				Ecosystem Element[b]			
Species	Ecosystem Element			CFE	Pasture	Agricultural Plots	Rural Infrastructure
T. assimilis							
	CFE	Radio locations vs. HR[c]		1*	+++	+++	+++
		UD subareas vs. SA	10-99%	1*	+++	+++	+++
	Pasture	Radio locations vs. HR		---	3*	---	+++
		UD subareas vs. SA	10-50%	---	3*	-	+++
			60-99%	---	2	+	+++
	Agriculture	Radio locations vs. HR		---	+++	2	+++
		UD subareas vs. SA	10-50%	---	+	2	+++
			60-90%	---	-	3*	+++
			99%	---	-	3	+
	Rural	Radio locations vs. HR		---	---	---	4
		UD subareas vs. SA	10-90%	---	---	---	4
			99%	---	---	-	4
T.icterocephala							
	CFE	Radio locations vs. HR		1*	+++	+++	+++
		UD subareas vs. SA	10-90%	1*	+++	+++	+++
			99%	1*	+	+++	+++
	Pasture	Radio locations vs. HR		---	3	---	+
		UD subareas vs. SA	10-70%	---	3*	-	+++
			80-99%	-	2	+	+++
	Agriculture	Radio locations vs. HR		---	+++	2*	+++
		UD subareas vs. SA	10-70%	---	+	2	+++
			80-99%	---	-	3*	+++
	Rural	Radio locations vs. HR		---	-	---	4
		UD subareas vs. SA	10-99%	---	---	---	4
C. aurantiirostris							
	CFE	Radio locations vs. HR[c]		1*	+++	+++	+++
		UD subareas vs. SA[d]	10-50, 80%	1	+++	+	+++
			60-70, 90%	2*	+++	-	+++
			99%	1	+	+	+++
	Pasture	Radio locations vs. HR		---	4	---	---
		UD subareas vs. SA	10-90%	---	3*	---	+++
			99%	-	3*	-	+++
	Agriculture	Radio locations vs. HR		---	+++	2*	+++
		UD subareas vs. SA	10-50, 80%	-	+++	2*	+++
			60-70, 90%	+	+++	1	+++
			99%	-	+	2	+++
	Rural	Radio locations vs. HR		---	+++	---	3*
		UD subareas vs. SA	10-99%	---	---	---	4

[a]A plus (+) indicates row ecosystem element is preferred over the column ecosystem element. A minus (-) indicates avoidance of row ecosystem element relative to column ecosystem element. Three signs show $P < 0.05$ and one sign shows $P > 0.05$. Numbers identify the overall ecosystem element preference ranking; lower numbers illustrate a greater preference, and an asterisk (*) confirms a significant ($P < 0.05$) preference over the subsequent lower-ranked ecosystem element.

[b]Habitat elements are listed from most to least land cover in the study area. CFE indicates countryside forest elements.

[c]Results from third-order selection (5) or radio locations relative to the home range (HR), or the area within the 99% UD subarea.

[d]Results from second-order selection (5) or 10, 20, 30, 40, 50, 60, 70, 80, 90, and 99% UD subareas relative to the study area (SA).

Supplementary Table 4. Summary of one-way ANOVAs and pairwise comparisons between species for total sum of countryside forest elements in each utilization distribution subarea.

UD Subarea[a]	$F_{5,252}$	P	Forest Dependence Pairing[b]	Pairwise comparisons[c]		
UD subarea 10%	1.914	< 0.0001	A	*A. ochrolaemus*	=	*C. altera*
			A	*A. ochrolaemus*	=	*L. coronata*
			A	*C. altera*	=	*L. coronata*
			B	*A. ochrolaemus*	=	*T. assimilis*
			B	*A. ochrolaemus*	=	*T. icterocephala*
			B+	*A. ochrolaemus*	>	*C. aurantiirostris*
			B++	*C. altera*	>>	*T. assimilis*
			B+++	*C. altera*	>>>	*T. icterocephala*
			B+++	*C. altera*	>>>	*C. aurantiirostris*
			B	*L. coronata*	=	*T. assimilis*
			B	*L. coronata*	>	*T. Icterocephala*
			B++	*L. coronata*	>>	*C. aurantiirostris*
			C++	*T. assimilis*	>>	*T. icterocephala*
			C+++	*T. assimilis*	>>>	*C. aurantiirostris*
			C	*T. icterocephala*	=	*C. aurantiirostris*
UD subarea 99%	1.377	< 0.0001	A	*A. ochrolaemus*	=	*C. altera*
			A	*A. ochrolaemus*	=	*L. coronata*
			A	*C. Altera*	=	*L. coronata*
			B++	*A. ochrolaemus*	>>	*C. aurantiirostris*
			B	*A. ochrolaemus*	=	*T. assimilis*
			B	*A. ochrolaemus*	=	*T. icterocephala*
			B+++	*C. altera*	>>>	*T. assimilis*
			B+++	*C. altera*	>>>	*T. icterocephala*
			B+++	*C. altera*	>>>	*C. aurantiirostris*
			B++	*L. coronata*	>>	*T. assimilis*
			B+++	*L. coronata*	>>>	*T. icterocephala*
			B+++	*L. coronata*	>>>	*C. aurantiirostris*
			C++	*T. assimilis*	>>	*T. icterocephala*
			C+++	*T. assimilis*	>>>	*C. aurantiirostris*
			C	*T. icterocephala*	=	*C. aurantiirostris*

[a]Only two utilization distribution (UD) subareas are shown for clarity.

[b]Forest dependence pairings indicate pairwise comparisons using Tukey's honest significance difference (HSD) test between species that limited to countryside forest elements (A), species are found in both countryside forest elements and agricultural plots (C), or a comparison between two species of different forest dependencies (B). Plus signs (+) indicate significant differences between species of each community pairing: (+) indicates $0.01 < P < 0.05$; (++) indicates $0.001 < P < 0.01$; and (+++) indicates $P < 0.001$.

[c]Greater-than, less-than, and equal signs between species indicate if differences occurred and their directionality based the total sum of countryside forest elements in each utilization distribution subarea. Number of signs indicates the degree of significance based on adjusted P-values from Tukey's HSD: one sign indicates $0.01 < P < 0.05$; two signs indicate $0.001 < P < 0.01$; and three signs indicate $P < 0.001$.

Supplementary Table 5. Summary of countryside forest element interior core area selection results from compositional analysis of habitat use.

Species			Selection of interior core areas	Λ	Degrees of freedom	χ^2	*P*
A. ochrolaemus							
	Radio locations vs. HR		No	-	-	-	-
	UD subareas vs. SA	10-99%	No	-	-	-	-
C. altera							
	Radio locations vs. HR		Yes	0.201	-	64	0.002
	UD subarea vs. SA	10-99%	Yes	0.046-0.155	10	75-122	all < 0.001
L. coronata							
	Radio locations vs. HR		No	-	-	-	-
	UD subareas vs. SA	10-20%	No	-	-	-	-
		30-99%	Yes	0.001-0.010	10	51-175	all < 0.001
T. assimilis							
	Radio locations vs. HR		Yes	0.216	-	90	0.002
	UD subarea vs. SA	10-99%	Yes	0.112-0.189	10	98-129	all < 0.001
T. icterocephala							
	Radio locations vs. HR		Yes	0.089	-	181	0.002
	UD subarea vs. SA	10-99%	Yes	0.037-0.130	10	153-247	all < 0.001
C. aurantiirostris							
	Radio locations vs. HR		No	-	-	-	-
	UD subareas vs. SA	10-30%	No	-	-	-	-
		40-99%	Yes	0.037-0.123	10	142-224	all < 0.001

[a]Results from third-order selection (5) or radio locations relative to the home range (HR), or the area within the 99% utilization distribution (UD) subarea. *P*-value calculated with randomization test.

[b]Results from second-order selection (5) or 10, 20, 30, 40, 50, 60, 70, 80, 90, and 99% UD subareas relative to the study area (SA). *P*-value calculated with parametric test.

Supplementary Table 6. Matrix of forest element interior core area preference ranking of *C. altera*.[a]

Interior core area distance from edge			0	10	20	30	40	50	60	70	80	90	100
0	Radio locations vs. HR[c]		1	+	+	+++	+++	+++	+++	+++	+++	+++	+++
	UD subareas vs. SA[d]	10%	1	+	+++	+++	+++	+++	+++	+++	+++	+++	+++
		20%	2	+	+	+++	+++	+++	+++	+++	+++	+++	+++
		30%	2	-	+	+++	+++	+++	+++	+++	+++	+++	+++
		40%	2	---	+	+	+++	+++	+++	+++	+++	+++	+++
		50%	2	---	+	+++	+++	+++	+++	+++	+++	+++	+++
		60-80%	3	---	-	+	+++	+++	+++	+++	+++	+++	+++
		90-99%	3	---	---	+	+	+++	+++	+++	+++	+++	+++
10	Radio locations vs. HR		-	2	+	+++	+++	+++	+++	+++	+++	+++	+++
		10%	-	2*	+++	+++	+++	+++	+++	+++	+++	+++	+++
		20%	-	1	+	+++	+++	+++	+++	+++	+++	+++	+++
		30%	+	1	+	+++	+++	+++	+++	+++	+++	+++	+++
		40-99%	+++	1	+	+++	+++	+++	+++	+++	+++	+++	+++
20	Radio locations vs. HR		-	-	3*	+++	+++	+	+++	+++	+++	+++	+++
		10%	---	---	3*	+++	+++	+++	+++	+++	+++	+++	+++
		30-50%	-	-	3*	+++	+++	+++	+++	+++	+++	+++	+++
		60-80%	+	-	2	+++	+++	+++	+++	+++	+++	+++	+++
		90-99%	+++	-	2*	+++	+++	+++	+++	+++	+++	+++	+++
30	Radio locations vs. HR		---	---	---	4	+	+	+++	+++	+++	+++	+++
	UD subareas vs. SA	10-99%	---	---	---	4*	+++	+++	+++	+++	+++	+++	+++
40	Radio locations vs. HR		---	---	---	-	6*	-	+++	+++	+++	+++	+++
	UD subareas vs. SA	10-99%	---	---	---	---	5*	+++	+++	+++	+++	+++	+++
50	Radio locations vs. HR		---	---	-	-	+	5	+++	+++	+	+++	+++
	UD subareas vs. SA	10%	---	---	---	---	---	6	+	+++	+++	+++	+++
		20-99%	---	---	---	---	---	6*	+++	+++	+++	+++	+++
60	Radio locations vs. HR		---	---	---	---	---	---	7	+	+++	+++	+++
	UD subareas vs. SA	10%	---	---	---	---	---	-	7	+	+++	+++	+++
		20-99%	---	---	---	---	---	---	7*	+++	+++	+++	+++
70	Radio locations vs. HR		---	---	---	---	---	---	-	8	+	+++	+++
	UD subareas vs. SA	10%	---	---	---	---	---	---	-	8	+	+++	+++
		20-99%	---	---	---	---	---	---	---	8*	+++	+++	+++
80	Radio locations vs. HR		---	---	---	---	---	-	---	-	9*	+++	+++
	UD subareas vs. SA	10%	---	---	---	---	---	---	---	-	9	+	+
		20-99%	---	---	---	---	---	---	---	---	9*	+++	+++
90	Radio locations vs. HR		---	---	---	---	---	---	---	---	---	10	+
	UD subareas vs. SA	10%	---	---	---	---	---	---	---	---	-	11	---
		20%	---	---	---	---	---	---	---	---	---	11	---
		30-40%	---	---	---	---	---	---	---	---	---	10	+
		50-80%	---	---	---	---	---	---	---	---	---	10*	+++
		90-99%	---	---	---	---	---	---	---	---	---	10	+
100	Radio locations vs. HR		---	---	---	---	---	---	---	---	---	-	11
	UD subareas vs. SA	10%	---	---	---	---	---	---	---	---	-	+++	10*
		20%	---	---	---	---	---	---	---	---	---	+++	10*
		30-40%	---	---	---	---	---	---	---	---	---	-	11
		50-80%	---	---	---	---	---	---	---	---	---	---	11
		90-99%	---	---	---	---	---	---	---	---	---	-	11

[a]A plus (+) indicates row interior core area is preferred over the column interior core area. A minus (-) indicates avoidance of row interior core area relative to column interior core area. Three signs show $P < 0.05$ and one sign shows $P > 0.05$. Numbers identify the overall interior core area preference ranking; lower numbers illustrate a greater preference, and an asterisk (*) confirms a significant ($P < 0.05$) preference over the subsequent lower-ranked interior core area.

[b]Interior core area is defined as the portion of an element contained within a specified distance from the edge. Interior core areas were calculated at 10 m intervals from the edge of each forest element, up to 100 m deep in the largest countryside forest elements.

[c]Results from third-order selection (5) or radio locations relative to the home range (HR), or the area within the 99% utilization distribution (UD) subarea.

[d]Results from second-order selection (5) or 10, 20, 30, 40, 50, 60, 70, 80, 90, and 99% UD subareas relative to the study area (SA).

Supplementary Table 7. Matrix of forest element interior core area preference ranking of *L. coronata*.[a]

Interior core area distance from edge[b]			0	10	20	30	40	50	60	70	80	90	100
0	UD subareas vs. SA[c]	30-60%	2	-	+	+++	+++	+++	+++	+++	+++	+++	+++
		70-80%	2	-	+	+	+++	+++	+++	+++	+++	+++	+++
		90%	2	---	+	+	+	+	+	+++	+++	+++	+++
		99%	3	---	-	+	+	+	+	+++	+++	+++	+++
10	UD subareas vs. SA	30-70%	+	1	+	+++	+++	+++	+++	+++	+++	+++	+++
		80%	+	1	+	+	+++	+++	+++	+++	+++	+++	+++
		90%	+++	1*	+	+	+	+++	+++	+++	+++	+++	+++
		99%	+++	1	+	+	+	+++	+++	+++	+++	+++	+++
20	UD subareas vs. SA	30, 70%	-	-	3*	+++	+++	+++	+++	+++	+++	+++	+++
		40-60%	---	---	3*	+++	+++	+++	+++	+++	+++	+++	+++
		80%	---	---	3*	+++	+++	+++	+++	+++	+++	+++	+++
		90%	---	---	3*	+++	+++	+++	+++	+++	+++	+++	+++
		99%	+	---	2	+++	+++	+++	+++	+++	+++	+++	+++
30	UD subareas vs. SA	30%	---	---	-	6	-	-	+	+	+	+	+++
		40%	---	---	-	7	---	-	-	+	+	+	+
		50%	---	---	-	8	+	---	-	-	+	+	+
		60%	-	---	-	4	+-	+	+	+	+	+	+++
		70%	-	-	---	4	+	+	+	+	+	+++	+++
		80%	-	-	-	4	+-	+	+	+	+++	+++	+++
		90-99%	-	-	-	4	+	+++	+++	+++	+++	+++	+++
40	UD subareas vs. SA	30%	---	---	-	+	4	+	+	+	+	+	+++
		40%	---	---	-	+++	5	-	+	+	+	+	+++
		50%	---	---	-	+++	6	-	+	+	+	+	+++
		60-70%	---	---	-	-	7	-	+	+	+	+	+
		80%	---	---	---	-	7	-	+	+	+	+	+
		90-99%	-	-	-	-	5	+	+	+	+	+++	+++
50	UD subareas vs. SA	30%	---	---	-	+	-	5	+	+	+++	+++	+++
		40%	---	---	-	+	+	4	+	+	+	+++	+++
		50%	---	---	-	+++	+	4	+	+	+	+	+++
		60-70%	---	---	-	-	+	5	+	+	+	+	+++
		80%	---	---	---	-	+	5	+	+	+	+	+
		90-99%	-	---	---	---	-	6	+	+	+	+	+
60	UD subareas vs. SA	30%	---	---	-	-	-	-	7	+	+	+	-
		40%	---	---	-	+	-	-	6	+	+	+++	+++
		50%	---	---	-	+	+	-	5	+	+	+++	+++
		60-70%	---	---	-	-	+	-	6	+	+	+	+++
		80%	---	---	---	-	+	-	6	+	+	+	+
		90-99%	-	---	---	---	-	-	7	+	+	+	+
70	UD subareas vs. SA	30%	---	---	---	-	-	-	-	8	+	+	+++
		40%	---	---	-	-	-	-	-	8	+	+++	+++
		50%	---	---	-	+	-	-	-	7	+	+++	+++
		60%	---	---	-	-	-	-	-	8	+	+	+++
		70-80%	---	---	---	-	-	-	-	8	+	+	+++
		90-99%	---	---	---	---	-	-	-	8	+	+	+
80	UD subareas vs. SA	30%	---	---	---	-	-	---	-	-	9	+	+
		40-70%	---	---	---	-	-	-	-	-	9	+	+
		80%	---	---	---	---	-	-	-	-	9	+	+++
		90-99%	---	---	---	---	-	-	-	-	9	+	+
90	UD subareas vs. SA	30%	---	---	---	-	-	---	-	-	-	10	+
		40%	---	---	---	-	-	---	---	---	-	10	+
		50%	---	---	---	-	-	-	---	---	-	10	+
		60%	---	---	---	-	-	-	-	-	-	10	+
		70-80%	---	---	---	---	-	-	-	-	-	10	+
		90-99%	---	---	---	---	---	-	-	-	-	10	+
100	UD subareas vs. SA	30%	---	---	---	---	---	---	-	---	-	-	11
		40-50%	---	---	---	-	---	---	---	---	-	-	11
		60%	---	---	---	---	---	---	---	---	-	-	11
		70%	---	---	---	---	-	---	---	---	-	-	11
		80%	---	---	---	---	-	-	-	---	---	-	11
		90%-99%	---	---	---	---	---	-	-	-	-	-	11

[a]A plus (+) indicates row interior core area is preferred over the column interior core area. A minus (-) indicates avoidance of row interior core area relative to column interior core area. Three signs show $P < 0.05$ and one sign shows $P > 0.05$. Numbers identify the overall interior core area preference ranking; lower numbers illustrate a greater preference, and an asterisk (*) confirms a significant ($P < 0.05$) preference over the subsequent lower-ranked interior core area.

[b]Interior core area is defined as the portion of an element contained within a specified distance from the edge. Interior core areas were calculated at 10 m intervals from the edge of each forest element, up to 100 m deep in the largest countryside forest elements.

[c]Results from third-order selection (5) or radio locations relative to the home range (HR), or the area within the 99% utilization distribution (UD) subarea.

[d]Results from second-order selection (5) or 10, 20, 30, 40, 50, 60, 70, 80, 90, and 99% UD subareas relative to the study area (SA).

Supplementary Table 8. Matrix of forest element interior core area preference ranking of *T. assimilis*.[a]

Interior core area distance from edge[b]			0	10	20	30	40	50	60	70	80	90	100
0	Radio locations vs. HR[c]		1*	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
	UD subareas vs. SA[d]	10-99%	1*	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
10	Radio locations vs. HR		---	2*	+++	+++	+++	+++	+++	+++	+++	+++	+++
	UD subareas vs. SA	10-99%	---	2*	+++	+++	+++	+++	+++	+++	+++	+++	+++
20	Radio locations vs. HR		---	---	3*	+++	+++	+++	+++	+++	+++	+++	+++
	UD subareas vs. SA	10-99%	---	---	3*	+++	+++	+++	+++	+++	+++	+++	+++
30	Radio locations vs. HR		---	---	---	5*	-	+++	+++	+++	+++	+++	+++
	UD subareas vs. SA	10-99%	---	---	---	4*	+++	+++	+++	+++	+++	+++	+++
40	Radio locations vs. HR		---	---	---	+	4	+	+++	+++	+++	+++	+
	UD subareas vs. SA	10-99%	---	---	---	---	5*	+++	+++	+++	+++	+++	
50	Radio locations vs. HR		---	---	---	---	-	6	+	+	+	+	+
	UD subareas vs. SA	10%	---	---	---	---	---	6	+	+	+++	+++	+++
		20-99%	---	---	---	---	---	6	+	+++	+++	+++	+++
60	Radio locations vs. HR		---	---	---	---	---	-	10	-	+	-	-
	UD subareas vs. SA	10-20%	---	---	---	---	---	-	7	+	+++	+++	+
		30-99%	---	---	---	---	---	-	7*	+++	+++	+++	+++
70	Radio locations vs. HR		---	---	---	---	---	-	+	9	+	+	+
	UD subareas vs. SA	10%	---	---	---	---	---	-	-	8	+	+	+
		20%	---	---	---	---	---	---	-	8	+	+	+
		30%	---	---	---	---	---	---	---	8	+	+	+
		40%	---	---	---	---	---	---	---	8*	+++	+++	+
		50-99%	---	---	---	---	---	---	---	8*	+++	+++	+++
80	Radio locations vs. HR		---	---	---	---	---	-	-	-	11	---	---
	UD subareas vs. SA	10-20%	---	---	---	---	---	---	---	-	9	+	+
		30%	---	---	---	---	---	---	---	-	10	+	-
		40%	---	---	---	---	---	---	---	---	10	+	-
		50%	---	---	---	---	---	---	---	---	9	+	+
		60%	---	---	---	---	---	---	---	---	9	+++	+
		70-99%	---	---	---	---	---	---	---	---	9*	+++	+++
90	Radio locations vs. HR		---	---	---	---	---	-	+	+	+++	8	---
	UD subareas vs. SA	10-30%	---	---	---	---	---	---	---	-	-	11	---
		40-50%	---	---	---	---	---	---	---	---	-	11	---
		60%	---	---	---	---	---	---	---	---	---	11	-
		70-80%	---	---	---	---	---	---	---	---	---	10	+
		90-99%	---	---	---	---	---	---	---	---	---	10*	+++
100	Radio locations vs. HR		---	---	---	---	-	-	+	+	+++	+++	7*
	UD subareas vs. SA	10-20%	---	---	---	---	---	---	-	-	-	+++	10*
		30%-40%	---	---	---	---	---	---	---	-	+	+++	9*
		50%	---	---	---	---	---	---	---	---	-	+++	10*
		60%	---	---	---	---	---	---	---	---	-	+	10
		70-80%	---	---	---	---	---	---	---	---	---	-	11
		90%-99%	---	---	---	---	---	---	---	---	---	---	11

[a]A plus (+) indicates row interior core area is preferred over the column interior core area. A minus (-) indicates avoidance of row interior core area relative to column interior core area. Three signs show $P < 0.05$ and one sign shows $P > 0.05$. Numbers identify the overall interior core area preference ranking; lower numbers illustrate a greater preference, and an asterisk (*) confirms a significant ($P < 0.05$) preference over the subsequent lower-ranked interior core area.

[b]Interior core area is defined as the portion of an element contained within a specified distance from the edge. Interior core areas were calculated at 10 m intervals from the edge of each forest element, up to 100 m deep in the largest countryside forest elements.

[c]Results from third-order selection (5) or radio locations relative to the home range (HR), or the area within the 99% utilization distribution (UD) subarea.

[d]Results from second-order selection (5) or 10, 20, 30, 40, 50, 60, 70, 80, 90, and 99% UD subareas relative to the study area (SA).

Supplementary Table 9. Matrix of forest element interior core area preference ranking of *T. icterocephala*[a]

Interior core area distance from edge[b]			0	10	20	30	40	50	60	70	80	90	100
0	Radio locations vs. HR[c]		1*	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
	UD subareas vs. SA[d]	10-99%	1*	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
10	Radio locations vs. HR		---	2*	+++	+++	+++	+++	+++	+++	+++	+++	+++
	UD subareas vs. SA	10-99%	---	2*	+++	+++	+++	+++	+++	+++	+++	+++	+++
20	Radio locations vs. HR		---	---	6*	-	-	-	+++	+	+	+	+++
	UD subareas vs. SA	10-99%	---	---	3*	+++	+++	+++	+++	+++	+++	+++	+++
30	Radio locations vs. HR		---	---	+	5	-	---	+	+	+	+	+++
	UD subareas vs. SA	10%	---	---	---	4	+	+	+	+	+++	+	+
		20-99%	---	---	---	4*	+++	+++	+++	+++	+++	+++	+++
40	Radio locations vs. HR		---	---	+	+	4	---	+	+	+	+	+++
	UD subareas vs. SA	10%	---	---	---	-	6	-	+	+	+	+	+
		20-30%	---	---	---	---	5	+	+++	+++	+++	+++	+++
		40-99%	---	---	---	---	5*	+++	+++	+++	+++	+++	+++
50	Radio locations vs. HR		---	---	+	+++	+++	3*	+	+	+	+	+++
	UD subareas vs. SA	10%	---	---	---	-	+	5	+	+	+	+	+
		20%	---	---	---	---	-	6	+	+	+	+	+
		30%	---	---	---	---	-	6*	+++	+++	+++	+++	+++
		40-99%	---	---	---	---	---	6*	+++	+++	+++	+++	+++
60	Radio locations vs. HR		---	---	---	-	-	-	7	+	+	+	+++
	UD subareas vs. SA	10%	---	---	---	-	-	-	8	-	+	+	+
		20%	---	---	---	---	---	-	7	+	+	+	+
		30%	---	---	---	---	---	---	7	+	+	+	+
		40-99%	---	---	---	---	---	---	7*	+++	+++	+++	+++
70	Radio locations vs. HR		---	---	-	-	-	-	-	8	-	+	+
	UD subareas vs. SA	10%	---	---	---	-	-	-	+	7	+	+	+
		20%	---	---	---	---	---	-	-	8	+	+	+
		30%	---	---	---	---	---	---	-	8	+	+	+
		40%	---	---	---	---	---	---	---	9	-	+	+
		50 & 80%	---	---	---	---	---	---	---	8	+	+	+
		60%	---	---	---	---	---	---	---	8	+	+++	+++
		70%	---	---	---	---	---	---	---	8	+	+	+++
		90-99%	---	---	---	---	---	---	---	8*	+++	+++	+++
80	Radio locations vs. HR		---	---	-	-	-	-	-	+	9	-	+
	UD subareas vs. SA	10%	---	---	---	---	-	-	-	-	10	+	-
		20%	---	---	---	---	---	-	-	-	9	+	+
		30%	---	---	---	---	---	---	-	-	9	+	+
		40%	---	---	---	---	---	---	---	+	8	+	+
		50, 80%	---	---	---	---	---	---	---	-	9	+	+
		60%	---	---	---	---	---	---	---	-	9*	+++	+++
		70%	---	---	---	---	---	---	---	-	9	+	+++
		90-99%	---	---	---	---	---	---	---	---	9*	+++	+++
90	Radio locations vs. HR		---	---	-	-	-	-	-	-	+	10	+
	UD subareas vs. SA	10%	---	---	---	-	-	-	-	-	-	11	---
		20%	---	---	---	---	---	-	-	-	-	11	---
		30%	---	---	---	---	---	---	-	-	-	10	+
		40-50, 70%	---	---	---	---	---	---	---	-	-	10	+
		60%	---	---	---	---	---	---	---	---	---	10	+
		80%	---	---	---	---	---	---	---	-	-	11	-
		90%	---	---	---	---	---	---	---	---	---	11	-
		99%	---	---	---	---	---	---	---	---	---	10	+
100	Radio locations vs. HR		---	---	---	---	---	---	---	-	-	-	11
	UD subareas vs. SA	10%	---	---	---	-	-	-	-	-	+	+++	9
		20%	---	---	---	---	---	-	-	-	-	+++	10*
		30%	---	---	---	---	---	---	-	-	-	-	11
		40-50%	---	---	---	---	---	---	---	-	-	-	11
		60-70%	---	---	---	---	---	---	---	---	---	-	11
		80%	---	---	---	---	---	---	---	-	-	+	10
		90%	---	---	---	---	---	---	---	---	---	+	10
		99%	---	---	---	---	---	---	---	---	---	-	11

[a]A plus (+) indicates row interior core area is preferred over the column interior core area. A minus (-) indicates avoidance of row interior core area relative to column interior core area. Three signs show $P < 0.05$ and one sign shows $P > 0.05$. Numbers identify the overall interior core area preference ranking; lower numbers illustrate a greater preference, and an asterisk (*) confirms a significant ($P < 0.05$) preference over the subsequent lower-ranked interior core area.

[b]Interior core area is defined as the portion of an element contained within a specified distance from the edge. Interior core areas were calculated at 10 m intervals from the edge of each forest element, up to 100 m deep in the largest countryside forest elements.

[c]Results from third-order selection (5) or radio locations relative to the home range (HR), or the area within the 99% utilization distribution (UD) subarea.

[d]Results from second-order selection (5) or 10, 20, 30, 40, 50, 60, 70, 80, 90, and 99% UD subareas relative to the study area (SA).

Supplementary Table 10. Matrix of forest element interior core area preference ranking of *C. aurantiirostris*.[a]

Interior core area distance from edge[b]			0	10	20	30	40	50	60	70	80	90	100
0	UD subareas vs. SA[c]	40-99%	1*	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
10	UD subareas vs. SA	40-99%	---	2*	+++	+++	+++	+++	+++	+++	+++	+++	+++
20	UD subareas vs. SA	40-99%	---	---	3*	+++	+++	+++	+++	+++	+++	+++	+++
30	UD subareas vs. SA	40-99%	---	---	---	4*	+++	+++	+++	+++	+++	+++	+++
40	UD subareas vs. SA	40-99%	---	---	---	---	5*	+++	+++	+++	+++	+++	+++
50	UD subareas vs. SA	40-99%	---	---	---	---	---	6*	+++	+++	+++	+++	+++
60	UD subareas vs. SA	40-50%	---	---	---	---	---	---	7	+	+	+	+
		60%	---	---	---	---	---	---	7	+++	+++	+	+
		70%	---	---	---	---	---	---	7	+++	+++	+++	+
		80-99%	---	---	---	---	---	---	7	+++	+++	+++	+++
70	UD subareas vs. SA	40-50%	---	---	---	---	---	---	-	8	+	+	+
		60%	---	---	---	---	---	---	---	9	+	-	+
		70-99%	---	---	---	---	---	---	---	8	+	+	+
80	UD subareas vs. SA	40-50%	---	---	---	---	---	---	-	-	10	+	-
		60%	---	---	---	---	---	---	---	-	11	-	-
		70%	---	---	---	---	---	---	---	-	11	---	-
		80%	---	---	---	---	---	---	---	-	10	-	+
		90%	---	---	---	---	---	---	---	-	10	+	-
		99%	---	---	---	---	---	---	---	-	9	+	+
90	UD subareas vs. SA	40-50%	---	---	---	---	---	---	-	-	-	11	---
		60%	---	---	---	---	---	---	-	+	+	8	+
		70%	---	---	---	---	---	---	---	-	+++	9	+
		80%	---	---	---	---	---	---	---	-	+	9	+
		90%	---	---	---	---	---	---	---	-	-	11	---
		99%	---	---	---	---	---	---	---	-	-	11	-
100	UD subareas vs. SA	40-50%	---	---	---	---	---	---	-	-	+	+++	9
		60-70%	---	---	---	---	---	---	-	-	+	-	10
		80%	---	---	---	---	---	---	---	-	-	-	11
		90%	---	---	---	---	---	---	---	-	+	+++	9
		99%	---	---	---	---	---	---	---	-	-	+	10

[a]A plus (+) indicates row interior core area is preferred over the column interior core area. A minus (-) indicates avoidance of row interior core area relative to column interior core area. Three signs show $P < 0.05$ and one sign shows $P > 0.05$. Numbers identify the overall interior core area preference ranking; lower numbers illustrate a greater preference, and an asterisk (*) confirms a significant ($P < 0.05$) preference over the subsequent lower-ranked interior core area.

[b]Interior core area is defined as the portion of an element contained within a specified distance from the edge. Interior core areas were calculated at 10 m intervals from the edge of each forest element, up to 100 m deep in the largest countryside forest elements.

[c]Results from third-order selection (5) or radio locations relative to the home range (HR), or the area within the 99% utilization distribution (UD) subarea.

[d]Results from second-order selection (5) or 10, 20, 30, 40, 50, 60, 70, 80, 90, and 99% UD subareas relative to the study area (SA).

Supplementary Table 11. Summary of one-way ANOVAs and pairwise comparisons between each species' mean proportion of countryside forest elements in each utilization distribution subarea.

Subarea[a]		Interior core area distance from edge[b]									
UD subarea 10%		10	20	30	40	50	60	70	80	90	100
$F_{5,227}$		14.154	14.984	11.691	7.945	7.825	6.816	5.637	4.620	3.932	2.650
P[c]		***	***	***	***	***	***	***	***	***	**
Com. Pair[d]	Pairwise comparisons[e]										
A	*A. ochrolaemus -C. altera*	=	=	=	=	=	=	=	=	=	=
A	*A. ochrolaemus -L. coronata*	=	=	=	=	=	=	=	=	=	=
A	*C. altera - L. coronata*	=	=	=	=	=	=	=	=	=	=
B	*A. ochrolaemus -T. assimilis*	=	=	=	=	=	=	=	=	=	=
B+	*A. ochrolaemus -T. icterocephala*	=	>	>	=	=	=	=	=	=	>
B+	*A. ochrolaemus -C. aurantiirostris*	=	>	>	>	=	=	=	=	=	>
B+++	*C. altera -T. assimilis*	>	>>	>>	>>	>>>	>>	>>	>>	>>	>>
B+++	*C. altera -T. icterocephala*	>>>	>>>	>>>	>>>	>>	>>	>	=	=	>>>
B+++	*C. altera-C. aurantiirostris*	>>>	>>>	>>>	>>>	>>	>>	>>	=	=	>>>
B++	*L. coronata-T. assimilis*	=	=	>	>	>>	>>	>	>>	>	=
B+++	*L. coronata -T. icterocephala*	>>>	>>>	>>>	>	>	>	=	=	=	>>>
B+++	*L. coronata -C. aurantiirostris*	>	>>	>>	>>	>>>	>>	>>	>>	>>	>>
C	*T. assimilis -T. icterocephala*	=	=	=	=	=	=	=	=	=	=
C	*T. assimilis - C. aurantiirostris*	=	=	=	=	=	=	=	=	=	=
C	*T. icterocephala - C. aurantiirostris*	=	=	=	=	=	=	=	=	=	=
UD subarea 99%		10	20	30	40	50	60	70	80	90	100
$F_{5,252}$		24.710	23.616	21.953	20.643	18.462	15.688	13.402	11.737	10.932	23.616
P		***	***	***	***	***	***	***	***	***	***
Com. Pair	Pairwise comparisons										
A	*A. ochrolaemus -C. altera*	=	=	=	=	=	=	=	=	=	=
A	*A. ochrolaemus -L. coronata*	=	=	=	=	=	=	=	=	=	=
A	*C. altera - L. coronata*	=	=	=	=	=	=	=	=	=	=
B+	*A. ochrolaemus -T. assimilis*	=	=	>	>	>	>	>	>	>	=
B++	*A. ochrolaemus -T. icterocephala*	>	>>	>>	>>	>>	>>	>>	>>	>>	>>
B+++	*A. ochrolaemus -C. aurantiirostris*	>>	>>	>>	>>	>>>	>>	>>	>>	>>	>>
B+++	*C. altera -T. assimilis*	>>>	>>>	>>>	>>>	>>>	>>	>>	>	=	>>>
B+++	*C. altera -T. icterocephala*	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>	>>>
B+++	*C. altera-C. aurantiirostris*	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>
B+++	*L. coronata-T. assimilis*	=	>	>>	>>	>>>	>>>	>>>	>>	>>	>
B+++	*L. coronata -T. icterocephala*	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>
B+++	*L. coronata -C. aurantiirostris*	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>
C++	*T. assimilis -T. icterocephala*	>>	>	=	=	=	=	=	=	=	>
C+++	*T. assimilis - C. aurantiirostris*	>>>	>>	=	=	=	=	=	=	=	>>
C	*T. icterocephala - C. aurantiirostris*	=	=	=	=	=	=	=	=	=	=

[a] Only two utilization distribution (UD) subareas are shown for clarity.

[b] Interior core area is defined as the portion of an element contained within a specified distance from the edge. Interior core areas were calculated at 10 m intervals from the edge of each forest element, up to 100 m deep in the largest countryside forest elements.

[c] P-values for one-way ANOVAs: (*) indicates $0.01 < P < 0.05$; (**) indicates $0.001 < P < 0.01$; and (***) indicates $P < 0.001$.

[b] Forest dependence pairings indicate pairwise comparisons using Tukey's honest significance difference (HSD) test between species limited to countryside forest elements (A), species found in both countryside forest elements and agricultural plots (C), or a comparison between the two (B). Plus signs (+) indicate significant differences between species of each community pairing: (+) indicates $0.01 < P < 0.05$; (++) indicates $0.001 < P < 0.01$; and (+++) indicates $P < 0.001$.

[e] Greater-than, less-than, and equal signs between species indicate if differences occurred and their directionality based the total sum of countryside forest elements in each utilization distribution subarea. Number of signs indicates the degree of significance based on adjusted P-values from Tukey's HSD: one sign indicates $0.01 < P < 0.05$; two signs indicate $0.001 < P < 0.01$; and three signs indicate $P < 0.001$.

Supporting Information Appendix References

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