

Birds of the Cerro El Amay Important Bird Area, Quiché, Guatemala

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El Área Importante para la Conservación de Aves Cerro El Amay (IBA GT006) en el departamento de Quiché, Guatemala, incluye más de 250 km² de bosque húmedo latifoliado, lo que representa el segundo bosque nuboso más extenso en Guatemala. La avifauna del bosque nuboso en la altitud de 1.000–2.600 m, así como de áreas agrícolas en esta elevación y de bosque de pino, fue investigada usando búsquedas intensivas diurnas y nocturnas a lo largo de transectos con estimación de distancia perpendicular, de octubre 2010 a abril 2011. Durante los conteos y observaciones casuales se registraron 265 especies de aves, representando un 89% de las especies esperadas según patrones generales de distribución de aves en Guatemala. La riqueza de especies de aves residentes y de aves migratorias neotropicales fue mayor en bosque nuboso de 1.000–1.800 m de altitud comparado con bosque nuboso de 1.800–2.600 m. De acuerdo a la tasa de detección a lo largo de los transectos con una truncación de datos en la distancia perpendicular de 40 m, las especies más abundantes en bosque nuboso de 1.000–1.800 m fueron *Cardellina pusilla*, *Henicorhina leucosticta*, *Chlorospingus ophthalmicus*, *Basileuterus culicivorus* y *Myadestes unicolor*, y en bosque nuboso de 1.800–2.600 m fueron *C. ophthalmicus*, *C. pusilla*, *H. leucophrys*, *Zimmerius villisimus* y *Turdus infuscatus*. Para las especies comunes se calculó la preferencia de hábitat según el promedio de la tasa de detección en los transectos. Para las cinco especies más abundantes, se calculó la densidad de población y abundancia absoluta. La densidad de la migratoria *C. pusilla* fue 3,7 individuos / ha (95% intervalo de confianza: 2,2–6,2) en bosque nuboso de 1.800–2.600 m, y de 4,4 individuos / ha (2,9–6,7) en bosque nuboso de 1.000–1.800 m. Según la extensión de ambos tipos de bosque, se estimó la población total de esta especie con 68.330 individuos (43.580–107.500). Considerando los individuos adicionales en áreas abiertas, áreas <1.000 m, y el recambio de individuos durante la migración, se asume que el IBA Cerro El Amay apoya >1% de la población global de *C. pusilla*. Los búhos (Strigiformes) más comunes de 1.000–1.800 m fueron *Ciccaba virgata* y *Megascops guatemalae*, y de 1.800–2.600 m fueron *Strix fulvescens* y *Megascops barbarus*. En el siglo XIX, *Oreophasis derbianus* fue registrado como poco común en el Cerro El Amay. En un esfuerzo de búsqueda de 18 días en hábitat apropiado de 2008–11 la especie no pudo ser reconfirmada para este IBA. La especie seguramente ya no es poco común en el área, pero es posible que todavía exista en secciones del bosque nuboso aún no investigadas. Este estudio identifica el Cerro El Amay como uno de los IBAs más importantes en Guatemala por el número de especies claves que alberga.

Ornithologically, dpto. Quiché is one of the most poorly known areas in Guatemala¹⁰. Cerro El Amay, in northern Quiché, which forms part of the Sierra de Chamá, supports the second-largest montane humid broadleaf forest in Guatemala at c.250 km²²³. Few bird records are available from the area. Salvin²⁶ collected several Horned Guans *Oreophasis derbianus* and Griscom¹⁷ reported several species collected and observed by Alfred Webster Anthony at El Soch. At the same site a short recent survey²⁸ provided sufficient evidence to designate an Important Bird Area (IBA GT006¹²). Especially highland species reported by Griscom for Uspantán might relate to Cerro El Amay, e.g. Bearded Screech Owl *Megascops barbarus* and Pink-headed Warbler *Cardellina versicolor*. Here we report on the first avifaunal survey to cover all habitat types on the upper Cerro El Amay, including efforts to rediscover Horned Guan, and

provide the first compilation of all species recorded in this IBA.

Study area and Methods

Study area.—The Cerro El Amay IBA (centred on 15°31'N 90°45'W) is located in the municipalities of Uspantán and Chicamán, dpto. Quiché, and is bordered by the río Chixoy to the east, the río Putul to the west, Quebrada Saquixpec in the north and Quebrada El Rosario in the south (Fig. 1). The IBA ranges in elevation from 300 to 2,600 m. Unbroken forest is limited to areas above 1,000 m, on which our surveys focused. Humid broadleaf forest covers c.10,400 ha at 1,000–1,800 m and 6,100 ha at 1,800–2,600 m (Fig. 1). We sampled the avifauna in five habitat types. Upper cloud forest (1,800–2,600 m) comprised c.35 m-tall humid broadleaf forest dominated by oak (*Quercus* spp.) along ridges, with a more diverse tree community including

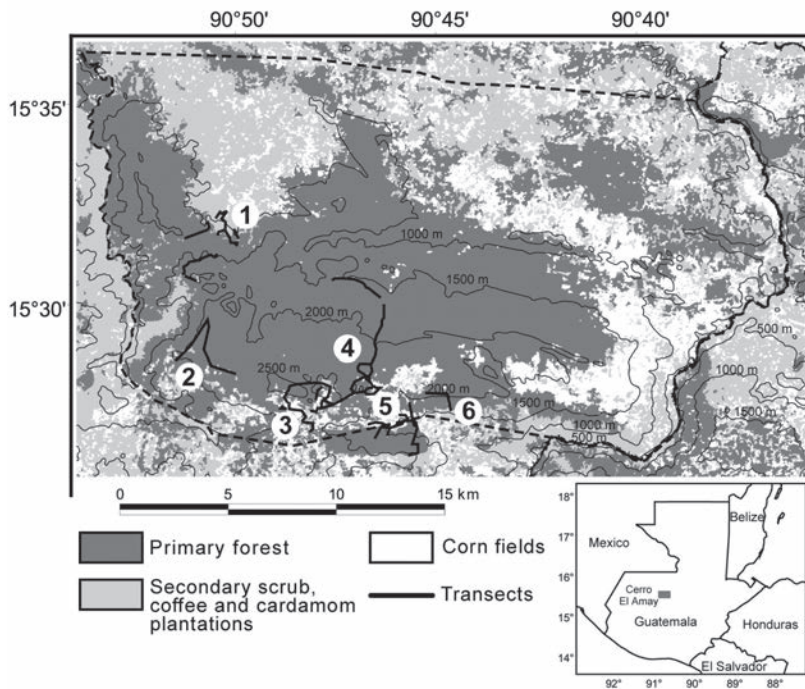


Figure 1. Vegetation cover and altitudinal zones in Cerro El Amay Important Bird Area (IBA GT006, dashed polygon) according to MAGA²³ and our field observations. Study sites: 1—La Gloria, 2—San Pedro La Esperanza, 3—Laj Chimel, 4—Chimel, 5—Reserva El Recuerdo, 6—El Soch, and transects used for intensive searches for Horned Guan *Oreophasis derbianus*. The inset shows the location of Cerro El Amay (grey rectangle) in Guatemala.

several Lauraceae on slopes. Lower cloud forest (1,000–1,800 m) was also c.35 m tall, locally with 50–65 m-tall trees (Mexican elm *Ulmus mexicanus* at La Gloria, cedar *Cedrela salvadorensis* at El Recuerdo). Pine forest (*Pinus* sp.) with a shrubby understorey was restricted to a hillside at El Recuerdo at 1,800–2,200 m. Natural habitat has been altered by agriculture around the main forest. We also sampled the bird community in upper open habitat (1,800–2,600 m) and lower open habitat (1,000–1,800 m), including forest edges, small plantations of coffee (*Coffea arabica*), cardamom (*Elettaria cardamomum*), sugarcane (*Saccharum officinarum*) and corn (*Zea mays*), with cattle pasture and second-growth scrub.

Bird surveys.—We surveyed lower cloud forest and lower open habitat in Reserva El Recuerdo (15°27'16"N 90°45'33"W) and La Gloria (15°32'04"N 90°49'57"W), upper cloud forest and upper open habitat in Chimel (15°28'12"N 90°47'00"W), Laj Chimel (15°27'30"N 90°48'45"W), El Soch (15°27'20"N 90°44'42"W) and San Pedro La Esperanza (15°28'40"N 90°50'56"W), and pine forest in El Recuerdo (Fig. 1).

KE & CA sampled the avifauna using audio-visual counts (diurnal and nocturnal intensive searches) along transects^{3,24}. Census workers were

familiar with bird vocalisations from previous studies^{9,10,14}. Diurnal counts were conducted at 05h00–10h00 h, although on days with exceptionally high bird activity this was extended until 11h50, and on nocturnal counts, 17h45–23h00 and 04h30–6h00, under optimal weather conditions (no rain, wind speed <4 Beaufort scale). For each bird or flock detected, we recorded the number of individuals and their perpendicular distance from the transect line, measured with a laser field ranger or estimated. Pre-existing trails were used as transects, in length 260–2,740 m (diurnal, $n = 34$ transects) or 100–2,560 m (nocturnal, $n = 21$ transects). Total sampling effort was 37.8 km of diurnal transects and 21.4 km of nocturnal transects. Counts were made on 16–20 October 2010, 2–12 February and 10–26 April 2011. In addition to standardised counts, casual observations were recorded over 153 hours. Ten days were spent in upper cloud forest >2,000 m, which is considered appropriate Horned Guan habitat¹¹.

Additional effort was made to detect Horned Guans during surveys in 2008–11. PT spent a total of eight days surveying cloud forest habitat at 2,000–2,600 m in February 2008, January 2010 and March 2011 in lands managed by the villages of La Gloria, Laj Chimel, San Pedro La Esperanza

and by the Chimel Community Association. While some pre-existing trails were used, the majority of areas surveyed were accessed by freshly cut trails, created to access remote parts of Cerro El Amay (Fig. 1). Intensive searches were conducted along c.32 km of trails, with at least 45 hours of observations.

Data analyses.—To compare species richness between habitats, we produced individual-based rarefaction curves using Biodiversity Professional²² and estimated species richness via a non-parametric first-order Jackknife estimator using EstimateS⁷. To calculate relative abundance, each transect was considered a sampling unit. To reduce the effect of different detectability among species, we truncated data at the perpendicular distance of 40 m (for nocturnal birds data were truncated at 100 m). Because transect length was variable, we calculated the encounter rate in number of individuals / 100 m transect. To determine habitat preferences, we compared encounter rate between the four main habitat types (upper cloud forest, lower cloud forest, upper open habitat, lower open habitat) with the parameter-free Kruskal-Wallis test with $\alpha = 0.05$, using PAST 2.08¹⁸. When significant differences were detected, we subsequently applied a pairwise Mann-Whitney U-Test with $\alpha = 0.05$, and a Bonferroni correction according to the number of pairs tested.

For the most abundant species the number of records was sufficient (c.80⁵) to calculate detection probability and population densities using Distance 6.0²⁹. Each transect was considered a replicate unit. Data were, when necessary, truncated during model selection. The best model was selected based on Akaike's Information Criterion (AIC) and chi-square goodness-of-fit-test for each interval⁵.

To classify all species according to their relative abundance in Cerro El Amay IBA, we established

five categories: abundant (mean >0.25 birds / 100 m transect), common (0.10–0.25 individuals / 100 m transect or >20 casual observations), fairly common (0.02–0.09 individuals / 100 m transect or >10 casual observations), uncommon (<0.02 individuals / 100 m transect or 3–10 records during transect counts and casual observations), and rare (1–2 records during transect counts and casual observations). Nomenclature follows the AOU¹ and supplements⁶.

Results

Species richness.—Between October 2010 and April 2011, 265 species were recorded in Cerro El Amay IBA during standardised bird counts and casual observations. Of these, 214 are considered breeding residents and 47 are Nearctic-Neotropical migrants (39 winter residents and eight transients). Four species are considered summer residents.

Some 5,667 birds were recorded during standardised intensive searches. An individual-based rarefaction analysis comparing both principal primary forest habitats revealed higher species richness in lower cloud forest compared to upper cloud forest, in both resident and migratory species (Fig. 2). The species richness calculated with a first-order Jackknife estimator based on transect counts was as follows (Jackknife estimation is indicated with SD): lower cloud forest: resident birds observed: 108 species, estimated: 137 ± 4 ; migratory birds observed: 30 species, estimated: 45 ± 5 ; upper cloud forest: resident birds observed: 79 species, estimated: 102 ± 7 ; migratory birds observed: 13 species, estimated: 19 ± 3 .

Relative abundance and habitat preferences.—Table 1 lists the most abundant species in each habitat type. Among common species with at least ten records during transects, we tested for differences in the mean encounter rate between upper and lower habitat cloud forest, and upper and lower open habitat (Table 2). Upper cloud forest specialists, exclusively recorded there or with a significantly greater encounter rate were Band-tailed Pigeon *Patagioenas fasciata*, Amethyst-throated Hummingbird *Lampornis amethystinus*, Garnet-throated Hummingbird *Lamprolaima rhami*, Hairy Woodpecker *Picoides villosus*, Spot-crowned Woodcreeper *Lepidocolaptes affinis*, Paltry Tyrannulet *Zimmerius vilissimus*, Hutton's Vireo *Vireo huttoni*, Rufous-browed Wren *Troglodytes rufociliatus*, Ruddy-capped Nightingale-Thrush *Catharus frantzii*, Black Thrush *Turdus infuscatus*, Mountain Thrush *T. plebejus*, Crescent-chested Warbler *Parula superciliosa*, Golden-browed Warbler *Basileuterus belli* and Common Bush Tanager *Chlorospingus ophthalmicus*. Species with a significantly greater encounter rate in lower cloud forest were: Green-throated Mountain-gem *Lampornis viridipallens*,

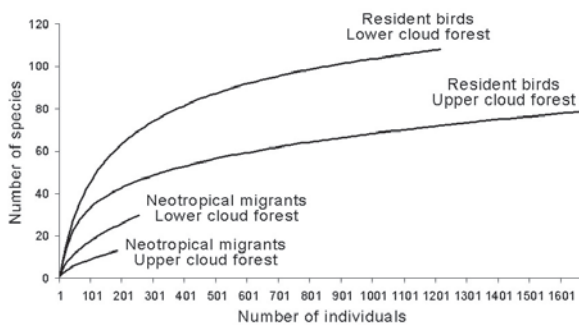


Figure 2. Rarefaction curves (based on the number of detected individuals) comparing species richness of resident and migratory birds in upper and lower cloud forest in Cerro El Amay IBA.

Table 1. Most abundant bird species in Cerro El Amay IBA, with a mean encounter rate >0.25 birds / 100 m of transect and strip width 80 m across all months from October 2010 to April 2011. Species are listed in descending order of abundance, for scientific names see Table 2.

Lower cloud forest		Upper cloud forest		Lower open habitat		Upper open habitat		Pine forest	
Species	Encounter rate	Species	Encounter rate	Species	Encounter rate	Species	Encounter rate	Species	Encounter rate
Wilson's Warbler	1.10	Common Bush Tanager	1.42	Wilson's Warbler	1.09	Amethyst-throated Hummingbird	0.61	White-eared Hummingbird	0.50
White-breasted Wood Wren	0.61	Wilson's Warbler	1.28	Swainson's Thrush	0.74	Wilson's Warbler	0.52	Grey-breasted Wood Wren	0.34
Common Bush Tanager	0.58	Grey-breasted Wood Wren	0.92	Azure-crowned Hummingbird	0.61	Brown-backed Solitaire	0.28	Wilson's Warbler	0.25
Golden-crowned Warbler	0.50	Paltry Tyrannulet	0.78	White-eared Hummingbird	0.61	Plain Wren	0.28	Ruddy Foliage-gleaner	0.25
Slate-coloured Solitaire	0.44	Black Thrush	0.68	Black-throated Green Warbler	0.50				
Swainson's Thrush	0.43	Yellowish Flycatcher	0.57	Plain Wren	0.49				
Grey-breasted Wood Wren	0.37	Amethyst-throated Hummingbird	0.57	Tennessee Warbler	0.36				
Green-throated Mountain-gem	0.35	Mountain Thrush	0.51	Slate-throated Redstart	0.34				
Slate-throated Redstart	0.34	Brown-backed Solitaire	0.43	Brown-capped Vireo	0.29				
Spot-breasted Wren	0.31	Ruddy-capped Nightingale-Thrush	0.40	Green Violetear	0.28				
Scaly-throated Foliage-gleaner	0.29	Golden-browed Warbler	0.40						
Black-throated Green Warbler	0.28	Rufous-browed Wren	0.37						
Yellowish Flycatcher	0.27	Chestnut-capped Brush Finch	0.37						
Eye-ringed Flatbill	0.27	Garnet-throated Hummingbird	0.33						
		Crescent-chested Warbler	0.29						
		Slate-throated Redstart	0.28						

Tawny-throated Leaf-tosser *Sclerurus mexicanus*, Scaly-throated Foliage-gleaner *Anabacerthia variegaticeps*, Eye-ringed Flatbill *Rhynchocyclus brevirostris*, White-breasted Wood Wren *Henicorhina leucosticta*, Black-headed Nightingale-Thrush *Catharus mexicanus*, Golden-crowned Warbler *Basileuterus culicivorus* and Red-crowned Ant Tanager *Habia rubica*.

Absolute abundance.—For the five most abundant species, density estimates were calculated from distance sampling data in April 2011. Common Bush Tanager was the most abundant bird in upper cloud forest with a density of 6.5 birds / ha (95% confidence interval: 4.1–10.3; $n = 134$ birds). In lower cloud forest it was recorded at a density of 4.3 birds / ha (95%: 2.8–6.5 birds / ha; $n = 70$ birds). Assuming a homogeneous population density throughout the upper cloud forest (6,100 ha) and lower cloud forest (10,400 ha), the total population in primary forest above

1,000 m in the IBA is estimated to be 84,400 birds (95%: 54,100–130,400 birds). The second most abundant bird was the migratory Wilson's Warbler *Cardellina pusilla* with a population density of 3.7 birds / ha (95%: 2.2–6.2 birds / ha; $n = 138$ birds) in upper cloud forest, and 4.4 birds / ha (95%: 2.9–6.7; $n = 92$ birds) in lower cloud forest. Consequently, total population in primary forest above 1,000 m was 68,330 birds (95% confidence interval: 43,580–107,500). The next most abundant birds in upper cloud forest were: Grey-breasted Wood Wren *Henicorhina leucophrys* (2.0 birds / ha; 95% confidence interval 1.3–3.0; $n = 136$ birds), Paltry Tyrannulet (1.6 birds / ha; 95% confidence interval 1.1–2.4; $n = 91$ birds), and Black Thrush (1.3 birds / ha; confidence interval 0.7–2.5; $n = 87$ birds).

Nocturnal birds.—Seven species of owls and three nighthawks were recorded in the IBA (Table 2). The commonest owls in lower cloud forest and open habitat were Mottled Owl *Ciccaba virgata* and

Table 2. Bird species recorded in the Cerro El Amay Important Bird Area.

IBA trigger species (marked in species column): ¹ = Globally threatened species (Vulnerable, Engangered, or Critically Endangered); ² = restricted to EBA 18 (North Central American highland); ³ = restricted to Madrean Highlands; ⁴ = restricted to Gulf Caribbean Slope; ⁵ = >1% of global population within IBA.

Evidence: P = photograph, R = voice recording, S = sight, V = voice.

Status: R = resident, nesting assumed; R* = resident, nesting observed (nest, fledged juveniles or nest-building adults); RV = summer resident; T = transient; V = visitor; ? = uncertain

Abundance: a = abundant (>0.25 individuals / 100 m transect); c = common (0.10–0.25 individuals / 100 m transect or >20 casual observations); f = fairly common (0.02–0.09 individuals / 100 m transect or >10 casual observations); u = uncommon (<0.02 individuals / 100 m transect or 3–10 records during transect counts and casual observations); r = rare (1–2 records during transect counts and casual observations), X = no data.

Habitat: A = upper cloud forest (1,800–2,600 m); B = lower cloud forest (1,000–1,800 m); C = upper open habitat (1,800–2,600 m); D = lower open habitat (1,000–1,800 m); E = open habitat <1,000 m; F = pine forest (1,800–2,200 m); G = small lagoon, + = historical record (Salvin 1874), * = open-habitat species recorded by Tenez²⁸. Habitat with highest detection rate underlined. If habitat preference was statistically significant (pairwise comparison with Mann-Whitney U-test with $\alpha = 0.05$, Bonferroni-corrected according to the number of pairs), p is indicated in parentheses.

Family and species	English name	Evidence	Residency status	Abundance	Habitat
TINAMIDAE					
<i>Tinamus major</i>	Great Tinamou	V	R	u	B
<i>Crypturellus soui</i>	Little Tinamou	V	R	u	D
<i>Crypturellus boucardi</i>	Slaty-breasted Tinamou	R	R	u	B
CRACIDAE					
<i>Ortalis vetula</i> ⁴	Plain Chachalaca	V	R	c	D
<i>Penelope purpurascens</i>	Crested Guan	R,P	R	f	A,B
<i>Penelopina nigra</i> ^{1,2,3}	Highland Guan	R,P	R*	c	<u>A</u> ,B
<i>Oreophasis derbianus</i> ^{1,2,3}	Horned Guan	-	?	X	+
ODONTOPHORIDAE					
<i>Dendrortyx leucophrys</i>	Buffy-crowned Wood Partridge	V,S	R	c	<u>A</u> ,C,D,F
<i>Odontophorus guttatus</i>	Spotted Wood Quail	V	R	f	B
ARDEIDAE					
<i>Ardea alba</i>	Great Egret	S	V	u	D
CATHARTIDAE					
<i>Coragyps atratus</i>	Black Vulture	S	V	u	D
<i>Cathartes aura</i>	Turkey Vulture	S	V	u	C,D
ACCIPITRIDAE					
<i>Chondrohierax uncinatus</i>	Hook-billed Kite	R,P	R	u	B
<i>Elanoides forficatus</i>	Swallow-tailed Kite	S	RV	X	E
<i>Accipiter striatus</i>	Sharp-shinned Hawk	S	V	r	D
<i>Accipiter striatus chionogaster</i>	White-breasted Hawk	P	R	f	<u>A</u> ,B,D,F
<i>Buteogallus anthracinus</i>	Common Black Hawk	P	R	u	B,D
<i>Buteogallus urubitinga</i>	Great Black Hawk	S	R	r	B
<i>Leucopternis albigollis</i>	White Hawk	P	R	u	B
<i>Buteo magnirostris</i>	Roadside Hawk	S	R	r	D
<i>Buteo platypterus</i>	Broad-winged Hawk	P	T	f	<u>A</u> ,B,C,D
<i>Buteo plagiatus</i>	Grey Hawk	P	R	u	D
<i>Buteo brachyurus</i>	Short-tailed Hawk	S	R	u	A,E
<i>Buteo jamaicensis</i>	Red-tailed Hawk	P	R	f	<u>A</u> ,B,C,D
<i>Spizaetus ornatus</i>	Ornate Hawk-Eagle	P	R	r	B
SCOLOPACIDAE					
<i>Phalaropus tricolor</i>	Wilson's Phalarope	S	V	r	G
COLUMBIDAE					
<i>Patagioenas flavirostris</i>	Red-billed Pigeon	S	R	r	D
<i>Patagioenas fasciata</i>	Band-tailed Pigeon	P	R	c	<u>A</u> ,B,C,D ($p = 0.002$)
<i>Columbina inca</i>	Inca Dove	-	R	X	*
<i>Columbina passerina</i>	Common Ground Dove	-	R	X	*
<i>Columbina talpacoti</i>	Ruddy Ground Dove	S	R	X	E
<i>Claravis pretiosa</i>	Blue Ground Dove	S	R	X	E

<i>Leptotila verreauxi</i>	White-tipped Dove	P	R*	f	B,C,D
<i>Geotrygon albigacies</i> ³	White-faced Quail-Dove	R	R	f	A,B
CUCULIDAE					
<i>Playa cayana</i>	Squirrel Cuckoo	S,V	R	f	B,C,D
<i>Tapera naevia</i>	Striped Cuckoo	V	R	u	C,E
<i>Dromococcyx phasianellus</i>	Pheasant Cuckoo	R	R	r	B
<i>Geococcyx velox</i>	Lesser Roadrunner	-	R	X	*
<i>Crotophaga sulcirostris</i>	Groove-billed Ani	S	R	u	D
STRIGIDAE					
<i>Megascops barbarus</i> ^{1,2,3}	Bearded Screech Owl	R,P	R	c	A,C,F
<i>Megascops guatemalae</i>	Vermiculated Screech Owl	R,P	R	c	B,D
<i>Glaucidium gnoma</i>	Northern Pygmy Owl	R,P	R	f	A,B,C,D
<i>Glaucidium griseiceps</i>	Central American Pygmy Owl	R	R	r	B
<i>Ciccaba virgata</i>	Mottled Owl	R	R	c	B,D
<i>Strix fulvescens</i> ^{2,3}	Fulvous Owl	R	R	c	A,C
<i>Aegolius ridgwayi</i>	Unspotted Saw-whet Owl	R	R	r	A
CAPRIMULGIDAE					
<i>Nyctidromus albigollis</i>	Common Pauraque	P	R*	c	B,C,D (p = 0.02)
<i>Anrostomus carolinensis</i>	Chuck-will's-widow	R	T	r	D
<i>Anrostomus arizonae</i>	Mexican Whip-poor-will	R	R	f	A,B,C,D,F
APODIDAE					
<i>Streptoprocne rutila</i>	Chestnut-collared Swift	V,S	R	u	A,B,C,D
<i>Streptoprocne zonaris</i>	White-collared Swift	P	R	f	A,B,C,D
<i>Chaetura vauxi</i>	Vaux's Swift	V,S	R	f	A,B,C,D
TROCHILIDAE					
<i>Phaethornis longirostris</i>	Long-billed Hermit	V,S	R	f	B,D
<i>Phaethornis striigularis</i>	Stripe-throated Hermit	R	R	c	B,D
<i>Colibri thalassinus</i>	Green Violetear	V,S	R	a	B,C,D (p = 0.03)
<i>Anthracothorax prevostii</i>	Green-breasted Mango	S	R	X	E
<i>Eugenes fulgens</i>	Magnificent Hummingbird	S,V	R	c	A,B,C,D
<i>Lampornis viridipallens</i> ^{2,3}	Green-throated Mountain-gem	P	R	a	A,B,C,D,F (p = 0.006)
<i>Lampornis amethystinus</i> ³	Amethyst-throated Hummingbird	S,V	R	a	A,B,C,D,F (p = 0.01)
<i>Lamprolaima rhama</i> ³	Garnet-throated Hummingbird	S,V	R	a	A,C (p = 0.04)
<i>Doricha enicura</i> ^{2,3}	Slender Sheartail	S	R	r	D
<i>Tilmatura dupontii</i> ³	Sparkling-tailed Hummingbird	S	R	r	D
<i>Archilochus colubris</i>	Ruby-throated Hummingbird	S	V	r	D
<i>Atthis ellioti</i> ^{2,3}	Wine-throated Hummingbird	R,P	R	c	A,B,C,D
<i>Abeillia abeillei</i> ³	Emerald-chinned Hummingbird	P	R*	f	B,D
<i>Campylopterus hemileucurus</i>	Violet Sabrewing	R	R	a	A,B,D (p = 0.04)
<i>Eupherusa eximia</i>	Stripe-tailed Hummingbird	S	R	f	B
<i>Amazilia cyanocephala</i>	Azure-crowned Hummingbird	S	R*	a	B,D (p = 0.002)
<i>Amazilia beryllina</i>	Berylline Hummingbird	S	R	u	B,D
<i>Amazilia tzacatl</i>	Rufous-tailed Hummingbird	S	R	u	D
<i>Hylocharis leucotis</i> ³	White-eared Hummingbird	P	R	a	A,M,C,D,F (p = 0.01)
TROGONIDAE					
<i>Trogon mexicanus</i> ³	Mountain Trogon	S,V	R	c	A,C,D (p = 0.02)
<i>Trogon collaris</i>	Collared Trogon	S,V	R	c	B,C,D,F
<i>Pharomachrus mocinno</i>	Resplendent Quetzal	R,P	R	c	A,B,C
MOMOTIDAE					
<i>Aspatha gularis</i> ^{2,3}	Blue-throated Motmot	V	R	f	A,B,C,D
<i>Momatus momota</i>	Blue-crowned Motmot	S,V	R	a	B,D
RAMPHASTIDAE					
<i>Aulacorhynchus prasinus</i>	Emerald Toucanet	P	R*	a	A,B,C,D

PICIDAE

<i>Melanerpes aurifrons</i>	Golden-fronted Woodpecker	S,V	R	c	D
<i>Sphyrapicus varius</i>	Yellow-bellied Sapsucker	S	V	r	C,D
<i>Picoides fumigatus</i>	Smoky-brown Woodpecker	V	R	r	B
<i>Picoides villosus</i>	Hairy Woodpecker	R	R	c	A,B,C,D ($p = 0.007$)
<i>Colaptes rubiginosus</i>	Golden-olive Woodpecker	S,V	R	c	A,B,C,D
<i>Colaptes auratus</i>	Northern Flicker	S,V	R	f	A,B,C,D
<i>Dryocopus lineatus</i>	Lineated Woodpecker	S,V	R	r	C,D
<i>Campephilus guatemalensis</i>	Pale-billed Woodpecker	S,V	R	r	D

FALCONIDAE

<i>Micrastur ruficollis</i>	Barred Forest Falcon	R	R	f	A,B
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PSITTACIDAE

<i>Bolborhynchus lineola</i>	Barred Parakeet	S,V	R	f	A,B,C,D
<i>Pyrilia haematotis</i>	Brown-hooded Parrot	V	R	r	B
<i>Pionus senilis</i>	White-crowned Parrot	V,S	R	u	B,D

THAMNOPHILIDAE

<i>Taraba major</i>	Great Antshrike	V	R	X	E
<i>Thamnophilus doliatus</i>	Barred Antshrike	S,V	R	c	B,D
<i>Myrmotherula schisticolor</i>	Slaty Antwren	S,V	R	u	B
<i>Cercomacra tyrannina</i>	Dusky Antbird	S,V	R	f	B,D

GRALLARIIDAE

<i>Grallaria guatemalensis</i>	Scaled Antpitta	S	R	u	B
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FORMICARIIDAE

<i>Formicarius analis</i>	Black-faced Antthrush	V	R	c	B,D
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FURNARIIDAE

<i>Sclerurus mexicanus</i>	Tawny-throated Leaf-tosser	S,V	R	a	A,B,D ($p = 0.003$)
<i>Dendrocincla anabatina</i> ⁴	Tawny-winged Woodcreeper	S,V	R	r	B
<i>Glyphorhynchus spirurus</i>	Wedge-billed Woodcreeper	S,V	R*	f	B,D
<i>Xiphocolaptes promeropirhynchus</i>	Strong-billed Woodcreeper	V	R	r	F
<i>Xiphorhynchus flavigaster</i>	Ivory-billed Woodcreeper	S,V	R	f	B
<i>Xiphorhynchus erythropygius</i>	Spotted Woodcreeper	S,V	R	c	A,B,D,F
<i>Lepidocolaptes affinis</i>	Spot-crowned Woodcreeper	S,V	R	c	A,B,C,D,F ($p = 0.03$)
<i>Anabacerthia variegaticeps</i>	Scaly-throated Foliage-gleaner	S,V	R	a	A,B,D ($p = 0.009$)
<i>Automolus ochrolaemus</i>	Buff-throated Foliage-gleaner	V	R	f	B
<i>Automolus rubiginosus</i>	Ruddy Foliage-gleaner	S,V	R*	c	A,B,C,D,E,F
<i>Synallaxis erythrothorax</i>	Rufous-breasted Spinetail	V	R	u	D

Tyrannidae

<i>Elaenia flavogaster</i>	Yellow-bellied Elaenia	S,V	R	f	D,E
<i>Elaenia frantzii</i>	Mountain Elaenia	S,V	R	f	A,C
<i>Mionectes oleagineus</i>	Ochre-bellied Flycatcher	S,V	R	c	B,D
<i>Zimmerius villosus</i>	Paltry Tyrannulet	P	R	a	A,B,C,D,F ($p = 0.004$)
<i>Oncostoma cinereigulare</i>	Northern Bentbill	S,V	R	f	B,D
<i>Todirostrum cinereum</i>	Common Tody-Flycatcher	S,V	R	f	D,E
<i>Rhynchocyclus brevirostris</i>	Eye-ringed Flatbill	R	R	a	A,B ($p = 0.003$)
<i>Tolmomyias sulphurescens</i>	Yellow-olive Flycatcher	V	R	f	A,B,D,E
<i>Platyrinchus cancrominus</i>	Stub-tailed Spadebill	V	R	c	B
<i>Mitrephanes phaeocercus</i>	Tufted Flycatcher	S,V	R	c	A,B,C,D ($p = 0.03$)
<i>Contopus cooperi</i>	Olive-sided Flycatcher	P	T	u	A,B,C,D
<i>Contopus pertinax</i> ³	Greater Pewee	S,V	R	f	B,F
<i>Contopus sordidulus</i>	Western Wood Pewee	P,R	T	f	A,B,C,D,E
<i>Contopus virens</i>	Eastern Wood Pewee	V,S	T	f	A,B,C,D
<i>Contopus cinereus</i>	Tropical Pewee	P	R	f	D
<i>Empidonax flaviventris</i>	Yellow-bellied Flycatcher	V,S	V	f	B,D

<i>Empidonax albigularis</i>	White-throated Flycatcher	P	R	u	D
<i>Empidonax minimus</i>	Least Flycatcher	P	V	c	A,B,C,D,E
<i>Empidonax hammondi</i>	Hammond's Flycatcher	V,S	V	u	A,C
<i>Empidonax flavescens</i>	Yellowish Flycatcher	S,V	R	a	A,B,C,D,F
<i>Empidonax fulvifrons</i> ³	Buff-breasted Flycatcher	S,V	R	r	C
<i>Attila spadiceus</i>	Bright-rumped Attila	S,V	R	f	B
<i>Rhytipterna holerythra</i>	Rufous Mourner	V	R	r	B
<i>Myiarchus tuberculifer</i>	Dusky-capped Flycatcher	S,V	R	c	B,C,D,E
<i>Myiarchus crinitus</i>	Great Crested Flycatcher	V	V	r	D
<i>Myiarchus tyrannulus</i>	Brown-crested Flycatcher	S,V	RV	r	B,D
<i>Pitangus sulphuratus</i>	Great Kiskadee	-	R	X	*
<i>Megarynchus pitangua</i>	Boat-billed Flycatcher	-	R	X	*
<i>Myiozetetes similis</i>	Social Flycatcher	S,V	R	c	C
<i>Myiodynastes luteiventris</i>	Sulphur-bellied Flycatcher	V	RV	c	B,D,E
<i>Tyrannus melancholicus</i>	Tropical Kingbird	V,S	R	u	C
<i>Tyrannus couchii</i> ⁴	Couch's Kingbird	V,S	R*	u	D
TITYRIDAE					
<i>Tityra semifasciata</i>	Masked Tityra	V,S	R	r	D
<i>Pachyrhamphus major</i>	Grey-collared Becard	V,S	R	u	B
<i>Pachyrhamphus aglaiae</i>	Rose-throated Becard	V,S	R	c	A,B,C,D,E
VIREONIDAE					
<i>Vireo plumbeus</i>	Plumbeous Vireo	S	R	r	A,D
<i>Vireo solitarius</i>	Blue-headed Vireo	S	V	c	A,B,C,D
<i>Vireo huttoni</i>	Hutton's Vireo	V,S	R	f	A ($p = 0.02$)
<i>Vireo gilvus</i>	Warbling Vireo	S	V	r	D
<i>Vireo leucophrys</i>	Brown-capped Vireo	V,S	R	a	A,B,C,D
<i>Vireo olivaceus</i>	Red-eyed Vireo	S	T	r	D
<i>Vireo flavoviridis</i>	Yellow-green Vireo	V,S	RV	X	E
<i>Hylophilus decurtatus</i>	Lesser Greenlet	V,S	R	c	B,D
<i>Vireolanius melitophrys</i> ³	Chestnut-sided Shrike-Vireo	V	R	f	A,F
<i>Vireolanius pulchellus</i>	Green Shrike-Vireo	V	R	f	B
<i>Cyclarhis gujanensis</i>	Rufous-browed Peppershrike	V,S	R	f	A,C,D
CORVIDAE					
<i>Cyanolyca pumilo</i>	Black-throated Jay	R	R	f	A,B
<i>Cyanolyca cucullata</i>	Azure-hooded Jay	R,P	R	c	A,B,D
<i>Psilorhinus morio</i>	Brown Jay	V,S	R	X	E
<i>Cyanocorax yncas</i>	Green Jay	V	R	r	B
<i>Cyanocorax melanocyaneus</i> ^{2,3}	Bushy-crested Jay	V,S	R	c	B,C,D
<i>Cyanocitta stelleri</i>	Steller's Jay	V	R	r	A
<i>Aphelocoma unicolor</i> ³	Unicoloured Jay	R,P	R	f	A,B,C
HIRUNDINIDAE					
<i>Progne chalybea</i>	Grey-breasted Martin	S	R	X	E
<i>Notiochelidon pileata</i> ^{2,3}	Black-capped Swallow	V,S	R	u	C
<i>Stelgidopteryx serripennis</i>	Northern Rough-winged Swallow	S	R	r	D,E
<i>Hirundo rustica</i>	Barn Swallow	S	V	u	C,E
AEGITHALIDAE					
<i>Psaltriparus minimus</i>	Bushtit	S	R	r	C
CERTHIIDAE					
<i>Certhia americana</i>	Brown Creeper	V,S	R	c	F

TROGLODYTIDAE

<i>Microcerculus philomela</i> ⁴	Nightingale Wren	V	R	f	B,D
<i>Troglodytes aedon</i>	House Wren	V,S	R	c	C,D,F
<i>Troglodytes rufociliatus</i> ^{2,3}	Rufous-browed Wren	V,S	R	a	A,B,C (p = 0.0003)
<i>Campylorhynchus zonatus</i>	Band-backed Wren	V,S	R	r	F
<i>Pheugopedius maculipectus</i>	Spot-breasted Wren	V,S	R	a	B,D,E
<i>Cantorchilus modestus</i>	Plain Wren	V,S	R	a	C,D
<i>Henicorhina leucosticta</i>	White-breasted Wood Wren	V,S	R	a	B,D (p = 0.02)
<i>Henicorhina leucophrys</i>	Grey-breasted Wood Wren	V,S	R	a	A,B,C,F

POLIOPTILIDAE

<i>Ramphocaenus melanurus</i>	Long-billed Gnatwren	V	R	r	B,D
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TURDIDAE

<i>Sialia sialis</i>	Eastern Bluebird	V,S	R	u	C
<i>Myadestes occidentalis</i> ³	Brown-backed Solitaire	V,S	R	a	A,B,C,D,F (p = 0.03)
<i>Myadestes unicolor</i> ³	Slate-coloured Solitaire	R	R*	a	A,B,C,E
<i>Catharus aurantirostris</i>	Orange-billed Nightingale-Thrush	V,S	R	c	C,D
<i>Catharus frantzii</i>	Ruddy-capped Nightingale-Thrush	V,S	R	a	A,B,C,D,F (p = 0.003)
<i>Catharus mexicanus</i>	Black-headed Nightingale-Thrush	R	R	c	B (p = 0.04)
<i>Catharus dryas</i>	Spotted Nightingale-Thrush	V,S	R	c	A,B,D
<i>Catharus ustulatus</i>	Swainson's Thrush	V,S	V	a	A,B,C,D
<i>Hylocichla mustelina</i>	Wood Thrush	P	V	c	B,D
<i>Turdus infuscatus</i> ³	Black Thrush	R	R	a	A,B,C,D (p = 0.006)
<i>Turdus plebejus</i>	Mountain Thrush	R	R	a	A (p = 0.0001)
<i>Turdus grayi</i>	Clay-coloured Thrush	V,S	R	c	B,C,D
<i>Turdus assimilis</i>	White-throated Thrush	V,S	R	f	B,D
<i>Turdus rufitorques</i> ^{2,3}	Rufous-collared Robin	V,S	R	a	A,C

MIMIDAE

<i>Dumetella carolinensis</i>	Grey Catbird	V,S	V	a	C,D
<i>Melanotis hypoleucus</i> ^{2,3}	Blue-and-white Mockingbird	V,S	R	a	A,C,D

PTILOGONATIDAE

<i>Ptilogonys cinereus</i> ³	Grey Silky-flycatcher	V,S	R	f	C
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PEUCEDRAMIDAE

<i>Peucedramus taeniatus</i>	Olive Warbler	V,S	R	u	B,F
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PARULIDAE

<i>Helmitheros vermivorum</i>	Worm-eating Warbler	S	V	r	B
<i>Parkesia motacilla</i>	Louisiana Waterthrush	V,S	V	u	B,D
<i>Parkesia noveboracensis</i>	Northern Waterthrush	V,S	V	u	B,D
<i>Vermivora chrysoptera</i>	Golden-winged Warbler	S	V	f	B,D
<i>Mniotilta varia</i>	Black-and-white Warbler	S	V	c	B,D
<i>Oreothlypis superciliosa</i> ³	Crescent-chested Warbler	V,S	R	a	A,B,C,F (p = 0.01)
<i>Oreothlypis peregrina</i>	Tennessee Warbler	S	V	a	A,B,C,D
<i>Oreothlypis ruficapilla</i>	Nashville Warbler	P	V	u	C
<i>Geothlypis poliocephala</i>	Grey-crowned Yellowthroat	-	R	X	*
<i>Geothlypis tolmiei</i>	MacGillivray's Warbler	V,S	V	c	C,D
<i>Geothlypis formosa</i>	Kentucky Warbler	V,S	V	r	B
<i>Setophaga fusca</i>	Blackburnian Warbler	P	T	c	A,B,C,D
<i>Setophaga petechia</i>	Yellow Warbler	S	V	r	C
<i>Setophaga pensylvanica</i>	Chestnut-sided Warbler	V,S	V	r	B,D
<i>Setophaga coronata</i>	Yellow-rumped Warbler	S	V	r	C
<i>Setophaga graciae</i>	Grace's Warbler	V	R	f	F

<i>Setophaga townsendi</i>	Townsend's Warbler	V,S	V	c	A,B,C,D
<i>Setophaga chrysoparia</i> ¹	Golden-cheeked Warbler	S	V	r	B
<i>Setophaga virens</i>	Black-throated Green Warbler	R,P	V	a	A,B,C,D
<i>Basileuterus rufifrons</i>	Rufous-capped Warbler	V,S	R	c	B,D,F ($p = 0.01$)
<i>Basileuterus belli</i> ³	Golden-browed Warbler	V,S	R	a	A,B,F ($p = 0.001$)
<i>Basileuterus culicivorus</i>	Golden-crowned Warbler	V,S	R	a	B,D ($p = 0.02$)
<i>Cardellina canadensis</i>	Canada Warbler	S	T	c	A,B,D
<i>Cardellina pusilla</i> ⁵	Wilson's Warbler	P	V	a	A,B,C,D,F
<i>Cardellina versicolor</i> ^{1,2,3}	Pink-headed Warbler	R, P	R	c	A,C
<i>Myioborus miniatus</i>	Slate-throated Redstart	P	R*	a	A,B,C,D,E,F

INCERTAE SEDIS

<i>Coereba flaveola</i>	Bananaquit	V,S	R	f	D,E
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THRAUPIDAE

<i>Ramphocelus sanguinolentus</i> ⁴	Crimson-collared Tanager	S	R	f	D,E
<i>Ramphocelus passerinii</i> ⁴	Passerini's Tanager	S	R	u	D,E
<i>Thraupis episcopus</i>	Blue-grey Tanager	V,S	R	f	D
<i>Thraupis abbas</i>	Yellow-winged Tanager	V,S	R	f	A,D
<i>Tangara larvata</i>	Golden-hooded Tanager	V,S	R	r	D
<i>Chlorophanes spiza</i>	Green Honeycreeper	P	R	u	B
<i>Cyanerpes cyaneus</i>	Red-legged Honeycreeper	V,S	R	r	D

INCERTAE SEDIS

<i>Saltator coerulescens</i>	Greyish Saltator	V,S	R	c	D
<i>Saltator maximus</i>	Buff-throated Saltator	V,S	R	c	D
<i>Saltator atriceps</i>	Black-headed Saltator	V,S	R	c	A,B,C,D

EMBERIZIDAE

<i>Volatinia jacarina</i>	Blue-black Grassquit	V,S	R	c	D
<i>Sporophila americana</i>	Variable Seedeater	V,S	R	f	D
<i>Sporophila torqueola</i>	White-collared Seedeater	V,S	R	c	C,D
<i>Tiaris olivaceus</i>	Yellow-faced Grassquit	P	R*	a	C,D,E
<i>Diglossa baritula</i> ³	Cinnamon-bellied Flowerpiercer	V,S	R	c	A,B,C,D ($p = 0.007$)
<i>Arremon aurantiostris</i>	Orange-billed Sparrow	V,S	R	f	B,D
<i>Arremon brunneiucha</i>	Chestnut-capped Brush Finch	R	R	a	A,B,C,D
<i>Arremonops chloronotus</i> ⁴	Green-backed Sparrow	V	R	r	D,E
<i>Atlapetes albinucha</i> ³	White-naped Brush Finch	V,S	R	a	A,C,D
<i>Pipilo maculatus</i>	Spotted Towhee	R	R	r	C
<i>Aimophila rufescens</i>	Rusty Sparrow	V,S	R	c	C,D
<i>Melospiza biarcuata</i>	Prevost's Ground Sparrow	V,S	R	c	D ($p = 0.03$)
<i>Melospiza lincolni</i>	Lincoln's Sparrow	P	V	c	C,D
<i>Zonotrichia capensis</i>	Rufous-collared Sparrow	V,S	R	c	C,D
<i>Junco phaeonotus</i>	Yellow-eyed Junco	V,S	R	r	C
<i>Chlorospingus ophthalmicus</i>	Common Bush Tanager	V,S	R	a	A ($p = 0.02$)

CARDINALIDAE

<i>Piranga rubra</i>	Summer Tanager	V,S	V	c	A,B,C,D
<i>Piranga ludoviciana</i>	Western Tanager	V,S	V	u	A,B,C,D
<i>Piranga bidentata</i>	Flame-coloured Tanager	V,S	R	c	A,B,C,D
<i>Piranga leucoptera</i>	White-winged Tanager	V,S	R	f	B
<i>Habia rubica</i>	Red-crowned Ant Tanager	V,S	R	c	B,D ($p = 0.001$)
<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak	V,S	V	c	A,B,C,D
<i>Cyanocompsa cyanoides</i>	Blue-black Grosbeak	V,S	R	r	B
<i>Passerina cyanea</i>	Indigo Bunting	V,S	V	f	B,C,D,E

ICTERIDAE

<i>Dives dives</i>	Melodious Blackbird	V,S	R	c	C,D,E
<i>Quiscalus mexicanus</i>	Great-tailed Grackle	V,S	R	c	C,D
<i>Molothrus aeneus</i>	Bronzed Cowbird	V,S	R	f	C,D,E
<i>Icterus wagleri</i> ³	Black-vented Oriole	V,S	R	f	B,D
<i>Icterus prothemelas</i> ⁴	Black-cowled Oriole	V,S	R	u	D
<i>Icterus chrysater</i>	Yellow-backed Oriole	V,S	R	c	B,D
<i>Icterus pectoralis</i>	Spot-breasted Oriole	V,S	R	u	D
<i>Icterus galbula</i>	Baltimore Oriole	V,S	V	c	B,D
<i>Amblycercus holosericeus</i>	Yellow-billed Cacique	V,S	R	c	D
<i>Psarocolius wagleri</i>	Chestnut-headed Oropendola	V,S	R*	f	B,D,E

FRINGILLIDAE

<i>Euphonia affinis</i>	Scrub Euphonia	V,S	R	r	D
<i>Euphonia hirundinacea</i>	Yellow-throated Euphonia	V,S	R	r	D,E
<i>Euphonia elegantissima</i>	Elegant Euphonia	V,S	R	f	A,B,C,D
<i>Euphonia gouldi</i> ⁴	Olive-backed Euphonia	V	R	f	B
<i>Chlorophonia occipitalis</i> ³	Blue-crowned Chlorophonia	P	R	f	A,B,D
<i>Spinus atriceps</i> ²³	Black-capped Siskin	P	R	f	A,D
<i>Spinus notatus</i>	Black-headed Siskin	P	R	f	A,C,D
<i>Spinus psaltria</i>	Lesser Goldfinch	P	R	f	A,B,C,D,F
<i>Coccothraustes abeillei</i> ³	Hooded Grosbeak	V,S	R	f	A,B

Vermiculated Screech Owl *Megascops guatemalae*. In upper cloud forest and adjacent open habitat commonest were Fulvous Owl *Strix fulvescens* and Bearded Screech Owl *Megascops barbarus*.

Horned Guan.—The species was not observed during a total of 18 days in cloud forest at 2,000–2,600 on Cerro El Amay. Crested Guan *Penelope purpurascens* and Highland Guan *Penelopina nigra* were the only cracids found in upper cloud forest; the latter was common with a mean encounter rate of 0.18 birds / 100 m of transect (Table 2).

Discussion

Based on general patterns of bird distribution in Guatemala^{11,19}, the 259 species recorded above 1,000 in 2010–11 represent 87% of those potentially occurring in the area >1,000 m, and 52% of the species potentially occurring in the IBA including lowland species and waterbirds. Many of the potentially occurring lowland species and species restricted to wetland habitats are yet to be recorded, because our surveys were focused above 1,000 m. Species expected to be common in lowlands, such as Rufous-tailed Hummingbird *Amazilia tzacatl*, Tawny-winged Woodcreeper *Dendrocincla anabatina*, Northern Rough-winged Swallow *Steligopteryx serripennis*, and Yellow-throated Euphonia *hirundinacea* and Olive-backed Euphonias *E. gouldi*, were uncommon or rare in areas >1,000 m (Table 2). In addition to those species recorded in October 2010–April 2011, eight

others were recorded previously, bringing to 273 species recorded in the IBA. Among these is Horned Guan, of which several specimens were collected in the 19th century²⁶. Tenez²⁸ recorded six species associated with open habitat. Griscom¹⁷ mentioned Dusky Flycatcher *Empidonax oberholseri* (then *E. wrightii*) collected at El Soch near Reserva El Recuerdo. However, the specimens were subsequently identified as Hammond's Flycatcher *E. hammondii* by R. Phillips (A. Valley & D. Dyer pers. comm.). PT recorded Hermit Warbler *Setophaga occidentalis* near the southern limit of the IBA.

Cerro El Amay was designated an IBA based on the presence of 19 trigger species¹³. This study increases the number of trigger species to 48 (Table 2), reconfirming IBA status under criteria A1 (presence of globally threatened species²¹), A2 (presence of at least 33% of species restricted to the North Central American Highlands Endemic Bird Area [EBA], Table 2), A3 (presence of at least 33% of species restricted to the Madrean Highlands biome) and A4 (site supports 1% of the global population of a migratory bird) (see Devenish *et al.*⁸ for details of categories). Four globally threatened species were recorded by our study: Highland Guan, Bearded Screech Owl, Golden-cheeked Warbler *Setophaga chrysoparia* and Pink-headed Warbler. Sixteen species are restricted to the North Central American Highlands, representing 70% of all Guatemalan species found in that EBA. Thirty-eight species recorded by us are restricted

to the Madrean Highlands, or 75% of Guatemalan bird species confined to that biome. Furthermore, nine species restricted to the Gulf Caribbean Slope represent 32% of the Guatemalan species restricted to this biome. Because lowland habitats were not the focus of our study, additional species restricted to that biome can be expected. Thus, Cerro El Amay could apply in the A3 category for two biomes. Based on an estimate of the global population size for Wilson's Warbler of 36 million²⁵, primary forest above 1,000 m at Cerro El Amay supported 0.1–0.3% of the world population in April 2011. Considering additional birds below 1,000 m and turnover of individuals during migration, we assume that the IBA supports >1% of the global population of Wilson's Warbler (IBA category A4iv).

Horned Guan is Endangered due to habitat loss, hunting and illegal trade^{4,16}. The first and only record of Horned Guan at Cerro El Amay dates from the 19th century²⁶, when it was considered fairly common²⁷. Since then, c.17 km² of primary forest above 1,800 m (19% of 90 km²) have been lost to agriculture (Fig. 1), and we assume that the species was heavily hunted. Despite a field effort of 18 days in appropriate habitat in 2008–11, the species' continued presence could not be confirmed. Thus, Horned Guan is certainly not a fairly common bird at Cerro El Amay now, if it occurs at all. Although much of the forest above 2,000 m is intact, suitable habitat with a high diversity of fruiting trees similar to other locations where the species occurs (Sierra de las Minas, south-west Guatemala, and El Triunfo, Chiapas, Mexico^{2,11,15}) appears to be limited to a few valleys at Cerro El Amay. Forests in the highest parts are oak-dominated and not optimal habitat for Horned Guan because of a lack of food. It might still occur as a rare bird restricted to sections of upper cloud forest not yet surveyed, especially at 2,000–2,500 m in the south-west of the IBA (Fig 1). We recommend further field effort in these areas.

The area of >250 km² of pristine cloud forest in Cerro El Amay IBA is severely threatened by an advancing agricultural frontier, which in the south has already reached 2,100 m elevation, and in the north 1,000 m (Fig. 1). Some areas within the IBA have recently been declared privately protected areas, but there is no strictly protected reserve according to IUCN categories I and II²⁰. Although many of the private reserves are currently among the best-protected sites in Guatemala, driven by the strong personal interest of their owners, the National Law of Protected Areas (Decreto 4–89, Congreso de la República de Guatemala) and its regulations (Acuerdo Gubernativo 759–90) do not require the long-term commitment of owners to conservation, nor do they require continued conservation from future landowners. Conservation effort is urgently needed among the forest-owning

communities in order to maintain Cerro El Amay as the second-largest cloud forest in Guatemala.

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