

Birds of the Guandera Biological Reserve, Carchi province, north-east Ecuador

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Relevamientos efectuados entre julio y septiembre de 1997 registraron un total de 140 especies de aves en los hábitats de límite de bosque nublado, el páramo adyacente y sectores de granjas de la Reserva Biológica Guandera, Carchi, nordeste de Ecuador. Se presenta una lista de especies con datos básicos de hábitat y abundancia en base a cantidad de observaciones por día. Varias especies raras y amenazadas endémicas de los Andes fueron registradas en buenos números en el área. La avifauna de Guandera resultó ser bastante similar a la del área de hábitat similar más próxima que ha sido relevada, el Cerro Mongus, pero el 26% de la lista total de especies difería.

Introduction

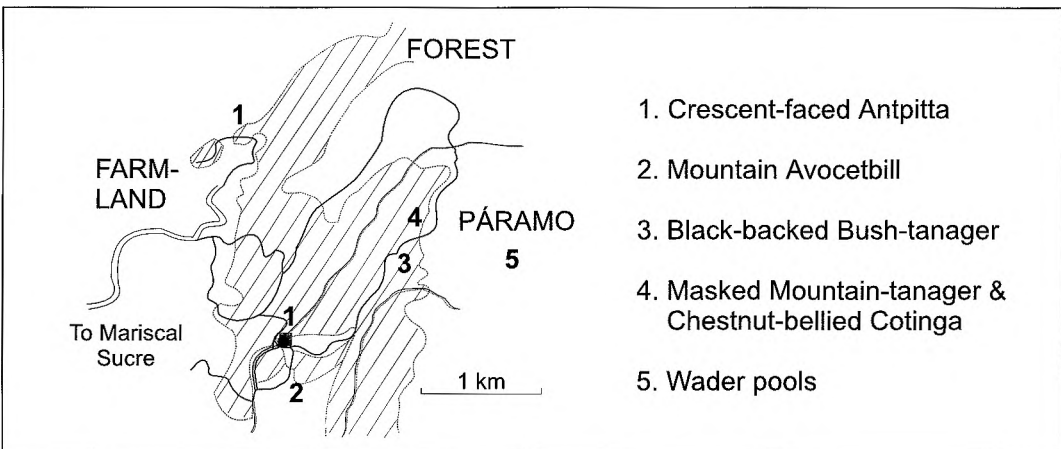
The Andes of South America contain several key areas of bird endemism^{5,6,20}. Two Endemic Bird Areas (EBAs) are the montane cloud forests of the north-central Andes and the montane grassland and transitional elfin forest of the central Andean páramo^{20,22}. The north-central Andes contain at least eight restricted-range or endemic species, and the central Andean páramo at least 10 species^{20,22}. These Endemic Bird Areas have been subject to widespread and severe deforestation in the current and recent centuries; the transitional areas between the cloud forest and páramo are threatened by frequent burning, grazing and conversion to agriculture such as potato cultivation^{6,7,22}. Consequently all of the restricted-range species in the north-central Andes are considered threatened or near-threatened, and half the restricted-range species of the central Andean páramo are globally threatened^{4,6,22}.

Despite the pressing conservation requirements, the avifauna of the upper temperate zone treeline in Ecuador has been little studied^{3,8,18}. In this paper

we present data from the first thorough survey of the newly established Guandera Biological Reserve, Carchi province, in the north-east of the country. The reserve contains part of the last inter-Andean valley forest in northern Ecuador, and includes a large area of páramo. We assessed the composition of bird species in the reserve and therefore the area's importance in conserving representative avifaunal elements of two Endemic Bird Areas.

Methods

Guandera Biological Reserve was surveyed from 17 July–11 September 1997 by a minimum of eight and a maximum of 14 observers during this period. The area surveyed was c.650 ha. This includes all of the 400 ha forested area of the reserve, a large part of the reserve's páramo, and some farmland bordering the reserve. The location of the survey area is given in Table 1. Altitudinally, the surveyed area ranged from 3,000–4,100 m, but all species listed in this paper were recorded at 3,100–3,700 m within the strict altitudinal boundaries of the reserve.



Map of the study area

1. Crescent-faced Antpitta
2. Mountain Avocetbill
3. Black-backed Bush-tanager
4. Masked Mountain-tanager & Chestnut-bellied Cotinga
5. Wader pools



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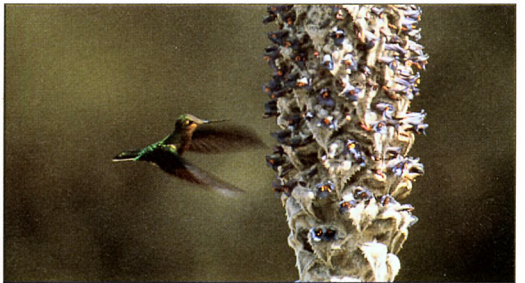
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14

- 1 Flammulated Treehunter *Thripadectes flammulatus* (Ross Macleod)
- 2 Black-chested Mountain-tanager *Buthraupis eximia* (Ross Macleod)
- 3 Band-winged Nightjar *Caprimulgus longirostris* (Ross Macleod)
- 4 Pale-naped Brush-finch *Atlapetes pallidinucha* (Ross Macleod)
- 5 Black-thighed Puffleg *Eriocnemis derbyi* (Ross Macleod)
- 6 Swallow-tailed Nightjar *Urospalis segmentata* (Ross Macleod)
- 7 Mountain Avocetbill *Opisthoprora euryptera* (Ross Macleod)
- 8 Female Great Sapphirewing *Pterophanes cyanopterus* (Ross Macleod)
- 9 Black-backed Bush-tanager *Urothraupis stolzmanni* (Ross Macleod)
- 10 Crescent-faced Antpitta *Grallaricula lineifrons* (Ross Macleod)
- 11 Montane cloud forest and paramó, Guandera Reserve, Ecuador (Ross Macleod)
- 12 Montane cloud forest, Guandera Biological Reserve, Ecuador (Ross Macleod)
- 13 Paramó edge forest, Guandera Biological Reserve, Ecuador (Ross Macleod)
- 14 Guandera Biological Reserve with Inter-Andean Valley in background, Ecuador (Ross Macleod)

Birds were recorded by field observation, mist-netting and tape-recording their voices. Birds were identified to species according to criteria in Hilty & Brown¹⁰ and Fjeldså & Krabbe⁸, and by reference to sound recordings from the National Sound Archive (London, UK); one species was identified from our tape-recordings by N. Krabbe. In total, we made observations on 44 days (or 422 observer days) at Guandera. Observations were made from 30 minutes before dawn until approximately two hours after dusk each day, with the majority of observations being collected within the first three hours after dawn. All daily records of a species by each observer were scrutinised each evening by the en-

Table 1. Boundaries of the survey area. The boundaries of the 400 ha forested area of the Guandera reserve are poorly defined but were completely contained within the defined survey area.

Degrees	Latitude N		Degrees	Longitude W	
	min	s		min	s
0	36	16.9	77	42	43.9
0	36	37.9	77	41	48.3
0	36	16.9	77	41	19.5
0	35	7.0	77	41	19.5
0	35	7.0	77	42	43.9

tire team. Where there was any doubt (by any member of the team) of a correct field identification for a species, this record was removed from the final species list. Records of species made by a single observer on a single occasion are included here only if adequate field descriptions were taken under ideal conditions. Mist-nets were principally used in areas of dense vegetation with the aim of catching skulking species that are otherwise difficult to record. Therefore no attempt was made to standardise mist-netting effort in different areas, habitats or weather conditions^{12,15}. Mist-netting was undertaken on 17 days; a mean of 30.0m²/hour⁻¹ of netting was used for a total of 41.9 hours. Nets were opened from 05h45–09h45, and on three occasions during 16h00–17h30. Nets were erected at the same site on consecutive days. All birds were released after capture. Tape-recordings were made on most days using procedures detailed in Parker¹¹. Species calling that could not be visually identified were recorded using a portable tape-recorder and directional microphone. Occasionally, but particularly with owl species, tape playback was used to further confirm an auditory identification.

Habitats

The survey area contained several habitat types defined below:

1. Farmland. Potato fields and short grass cattle and horse pasture. Fields were surrounded by dense hedges in most areas or by slope forest at the edge of the reserve. Most fields had isolated large slope forest trees retained within hedges in fields used for grazing.
2. Edge farm forest. Any slope forest (see below) within 150 m of potato fields or pasture.
3. Forest. This was divided into two types:
 - 3.1. Guandera forest. Canopy height over 15 m. Relatively species-poor forest, consisting of guandera *Clusia flaviflora* and *Ilex* trees. Ground cover sparse, dominated by bromeliads and mosses.
 - 3.2. Slope forest. Canopy height over 15 m, dominated by *Weinmannia*, *Ocotea* and *Miconia*, although containing a diversity of other tree species including Guandera. Ground cover dominated by *Anthurium* and *Boehmeria* that formed a dense undergrowth.
4. Regenerating cleared forest. Canopy height less than 5 m, although isolated stands of taller trees present. A diverse shrub community dominated by members of Asteraceae and Ericaceae, which formed dense thickets interspersed with grassy areas.
5. Ridge scrub. Canopy height less than 5 m, with some emergents. Dominated by *Weinmannia*,

Blechnum tree ferns, *Diplostegium* and members of Ericaceae, which gave a uniformly dense cover.

6. Edge páramo forest. Forest within c.100 m of the treeline. This was divided into two types:
 - 6.1. Elfin forest. Canopy height 5–10 m, dominated by *Ilex* and *Weinmannia brachystachya*, with some emergent stands of guandera. Tangled understorey of *Miconia* and Ericaceae.
 - 6.2. Transitional forest. Similar in species composition and canopy height to elfin forest, with trees occurring in islands between open areas of páramo-like vegetation.
7. Páramo. High-altitude grassland dominated by bunch grasses, with characteristic rosette plants *Espeletia* and *Puya*. Islands of shrubby vegetation similar in composition to elfin forest were present at lower altitudes. Marshy areas and pools were present at higher altitudes.

A bird was only recorded as using a habitat if the species was recorded in the habitat on two or more days, except where a total of only one record was obtained for that species.

Results

Avifauna

A total of 140 bird species was recorded (Appendix 1). This is unlikely to be a complete list as we were still recording new species at the end of the survey, even excluding the records of North American migrants that were only recorded during the final part of the survey (Fig. 1). Nevertheless it appears likely that, considering the small size of the reserve, the

Figure 1. The cumulative number of new species of bird seen each day of the survey expressed as a percentage of the total number of species seen during the survey (N = 134, excluding six species of North American migrants), top solid line; and the percentage of the total number of species recorded each day that were new species (mean \pm standard error = 51 \pm two species per day, excluding six species of North American migrants), bottom dashed line.

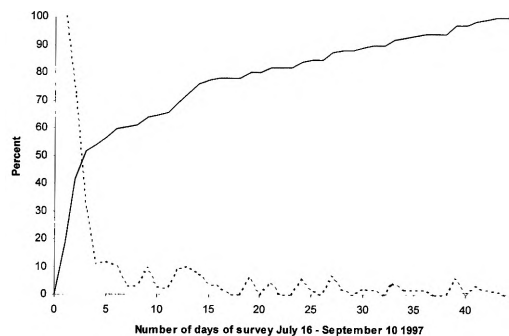


Table 2. Bird species recorded only at Guandera or Cerro Mongus, excluding all North American migrants and species recorded only once at either site that may have represented vagrants.

Guandera

Nothoprocta curvirostris Curve-billed Tinamou
Buteo albigula White-throated Hawk
Falco sparverius American Kestrel
Falco femoralis Aplomado Falcon
Zenaidura macroura Eared Dove
Asio flammeus Short-eared Owl
Caprimulgus longirostris Band-winged Nightjar
Lesbia victoriae Black-tailed Trainbearer
Chalcostigma stanleyi Blue-mantled Thornbill
Opisthoprora euryptera Mountain Avocetbill
Thripadectes flammulatus Flammulated Treehunter
Anairetes parulus Tufted Tit-tyrant
Myiophobus flavicans Flawless Flycatcher
Ochthoeca cinnamomeiventris Slaty-backed Chat-tyrant
Myiatheretes striaticollis Streak-throated Bush-tyrant
Notiochelidon flavipes Pale-footed Swallow
Cinclus leucocephalus White-capped Dipper
Conirostrum cinereum Cinerous Conebill
Chlorornis riefferii Grass-green Tanager
Sericossphya albocristata White-capped Tanager
Chlorospingus ophthalmicus Common Bush-tanager
Cnemoscopus rubrirostris Grey-hooded Bush-tanager
Pheucticus aureoventris Black-backed Grosbeak
Atlapetes rufinucha Rufous-naped Brush-finch
Catamenia homochroa Páramo Seedeater

Cerro Mongus

Nothocercus julius Tawny-breasted Tinamou
Columbina passerina Common Ground-dove
Leptosittaca branickii Golden-plumed Conure
Xiphocolaptes promeropirhynchus Strong-billed Woodcreeper
Scytalopus senilis Ash-colored Tapaculo
S. latebricola Brown-rumped Tapaculo
Phyllomyias uropygialis Tawny-rumped Tyrannulet
Notiochelidon cyanoleuca Blue-and-white Swallow
Haplospiza rustica Slaty Finch
Cacicus leucoramphus Mountain Cacique
Amblycercus holosericeus Yellow-billed Cacique

intensity and length of the survey, and the variety of survey methods used, comparatively few species were missed. No species was captured in a mist-net that was not recorded by observation, and only Ocellated Tapaculo *Acropternis orthonyx* was tape-recorded without being recorded visually.

The closest area of similar habitat that has been surveyed is Cerro Mongus, c.50 km to the southwest on the same ridge¹⁸. A total of 104 species have been recorded at both sites; species differences are listed in Table 2. Excluding North American migrants and species recorded at either site only once (and therefore perhaps vagrants), 25 species have been recorded at Guandera but not at Cerro Mongus, and 11 species vice-versa.

Discussion

The Guandera Biological Reserve's avifauna is typical of the northern Andes of Ecuador at c.3,000–4,000 m^{8,18}. Several species were notable however. Curve-billed Tinamou *Nothoprocta curvirostris* has not previously been recorded in the far north of Ecuador^{8,18}, and our records may represent the most northerly record for this species to date (identification was based on sightings of the species in the open at distances of 15–50 m for up to 10 minutes). Curve-billed Tinamou was recorded, on three separate days by five different observers, feeding in open short-grass pasture at the lower edge of the reserve (3,200 m). Mountain Avocetbill *Opisthoprora euryptera* is rarely recorded⁸ but appears to be relatively common at Guandera, at 3,300 m. Crescent-faced Antpitta *Grallaricula lineifrons* is known from very few sites^{8,17}, although this may be a consequence of its very skulking behaviour and its distinctive call being undescribed until recently, rather than its true rarity. Chestnut-bellied Cotinga *Doliornis remseni* was only recently described and is known from approximately five other sites from south Colombia to south Ecuador¹⁹. Pale-footed Swallow *Notiochelidon flavipes* is very locally distributed from Bolivia to Colombia and has not been previously recorded in north Ecuador^{8,16}. Spectacled Whitestart *Mioborus melanocephalus* was common at Guandera (all had conspicuous rufous crowns) but all showed some characters of Golden-fronted Whitestart *M. ornatus* (larger areas of yellow around the eye, malar and forehead than on birds from further south in Ecuador^{16,18}). Masked Mountain-tanager *Buthraupis wetmorei* has been recorded at only a few sites^{8,16}, and only one other site in northern Ecuador¹⁸. Black-backed Bush-tanager *Urothraupis stolzmanni* apparently occurs, discontinuously, from central Ecuador to southern Colombia^{8,16}, but our records from Guandera along with those from Cerro Mongus¹⁸ suggest that the species may occur continuously at least to the border with Colombia.

From a conservation standpoint, Guandera Biological Reserve contains a number of important Andean endemics. Carunculated Caracara *Phalcooenus carunculatus*, Black-thighed Puffleg *Eriocnemis derbyi*, Chestnut-bellied Cotinga, Crescent-faced Antpitta, Black-backed Bush-tanager, and Masked Mountain-tanager are all restricted-range / endemic species classified as threatened or near-threatened^{4–6}. Black-thighed Puffleg and Black-backed Bush-tanager were present at Guandera in large numbers and were probably breeding. Carunculated Caracara occurred in small numbers but may have been breeding on the reserve (an adult was observed possibly landing at a nest site). Crescent-faced Antpitta was reasonably widespread on the reserve and is very likely to breed there (individuals were heard singing and responded

strongly to playback). Both Chestnut-bellied Cotinga and Masked Mountain-tanager were uncommon at Guandera, being only seen in very small numbers in elfin transitional forest adjacent to páramo.

As with any bird survey, there are problems of detecting all of the species present, particularly in densely forested, lower altitude sites²¹. These problems can be minimised by combining observational methods with mist-netting and tape-recording that permit the detection of skulking and nocturnal species^{2,11-14}. Ideally, survey periods should be over relatively long periods because the efficiency of identification from vocalisations is strongly dependent on time of year¹³ and the probability of encountering low-density species will be a function of observer effort⁹. With long-term studies, however, there is the problem of oversampling where the number of new species recorded with time does not reach asymptote and continues to remain on an upward trend. Rare visitors and vagrants will continue to be recorded even after all of the regular species have been observed because of birds' great mobility^{1,9}. The number of new species with time graph from this study (Fig. 1) is typical of an intensive study, where, although the species growth curve does not reach an asymptote, it is likely that the majority of the resident members of the avifauna of the area have been recorded.

Where a variety of sampling methods and high observer effort have been used in surveys, then species' lists for different areas should be reasonably comparable within the same habitat type¹⁴. Overall, the habitats and bird species composition of Guandera and Cerro Mongus were similar. This is perhaps unsurprising as both areas are effectively connected by continuous forest along the east ridge of the inter-Andean valley (pers. obs.). Excluding migrants and probable vagrants that will be recorded in direct proportion to sampling effort, 74% of species recorded totally were found at both sites. Some of the differences will have been a consequence of differences in sampling effort (the Cerro Mongus survey consisted of 53 observer-days¹⁵) and minor habitat differences (e.g. the lack of rivers at Cerro Mongus explains the absence of Slaty-backed Chat-tyrant *Ochthoeca cinnamomeiventris* and White-capped Dipper *Cinclus leucocephalus*. The lack of records of Ash-colored Tapaculo *Scytalopus senilis* at Guandera may have been due to lack of experience of the call of this skulking species. Even so, the differences demonstrate that even a small distance between similar habitat sites in the Andes can lead to a noticeable change in bird species composition. These changes, and the very rapid deforestation that is occurring within the inter-Andean valley of northern Ecuador¹⁸, underline the need for further survey work to identify the remaining sites worthy of conservation.

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Appendix I. Bird species recorded on the Guandera reserve, Carchi Province (3,100–3,700 m) 17 July–11 September 1997

		Days recorded N = 44	% of days recorded	Observer -days recorded N = 422	% observer -days recorded	No. of netting captures	Habitat*
Curve-billed Tinamou	<i>Nothoprocta curvirostris</i>	3	6.8	6	1.4	0	I
Great White Egret	<i>Casmerodius albus</i>	1	2.3	2	0.5	0	V
Speckled Teal	<i>Anas flavirostris</i>	9	20.5	16	3.8	0	7
Black Vulture	<i>Coragyps atratus</i>	1	2.3	1	0.2	0	I
Cinereous Harrier	<i>Circus cinereus</i>	2	4.5	5	1.2	0	7
Sharp-shinned Hawk	<i>Accipiter striatus</i>	20	45.5	55	13.0	0	I-7
White-throated Hawk	<i>Buteo albiflaga</i>	12	27.3	22	5.2	0	2-6
Puna Hawk	<i>Buteo poecilochrous</i>	2	4.5	3	0.7	0	7
Black-chested Buzzard-eagle	<i>Geranoaetus melanoleucos</i>	2	4.5	7	1.7	0	I-7
Carunculated Caracara	<i>Phalcoenus carunculatus</i>	11	25.0	29	6.9	0	I-7
American Kestrel	<i>Falco sparverius</i>	12	27.3	27	6.4	0	I-2
Aplomado Falcon	<i>Falco femoralis</i>	2	4.5	4	0.9	0	I
Andean Guan	<i>Penelope montagnii</i>	26	59.1	74	17.5	0	2-4
Andean Lapwing	<i>Vanellus resplendens</i>	1	2.3	2	0.5	0	7
Noble Snipe	<i>Gallinago nobilis</i>	8	18.2	19	4.5	0	7
Andean Snipe	<i>Gallinago jamesoni</i>	5	11.4	11	2.6	0	7
Solitary Sandpiper	<i>Tringa solitaria</i>	2	4.5	3	0.7	0	7
Lesser Yellowlegs	<i>Tringa flavipes</i>	1	2.3	2	0.5	0	7
Greater Yellowlegs	<i>Tringa melanoleuca</i>	8	18.2	17	4.0	0	7
Spotted Sandpiper	<i>Tringa macularia</i>	1	2.3	2	0.5	0	7
Pectoral Sandpiper	<i>Calidris melanotos</i>	1	2.3	1	0.2	0	7
Band-tailed Pigeon	<i>Columba fasciata</i>	24	54.5	64	15.2	0	I-6
Eared Dove	<i>Zenaida auriculata</i>	18	40.9	42	10.0	0	I
White-tipped Dove	<i>Leptotila verreauxi</i>	2	4.5	3	0.7	0	2

White-capped Parrot	<i>Pionus seniloides</i>	26	59.1	126	29.9	0	2-3
White-throated Screech-owl	<i>Otus albugularis</i>	3	6.8	4	0.9	0	3
Andean Pygmy-owl	<i>Glauucidium jardiinii</i>	8	18.2	11	2.6	0	3-6
Rufous-banded Owl	<i>Ciccaba albitarsus</i>	13	29.5	55	13.0	0	3-4
Short-eared Owl	<i>Asio flammeus</i>	1	2.3	3	0.7	0	1
Common Nighthawk	<i>Chordeiles minor</i>	2	4.5	2	0.5	0	7
Rufous-bellied Nighthawk	<i>Lurocalis rufiventris</i>	15	34.1	40	9.5	0	3-4
Swallow-tailed Nightjar	<i>Uropsalis segmentata</i>	7	15.9	22	5.2	0	1-4
Band-winged Nightjar	<i>Caprimulgus longirostris</i>	11	25.0	21	5.0	0	1-7
Chestnut-collared Swift	<i>Cypseloides rutilus</i>	2	4.5	4	0.9	0	V
White-collared Swift	<i>Streptoprocne zonaris</i>	8	18.2	14	3.3	0	1-7
Sparkling Violetear	<i>Colibri coruscans</i>	18	40.9	36	8.5	0	1
Shining Sunbeam	<i>Aglaeactis cupripennis</i>	15	34.1	38	9.0	0	1.7
Mountain Velvetbreast	<i>Lafresnaya lafresnayi</i>	35	79.5	161	38.2	14	2.4
Great Sapphirewing	<i>Pterophanes cyanopterus</i>	39	88.6	184	43.6	0	4.7
Buff-winged Starfrontlet	<i>Coeligena lutetiae</i>	39	88.6	216	51.2	3	1-6
Sword-billed Hummingbird	<i>Ensifera ensifera</i>	28	63.6	87	20.6	0	1,2,4
Glowing Puffleg	<i>Eriocnemis vestitus</i>	1	2.3	1	0.2	0	3
Sapphire-vented Puffleg	<i>Eriocnemis luciani</i>	8	18.2	8	1.9	0	3
Golden-breasted Puffleg	<i>Eriocnemis mosquera</i>	42	95.5	228	54.0	16	5
Black-thighed Puffleg	<i>Eriocnemis derbyi</i>	40	90.9	181	42.9	19	2-4
Long-tailed Sylph	<i>Agelaiocercus kingi</i>	2	4.5	2	0.5	0	4
Black-tailed Trainbearer	<i>Lesbia victorae</i>	6	13.6	9	2.1	0	1
Green-tailed Trainbearer	<i>Lesbia nuna</i>	3	6.8	7	1.7	0	1
Purple-backed Thornbill	<i>Rhamphomicron microrhynchum</i>	33	75.0	119	28.2	0	4
Viridian Metaltail	<i>Metallura williami</i>	2	4.5	4	0.9	0	7
Tyrian Metaltail	<i>Metallura tyrianthina</i>	43	97.7	365	86.5	16	1-7
Rainbow-bearded Thornbill	<i>Chalcostigma herrani</i>	27	61.4	68	16.1	1	4-7
Blue-mantled Thornbill	<i>Chalcostigma stanleyi</i>	1	2.3	1	0.2	0	7
Mountain Avocetbill	<i>Opisthoprora euryptera</i>	9	20.5	17	4.0	1	2.4
Masked Trogon	<i>Trogon personatus</i>	14	31.8	40	9.5	1	3
Grey-breasted Mountain-toucan	<i>Andigena hypoglauca</i>	22	50.0	55	13.0	0	2-4
Bar-bellied Woodpecker	<i>Veniliornis nigriceps</i>	9	20.5	15	3.6	0	3-4
Crimson-mantled Woodpecker	<i>Piculus rivoli</i>	3	6.8	7	1.7	0	1-2
Bar-winged Cinclodes	<i>Cinclodes fuscus</i>	7	15.9	10	2.4	0	7
Elegant Spinetail	<i>Synallaxis elegantior</i>	20	45.5	45	10.7	0	1-6
Rufous Spinetail	<i>Synallaxis unirufa</i>	3	6.8	4	0.9	0	3-6
White-browed Spinetail	<i>Hellmayrea gularis</i>	6	13.6	11	2.6	8	4-5
White-chinned Thistletail	<i>Schizoeca fuliginosa</i>	15	34.1	29	6.9	0	2-6
Many-striped Canestero	<i>Asthenes flammulata</i>	3	6.8	5	1.2	0	7
Spot-crowned Woodcreeper	<i>Lepidocolaptes affinis</i>	1	2.3	1	0.2	0	3
Pearled Treerunner	<i>Margarornis squamiger</i>	41	93.2	264	62.6	0	2-6
Streaked Tuftedcheek	<i>Pseudocolaptes boissonneautii</i>	36	81.8	126	29.9	1	2-6
Flammulated Treehunter	<i>Thripadectes flammulatus</i>	3	6.8	9	2.1	1	3-4
Rufous Antpitta	<i>Grallaria rufula</i>	5	11.4	9	2.1	0	3
Tawny Antpitta	<i>Grallaria quitensis</i>	17	38.6	49	11.6	0	7
Undulated Antpitta	<i>Grallaria squamigera</i>	3	6.8	11	2.6	1	2-3
Crescent-faced Antpitta	<i>Grallaricula lineifrons</i>	5	11.4	20	4.7	0	2-3
Andean Tapaculo	<i>Scytalopus magellanicus</i>	2	4.5	4	0.9	0	3,6
Unicolored (Blackish) Tapaculo	<i>Scytalopus unicolor</i>	1	2.3	1	0.2	0	3
Ocellated Tapaculo**	<i>Acropternis orthonyx**</i>	5	11.4	5	1.2	0	3
Barred Fruiteater	<i>Pipreola arcuata</i>	1	2.3	2	0.5	0	3
Red-crested Cotinga	<i>Ampelion rubrocristata</i>	32	72.7	87	20.6	0	1-6
Chestnut-bellied Cotinga	<i>Doliornis remseni</i>	5	11.4	9	2.1	0	6
Barred Becard	<i>Pachyrhamphus validus</i>	2	4.5	5	1.2	0	3
Agile Tit-tyrant	<i>Anairetes agilis</i>	21	47.7	58	13.7	0	2-6
Tufted Tit-tyrant	<i>Anairetes parulus</i>	4	9.1	7	1.7	0	1,5
White-throated Tyrannulet	<i>Mecocerculus leucophrys</i>	43	97.7	220	52.1	0	1-7
White-banded Tyrannulet	<i>Mecocerculus stictopterus</i>	41	93.2	232	55.0	2	1-6
Black-capped Tyrannulet	<i>Phyllomyias nigrocappillus</i>	9	20.5	18	4.3	0	1-4
Fluorescent Flycatcher	<i>Myiophobus flavicans</i>	1	2.3	2	0.5	0	3
Cinnamon Flycatcher	<i>Pyrrhomyias cinnamomea</i>	16	36.4	49	11.6	0	3-4
Rufous-headed Pygmy-tyrant	<i>Pseudotriccus ruficeps</i>	9	20.5	18	4.3	0	3
Brown-backed Chat-tyrant	<i>Ochthoeca fumicolor</i>	24	54.5	66	15.6	0	5.7
Rufous-breasted Chat-tyrant	<i>Ochthoeca rufipectoralis</i>	35	79.5	132	31.3	1	1-6
Slaty-backed Chat-tyrant	<i>Ochthoeca cinnamomeiventris</i>	3	6.8	6	1.4	0	3
Crowned Chat-tyrant	<i>Ochthoeca frontalis</i>	10	22.7	18	4.3	2	2-4
Red-rumped Bush-tyrant	<i>Cnemarcus erythropygus</i>	2	4.5	4	0.9	0	7
Streak-throated Bush-tyrant	<i>Myiotheretes striaticollis</i>	5	11.4	9	2.1	0	1-6
Smoky Bush-tyrant	<i>Myiotheretes fumigatus</i>	7	15.9	14	3.3	0	2-4
Pale-footed Swallow	<i>Notiochelidon flavipes</i>	31	70.5	181	42.9	0	1-6
Brown-bellied Swallow	<i>Notiochelidon murina</i>	43	97.7	250	59.2	0	1-7
Turquoise Jay	<i>Cyanolyca turcosa</i>	11	25.0	38	9.0	0	1-6
White-capped Dipper	<i>Cinclus leucocephalus</i>	12	27.3	30	7.1	0	2-3

Rufous Wren	<i>Cinnycerthia unirufa</i>	23	52.3	43	10.2	0	3
Mountain Wren	<i>Troglodytes solstitialis</i>	39	88.6	155	36.7	3	2-6
Grass Wren	<i>Cistothorus platensis</i>	14	31.8	57	13.5	1	1,4,7
Great Thrush	<i>Turdus fuscater</i>	43	97.7	408	96.7	0	1-7
Glossy-black Thrush	<i>Turdus serranus</i>	1	2.3	2	0.5	0	3
Paramo Pipit	<i>Anthus bogotensis</i>	8	18.2	14	3.3	0	7
Spectacled Whitestart	<i>Myioborus melanocephalus</i>	43	97.7	332	78.7	0	1-6
Citrine Warbler	<i>Basileuterus luteoviridis</i>	31	70.5	81	19.2	4	2-4
Black-crested Warbler	<i>Basileuterus nigrocristatus</i>	23	52.3	55	13.0	4	1-4
Cinereous Conebill	<i>Conirostrum cinereum</i>	2	4.5	2	0.5	0	1-3
Blue-backed Conebill	<i>Conirostrum sitticolor</i>	40	90.9	210	49.8	1	2-6
Masked Flowerpiercer	<i>Diglossopis cyanea</i>	41	93.2	225	53.3	0	2-6
Black Flowerpiercer	<i>Diglossa humeralis</i>	35	79.5	117	27.7	0	1,2,4
Glossy Flowerpiercer	<i>Diglossa lafresnayii</i>	43	97.7	303	71.8	9	3-6
White-sided Flowerpiercer	<i>Diglossa albilatera</i>	27	61.4	67	15.9	3	4
Blue-and-black Tanager	<i>Tangara vassorii</i>	4	9.1	7	1.7	0	2
Hooded Mountain-tanager	<i>Buthraupis montana</i>	42	95.5	257	60.9	0	1-7
Masked Mountain-tanager	<i>Buthraupis wetmorei</i>	8	18.2	14	3.3	0	6
Black-chested Mountain-tanager	<i>Buthraupis eximia</i>	31	70.5	97	23.0	5	3-6
Buff-breasted Mountain-tanager	<i>Dubusia taeniata</i>	22	50.0	44	10.4	0	1-4
Grass-green Tanager	<i>Chlorornis riefferii</i>	9	20.5	17	4.0	0	3
Lacrimose Mountain-tanager	<i>Anisognathus lacrymosus</i>	44	100.0	230	54.5	2	2-6
Scarlet-bellied Mountain-tanager	<i>Anisognathus igniventris</i>	44	100.0	364	86.3	3	1-6
White-capped Tanager	<i>Sericossphya albocristata</i>	2	4.5	3	0.7	0	3,4
Golden-crowned Tanager	<i>Iridosornis rufivertex</i>	35	79.5	128	30.3	0	3-6
Common Bush-tanager	<i>Chlorospingus ophthalmicus</i>	1	2.3	1	0.2	0	2
Grey-hooded Bush-tanager	<i>Cnemoscopus rubrirostris</i>	1	2.3	1	0.2	0	2
Black-backed Bush-tanager	<i>Urothraupis stolzmanni</i>	17	38.6	44	10.4	0	6
Black-headed Hemispingus	<i>Hemispingus verticalis</i>	39	88.6	144	34.1	0	2-6
Superciliaried Hemispingus	<i>Hemispingus superciliaris</i>	35	79.5	97	23.0	0	2-4
Black-capped Hemispingus	<i>Hemispingus atropileus</i>	10	22.7	24	5.7	4	3
Black-backed Grosbeak	<i>Pheucticus aureoventris</i>	6	13.6	11	2.6	0	1
Pale-naped Brush-finch	<i>Atlapetes pallidinucha</i>	32	72.7	116	27.5	1	3-5
Rufous-naped Brush-finch	<i>Atlapetes rufinucha</i>	24	54.5	56	13.3	4	2-4
Stripe-headed Brush-finch	<i>Atlapetes torquatus</i>	28	63.6	68	16.1	2	2-3
Slaty Brush-finch	<i>Atlapetes schistaceus</i>	43	97.7	259	61.4	4	2-6
Paramo Seedeater	<i>Catamenia homochroa</i>	16	36.4	34	8.1	0	1,2,4,7
Plain-coloured Seedeater	<i>Catamenia inornata</i>	30	68.2	94	22.3	0	1,7
Plumbeous Sierra-finch	<i>Phrygilus unicolor</i>	12	27.3	23	5.5	0	7
Andean Siskin	<i>Carduelis spinescens</i>	23	52.3	78	18.5	0	7
Hooded Siskin	<i>Carduelis magellanica</i>	4	9.1	5	1.2	0	1
Rufous-collared Sparrow	<i>Zonotrichia capensis</i>	44	100.0	355	84.1	2	1-7

*1 = Farmland, 2 = Edge farmland forest (includes slope forest), 3 = Forest (combines guandera and slope forest), 4 = Regenerating cleared forest, 5 = Ridge scrub, 6 = Edge páramo forest (includes transitional and elfin forest), 7 = Páramo, V = vagrant. ** identified from our tape-recording by Niels Krabbe

Appendix 2: Site access

Guandera Biological Reserve is owned and run by Fundación Jatun Sacha (Casilla 17-12-867 Quito, Ecuador Avenida Rio Coca). The reserve can be contacted directly via e-mail (larry@uio.satnet.net), although mail is only checked every few days. The reserve is in Carchi Province, approximately 11 km east of San Gabriel, a town on the Pan-American highway (4–5 hours north of Quito). At San Gabriel, local taxis can be hired to Mariscal Sucre, the nearest village to the reserve. At Mariscal Sucre, contact José Cando Rosero for a guide into the reserve. The walk from Mariscal Sucre to the reserve lodge takes approximately 2–3 hours depending on fitness and load. The reserve lodge is a large house with good facilities costing \$25 per night (\$5 for Ecuadorian nationals); see <http://www.rainforest.org/html/guandera.html>. Temperatures on the reserve are cold and the area receives much rainfall; rubber boots, warm clothing and waterproofs are essential. The reserve can be covered in around a day but allow 3–4 days to encounter most species. By crossing the páramo adjacent to the reserve you can reach the eastern Andean forest slope, and Spectacled Bear *Tremarctos ornatus* occurs along the forest edge.