The Belize Important Bird Areas Project

Bruce W. Miller, PhD.
Carolyn M. Miller, MSc.
Gallon Jug, Belize

June 21, 2007

A Joint project with BirdLife International and The Belize Audubon Society
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INTRODUCTION

The BirdLife Important Bird Areas (IBA) project is global in scope and strives to protect key bird habitats around the world. It is impossible, both practically and financially, to develop separate projects to conserve all species at risk in the world, one by one. Thus the identification of particular sites, which are important for many species together, is a key component of BirdLife's priority setting (Boyla, 2005).

The function of the program is to identify, protect and manage a network of sites that are important for long-term viability of naturally occurring bird populations, across the geographic range of those bird species for which a site-based approach is appropriate (Boyla, 2005).

The continued ecological integrity of these sites will be decisive in maintaining and conserving such birds. Legal protection, management and monitoring of these crucial sites will all be important targets for action and many (but not all) bird species may be effectively conserved by these means (Boyla, 2005).

Patterns of bird distributions are such that, in most cases, it is possible to select sites that support many species. The sites are identified on the basis of bird numbers and species’ complements that meet triggering criteria. These sites are selected such that taken together they form a network throughout the species’ biogeographic distributions (Boyla, 2005). This network may be considered at a minimum, essential to ensure the survival of these species across their ranges. The idea is that in the event that there are significant losses of the remaining habitat elsewhere through human or other perturbations, sufficient protected habitats remain in order to maintain viable populations of birds (Boyla, 2005).
The IBA program aims to ensure the long-term conservation of a network of critically important bird and biodiversity sites that, in combination, encompass all major ecosystems. The BirdLife partnership strategic aims are to identify and protect IBAs throughout the world. For the Americas regional IBAs have been identified by country specific projects with local partners. The IBA Program also aims to guide the implementation of national conservation strategies through the promotion and development of national protected-area programs.

The Belize IBA Project was funded by BirdLife International through the local partner, the Belize Audubon Society (BAS). The project was completed for BAS by Bruce W. Miller Ph.D. and Carolyn M. Miller MSc. The methods used to identify the IBAs are standardized across the globe to ensure parity among sites and species. All IBAs are considered in a global context. While these standardized methods were used for the regional IBAs for the Mesoamerican region, relevant issues that differed from global criteria were discussed and agreed upon regionally via a technical committee before the regional IBAs were delineated.

**METHODS**

**IBA Criteria**

When possible, IBAs were to be linked to existing protected areas. The protected areas used are those recognized nationally and internationally and included in the IUCN National Protected Areas database and include Ramsar, World Heritage and MAB reserves. This was the case for the IBAs we identified for Belize.

In addition to the four IBA selection criteria used globally to identify IBAs, those in Mesoamerica also included an evaluation of Neotropical migrants as well. Belize is an important wintering group for Neotropical migrant species. Approximately 20% of the species comprising Belize’s avifauna are Neotropical migrants. For the terrestrial Neotropical migrants we completed distribution modeling analyses for 72 species. These were the species for which we had sufficient data (≥10 distribution points) to conduct robust
predictive models for the country. All probabilities below 22% were removed from the maps. Species data points and predictive parameters used were the georeferenced points from the master data table as described below. Maximum Entropy models were used and grid files were imported into Arc-View as shape files for the final maps. They are included in a summary of these as they related to the 6 IBAs identified for Belize (Appendix 1).

Following is a summary of the four global and regional criteria that were the “triggers” used to identify each proposed IBA.

The A1 category is identified by species of global concern, generally those on the IUCN Red List and in the case of Belize those identified to be of national conservation concern. A site qualifies as an IBA if it regularly holds significant numbers of globally threatened species, or other species of conservation concern. The site qualifies if it is known, estimated or thought to hold a population of a species listed as Critical or Endangered. Population-size thresholds for Vulnerable, Conservation Dependent, Data Deficient and Near Threatened species were set to regional levels.

The A2 category is identified by species that are considered to have a restricted range of distribution. A site qualifies if it is known or thought to hold a significant component of the restricted range species whose breeding distributions define an Endemic Bird Area (EBA) or Secondary Areas (SA) under BirdLife International guidelines. Such sites form one of a set selected to ensure that, as far as possible, all restricted-range species of an EBA or SA are present in significant numbers in at least one site and preferably, more.

The A3 category is identified by species that are considered to be restricted to a certain biome, or broad habitat type, e.g. coastal mangroves. A site qualifies if it is known or thought to hold a significant component of the group of species whose distributions are largely or wholly confined to one biome. The site has to form one of a set selected to ensure that, as far as possible, all species in the restricted biome are adequately represented.
The A4 category is more complex with 4 subcategories. The A4(i) category is identified by congregations of water birds as defined by Rose and Scott (1997). A site qualified if it is known or thought to hold a on a regular basis $\geq 1\%$ of a biogeographic population of a congregatory waterbird species. Global population numbers were based on Rose, P.M. and Scott, D.A. eds. (1997, 2007) and waterfowl population estimates from Wetlands International. Regional thresholds used for this project were provided by BirdLife so that in Belize species that have population estimates that are $\geq 1\%$ of the regional estimates are triggers for an IBA.

The A4(ii) category is identified by congregations of seabird or terrestrial species. A site qualified if it is known or thought to hold on a regular basis $\geq 1\%$ of the global population of a congregatory seabird or terrestrial species. This category includes seabirds not included in Rose and Scott (1997). Where quantitative data were lacking, numerical thresholds for each species were set regionally or inter-regionally as appropriate by BirdLife International and guidance from the Mesoamerican technical committee. In some cases thresholds were taken as estimates of the 1% of the global population. Species in Belize with population estimates $\geq 1\%$ of these thresholds were triggers for an IBA.

The A4(iii) category is identified by holding on a regular basis $\geq 20,000$ waterbirds or $\geq 10,000$ pairs of seabirds of one or more species. For waterbirds this is the same criteria used in the Ramsar. The water bird risk assessment completed in 2006 (Miller and Miller, 2006) provided baseline estimates for this category in Belize.

The final A4 (iv) category concerns congregations that occur at bottleneck sites when large concentrations of one or more species are temporally concentrated in a small geographic area along the migratory route. This makes a very large number of individuals and species subject to disproportional vulnerability to threats. A site would qualify if it is known or thought to exceed thresholds set for migratory species at bottleneck sites. The numerical thresholds were set regionally or inter-regionally as appropriate.
The IBA process was designed so that all of the supporting data on triggering species were to be added to the World Biodiversity Database (WBDB). We completed this data entry as part of the Belize IBA project.

For Mesoamerica it was important that the taxonomy, or names used, was standardized. BirdLife uses globally recognized species names that do not always agree with the American Ornithologists Union (A.O.U.) recognized names used in the Americas. A simple name change, or use of a different name, can have profound effects when recognizing a species distribution limits. In all cases names have been adjusted to match those species recognized for Belize and match those used in the WBDB. Some common names will not be familiar to many and differ from what are recognized within Belize. For example the Sand Martin (Riparia riparia) is better known as the Bank Swallow in the Americas. Regardless of the differences in the names for this project, all names correctly reflect the bird species that are known to occur in Belize.

Phase I
In November 2006, BirdLife requested a draft of the potential IBAs for Belize. We provided this with the understanding that the data compilation phase was underway, but the analysis had not yet begun. This draft (Figure 1) was comprised of four potential IBAs and was based on our broad knowledge of bird distributions in Belize and a preliminary look at the bird distribution data in the Belize Biodiversity Information System (BBIS).
Upon completion of the spatial analyses of those species that met one or more of the triggering criteria, we were able to delineate the proposed IBAs for Belize in a more robust fashion. Much of the initial work involved compiling the raw data and verifying locations and georeferencing each point. We then used the verified location data for each species for predictive distribution modeling using Maximum Entropy (Phillips et al., 2006). Once the proposed IBAs were identified, all of the relevant data for each was entered into the World Biodiversity Database (WBDB). The BirdLife staff will review each species and verify them to support the IBA designation.

During the preliminary discussion in November 2006 at the regional IBA meeting in Antigua, Guatemala held in conjunction with the Mesoamerican Society for Conservation and Biology, there were discussions regarding range and biome restricted species. We believed that the Black Catbird was a range restricted species and not a biome restricted species. We compiled all of the known distribution location points for the species using
museum data, unpublished data from Belize and data compiled during the Ecoregional Plan Assessment for the Maya, Zoque and Olmeca Forests (TNC, 2006). We demonstrated this with spatial modeling and predictive distribution models for the species (Miller and Miller, 2007) see Appendix 2 for details.

**Phase II**
We compiled all available data on bird species known to occur in Belize that met a number of criteria. These species included Neotropical migrants, those of conservation concern for Belize, those of global concern, those that were range restricted, those that were biome restricted and species that are known to form congregations. The identification of species of conservation concern and considered to be at risk was based on Jones (2003), Jones and Vallely (2001), Miller and Miller (1997, 1998, 2006, 2007), BERDS (2007), and the Belize Biodiversity Information System (2007). The remaining species were based upon Boyla (2005) and various iterations of species lists provide by David Díaz, IBAs Program Officer. Additional information for population estimates for Belize used the Belize water bird risk assessment (Miller and Miller, 2006) and the archived data for the four Belize Christmas Bird Counts extending nearly 40 years in the case of Belize City.

While the WBDB was used to create the county species list, it is a global database that is optimized primarily as a toll to evaluate and confirm IBAs. The county level database systems (BBIS, BERDS) provided a higher level of detail for the birds under examination and that data was used in our analyses. These databases include data that had been compiled from a wide range of published and unpublished sources.

The distribution data for these species was compiled in single master table that included all species known to occur within Belize. This Excel spreadsheet included all relevant parameters for each species record to facilitate the use of the data for the final analyses. Thus it could be sorted and filtered for any given parameter.

The taxonomy segment included the Order, Family, Species (scientific name), Common Name, the BBIS database ID and the WBDB ID as the SpcRecID. Each row or record
included a specific record identification field comprised of the source database (BBIS or BERDS) that linked each to the original the data source.

The location was included for each record that met one of the IBA trigger criteria and comprised of the longitude and latitude (X,Y coordinates in both decimal degrees and UTM zone 16, using the NAD27 Central America base datum), the number of individuals reported for each record and the date of the observation when available.

Each record also included the BirdLife “trigger” criteria as well as WBDB fields. These included a field that verified the taxonomy that was officially recognized, and the 4 trigger categories, A1-A4. The A1 column was the data on species of global concern and we used the IUCN categories; LC = least concern, VU = vulnerable, NT = near threatened and EN = endangered. The column for the Restricted Range species (A2) were identified as either Yes or No. The column for the Biome Restricted species (A3) was treated in the same way, either Yes or No. The congregatory designation (A4i-A4iv) was tracked using two columns. The first was similar to the previous two; either the species was or was not considered to be congregatory with a Yes or No. The next column was linked to a population estimate spreadsheet provided by David Díaz that contained either the regional or global population estimates with estimates for Belize that we updated. A simple if-then statement carried out the calculations such that if the Belize population estimates were ≥ 1% of the regional or global population it returned a “T” to the master spreadsheet indicating that the species met the criteria for the country trigger under the A4 criteria.

The remaining columns for each record included the WBDB fields; country occurrence status which were all native, whether the species was resident, whether it breeds in the country or not, whether it is a migrant (a.k.a. “passage”), the season of occurrence and whether it is threatened within Belize.

For those species that met one or more of the IBA selection criteria, specific location data was then georeferenced and verified using the digital 1:50,000 topographic maps for Belize.
in one of two Geographic Information Systems (GIS), Arc-View 3.3 or Arc-GIS 92. Table 1 below summarizes the species used in defining the IBA triggers.

Using the master species data table with the X,Y coordinates in the GIS, allowed us to determine species distributions that were spatially explicit and extract accurate species lists for each proposed IBA.

**Table 1.** Summary of the number of orders, families and species that met one of the four criteria to trigger an IBA. Under the IUCN in blue are the subtotals of each subcategory.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Order</th>
<th>Family</th>
<th>Species</th>
</tr>
</thead>
<tbody>
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<td>IUCN</td>
<td>9</td>
<td>14</td>
<td>20</td>
</tr>
<tr>
<td>EN</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>NT</td>
<td>7</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>VU</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Restricted Range</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Biome Restricted</td>
<td>7</td>
<td>17</td>
<td>43</td>
</tr>
<tr>
<td>Congregatory</td>
<td>11</td>
<td>23</td>
<td>116</td>
</tr>
<tr>
<td><strong>Total trigger species</strong></td>
<td>40</td>
<td>74</td>
<td>203</td>
</tr>
</tbody>
</table>

Predictive modeling and subsequent mapping used the Maximum Entropy program for modeling the species distributions following Phillips et al. (2006). These models used georeferenced species distribution points and a range of environmental variables that included habitats, elevations and climate data such as minimum and maximum rain fall, temperatures etc.

**RESULTS**

After evaluating all of the predictive models and species distributions, six logical IBAs emerged and were delineated for Belize (Figure 2). These are the Rio Bravo and Gallon Jug Estate, Crooked Tree and Associated Wetlands, Northeastern Belize, the Maya Mountains and Southern Reserves, the Coastal and Near Shore Islands and the Offshore Area and Barrier Islands.
All details for the six IBAs identified for Belize have been entered into the WBDB. In this report we provide a summary of each IBA below. In some cases there are both resident and migratory and breeding and non-breeding populations within Belize, e.g., Cattle Egret, which will explain why the total numbers of residents and migrants may exceed the total species reported occurring within a given IBA.

**Figure 2.** The six Important Bird Areas identified for Belize.

**Rio Bravo and Gallon Jug Estate**
In the northwestern corner of Belize, the IBA is comprised of the Aguas Turbias National Park, Rio Bravo Conservation Management Area and the Gallon Jug Estate, both of the latter are privately owned. This 201,200 ha area has 444 recorded species of which 305 are
residents, 277 are known or thought to breed in the area, 166 are species not known to nest in the area and 139 that are considered migrants. These include species that meet the A1, A2, A3, A4i, A4ii and A4iii trigger criteria.

**Crooked Tree and Associated Wetlands**

This area is comprised of the Crooked Tree Wildlife Sanctuary (also a RAMSAR site), Lamanai Archaeological Reserve, Monkey Bay National Park, Monkey Bay – a private reserve, Runaway Creek – a private reserve and the Manatee Forest Reserve. Crooked Tree and the surrounding wetlands were identified as important during the water bird risk assessment (Miller and Miller, 2006).

This 160,345 ha area has 400 recorded species of which 277 are residents, 243 are known or thought to breed in the area, 155 are species not known to nest in the area and 123 that are considered migrants. These include species that meet the A1, A2, A3, A4i, A4iii trigger criteria.

**Northeastern Belize**

This area is comprised of the Freshwater Creek Forest Reserve, Shipstern Nature Reserve and Fireburn – private reserves, Bacalar Chico and Honey Camp National Parks, Cerros Maya Archaeology Reserve, Corozal Bay Wildlife Sanctuary, Doubloon Bank and Little Guana Caye – Bird Sanctuaries, Rocky Point Spawning Aggregation and Bacalar Chico Marine Reserve.

This 238, 282 ha area has 255 recorded species of which 250 are residents, 241 are known or thought to breed in the area, 114 are species not known to nest in the area and 105 that are considered migrants. These include species that meet the A1, A2, A3, A4i trigger criteria.

**Maya Mountains and Southern Reserves**

This IBA encompasses the majority of the terrestrial protected areas in Belize. It is comprised of the Sibun, Vaca, Chiquibul, Maya Mountain, Sittee River, Columbia River, Manatee, Deep River and Mountain Pine ridge Forest Reserves. It includes the following 7
national parks: Five Blues Lake, St. Herman’s and Blue Hole, Billy Barquedeer, Nojkaaxmeen Eligio Panti, Mayflower Bocawina and Payne’s Creek. Three Archeological Reserves, Barton Creek, Caves Branch and Caracol, are included. Additional protected areas within this IBA include the Bladen Nature Reserve, Victoria Peak and Thousand Foot Falls Natural Monuments and the Cockscomb Basin Wildlife Sanctuary. There are also three private reserves within this IBA: Golden Stream, Block 127 and Runaway Creek.

This 645,856 ha area has 411 recorded species of which 310 are residents, 295 are known or thought to breed in the area, 116 are species not known to nest in the area and 101 that are considered migrants. These include species that meet the A1, A2, A3, A4i trigger criteria.

Coastal and Near Shore Islands
This area is comprised of 3 Marine Reserves: Hol Chan, Caye Caulker and Port Honduras; and seven Forest Reserves: Grants Works, Mango Creek, Swasey-Bladen, Machaca, Caye Caulker, Deep River and Manatee. There are also four Wildlife Sanctuaries: Aguascaliente, Gales Point, Swallow Caye, and Corozal Bay. There are two National Parks: Sarstoon-Temash and Payne’s Creek. The four Bird Sanctuaries are Bird Caye, Monkey Caye, Los Salones and an un-named caye. Altun Ha is the sole Archaeological Reserve and Burdon Canal is the sole Nature Reserve within this IBA.

This 695,622 ha area has 413 recorded species of which 262 are residents, 242 are known or thought to breed in the area, 171 are species not known to nest in the area and 151 that are considered migrants. These include species that meet the A1, A2, A3, A4i trigger criteria.

Off-shore and Barrier Islands
This IBA is comprised of five Marine Reserves: South Water Caye, Gladden Spit, Silk Cayes, Sapodilla Cayes and Glovers Reef. Halfmoon Caye Natural Monument, Laughing Bird Caye National Park and Man of War Caye Bird Sanctuary make up the island areas. There are ten Spawning Aggregations: Northern Glovers Reef, Sandbore, South Point Tureneffe, South Point Lighthouse, Rise and Fall Bank, Seal Caye, Dog Flea, Gladden Spit, Nicholas Caye and Caye Glory included in this IBA.
This 1,219,671 ha area has 157 recorded species of which 50 are residents, 42 are known or thought to breed in the area, 116 are species not known to nest in the area and 107 that are considered migrants. These include species that meet the A1, A2, A3, A4i, A4iii trigger criteria.

One of the goals of the project was also to incorporate practical management constraints within each IBA by including existing protected areas where possible. The proposed IBAs do this very well as can be seen in Figure 3 below.

**Figure 3.** Proposed IBAs within the protected areas system with each delineated by the red lines.
Examples of species distribution mapping and spatial modeling for the four triggering criteria and how the proposed IBAs accommodate them can be seen below. These are species of global concern based on IUCN identified species (Figure 4), those that were range restricted (Figure 5), those that were biome restricted (Figure 6) and species that are known to form congregations (Figure 7).

**Figure 4.** Species of global concern using the Keel-billed Motmot (*Electron carinatum*) as an example.
**Figure 5.** Range restricted species using the Black Catbird (*Melanoptila glabirostris*) as an example.

**Figure 6.** Biome restricted species using the Ocellated Turkey (*Meleagris ocellata*) as an example.
CONCLUSIONS

With its low human population pressures and largely intact habitat, Belize has long been considered a haven for biodiversity with an enviable network of protected areas. The IBAs determined through this project, further highlight their importance. Increased habitat loss and pressure in surrounding countries has made Belize “Noah’s Ark” for many species, including migrant bird species which comprise up to 20% of its avifauna.

With pressure in their breeding grounds in North America, Neotropical migrant species face special challenges at both ends of the continuum. The delineated IBAs include the major habitats that are important for the terrestrial Neotropical migrants. We provide predictive distribution maps for 72 terrestrial Neotropical migrants that had sufficient distribution data, in relation to the delineated six IBAs. The Acadian Flycatcher and American Redstart are examples of these (Figure 8). These two demonstrate that for species with restricted habitat requirements (Acadian Flycatcher) the IBAs will cover much of their predicted range in Belize, and for more wide ranging species (American Redstart) a significant area of their range falls outside of the IBAs. While many of these species apparently do as well in
secondary and disturbed areas as they do in intact habitats based on the number of records of occurrence in these areas, they are still included within the IBAs.

**Figure 8.** Example of predicted distributions of two terrestrial Neotropical migrants.

The area in western Belize between the Rio Bravo-Gallon Jug and the Maya Mountain IBAs emerged as an area with high probabilities for occurrence of many species due to the habitat type, climate and elevations. This area is comprised of private lands including the Spanish Lookout Mennonite community dominated by agriculture and recent petroleum extraction.

The largest remaining forested area of these is the Yalbac Ranch and Cattle Company where intensive logging has been ongoing over the past 10 years. While the Yalbac land has been for sale for the past 15 years and considered by commercial logging interests, and as a conservation investment (e.g., The Nature Conservancy), there have apparently not been any offers acceptable to the owners. It is understood that with the recent discovery of oil in the Spanish Lookout area directly to the south, the land has been taken off of the market. For this reason, Yalbac was not considered as we delineated the IBAs as there would be no practical conservation management option for the area unless Yalbac is ultimately purchased.
and annexed to the national protected areas system. This is unfortunate as Yalbac appears to be a critical habitat and link for bird conservation, particularly migrant species.

Based on the water bird risk assessment for Belize (Miller and Miller, 2006) several species met the $\geq 1\%$ of the global population to be a trigger at the country level. However when spread between several proposed IBAs, the numbers were below the trigger level for a given IBA. Some of these species, such as the Boat-billed Heron (*Cochlearius cochlearius*), were not concentrated into a particular IBA but when considered in the national context, their importance as trigger species was clear. These species warrant special attention lest they “slip through the cracks” based on a population selection criteria limited to a single IBA.

For northern Central America this may not be a trivial issue. Belize population estimates of some A4 species approach or exceed the $\geq 1\%$ triggering level and therefore are critical to the survival of these species regionally. Thus special conservation concern and consideration should be given by BirdLife to these species and recognition that when all of the IBAs for Belize are considered, the “triggering” threshold will be met. However, when the IBAs are delineated as subsets of the country, the population numbers within each IBA may no longer serve as triggers under the A4 criteria.

In the case of the Jabiru (*Jabiru mycteria*) recent research suggests that the Central American population is genetically distinct from its larger South American cousin (Figueroa, 2005). While there was initial concern that the population of the Jabiru within Belize and the delineated IBAs would not be sufficient to meet the $\geq 1\%$ global triggering level, the species will be covered under the IBAs delineated by other species of waterbirds that served as adequate triggers.

As noted in the recent waterbird assessment (Miller and Miller, 2006), the aquaculture industry is making positive steps towards developing new guidelines that will protect many of the congregatory species that have in the past been shot as pests. While overall, Belize continues to have a favorable outlook for many avian species, this is not an excuse for
complacency. Instead, Belize’s conservation community needs to concentrate effort on strengthening its protected areas and draw attention to its IBAs.

While the protected areas network is extensive, in reality, enforcement of laws governing these areas is lacking. It is widely acknowledged that encroachment and illegal resource exploitation continue in and around the national protected areas system. Unless the Government of Belize (GOB), supported by the conservation NGOs develops the political will to eliminate corruption related to new development schemes and begin enforcement of the existing conservation and environmental regulations, this IBA project, as have many other conservation planning activities, will not in the end translate to tangible conservation results. The key for a small developing country like Belize is the financial support to assist both the GOB and national NGOs in achieving the conservation goals. The now tired cliché “Conservation without funding is just conversation” is more true today than when it was first uttered years ago.

Acknowledgements
Our thanks to the Terra Foundation and Gallon Jug Agroindustry for long term conservation support over many years in Belize. BirdLife’s David Díaz and Rob Clay were helpful in all aspects of this project as were the members of the Central American Technical Committee. We thank the Belize Audubon Society for the opportunity to conduct this project.

References


TNC. 2006. Ecoregional Plan Assessment Maya, Zoque and Olmeca Forests.
Appendix 1

Neotropical migrant predicted distributions in relation to the Belize Important Bird Areas

For these analyses only species of terrestrial Neotropical migrants with more than 10 distribution points for the country were used to the predictive models. The darker colors indicate a higher predicted probability of occurrence ranging form 22%-100%. All probabilities below 22% were removed from the maps. Species data points and predictive parameters used were the georeferenced points from the master data table and as described in the methods section. Maximum Entropy models were used and grid files were imported into Arc-View as shape files for the final maps.
Black-throated Blue Warbler
Black-throated Green Warbler
Blue Bunting
Blue Grosbeak
Cedar Waxwing

Cerulean Warbler

Chestnut-sided Warbler

Common Yellowthroat
Great Crested Flycatcher

Golden-winged Warbler

Grace's Warbler

Grasshopper sparrow
Indigo Bunting

Kentucky Warbler

Louisiana Waterthrush

Least Flycatcher
Olive-sided Flycatcher

Orchard Oriole

Ovenbird

Palm Warbler
Tree Swallow

White-eyed Vireo

Wilson's Warbler

Wood Thrush
Appendix 2

A case to recognize the Black Catbird as a restricted range endemic for the purposes of identifying IBAs in Belize.

Bruce W. Miller and Carolyn M. Miller
23 November 2006

The Black Catbird (*Melanoptila glabrirostris*), like the Yucatan Vireo (*Vireo magister*), should be considered as a regional endemic with a restricted range for purposes of identifying IBAs in Belize and Mexico. For the evaluation of the distribution of the species, we have compiled all readily available records for both the Black Catbird and Yucatan Vireo. The Yucatan Vireo was selected for comparison as it is recognized by BirdLife as a target species for the identification of IBAs. Data sources include museum data compiled and georeferenced from GBIF (2006), BERDS (2006), BBIS (2006), Jones (2001), Jones and Gardner (2003), Miller and Miller (1991, 2006), Morgenthaler (2003) and the Plan Ecorregional de las selvas Maya, Zoque y Olmeca. (2005).

For these analyses, we have only used the “non-accidental” records for the Black Catbird and dismissed those rare occasional sight records of single birds, e.g. at Chan Chich Lodge, Belize and the Petén of Guatemala, as they do not constitute part of the normal breeding range or population. We present the results of the analyses as maps showing both point data and the results of two predictive distribution models. The Bioclim model (Busby, 1991; Peterson et. al., 2000) was run using Diva-GIS and climate data available on the Diva data server. The other was based upon the Maximum Entropy model that included habitat layers in addition to climate data (MaxEnt. 2006; see Philips et al., 2006 for details).
The Black Catbird is classified Near-threatened by BirdLife International. Published range maps suggest it is a wide spread species across the Yucatan Peninsula (Figure 1).

**Figure 1.** The distribution map of the Black Catbird according to NatureServe (2006) with Belize outlined in green.
The Black Catbird was included in the species evaluated during the ecoregional planning project for the Selva Maya, Zoque and Olmeca initiated by TNC. The Yucatan Vireo was not considered during that project. The technical team of this project used DOMAIN to create maps of potential distributions for the species considered. The results of this analysis for the Black Catbird (Figure 2) can been seen below (Plan Ecorregional de las selvas Maya, Zoque y Olmeca., 2005).

![Figure 2. Potential distribution of the Black Catbird based on the DOMAIN model (source Plan Ecorregional de las selvas Maya, Zoque y Olmeca., 2005)](image)

As seen above, this potential distribution included a relatively large area of the Yucatan Peninsula. While Howell and Webb (1995) considered it uncommon to rare inland in northern Belize and in the Yucatán, they did point out that its status for much of the Yucatan was unclear.
Based on verified location records, the range and potential distributions shown above are misleading.

Essentially the Black Catbird is restricted to the Caribbean coastal areas and off-shore islands of Belize and Mexico (Figure 3). Jones and Gardner (2003) suggest it is a common resident on Ambergris Caye and Caye Caulker and uncommon to locally common on the mainland. Based on reports and records within Belize it is generally common in the northeastern mainland and northern cayes of Belize.

Figure 3. Distribution points of the Black Catbird, discounting accidental inland records.
The results of the predictive distributions using both the Bioclim and Maximum Entropy models (Figure 4) show the Black Catbird population to be restricted to the Caribbean coastal areas and inland as well as the offshore islands of Mexico and Belize. There is a reasonable amount of congruence between the two models. In Mexico the island of Cozumel is very important. In Belize while the offshore islands are important, the northeastern part of the mainland is also a critical portion of the species range.

**Figure 4.** Black Catbird predicted distribution based on the Bioclim model (left) and the Maximum Entropy model (right). The darker colors indicate a greater probability of occurrence.

The Yucatan Vireo is currently considered an endemic for purposes of IBA identification by BirdLife. The range map for the western Caribbean (Figure 5) does suggest it has a more restricted distribution than that previously considered for the Black Catbird (Figure 1). As with the Black Catbird, the actual distribution points for the species suggest a slight different pattern.
Figure 5. Western range of the Yucatan Vireo based on the published distribution, pink shaded areas (source NatureServe 2006) and distribution points.
Figure 6. Yucatan Vireo predicted distribution based on the Bioclim model (left) and the Maximum Entropy model (right). The darker colors indicate a greater probability of occurrence.

Based on these analyses, we assert that the Black Catbird should also be a target for defining IBAs in Belize, similar to the Yucatan Vireo. While the Yucatan Vireo ranges farther east in the insular Caribbean, the Black Catbird is restricted to the coastal and offshore areas of Mexico and Belize.

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Appendix 1

Neotropical migrant predicted distributions in relation to the Belize Important Bird Areas

For these analyses only species of terrestrial Neotropical migrants with more than 10 distribution points for the country were used to the predictive models. The darker colors indicate a higher predicted probability of occurrence ranging from 22%-100%. All probabilities below 22% were removed from the maps. Species data points and predictive parameters used were the georeferenced points from the master data table and as described in the methods section. Maximum Entropy models were used and grid files were imported into Arc-View as shape files for the final maps.
Black-throated Blue Warbler
Black-throated Green Warbler
Blue Bunting
Blue Grosbeak
Great Crested Flycatcher
Golden-winged Warbler
Grace's Warbler
Grasshopper sparrow
Magnolia Warbler

Northern Parula

Northern Rough-winged Swallow

Northern Waterthrush
Worm-eating Warbler
White-throated Flycatcher
Yellow-breasted Chat
Yellow-bellied Sapsucker
Appendix 2

A case to recognize the Black Catbird as a restricted range endemic for the purposes of identifying IBAs in Belize.

Bruce W. Miller and Carolyn M. Miller
23 November 2006

The Black Catbird (*Melanoptila glabrirostris*), like the Yucatan Vireo (*Vireo magister*), should be considered as a regional endemic with a restricted range for purposes of identifying IBAs in Belize and Mexico. For the evaluation of the distribution of the species, we have compiled all readily available records for both the Black Catbird and Yucatan Vireo. The Yucatan Vireo was selected for comparison as it is recognized by BirdLife as a target species for the identification of IBAs. Data sources include museum data compiled and georeferenced from GBIF (2006), BERDS (2006), BBIS (2006), Jones (2001), Jones and Gardner (2003), Miller and Miller (1991, 2006), Morgenthaler (2003) and the Plan Ecorregional de las selvas Maya, Zoque y Olmeca. (2005).

For these analyses, we have only used the “non-accidental” records for the Black Catbird and dismissed those rare occasional sight records of single birds, e.g. at Chan Chich Lodge, Belize and the Petén of Guatemala, as they do not constitute part of the normal breeding range or population. We present the results of the analyses as maps showing both point data and the results of two predictive distribution models. The Bioclim model (Busby, 1991; Peterson et. al., 2000) was run using Diva-GIS and climate data available on the Diva data server. The other was based upon the Maximum Entropy model that included habitat layers in addition to climate data (MaxEnt. 2006; see Philips et al., 2006 for details).
The Black Catbird is classified Near-threatened by BirdLife International. Published range maps suggest it is a wide spread species across the Yucatan Peninsula (Figure 1).

**Figure 1.** The distribution map of the Black Catbird according to NatureServe (2006) with Belize outlined in green.
The Black Catbird was included in the species evaluated during the ecoregional planning project for the Selva Maya, Zoque and Olmeca initiated by TNC. The Yucatan Vireo was not considered during that project. The technical team of this project used DOMAIN to create maps of potential distributions for the species considered. The results of this analysis for the Black Catbird (Figure 2) can been seen below (Plan Ecorregional de las selvas Maya, Zoque y Olmeca., 2005).

![Figure 2. Potential distribution of the Black Catbird based on the DOMAIN model (source Plan Ecorregional de las selvas Maya, Zoque y Olmeca., 2005)](image)

As seen above, this potential distribution included a relatively large area of the Yucatan Peninsula. While Howell and Webb (1995) considered it uncommon to rare inland in northern Belize and in the Yucatán, they did point out that its status for much of the Yucatan was unclear.
Based on verified location records, the range and potential distributions shown above are misleading.

Essentially the Black Catbird is restricted to the Caribbean coastal areas and off-shore islands of Belize and Mexico (Figure 3). Jones and Gardner (2003) suggest it is a common resident on Ambergris Caye and Caye Caulker and uncommon to locally common on the mainland. Based on reports and records within Belize it is generally common in the northeastern mainland and northern cayes of Belize.

Figure 3. Distribution points of the Black Catbird, discounting accidental inland records.
The results of the predictive distributions using both the Bioclim and Maximum Entropy models (Figure 4) show the Black Catbird population to be restricted to the Caribbean coastal areas and inland as well as the offshore islands of Mexico and Belize. There is a reasonable amount of congruence between the two models. In Mexico the island of Cozumel is very important. In Belize while the offshore islands are important, the northeastern part of the mainland is also a critical portion of the species range.

**Figure 4.** Black Catbird predicted distribution based on the Bioclim model (left) and the Maximum Entropy model (right). The darker colors indicate a greater probability of occurrence.

The Yucatan Vireo is currently considered an endemic for purposes of IBA identification by BirdLife. The range map for the western Caribbean (Figure 5) does suggest it has a more restricted distribution than that previously considered for the Black Catbird (Figure 1). As with the Black Catbird, the actual distribution points for the species suggest a slight different pattern.
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