

CONSERVATION PRIORITY-SETTING IN GUATEMALA THROUGH THE IDENTIFICATION OF IMPORTANT BIRD AREAS

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Abstract. The designation of Important Bird Areas (IBAs), a prioritization scheme developed by BirdLife International, is based on four quantitative ornithological criteria: 1) globally threatened species, 2) restricted-range species, 3) biome-restricted species, and/or (4) flocking species. A total of 21 areas in Guatemala fulfill international IBA criteria. All IBAs were delimited based on spatial habitat requirements of key species and cover about 48% of the country. Guatemalan IBAs are crucial for the conservation of bird species endemic to the northern Central American highlands. The Guatemalan IBA network covers habitat for eight globally threatened species and 25 restricted-range species. Two sites support >1% of the biogeographic population of waterbird species. Guatemalan IBAs are rather large, ranging from 44 to 21 000 km², and include not only intact habitat (61% of the area of all IBAs), but also areas where efforts should be invested to restore habitat (38%). Long-term habitat conservation in the half of the country is challenging. Guatemala's human population is growing rapidly, increasing the pressure on natural habitat. All parts of the Guatemalan society are addressed by the designation of large IBAs, which is an opportunity to enhance conservation efforts among the private and communal sectors.

Key words: bird conservation, Endemic Bird Areas (EBA), globally threatened species, Guatemala, Important Bird Areas (IBA), restricted-range species

PRIORIZACIÓN PARA LA CONSERVACIÓN EN GUATEMALA POR MEDIO DE LA IDENTIFICACIÓN DE IBAS

Resumen. La designación de IBAs, un esquema para priorizar sitios de conservación desarrollado por BirdLife International, tiene como base cuatro criterios ornitológicos cuantitativos: (1) especies globalmente amenazadas, (2) especies de distribución restringida, (3) especies restringidas a un bioma y (4) especies congregatorias. Un total de 21 áreas en Guatemala cumplen con los requisitos internacionales de IBAs. Todas las IBAs fueron delimitadas con base en requerimientos espaciales de hábitat de especies clave y cubren alrededor de 48% del país. Las IBAs de Guatemala son cruciales para la conservación de especies de aves endémicas de las tierras altas del norte de Centro América. La red de IBAs de Guatemala cubre hábitat para ocho especies globalmente amenazadas y para 25 especies de distribución restringida. Dos sitios sostienen >1% de la población biogeográfica de especies de aves acuáticas. Las IBAs de Guatemala son particularmente extensas, entre 44 a 21 000 km², e incluyen no solamente hábitat primario (61% del área de todas las IBAs) sino también áreas donde deben invertirse esfuerzos para restaurar el hábitat (38%). La conservación de hábitat a largo plazo en la mitad del país es un reto. La población humana de Guatemala está creciendo rápidamente, aumentando la presión sobre el hábitat natural. Todos los sectores de la sociedad guatemalteca están involucrados por la designación de IBAs extensas, lo cual es una oportunidad para aumentar los esfuerzos de conservación entre los sectores privados y comunitarios.

INTRODUCTION

The main threat to biodiversity on a global scale is the loss of natural habitat due to human activity. Worldwide, birds are the best researched and most popular animals (BirdLife International 2004a), their wild populations are relatively easy

to study, and they are useful indicators to identify important sites for conservation. Saving areas critical for the conservation of birds also benefits many other plant and animal species of conservation concern (Bibby et al. 1992).

Extensive data on the distribution and ecology of birds led BirdLife International in the

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1980s to develop the Important Bird Area (IBA) program, a worldwide initiative to identify and protect critical areas for bird conservation (Boyla and Estrada 2005). The identification of IBAs is based on quantitative ornithological criteria, using the most recent data on the distribution and population size of key species. More than 8500 IBAs have been identified worldwide so far (García-Moreno et al. 2007), including those in several countries in the Neotropics; for example, Mexico (Arizmendi and Márquez-Valdelamar 2000), the tropical Andean region (Boyla and Estrada 2005), and Argentina (Di Giacomo et al. 2007). The first IBA account for a Central American country was provided by Angehr (2003) for Panama.

Important regions for bird conservation on a continental scale were identified based on the distribution of restricted-range and globally threatened species (Wege and Long 1995, Stattersfield et al. 1998). To prioritize the most important sites for bird conservation within these regions, in 2005 BirdLife International began to identify IBAs in all Central American countries, in collaboration with national partner organizations. The objective of this paper is to assess the global conservation importance of land areas in Guatemala based on avian data applying Bird Life International's IBA criteria, and to present the first list of Guatemalan IBAs.

METHODS

IBA CRITERIA

Important Bird Areas are identified worldwide using the same standard quantitative ornithological criteria, based on the presence of globally threatened species (Criterion A1), restricted-range species (Criterion A2), biome-restricted species (Criterion A3), and flocking species (Criterion A4). A site in Guatemala qualified as IBA when at least one of the following criteria was fulfilled.

Criterion A1

At least one globally threatened species (Vulnerable, Endangered, or Critically Endangered) according to IUCN Red List criteria (IUCN 2001, 2007) occurs regularly at the site (at least one individual of a Critically Endangered or Endangered species, at least 10 pairs of a Vulnerable species). Species classified as Extinct, Near Threatened, or Data Deficient in the IUCN Red List, and species not regularly occurring in Guatemala were excluded from the analysis.

Criterion A2

At least 33% of the species restricted to an Endemic Bird Area (EBA) and recorded in Guatemala occur regularly at the site. Restricted-range species have a distribution range of <50 000 km². The list of restricted-range species was derived from decisions of the Central American IBA Technical Committee, based on up-to-date knowledge on the species distribution and an initial species set (Howell and Webb 1995, Stattersfield et al. 1998). Only two species restricted to EBA17 (Northern Central American Pacific Slope) are recorded in Guatemala. In this case both species must occur on a site to qualify as IBA. Stattersfield et al. (1998) included also the Guatemalan Atlantic coast in EBA19 (Central American Caribbean Slope). Two species restricted to this EBA occur in Guatemala—Gray-headed Piprites (*Piprites griseiceps*) and Snowy Cotinga (*Carpodectes nitidus*)—but they do not regularly (Eisermann and Avendaño 2007). Thus, they were not used to identify IBAs.

Criterion A3

At least 33% of the species restricted to a biome and recorded in Guatemala occur regularly at the site. The classification of Neotropical zoogeographic regions by Stotz et al. (1996) was used for this criterion. The list of biome-restricted species was derived from decisions of the Central American IBA Technical Committee, based on up-to-date knowledge on the species distribution and an initial list of Stotz et al. (1996).

Criterion A4i-ii

The site supports at least 1% of the biogeographic population of flocking water and seabirds, according to continental estimates by Wetlands International (2006) and Morrison et al. (2006), for seabirds del Hoyo et al. (1992) and BirdLife International (2004b), and recent site estimates (Eisermann 2006, Sigüenza 2007). For populations of >2 000 000 individuals, a threshold value of 20 000 individuals was used.

Criterion A4iv

The site supports at least 1% of the biogeographic population at "bottleneck" sites during migration, according to continental estimates by Rich et al. (2004).

Criterion A4iii (sites supports at least 20 000 waterbirds; see Boyla and Estrada 2005) was not applied to identify globally Important Bird Areas in Guatemala, because this criterion will

be used for the identification of regional important sites.

Species nomenclature follows AOU (1998) and supplements, AOU (2008) being the last supplement reviewed. In the case of *Aratinga holochlora rubritorquis* we indicate the subspecies in order to refer non-ambiguously to the taxon *Aratinga rubritorquis*, used by BirdLife International in the World Bird Data Base, an online data storage on bird populations in IBAs, accessible at <<http://www.birdlife.org/datazone/>>.

IBA BOUNDARIES

In general, IBA boundaries should comply with conservation requirements of key species and be practical targets for conservation management (Boyla and Estrada 2005). The total area of all IBAs should provide sufficient habitat for all key species.

In Guatemala, large IBAs were bounded in cases of close proximity between sites with avian data, based on known or assumed large qualitative and spatial habitat requirements of key species. Borders were defined with the participation of local specialists along reserve limits, rivers, roads, contours, straight lines between villages, or habitat borders.

DATA SOURCE AND ANALYSIS

We used recent bird records from 1990 to 2007 for the identification of IBAs, based on a compilation of recent records and a comprehensive bibliography of publications and unpublished reports (Eisermann and Avendaño 2006, 2007). Additional unpublished information was compiled during five national IBA workshops with local specialists.

A recent vegetation mapping on a scale of 1:50 000 (MAGA 2006), based on aerial photographs from 2003, and the most recent human population census data (INE 2002) were used for spatial analyses. Software ArcView 3.2 was used for all analyses.

To classify the urgency of conservation action among IBAs, four indicators were used: 1) presence of globally threatened species, 2) coverage of protected areas, 3) ratio between unaltered and human-altered habitat within the IBAs, and 4) expected considerable decrease of the coverage of unaltered habitat in the near future. We classified conservation priority in three categories:

Urgent

Site supports at least one globally Critically Endangered or Endangered bird species, has

<50% unaltered habitat, and <10% coverage of protected areas.

High

Site supports at least one globally threatened (EN or VU) bird species, has <50% unaltered habitat or <10% coverage of protected areas, or coverage of unaltered habitat is assessed to decrease considerably in the near future.

Medium

Coverage of protected areas is >10%, but site has <50% of unaltered habitat independent of the presence of globally threatened species, or site has <10% protected area.

RESULTS

GENERAL ANALYSIS

Of the 725 bird species recorded in Guatemala (Eisermann and Avendaño 2007), 92 species qualified under one or several of the IBA criteria A1, A2, and A3. This assemblage includes four globally Endangered and four Vulnerable species, two restricted-range species of EBA17 and 23 species of EBA18, 12 biome-restricted species of the Pacific Arid Slope, 49 species of the Madrean Highlands, and 27 species of the Gulf Caribbean Slope (Appendix). According to the 33% threshold, a site qualified as IBA when it supports populations of 8 species of EBA18, 4 species of Pacific Arid Slope, 16 species of Madrean Highlands, or 9 species of Gulf Caribbean Slope. Under criteria A4i-ii, 146 water and seabird species were considered, and under criterion A4iv, 212 migratory bird species which occur regularly in Guatemala.

A total of 21 IBAs were identified in Guatemala, of which 16 support populations of globally threatened species, 9 support restricted-range species, and 18 support biome-restricted species (Fig. 1, Appendix). Only two IBAs support more than 1% of the biogeographical population of a waterbird species, which are Least Grebe (*Tachybaptus dominicus*), Bare-throated Tiger-Heron (*Tigrisoma mexicanum*), and Wood Stork (*Mycteria americana*) in the IBA Maya-Lacandon (GT001), and American White Pelican (*Pelecanus erythrorhynchos*) in the IBA Manchon-Guamuchal (GT020). Because of a lack of data on the abundance of migratory landbirds, no site qualified under criterion A4iv. The network of IBAs includes populations of all but one of the key species of criteria A1, A2, and A3. Black-throated Bobwhite (*Colinus nigrogularis*) has been recorded historically in northern

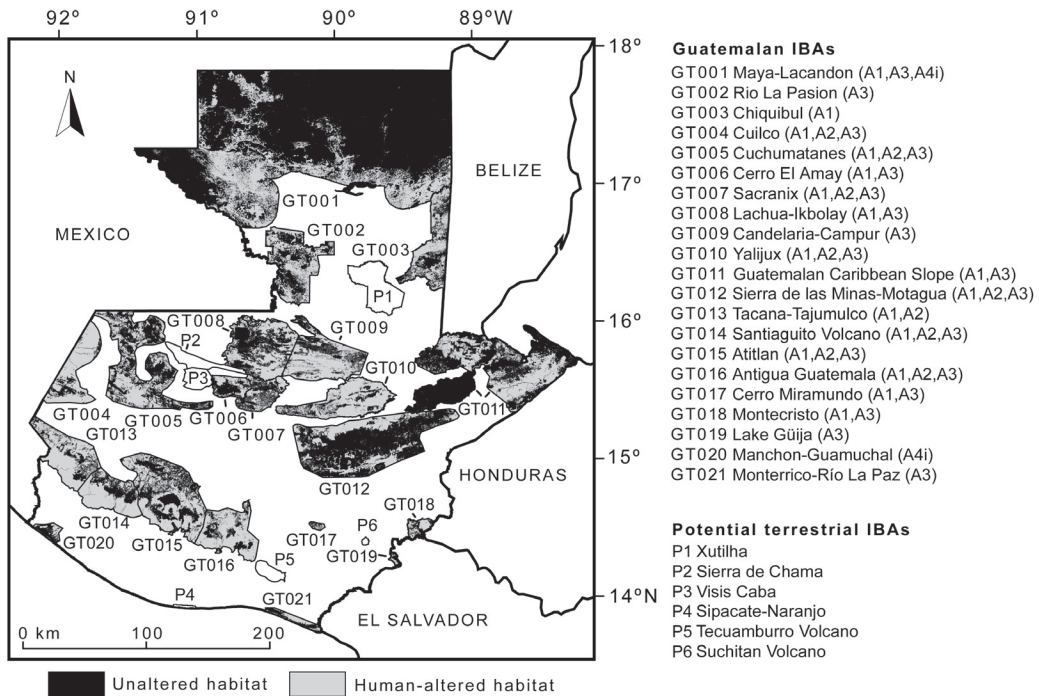


FIGURE 1. Important Bird Areas (IBAs) in Guatemala. Criteria under which the site applied as IBA are given in parenthesis: A1 (globally threatened species), A2 (restricted-range species), A3 (biome-restricted species), A4i (at least 1% of the biogeographic population of a waterbird species).

Guatemala (van Tyne 1935, Taibel 1955), but has not been reported recently.

The IBA network covers 51 884 km² (48% of Guatemala). The IBA size ranges from 4360 to 2 095 087 ha (Table 1). Of the total IBA area, 61.2% (31 770 km²) is covered with unaltered habitat (mainly old growth forest, natural scrub, and wetlands), 38.3% (19 885 km²) is covered with human-altered habitat (mainly agricultural area and secondary growth scrub), and 0.5% (229 km²) with urban area. Habitat distribution within each IBA is presented in Table 1.

The Guatemalan system of protected areas covers 32% (34 587 km²) of the country (CONAP 2007). Of the 51 884 km² identified as IBA, 60% (31 000 km²) are located within protected areas. Consequently, 40% (22 884 km²) are unprotected. The coverage of protected areas in individual IBAs ranges from 0% to 100% (Table 1).

All Guatemalan IBAs have human settlements. The population density within the IBAs ranges from 3 to 295 persons per km² (Table 1). Population density is highest in the highlands with favorable conditions for agriculture (fertile soils and favorable climate). The northern Petén belongs to the largest Neotropical forest area

north of the Amazon, with few people living in the area.

In addition to the 21 IBAs identified, seven more sites are considered potential IBAs, including one in pelagic waters off the Pacific coast where two globally threatened seabird species (Parkinson's Petrel *Procellaria parkinsoni* and Pink-footed Shearwater *Puffinus creatopus*, both VU) occur apparently regularly (Jehl 1974, P. Velásquez and V. Dávila in Jones and Komar 2008). More field data are required to assess the magnitude in which these species use Guatemalan Pacific waters and to identify the most important locations. More data are also required for the designation of potential terrestrial sites, which are Xutilha (center point: 16.24°N, 89.70°W), Sierra de Chama (15.73°N, 91.06°W), Visis Caba (15.58°N, 91.00°W), Tecuamburro Volcano (14.18°N, 90.46°W), Suchitan Volcano (14.40°N, 89.77°W), and Sipacate-Naranjo (13.92°N, 91.10°W) (Fig. 1).

PRIORITY-SETTING AMONG AND WITHIN IBAS

Because the area covered by IBAs in Guatemala is extensive, we applied a further prioritization among and within IBAs. Based

TABLE 1. CONSERVATION PRIORITIES IN GUATEMALAN IMPORTANT BIRD AREAS (IBAs).

IBA	Size of IBA (ha) and % of legally protected area within IBA ¹	Unaltered habitat (priority for protection) ²		Altered habitat (priority for restoration) ²		Urban area (priority for education) ²		Human population density (persons per km ²) ³	Priority for conservation action ⁴
		(ha)	(%)	(ha)	(%)	(ha)	(%)		
GT001 Maya-Lacandon	2 095 087 (99%)	1 743 345	83	350 161	17	1581	0	3	high
GT002 Rio La Pasion	185 206 (100%)	88 633	48	95 863	52	710	0	16	medium
GT003 Chiquibul	145 036 (100%)	74 859	52	68 977	48	1200	1	20	medium
GT004 Cuילו	127 773 (0%)	20 241	16	107 408	84	125	0	105	medium
GT005 Cuchumatanes	303 813 (2.4%)	148 013	49	155 511	51	289	0	77	urgent
GT006 Cerro El Amay	45 173 (10%)	26 075	58	19 062	42	36	0	39	high
GT007 Sacranix	71 429 (0.3%)	32 417	45	38 949	55	63	0	75	medium
GT008 Lachua-Ikbolay	211 746 (7.3%)	97 407	46	114 138	54	202	0	31	medium
GT009 Candelaria-Campur	186 987 (0%)	62 926	34	123 740	66	320	0	53	medium
GT010 Yalijux	163 393 (1.9%)	33 677	21	129 398	79	317	0	92	high
GT011 Guatemalan Caribbean Slope	465 945 (35%)	286 127	61	175 900	38	3917	1	35	medium
GT012 Sierra de las Minas-Motagua	426 957 (57%)	296 729	70	127 110	30	3118	1	51	medium
GT013 Tacana-Tajumulco	148 499 (12%)	35 209	24	112 227	76	1062	1	240	medium
GT014 Santiaguillo Volcano	121 461 (21%)	34 811	29	85 314	70	1337	1	258	medium
GT015 Atitlan	276 869 (51%)	125 096	45	150 042	54	1731	1	265	medium
GT016 Antigua Guatemala	137 862 (30%)	35 092	26	96 372	70	6398	5	295	medium
GT017 Cerro Miramundo	5 564 (0%)	3 171	57	2 375	43	19	0	40	high
GT018 Montecristo	22 114 (98%)	8 588	39	13 235	60	292	1	60	medium
GT019 Lago de Güija	4 360 (0%)	1 780	41	2 580	59	0	0	12	medium
GT020 Manchon-Guamuchal	20 659 (6.1%)	11 918	58	8 698	42	44	0	28	medium
GT021 Monterrico-Rio La Paz	22 494 (11%)	10 919	49	11 468	51	107	1	62	medium

¹ Based on the national registry of protected areas (CONAP 2007).

² Based on a vegetation mapping on a scale of 1:50 000 (MAGA 2006).

³ Based on the most recent national population census (INE 2002).

⁴ Urgent-Site supports at least one globally Endangered bird species, has <50% unaltered habitat, and <10% coverage of protected areas. High-Site supports at least one globally threatened (EN or VU) bird species, has <50% unaltered habitat or <10% coverage of protected areas, or ratio between unaltered vs. altered habitat is assessed to change considerably in the near future. Medium-Coverage of protected areas is >10%, but site has less than 50% of unaltered habitat independent of the presence of globally threatened species, or site has <10% protected area.

on the presence of globally threatened species, low coverage of protected areas, and high percentage of altered habitat, or an expected considerable decrease in the coverage of unaltered habitat in the near future, the IBAs Cuchumatanes, Maya-Lacandon, Cerro El Amay, Yalijux, and Cerro Miramundo have the highest priority for conservation efforts (Table 1). The IBA Maya-Lacandon, despite being almost entirely protected as Maya Biosphere Reserve and several national parks, has a high priority for conservation because a loss of 183 000 ha of forest (10% of this IBA) is expected if all of the recently proposed road constructions are carried out (Ramos et al. 2007).

In most IBAs, land ownership is a mixture of state (e.g., national parks), communal (e.g., municipal parks and forest reserves of indigenous communities), and private property. Unaltered habitat is fragmented throughout Guatemala, covering in each IBA between 16% and 83% (Table 1). The total area of unaltered habitat within IBAs amounts to 31 770 km² (29% of the country), which has protection priority. In areas within IBAs currently covered with altered habitat (19 885 km²; 18% of the country), habitat restoration should be pursued. Urban area covers between 0% and 4.6% of each IBA. The IBA Antigua Guatemala, for example, includes the town of Antigua which is surrounded by important highland forests. Towns and rural settlements within IBAs have priority for environmental education and the development of alternative economic income in order to lower the pressure on natural habitat.

DISCUSSION

This first assessment of IBAs in Guatemala is mainly based on distributional data of globally threatened, restricted-range, and biome-restricted bird species. Only two IBAs qualified under the A4-criterion, supporting at least 1% of the biogeographical population of waterbirds or migratory landbirds. Because of a lack of quantitative data, none of the IBAs qualified as bottleneck site for migrating landbirds.

Guatemalan IBAs are crucial for bird conservation in Central America because most sites support populations of globally threatened species. Populations of restricted-range species, the second most critical assemblage for conservation, are exclusively supported by highland IBAs. Approximately 37 500 km² (35%) of Guatemala belong to the highlands above 900 m, which is about 25% of the Endemic Bird Area (EBA) North Central American Highlands (Stattersfield et al. 1998). Some of the species restricted to this

EBA have a range restricted to the highlands of Guatemala and Chiapas, Mexico (Horned Guan, Bearded Screech-Owl, Pink-headed Warbler, Azure-rumped Tanager, and Black-capped Siskin; scientific names are listed in the Appendix), which highlights the responsibility of Guatemala and the international community for the survival of these species.

Compared with other countries, IBA identification in Guatemala resulted in a rather high coverage of almost half of the country. In Ecuador, for example, IBAs cover about 36% of the country (Boyla and Estrada 2005). To focus conservation efforts in Guatemalan IBAs exclusively on remaining unaltered habitat – which equals 61% of the IBA area or 29% of the country – is very likely insufficient for the long-term survival of all 97 key species of criteria A1, A2, and A3. The habitat of several species (e.g., Highland Guan and Azure-rumped Tanager) has been considerably reduced by human activity. Until reasonable population viability assessments indicate the contrary, we must assume that habitat restoration is necessary for the survival of these populations. This is challenging in an agricultural country with a rapidly growing human population. The Guatemalan population has increased 35% from 1994 to 2002 (INE 2002), and it is expected to double from 2010 to 2050 to a total of 27.9 million (CEPAL 2007).

We believe that the designation of large IBAs, including those in or with altered habitat, has advantages for conservation in Guatemala. Because of the mixed land ownership in the IBAs, all parts of the Guatemalan society are involved in this conservation effort. BirdLife International's designation of IBAs carries no legal status. It is rather a certification of globally important sites that can encourage more private landowners to take pride and protect habitat. The high number of recently declared private nature reserves in Guatemala (79 of 94 new protected areas established from 2001 to 2006, CONAP 2007), indicates that the private sector is sensitive to conservation concerns. The affiliation of a property within an IBA can be useful to promote alternative land uses, for example low impact tourism (e.g., birdwatching) or conservation science research.

The principal conservation goals in Guatemalan IBAs are to 1) lower the rate of loss of unaltered habitat, and 2) increase the coverage of restored habitat. National vegetation cover mappings like MAGA (2006) and future updates may serve as monitoring tools, together with local bird monitoring programs. Some areas are currently in the focus of regional conservation funding, e.g., the volcanic belt, Sierra de los Cuchumatanes, Sierra de las

Minas, and Maya Biosphere Reserve, supported by the Critical Ecosystem Partnership Fund and Tropical Forest Conservation Act. Other areas have been ignored so far, like the highlands of the provinces Quiché and Alta Verapaz (IBAs Cerro El Amay, Lachua-Ikbolay, Candelaria-Campur, Sacranix, and Yalijux).

No general recipe can be given to achieve the conservation goals, because local conditions vary widely among the Guatemalan IBAs (e.g., human population density, cultural traditions, landownership, local economies, and habitat distribution). To find common denominators among local interests requires the involvement of all local stakeholders—local government agencies, community councils, non-governmental organizations, enterprises, and academic institutions.

A basic requirement for IBA conservation is to raise the education level of the Guatemalan society. Currently, 28% of the Guatemalan population aged 15 years and older are illiterate, which is the second highest rate in Latin America and the Caribbean (CEPAL 2007). An increased education level will most likely lead to a smaller rate of population increase, elevate the environmental awareness, and consequently lower the pressure on natural habitat.

Some IBAs require urgent action in the short term to be saved. Governance needs to be re-established in the northwest of the IBA Maya-Lacandon (ParksWatch 2005), and reserve management needs to be initiated or improved in several protected areas. Agricultural diversification with high value crops may lead to a more efficient land use, decreasing the pressure on natural areas. The cultivation of bio-fuel crops needs to be regulated, otherwise extensive forest areas are threatened to be converted into bio-fuel fields.

Tourism may contribute to conservation if conducted in a responsible manner. Recently, birding tourism is becoming more popular in Guatemala. Involved people need to be educated about how to avoid negative impacts (Sekercioglu 2002), especially on threatened species. To increase funds for conservation, the value of biodiversity needs to be further promoted on the political level, both nationally and internationally.

Research focused on population dynamics may provide deeper insight in species' requirements for their long-term survival. It is a responsibility of scientists to provide this information, not just within scientific circles, but also among the general public and the state's executive power. Birdwatchers can contribute to the study of Guatemalan birds by submitting bird records to eBird Guatemala, an online data storage developed by Cornell Lab of Ornithology

and National Audubon Society (<http://ebird.org/content/guatemala/>).

We hope that the IBAs will be useful as a guideline to focus conservation efforts in Guatemala, be it on the national level, for instance by focusing incentives for primary forest conservation and reforestation paid by the National Forest Institute, or on the international level by providing funding for conservation action.

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APPENDIX. GLOBALLY THREATENED, RESTRICTED-RANGE, AND BIOME-RESTRICTED SPECIES CRITICAL FOR THE IDENTIFICATION OF IMPORTANT BIRD AREAS IN GUATEMALA.

Species ¹	Globally threatened (A1)/Restricted-range (A2)/Biome-restricted (A3) ²	Number of IBAs where the species occurs regularly	IBAs where the species occurs regularly ³
Plain Chachalaca <i>Ortalis vetula</i>	-/-/GCS	12	GT001, GT002, GT003, GT004, GT005, GT006, GT007, GT008, GT009, GT010, GT011, GT012
White-bellied Chachalaca <i>Ortalis leucogastra</i>	-/EBA17/PAS	6	GT014, GT015, GT018, GT019, GT020, GT021
Highland Guan <i>Penelopina nigra</i>	VU/EBA18/MAH	12	GT004, GT005, GT006, GT007, GT011, GT010, GT012, GT013, GT014, GT015, GT016, GT018
Horned Guan <i>Oreophasis derbianus</i>	EN/EBA18/MAH	7	GT005, GT006, GT012, GT013, GT014, GT015, GT016
Ocellated Turkey <i>Meleagris ocellata</i>	-/-/GCS	1	GT001
Black-throated Bobwhite <i>Colinus nigrogularis</i>	-/-/GCS	0	-
Ocellated Quail <i>Cyrtonyx ocellatus</i>	-/EBA18/MAH	3	GT010, GT013, GT015
White-faced Quail-Dove <i>Geotrygon albifacies</i>	-/-/MAH	9	GT006, GT007, GT011, GT010, GT012, GT014, GT015, GT017, GT018
Red-throated Parakeet <i>Aratinga holochlora rubritorquis</i>	-/EBA18/MAH	1	GT0012
Orange-fronted Parakeet <i>Aratinga canicularis</i>	-/-/PAS	6	GT004, GT012, GT014, GT015, GT019, GT021
Yellow-lored Parrot <i>Amazona xantholora</i>	-/-/GCS	1	GT001
Yellow-headed Parrot <i>Amazona oratrix</i>	EN/-/-	1	GT011
Lesser Ground-Cuckoo <i>Morococcyx erythropygus</i>	-/-/PAS	1	GT012
Pacific Screech-Owl <i>Megascops cooperi</i>	-/-/PAS	2	GT020, GT021
Whiskered Screech-Owl <i>Megascops trichopsis</i>	-/-/MAH	2	GT015, GT018
Bearded Screech-Owl <i>Megascops barbarus</i>	-/EBA18/MAH	2	GT004, GT010
Fulvous Owl <i>Strix fulvescens</i>	-/EBA18/MAH	5	GT010, GT012, GT014, GT015, GT018
Yucatan Poorwill <i>Nyctiphrynus yucatanicus</i>	-/-/GCS	1	GT001
Yucatan Nightjar <i>Caprimulgus badius</i>	-/-/GCS	1	GT011
Great Swallow-tailed Swift <i>Panyptila sanctihieronymi</i>	-/-/MAH	1	GT016
Wedge-tailed Sabrewing <i>Campylopterus curvipennis</i>	-/-/GCS	4	GT001, GT008, GT009, GT011
Rufous Sabrewing <i>Campylopterus rufus</i>	-/EBA18/MAH	3	GT013, GT015, GT016
Emerald-chinned Hummingbird <i>Abeillia abeillei</i>	-/-/MAH	7	GT007, GT010, GT012, GT014, GT015, GT016, GT017
White-eared Hummingbird <i>Hylocharis leucotis</i>	-/-/MAH	11	GT004, GT005, GT006, GT007, GT010, GT012, GT014, GT015, GT016, GT017, GT018
Blue-tailed Hummingbird <i>Amazilia cyanura</i>	-/EBA17/PAS	3	GT014, GT015, GT016
Buff-bellied Hummingbird <i>Amazilia yucatanensis</i>	-/-/GCS	1	GT001
Green-fronted Hummingbird <i>Amazilia viridifrons</i>	-/-/PAS	2	GT004, GT005

APPENDIX. CONTINUED.

Species ¹	Globally threatened (A1)/Restricted-range (A2)/Biome-restricted (A3) ²	Number of IBAs where the species occurs regularly	IBAs where the species occurs regularly ³
Green-throated Mountain-gem <i>Lampornis viridipallens</i>	-/EBA18/MAH	13	GT004, GT005, GT006, GT007, GT011, GT010, GT012, GT013, GT014, GT015, GT016, GT017, GT018
Amethyst-throated Hummingbird <i>Lampornis amethystinus</i>	-/-/MAH	10	GT004, GT005, GT006, GT007, GT010, GT012, GT014, GT015, GT016, GT018
Garnet-throated Hummingbird <i>Lamprolaima rhami</i>	-/-/MAH	10	GT004, GT005, GT006, GT007, GT010, GT012, GT014, GT015, GT016, GT018
Slender Sheartail <i>Doricha enicura</i>	-/EBA18/MAH	4	GT007, GT010, GT016, GT018
Sparkling-tailed Hummingbird <i>Tilmatura dupontii</i>	-/-/MAH	5	GT007, GT011, GT010, GT014, GT015
Wine-throated Hummingbird <i>Atthis ellioti</i>	-/EBA18/MAH	6	GT007, GT010, GT012, GT014, GT015, GT018
Mountain Trogon <i>Trogon mexicanus</i>	-/-/MAH	9	GT004, GT005, GT007, GT010, GT012, GT014, GT015, GT016, GT017
Blue-throated Motmot <i>Aspatha gularis</i>	-/EBA18/MAH	10	GT004, GT006, GT007, GT010, GT012, GT014, GT015, GT016, GT017, GT018
Russet-crowned Motmot <i>Momotus mexicanus</i>	-/-/PAS	2	GT004, GT012
Keel-billed Motmot <i>Electron carinatum</i>	VU/-/GCS	5	GT001, GT003, GT008, GT011, GT012
Chestnut-colored Woodpecker <i>Celeus castaneus</i>	-/-/GCS	6	GT001, GT002, GT003, GT007, GT008, GT011
Tawny-winged Woodcreeper <i>Dendrocincla anabatina</i>	-/-/GCS	7	GT001, GT002, GT003, GT005, GT007, GT008, GT011
Yellow-bellied Tyrannulet <i>Ornithion semiflavum</i>	-/-/GCS	7	GT001, GT002, GT003, GT007, GT008, GT009, GT011
Belted Flycatcher <i>Xenotriccus callizonus</i>	-/EBA18/MAH	2	GT005, GT015
Greater Pewee <i>Contopus pertinax</i>	-/-/MAH	9	GT004, GT005, GT011, GT010, GT012, GT014, GT015, GT016, GT018
Pine Flycatcher <i>Empidonax affinis</i>	-/-/MAH	3	GT005, GT010, GT015
Buff-breasted Flycatcher <i>Empidonax fulvifrons</i>	-/-/MAH	7	GT005, GT006, GT010, GT012, GT015, GT016, GT018
Yucatan Flycatcher <i>Myiarchus yucatanensis</i>	-/-/GCS	1	GT001
Nutting's Flycatcher <i>Myiarchus nuttingi</i>	-/-/PAS	3	GT012, GT019, GT021
Couch's Kingbird <i>Tyrannus couchii</i>	-/-/GCS	4	GT001, GT007, GT008, GT009
Lovely Cotinga <i>Cotinga amabilis</i>	-/-/GCS	5	GT001, GT007, GT008, GT009, GT011
White-collared Manakin <i>Manacus candei</i>	-/-/GCS	8	GT001, GT002, GT005, GT007, GT008, GT009, GT011, GT010
Long-tailed Manakin <i>Chiroxiphia linearis</i>	-/-/PAS	2	GT014, GT015
Chestnut-sided Shrike-Vireo <i>Vireolanius melitophrys</i>	-/-/MAH	6	GT004, GT010, GT014, GT015, GT016, GT018
White-throated Magpie-Jay <i>Calocitta formosa</i>	-/-/PAS	7	GT004, GT012, GT013, GT014, GT015, GT019, GT021
Bushy-crested Jay <i>Cyanocorax melanocyaneus</i>	-/EBA18/MAH	9	GT006, GT007, GT010, GT012, GT013, GT014, GT015, GT016, GT018
Yucatan Jay <i>Cyanocorax yucatanicus</i>	-/-/GCS	1	GT001
Black-throated Jay <i>Cyanolyca pumilo</i>	-/EBA18/MAH	9	GT004, GT005, GT007, GT010, GT012, GT014, GT015, GT017, GT018

APPENDIX. CONTINUED.

Species ¹	Globally threatened (A1)/Restricted-range (A2)/Biome-restricted (A3) ²	Number of IBAs where the species occurs regularly	IBAs where the species occurs regularly ³
Unicolored Jay <i>Aphelocoma unicolor</i>	-/-/MAH	5	GT005, GT012, GT014, GT015, GT018
Black-capped Swallow <i>Notiochelidon pileata</i>	-/EBA18/MAH	10	GT005, GT006, GT007, GT010, GT012, GT014, GT015, GT016, GT017, GT018
Banded Wren <i>Thryothorus pleurostictus</i>	-/-/PAS	3	GT004, GT012, GT014
Rufous-browed Wren <i>Troglodytes rufociliatus</i>	-/EBA18/MAH	11	GT004, GT005, GT006, GT007, GT010, GT012, GT014, GT015, GT016, GT017, GT018
Nightingale Wren <i>Microcerculus philomela</i>	-/-/GCS	5	GT005, GT007, GT008, GT009, GT011
Brown-backed Solitaire <i>Myadestes occidentalis</i>	-/-/MAH	11	GT004, GT005, GT006, GT007, GT010, GT012, GT013, GT014, GT015, GT016, GT017
Slate-colored Solitaire <i>Myadestes unicolor</i>	-/-/MAH	10	GT005, GT006, GT007, GT008, GT011, GT010, GT012, GT014, GT015, GT018
Black Thrush <i>Turdus infuscatus</i>	-/-/MAH	10	GT004, GT005, GT006, GT007, GT010, GT012, GT014, GT015, GT016, GT018
Rufous-collared Thrush <i>Turdus rufitorques</i>	-/EBA18/MAH	10	GT004, GT005, GT007, GT010, GT012, GT014, GT015, GT016, GT017, GT018
Blue-and-white Mockingbird <i>Melanotis hypoleucus</i>	-/EBA18/MAH	7	GT007, GT010, GT012, GT014, GT015, GT016, GT018
Gray Silky-flycatcher <i>Ptilogonys cinereus</i>	-/-/MAH	10	GT004, GT005, GT006, GT007, GT010, GT012, GT014, GT015, GT016, GT017, GT018
Olive Warbler <i>Peucedramus taeniatus</i>	-/-/MAH	7	GT004, GT007, GT010, GT012, GT014, GT015, GT016
Crescent-chested Warbler <i>Parula superciliosa</i>	-/-/MAH	10	GT004, GT005, GT010, GT012, GT013, GT014, GT015, GT016, GT017, GT018
Golden-cheeked Warbler <i>Dendroica chrysoparia</i>	EN/-/-	1	GT012
Cerulean Warbler <i>Dendroica cerulea</i>	VU/-/-	2	GT001, GT011
Red-faced Warbler <i>Cardellina rubrifrons</i>	-/-/MAH	5	GT004, GT010, GT015, GT016, GT018
Pink-headed Warbler <i>Ergaticus versicolor</i>	VU/EBA18/MAH	8	GT004, GT005, GT010, GT012, GT014, GT015, GT016, GT017
Painted Redstart <i>Myioborus pictus</i>	-/-/MAH	6	GT004, GT005, GT012, GT015, GT016, GT018
Golden-browed Warbler <i>Basileuterus belli</i>	-/-/MAH	11	GT004, GT005, GT007, GT010, GT012, GT013, GT014, GT015, GT016, GT017, GT018
Gray-throated Chat <i>Granatellus sallaiei</i>	-/-/GCS	3	GT001, GT002, GT008
Black-throated Shrike-Tanager <i>Lanio aurantius</i>	-/-/GCS	6	GT001, GT002, GT007, GT008, GT009, GT011
Rose-throated Tanager <i>Piranga roseogularis</i>	-/-/GCS	1	GT001
Crimson-collared Tanager <i>Ramphocelus sanguinolentus</i>	-/-/GCS	8	GT001, GT005, GT006, GT007, GT008, GT009, GT011, GT010
Passerini's Tanager <i>Ramphocelus passerinii</i>	-/-/GCS	8	GT001, GT002, GT003, GT005, GT007, GT008, GT009, GT011
Azure-rumped Tanager <i>Tangara cabanisi</i>	EN/EBA18/MAH	3	GT013, GT014, GT015
Cinnamon-bellied Flower-piercer <i>Diglossa baritula</i>	-/-/MAH	10	GT004, GT005, GT007, GT010, GT012, GT014, GT015, GT016, GT017, GT018
Green-backed Sparrow <i>Arremonops chloronotus</i>	-/-/GCS	7	GT001, GT002, GT003, GT007, GT008, GT009, GT011

APPENDIX. CONTINUED.

Species ¹	Globally threatened (A1)/Restricted-range (A2)/Biome-restricted (A3) ²	Number of IBAs where the species occurs regularly	IBAs where the species occurs regularly ³
White-eared Ground-Sparrow <i>Melospiza leucotis</i>	-/EBA18/-	3	GT014, GT015, GT016
Black-vented Oriole <i>Icterus wagleri</i>	-/-/MAH	6	GT004, GT005, GT006, GT015, GT016, GT018
Bar-winged Oriole <i>Icterus maculialatus</i>	-/EBA18/MAH	3	GT015, GT016, GT018
Black-cowled Oriole <i>Icterus prosthelas</i>	-/-/GCS	7	GT001, GT002, GT007, GT008, GT009, GT011, GT012
Yellow-winged Cacique <i>Cacicus melanicterus</i>	-/-/PAS	2	GT020, GT021
Montezuma Oropendola <i>Psarocolius montezuma</i>	-/-/GCS	7	GT001, GT002, GT003, GT007, GT008, GT009, GT011
Olive-backed Euphonia <i>Euphonia gouldi</i>	-/-/GCS	6	GT001, GT002, GT007, GT008, GT009, GT011
Blue-crowned Chlorophonia <i>Chlorophonia occipitalis</i>	-/-/MAH	10	GT005, GT007, GT011, GT010, GT012, GT013, GT014, GT015, GT016, GT018
Black-capped Siskin <i>Carduelis atriceps</i>	-/EBA18/MAH	5	GT005, GT010, GT014, GT015, GT016
Hooded Grosbeak <i>Coccothraustes abeillei</i>	-/-/MAH	8	GT005, GT007, GT010, GT014, GT015, GT016, GT017, GT018

¹Nomenclature according to AOU (1998) and supplements, AOU (2008) being the last supplement reviewed.²Globally threatened species according to IUCN (2007): VU-Vulnerable, EN-Endangered; Restricted-range species according to Stattersfield et al. (1998), and decisions of the Central American IBA Technical Committee: EBA17-North Central American Pacific Slope; EBA18-North Central American Highland; r-r-restricted range outside of Endemic Bird Areas; Biome-restricted species according to a classification by Stotz et al. (1996) and a revision of the Central American IBA Technical Committee: GCS-Gulf Caribbean Slope; PAS-Pacific Arid Slope; MAH-Madreal Highland.³IBA code according to Table 1.