

# Results of Terrestrial Bird Studies on St. Martin: Winter of 2007

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## Introduction

During the winter months of January-March 2007, Environmental Protection in the Caribbean (EPIC) banded passerines in three habitats on the Caribbean island of St. Martin. The habitats were defined as secondary dry forest, thorn scrub forest, and mangrove forest. This was the sixth year banding in the secondary dry forest, fourth year banding in thorn scrub forest, and third year banding in the mangrove forest. Additionally, point count surveys were conducted in all habitats to detect birds which were not captured while banding.

There is little known regarding passerine overwintering requirements in the Lesser Antillean region of the Caribbean. Much has been studied on overwintering passerines in the Greater Antillean islands to the north of the Lesser Antilles, including the islands of Hispaniola, Puerto Rico, and Jamaica (Arendt and Faaborg 1989; Confer and Holmes 1993; Ewert and Askins 1991; Marra *et al.* 1993; Parrish and Sherry 1994; Wallace *et al.* 1996; Wunderle and Wade 1993). Habitat and diet requirements must be known in order to better conserve and protect the birds which over-winter in the Lesser Antilles.

## Objectives

- Band both migrant birds and resident birds.
- Conduct area surveys for birds not accounted for while banding.
- Assess how many birds and which species of birds are using each habitat type: secondary dry forest, thorn scrub forest, and mangrove forest.
- For overwintering migrants: Assess length of stay in overwintering habitat.
- For overwintering migrants: Assess general health during overwintering period.
- For resident species: Assess general health over a three-month period as well as inter-annually.
- For resident species: Assess breeding cycles inter-annually.

## Methods

*Mist-netting:* The objective of mist-netting was to collect information on the bird's age, sex, fat stores, molt, and plumage characteristics. Capture/re-capture analysis will give us additional insight into population estimates. Nets were placed within three separate habitats: secondary dry forest ("forest site"), thorn scrub forest ("scrub site"), and mangrove forest ("mangrove site"). Seventeen nets were used at the forest and scrub site and ten nets were used at the mangrove site. Nets were arranged at a distance of three nets per two-hectare area. This distance assured biologists of covering all nets within a 15-minute time span. All nets used were 6m or 12m long, 30mm mesh, 4-tier, tethered, nylon mist nets. Nets at the forest site were open from between 0600 and 1800 or less. Nets at the scrub site and mangrove site were open during morning hours, 0600-1200 or less. Nets were placed in areas of high avian traffic. This assured us of high capture/re-capture rates. Finally, all birds were fitted with uniquely numbered leg bands. Banding dates were:

<b>Banding Period</b>	<b>Secondary Dry Forest</b>	<b>Thorn Scrub Forest</b>	<b>Mangrove Forest</b>
Period One	2-6 January	9-13 January	12-14 January
Period Two	1-6 February	7-11 February	13-15 February
Period Three	1-5 March	7-11 March	13-15 March

*Point Counts:* Fixed radius point counts were run concurrently with mist-net sites during all banding periods. Surveys were done in three habitats on the island, secondary dry forest, thorn scrub forest, and mangrove forest. Each transect was done along pre-existing trails in each habitat. These trails were the only “breaks” in otherwise unbroken tracts of habitat, none of which border habitat edges.

Surveys started between 0600 and 0900 and ran for 70 minutes. Ten points were located along each transect. Points were located approximately 200 meters apart from each other, avoiding duplication of previously recorded birds, as more than 95% of individuals are detected within 125 meters of the observer (Ralph and Scott 1981). Five minutes were spent at each point. Data collected included all individuals seen or heard. Counts only took place during stable weather conditions, not during rainy or exceptionally windy conditions. A single observer completed all surveys to reduce observer bias. During data collection, birds flying over the site were recorded separately from individuals detected in vegetation, as these birds may not have been associated with the habitat surrounding the station.

### **Results**

We mist-netted for a total of 2874.75 net hours, including 1234.75 hours at the forest site, 1300 hours at the scrub site, and 340 hours at the mangrove site. Net hours are defined as total hours banded times total nets open during those hours (i.e. three mist nets open for three hours each is nine net hours).

We captured a total of 2,046 birds at all sites combined this year including 316 migrants and 1,730 residents. We banded 1,152 birds, recaptured 738 birds, and released 156 un-banded birds. We banded a total of 27 species including 14 species of overwintering migrants and 13 species of resident birds (Tables 1 and 2). During area searches of all study sites, we detected 38 species, including 17 migrant and 21 resident species.

#### *Secondary Dry Forest*

The secondary dry forest site is located on Loterie Farm on the northeast side of St. Martin. The site is located at the 350 meter level on Pic Paradis. We banded at this site previously during the winters from 2002-2006.

We captured 592 birds of 18 species at the forest site this year, 350 birds banded, 173 recaptures, and 70 released un-banded. Of the 18 species captured, there were eight over-wintering migrant species (n=258) and nine resident species (n=334). The capture rate (birds/net hour) for migrant species was .209 while the capture rate for residents was .271 (Tables 5 and 6).

Our capture rate in this habitat (.479 birds/net hour) was below that of both the thorn scrub site (.617) and the mangrove site (1.918). However, we captured more migrants in the forest habitat (n=204) (includes birds recaptured from previous years but not same year re-captures) than in the scrub site (n=27). Forty-four percent of the new birds captured in the forest were overwintering migrants.

We had a capture rate of .394 new birds per net hour at the forest site in 2007 (includes birds recaptured from previous years but not same year re-captures). This rate is substantially higher than the six year mean for the forest site. (Tables 7, 8)

We recaptured 94 birds of eight species from previous years including five resident species (n=37) and three migrant species (n=57) (tables 3 and 4).

During area searches of this site we recorded 29 species including 12 migrant species and 17 resident species (Table 10 and 11).

#### *Thorn Scrub Forest*

The thorn scrub forest site is located on the northwest slope of Pic Paradis within the private boundaries of Loterie Farm. The site is characterized by thorn acacia (*Acacia turtuosa*) and a low canopy (~ 3m). This was the fourth year banding at this site. Notably, half of the site was vastly altered during the last banding period, when large amounts of vegetation were removed by the land owner for future development.

We captured a total of 801 birds of 17 species at this site, banding 397 birds, recapturing 351 birds, and releasing 54 un-banded birds. Of the 23 species banded, eight were overwintering migrants (n=24) and 15 were resident species (n=373). (Tables 1, 2, and 11)

We had a capture rate of .405 new birds per net hour at the scrub site in 2007 (includes birds recaptured from previous years but not same year re-captures). This rate is slightly higher than the five-year mean for this scrub site. (Tables 13, 14)

We recaptured 129 birds of nine species from previous years, including three species of migrant (n=3) and six species of resident (n=126). (Tables 3 and 4)

During area searches of this site we recorded 22 species, including six migrant species and 16 resident species. (Tables 15 and 16).

#### *Mangrove Forest*

The mangrove scrub forest site is located in the Etang aux Poisson and along its margins in eastern St. Martin. Primary vegetation within this area consisted of red mangroves, black mangrove, white mangrove, buttonwood, and sea grape. Previously, we banded at this site during 2003 and 2004.

We captured a total of 652 birds of 14 species at this site, banding 405 birds, recapturing 214 birds, and releasing 33 un-banded birds. Of the 14 species banded, three were overwintering migrants (n=10) and 11 were resident species (n=642). (Tables 1, 2, and 11)

We had a capture rate of 1.276 new birds per net hour at the mangrove site in 2007 (includes birds recaptured from previous years but not same year re-captures). This rate is substantially higher than the three-year mean for this site. (Tables 19, 20)

We recaptured 29 resident birds of three species from previous years. There were no migrant birds recaptured from previous years at this site. (Tables 3, 4)

During area searches of this site we recorded 19 species, including four migrant species and 15 resident species. (Tables 21, 22)

#### **Discussion**

Banding at three distinct habitat types during the winter of 2007 enabled us to further distinguish which habitats land birds of St. Martin require during the winter months. We were able to identify species which rely on a single habitat type during their overwintering stay on St. Martin. Additionally, we were able to

identify habitats where the majority of certain overwintering species are located. Finally, we were able to monitor populations of resident species in multiple habitats.

The secondary dry forest is critically important habitat for migrant landbirds on St. Martin. Within this habitat, we recorded nearly 85% of all migrant landbirds banded on St. Martin. Eight of the 13 overwintering species observed/banded on St. Martin in 2007 were banded in the forest site.

Thorn scrub is critical habitat for resident species on the island. We recorded high counts for 6 of the 14 resident species banded. This habitat was also notable for the high number of Pearly-eyed Thrashers banded, where we banded 28 of the total 39 banded.

Mangrove is critical habitat for resident species on the island as well as for particular migrant species. We recorded high counts for 5 of the 14 resident species banded. Additionally within this habitat, we banded the only Northern Waterthrushes, a migrant species, on the island.

All habitats share common threats: habitat loss due to development, hunting by humans, and mongoose predation. Secondary dry forest habitat is rapidly decreasing as developments encroach up the forested hillsides of the island. Predation by mongoose on landbirds is a serious threat (Seaman and Randall 1962). We witnessed mongoose predation on landbirds in our mist nets on multiple occasions. Mongoose have been commonly observed in both habitats on the island. Many of these threats can be controlled by proper management and development of the island.

Careful consideration of habitat and species loss due to development should be a major consideration of developers and governments. Hunting on St. Martin should be regulated and bans should be put placed on taking threatened and endangered resident species and all migrant species. These hunting bans should be enforced by land management officers. Control of the mongoose problem should be taken up. Trapping and removal of this invasive species should become a priority for both public and private land managers. St. Martin is an important area for migrating and overwintering birds. The habitats of the island should be protected for both the use of these birds as well as the use of resident birds on St. Martin.

### **Priority Recommendations**

- Pass legislation protecting areas of high bird diversity from development, including hillside slopes above 200 meters and all wetland areas, including ponds, lagoons, and coastal intertidal zones.
- Enact a permit system where all new developments are required to uphold stringent environmental laws, including limiting vegetation removal (i.e. stands of large trees or mangrove forests) and filling wetland areas with debris.
- Enact legislation protecting all non-invasive landbird species from hunting, including both resident and migratory species

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**Tables**

Table 1. Migrant bird totals for new birds trapped (non-recaptures) for both banding sites during winter 2007 on St. Martin

<b>Migrant Birds</b>			
	<b>forest</b>	<b>scrub</b>	<b>mangroves</b>
<b>Northern Parula</b>	22	11	0
<b>Cape May Warbler</b>	0	0	1
<b>Black-throated Blue Warbler</b>	10	0	0
<b>Prairie Warbler</b>	0	5	2
<b>Black-and-white Warbler</b>	44	2	0
<b>American Redstart</b>	115	3	0
<b>Prothonotary Warbler</b>	0	1	0
<b>Worm-eating Warbler</b>	1	0	0
<b>Ovenbird</b>	2	4	0
<b>Northern Waterthrush</b>	0	0	5
<b>Kentucky Warbler</b>	3	0	0
<b>Hooded Warbler</b>	7	0	0
<b>Baltimore Oriole</b>	0	1	0

Table 2. Resident bird totals for new birds trapped (non-recaptures) for both banding sites during winter 2007 on St. Martin.

<b>Resident Birds</b>			
	<b>forest</b>	<b>scrub</b>	<b>mangroves</b>
<b>White-winged Dove</b>	0	0	2
<b>Zenaida Dove</b>	2	9	3
<b>Common Ground Dove</b>	1	14	12
<b>Mangrove Cuckoo</b>	0	1	2
<b>Green-throated Carib</b>	0	0	0
<b>Antillean-crested Hummingbird</b>	43	0	0
<b>Caribbean Eleania</b>	10	26	13
<b>Gray Kingbird</b>	0	0	3
<b>Scaly-breasted Thrasher</b>	2	1	0
<b>Pearly-eyed Thrasher</b>	11	28	0
<b>Golden Yellow Warbler</b>	0	7	25
<b>Bananaquit</b>	162	209	320
<b>Black-faced Grassquit</b>	30	174	24
<b>Lesser Antillean Bullfinch</b>	22	30	22

Table 3. 2007 migrant recapture histories by year originally banded, species, and number recaptured.

Migrants	Forest Site					
	2002	2003	2004	2005	2006	2007
American Redstart	2	3	2	16	21	22
Black-and-white Warbler		2	2	1	7	7
Black-throated Blue Warbler						5
Hooded Warbler						4
Kentucky Warbler						2
Northern Parula					1	2
Ovenbird						2
Prairie Warbler						
Worm-eating Warbler						1
	Scrub Site					
	2002	2003	2004	2005	2006	2007
American Redstart					1	4
Black-and-white Warbler					1	
Northern Parula					1	8
Ovenbird						4
Prairie Warbler						1
	Mangrove Site					
	2002	2003	2004	2005	2006	2007
Northern Waterthrush						2



Table 4. 2007 resident recapture histories by year originally banded, species, and number recaptured.

Residents	Forest Site					
	2002	2003	2004	2005	2006	2007
Antillean-crested Hummingbird						1
Bananaquit		4	1	8	17	26
Black-faced Grassquit			1		1	2
Caribbean Eleania					1	1
Common Ground Dove						
Golden Yellow Warbler						
Lesser Antillean Bullfinch					3	1
Pearly-eyed Thrasher			1			1
	Scrub Site					
	2002	2003	2004	2005	2006	2007
Bananaquit		1	1	13	52	45
Black-faced Grassquit		3		7	29	130
Caribbean Eleania						8
Common Ground Dove				1	1	5
Golden Yellow Warbler		1			2	
Lesser Antillean Bullfinch		1		2	6	6
Pearly-eyed Thrasher		5	1			15
	Mangrove Site					
	2002	2003	2004	2005	2006	2007
Bananaquit		7	16			143
Black-faced Grassquit		2				4
Caribbean Eleania						9
Common Ground Dove						3
Golden Yellow Warbler			4			12
Lesser Antillean Bullfinch						13

Table 5. Comparison of total new migrant birds trapped in the secondary dry forest during 2002-2007.

<b>Migrant Birds</b>						
	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
<b>Yellow-throated Vireo</b>	0	0	1	0	0	0
<b>Blue-winged Warbler</b>	0	0	0	2	0	0
<b>Northern Parula</b>	0	0	0	14	9	22
<b>Chestnut-sided Warbler</b>	1	0	1	1	1	0
<b>Magnolia Warbler</b>	0	1	2	0	0	0
<b>Black-throated Green Warbler</b>	0	0	0	0	1	0
<b>Black-throated Blue Warbler</b>	2	3	7	15	1	10
<b>Prairie Warbler</b>	0	0	0	0	0	0
<b>Kentucky Warbler</b>	0	0	0	2	0	3
<b>Black-and-white Warbler</b>	1	9	10	17	32	44
<b>American Redstart</b>	23	16	14	53	59	115
<b>Worm-eating Warbler</b>	0	0	0	2	0	1
<b>Ovenbird</b>	1	2	5	1	4	2
<b>Louisiana Waterthrush</b>	1	0	0	0	0	0
<b>Hooded Warbler</b>	7	5	3	7	4	7
<b>Rose-breasted Grosbeak</b>	0	0	0	1	0	0
<b>Indigo Bunting</b>	0	0	8	0	0	0

Table 6. Comparison of total new resident birds trapped in the secondary dry forest during 2002-2007.

<b>Resident Birds</b>						
	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
<b>Zenaida Dove</b>	2	1	6	0	2	2
<b>Common Ground Dove</b>	2	0	0	0	0	1
<b>Caribbean Eleania</b>	0	2	1	2	5	10
<b>Scaly-breasted Thrasher</b>	5	10	11	3	2	2
<b>Pearly-eyed Thrasher</b>	16	6	28	14	17	11
<b>Antillean-crested Hummingbird</b>	3	4	6	8	44	43
<b>Bananaquit</b>	112	51	64	64	100	162
<b>Black-faced Grassquit</b>	23	5	21	3	9	30
<b>Lesser Antillean Bullfinch</b>	12	8	6	9	11	22
<b>Bridled Quail-dove</b>	0	0	0	0	1	0

Table 7. Comparison of new migrant birds trapped per net hour in the secondary dry forest from 2002-2007.

<b>Migrant Birds</b>						
<b>Species</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
<b>Yellow-throated Vireo</b>	0	0	0.001	0	0	0
<b>Blue-winged Warbler</b>	0	0	0	0.002	0	0
<b>Northern Parula</b>	0.008	0.006	0.004	0.014	0.005	0.018
<b>Chestnut-sided Warbler</b>	0.002	0	0.001	0.004	0.001	0
<b>Magnolia Warbler</b>	0	0.001	0.002	0	0	0
<b>Black-throated Blue Warbler</b>	0.004	0.003	0.006	0.015	0.001	0.008
<b>Black-throated Green Warbler</b>	0	0	0	0	0.001	0
<b>Prairie Warbler</b>	0.006	0.001	0	0	0	0
<b>Kentucky Warbler</b>	0	0.003	0.001	0.002	0	0.002
<b>Black-and-white Warbler</b>	0.002	0.009	0.008	0.017	0.019	0.036
<b>American Redstart</b>	0.048	0.017	0.011	0.053	0.035	0.093
<b>Worm-eating Warbler</b>	0	0	0	0.002	0	0.001
<b>Ovenbird</b>	0.002	0.002	0.004	0.001	0.002	0.002
<b>Louisiana Waterthrush</b>	0.002	0	0	0	0	0
<b>Hooded Warbler</b>	0.015	0.005	0.002	0.007	0.002	0.006
<b>Rose-breasted Grosbeak</b>	0	0	0	0.001	0	0
<b>Indigo Bunting</b>	0	0	0.006	0	0	0

Table 8. Comparison of new resident birds trapped per net hour in the secondary dry forest from 2002-2007.

<b>Resident Birds</b>						
<b>Species</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
<b>Zenaida Dove</b>	0.004	0.001	0.005	0	0.001	0.002
<b>Common Ground Dove</b>	0.004	0	0	0	0	0.001
<b>Bridled Quail-dove</b>	0	0	0	0	0.001	0
<b>Caribbean Eleania</b>	0	0.002	0.001	0.002	0.003	0.008
<b>Scaly-breasted Thrasher</b>	0.01	0.01	0.009	0.003	0.001	0.002
<b>Pearly-eyed Thrasher</b>	0.033	0.006	0.022	0.014	0.01	0.009
<b>Antillean-crested Hummingbird</b>	0.006	0.004	0.005	0.008	0.026	0.035
<b>Bananaquit</b>	0.233	0.053	0.051	0.065	0.06	0.131
<b>Black-faced Grassquit</b>	0.048	0.005	0.017	0.003	0.005	0.024
<b>Lesser Antillean Bullfinch</b>	0.025	0.008	0.005	0.009	0.007	0.018

Table 9. Comparison of high counts for migrant species encountered during area surveys of secondary dry forest site from the winters of 2003-2007.

<b>Migrant Species</b>					
	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
<b>Baltimore Oriole</b>	0	1	0	0	0
<b>Yellow-billed Cuckoo</b>	1	1	1	0	0
<b>Chuck-will's Widow</b>	1	0	0	0	0
<b>Yellow-bellied Sapsucker</b>	0	0	1	0	0
<b>Yellow-throated Vireo</b>	0	1	1	1	2
<b>Blue-winged Warbler</b>	0	0	2	0	0
<b>Northern Parula</b>	6	5	8	5	17
<b>Chestnut-sided Warbler</b>	0	1	1	0	0
<b>Magnolia Warbler</b>	1	3	2	0	1
<b>Black-throated Blue Warbler</b>	6	7	12	1	4
<b>Black-throated Green Warbler</b>	0	0	0	2	0
<b>Myrtle Warbler</b>	1	0	0	0	0
<b>Prairie Warbler</b>	3	3	0	0	2
<b>Canada Warbler</b>	0	1	0	0	0
<b>Black-and-white Warbler</b>	6	12	16	2	10
<b>American Redstart</b>	18	24	40	26	31
<b>Worm-eating Warbler</b>	1	1	2	0	1
<b>Ovenbird</b>	1	5	2	0	1
<b>Hooded Warbler</b>	2	5	6	2	6
<b>Kentucky Warbler</b>	1	1	2	0	1
<b>Scarlet Tanager</b>	0	0	1	0	0
<b>Rose-breasted Grosbeak</b>	0	0	1	0	0
<b>Indigo Bunting</b>	0	12	1	0	1

Table 10. Comparisons of high counts for resident species encountered during area surveys of secondary dry forest site from the winters of 2002-2007.

<b>Resident Species</b>					
	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
<b>Osprey</b>	1	0	0	0	0
<b>Green Heron</b>	0	0	0	0	3
<b>American Kestrel</b>	2	2	2	0	3
<b>Zenaida Dove</b>	2	6	8	0	13
<b>Bridled Quail Dove</b>	0	0	0	0	2
<b>Scaly-naped Pigeon</b>	0	0	0	0	4
<b>Common Ground Dove</b>	0	3	6	0	3
<b>Green-throated Carib</b>	1	1	2	1	2
<b>Antillean Crested Hummingbird</b>	1	4	9	3	8
<b>Mangrove Cuckoo</b>	0	0	0	0	3
<b>Caribbean Elaenia</b>	5	3	2	6	13
<b>Gray Kingbird</b>	3	2	3	6	5
<b>Scaly-breasted Thrasher</b>	12	11	7	4	9
<b>Pearly-eyed Thrasher</b>	23	31	21	8	20
<b>Black-whiskered Vireo</b>	0	0	0	0	2
<b>Golden Yellow Warbler</b>	0	2	0	0	0
<b>Bananaquit</b>	22	18	37	14	44
<b>Black-faced Grassquit</b>	7	9	4	3	22
<b>Lesser Antillean Bullfinch</b>	4	6	12	5	10

Table 11. Comparison of total new migrant birds trapped in the thorn scrub forest from 2003-2007.

<b>Migrant Species</b>				
	<b>2003</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
<b>Merlin</b>	1	0	0	0
<b>Northern Parula</b>	4	4	6	11
<b>Prairie Warbler</b>	5	1	2	5
<b>Black-and-white-Warbler</b>	0	1	1	2
<b>Ovenbird</b>	0	3	2	4
<b>Hooded Warbler</b>	3	1	1	0
<b>Indigo Bunting</b>	1	2	0	0
<b>Northern Waterthrush</b>	0	0	2	0
<b>White-eyed Vireo</b>	0	0	1	0
<b>American Redstart</b>	0	0	2	3
<b>Yellow Warbler</b>	0	0	1	0
<b>Baltimore Oriole</b>	0	0	0	1

Table 12. Comparison of total new resident birds trapped in the thorn scrub forest from 2003-2007.

<b>Resident Birds</b>				
	<b>2003</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
<b>Cattle Egret</b>	0	1	0	0
<b>Green Heron</b>	0	1	1	0
<b>Zenaida Dove</b>	4	3	2	9
<b>Common Ground Dove</b>	9	2	7	14
<b>Mangrove Cuckoo</b>	1	0	0	0
<b>Green-throated Carib</b>	4	3	1	0
<b>Antillean Crested Hummingbird</b>	0	0	5	0
<b>Caribbean Eleania</b>	12	2	19	26
<b>Gray Kingbird</b>	0	0	3	0
<b>Bare-eyed Robin</b>	0	0	1	0
<b>Scaly-breasted Thrasher</b>	2	0	3	1
<b>Pearly-eyed Thrasher</b>	22	9	30	28
<b>Black-whiskered Vireo</b>	3	0	0	0
<b>Golden Yellow Warbler</b>	8	3	16	7
<b>Bananaquit</b>	331	92	196	209
<b>Black-faced Grassquit</b>	93	20	93	174
<b>Lesser Antillean Bullfinch</b>	15	4	29	30

Table 13. Comparison of new migrant birds trapped per net hour in the thorn scrub forest from 2003-2007

<b>Migrant Birds</b>				
<b>Species</b>	<b>2003</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
<b>Merlin</b>	0.001	0	0	0.000
<b>Northern Parula</b>	0.004	0.01	0.005	0.008
<b>Prairie Warbler</b>	0.006	0.003	0.002	0.004
<b>Black-and-white-Warbler</b>	0	0.003	0.001	0.002
<b>Ovenbird</b>	0	0.008	0.002	0.003
<b>Northern Waterthrush</b>	0	0	0.002	0.000
<b>American Redstart</b>	0	0	0.002	0.002
<b>Hooded Warbler</b>	0.003	0.003	0.001	0.000
<b>Yellow Warbler</b>	0	0	0.001	0.000
<b>White-eyed Vireo</b>	0	0	0.001	0.000
<b>Indigo Bunting</b>	0.001	0.005	0	0.000
<b>Baltimore Oriole</b>	0	0	0	0.001

Table 14. Comparison of new resident birds trapped per net hour in the thorn scrub forest from 2003-2007

<b>Resident Birds</b>				
<b>Species</b>	<b>2003</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
<b>Cattle Egret</b>	0	0.003	0	0
<b>Green Heron</b>	0	0.003	0.001	0
<b>Zenaida Dove</b>	0.004	0.008	0.002	0.007
<b>Common Ground Dove</b>	0.01	0.005	0.006	0.011
<b>Mangrove Cuckoo</b>	0.001	0	0	0
<b>Green-throated Carib</b>	0.004	0.008	0.001	0
<b>Antillean Crested Hummingbird</b>	0	0.004	0.004	0
<b>Caribbean Eleania</b>	0.013	0.005	0.015	0.02
<b>Gray Kingbird</b>	0	0	0.002	0
<b>Bare-eyed Robin</b>	0	0	0.001	0
<b>Scaly-breasted Thrasher</b>	0.002	0	0.002	0.001
<b>Pearly-eyed Thrasher</b>	0.024	0.024	0.024	0.022
<b>Black-whiskered Vireo</b>	0.003	0	0	0
<b>Golden Yellow Warbler</b>	0.009	0.008	0.013	0.005
<b>Bananaquit</b>	0.368	0.241	0.159	0.161
<b>Black-faced Grassquit</b>	0.103	0.052	0.075	0.134
<b>Lesser Antillean Bullfinch</b>	0.017	0.01	0.023	0.023

Table 15. Comparison of high counts for migrant species encountered during area surveys of thorn scrub forest site from 2003-2007

<b>Migrant Species</b>				
	<b>2003</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
<b>Wilson's Snipe</b>	0	0	1	0
<b>Sora</b>	0	0	1	0
<b>Merlin</b>	0	1	0	1
<b>Peregrine Falcon</b>	0	0	0	1
<b>Yellow-billed Cuckoo</b>	2	0	0	0
<b>White-eyed Vireo</b>	0	1	1	0
<b>Northern Parula</b>	4	5	1	3
<b>Prairie Warbler</b>	3	3	1	3
<b>American Redstart</b>	2	8	0	2
<b>Ovenbird</b>	0	3	0	0
<b>Hooded Warbler</b>	0	1	0	0
<b>Common Yellowthroat</b>	1	0	0	0
<b>Indigo Bunting</b>	0	2	0	0
<b>Baltimore Oriole</b>	0	0	0	1

Table 16. Comparisons of high counts for resident species encountered during area surveys of thorn scrub forest site from 2003-2007.

<b>Resident Species</b>				
	<b>2003</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
<b>Cattle Egret</b>	0	0	11	33
<b>Green Heron</b>	0	0	1	4
<b>Osprey</b>	1	0	0	0
<b>American Kestrel</b>	0	2	3	3
<b>Zenaida Dove</b>	1	2	8	16
<b>Common Ground Dove</b>	1	1	0	7
<b>Mangrove Cuckoo</b>	1	3	3	4
<b>Green-throated Carib</b>	0	1	0	1
<b>Antillean-crested Hummingbird</b>	0	0	2	5
<b>Caribbean Elaenia</b>	3	1	11	10
<b>Gray Kingbird</b>	0	3	12	7
<b>Scaly-breasted Thrasher</b>	1	0	0	0
<b>Pearly-eyed Thrasher</b>	22	9	3	11
<b>Black-whiskered Vireo</b>	1	1	0	7
<b>Golden Yellow Warbler</b>	8	10	9	11
<b>Bananaquit</b>	46	21	38	22
<b>Black-faced Grassquit</b>	14	8	43	58
<b>Lesser Antillean Bullfinch</b>	0	3	7	9

Table 17. Comparison of total new migrant birds trapped in the mangrove forest from 2003-2007.

<b>Migrant Birds</b>			
	<b>2003</b>	<b>2004</b>	<b>2007</b>
<b>Lesser Yellowlegs</b>	0	1	0
<b>Spotted Sandpiper</b>	0	2	0
<b>Least Sandpiper</b>	0	1	0
<b>Semipalmated Sandpiper</b>	0	2	0
<b>Prothonotary Warbler</b>	3	0	0
<b>Northern Waterthrush</b>	9	3	5
<b>Prairie Warbler</b>	3	1	2
<b>Myrtle Warbler</b>	1	0	0
<b>Cape May Warbler</b>	0	0	1



Table 18. Comparison of total new resident birds trapped in the mangrove forest from 2003-2007.

<b>Resident Birds</b>			
	<b>2003</b>	<b>2004</b>	<b>2007</b>
<b>Green Heron</b>	0	2	0
<b>White-winged Dove</b>	0	0	2
<b>Zenaida Dove</b>	0	0	3
<b>Common Ground Dove</b>	20	23	12
<b>Mangrove Cuckoo</b>	0	0	2
<b>Gray Kingbird</b>	8	1	3
<b>Caribbean Eleania</b>	14	7	13
<b>Pearly-eyed Thrasher</b>	0	1	0
<b>Green-throated Carib</b>	0	2	0
<b>Belted Kingfisher</b>	1	2	0
<b>Golden Yellow Warbler</b>	23	39	25
<b>Bananaquit</b>	90	126	320
<b>Black-faced Grassquit</b>	21	18	24
<b>Lesser Antillean Bullfinch</b>	3	0	22

Table 19. Comparison of new migrant birds trapped per net hour in the mangrove forest from 2003-2007

<b>Migrant Birds</b>			
<b>Species</b>	<b>2003</b>	<b>2004</b>	<b>2007</b>
<b>Lesser Yellowlegs</b>	0	0.001	0
<b>Spotted Sandpiper</b>	0	0.003	0
<b>Least Sandpiper</b>	0	0.001	0
<b>Semipalmated Sandpiper</b>	0	0.003	0
<b>Prothonotary Warbler</b>	0.004	0.001	0
<b>Northern Waterthrush</b>	0.012	0.006	0.015
<b>Prairie Warbler</b>	0.004	0.001	0.006
<b>Myrtle Warbler</b>	0.001	0	0
<b>Cape May Warbler</b>	0	0	0.003

Table 20. Comparison of new resident birds trapped per net hour in the mangrove forest from 2003-2007

<b>Resident Birds</b>			
<b>Species</b>	<b>2003</b>	<b>2004</b>	<b>2007</b>
<b>Green Heron</b>	0	0.003	0
<b>White-winged Dove</b>	0	0	0.006
<b>Zenaida Dove</b>	0	0	0.009
<b>Common Ground Dove</b>	0.027	0.032	0.035
<b>Mangrove Cuckoo</b>	0	0	0.006
<b>Gray Kingbird</b>	0.011	0.001	0.009
<b>Caribbean Eleania</b>	0.019	0.01	0.038
<b>Pearly-eyed Thrasher</b>	0	0.001	0
<b>Green-throated Carib</b>	0	0.003	0
<b>Belted Kingfisher</b>	0.001	0.003	0
<b>Golden Yellow Warbler</b>	0.031	0.055	0.074
<b>Bananaquit</b>	0.12	0.177	0.941
<b>Black-faced Grassquit</b>	0.028	0.025	0.071
<b>Lesser Antillean Bullfinch</b>	0.004	0	0.065

Table 21. Comparison of high counts for migrant species encountered during area surveys of mangrove forest site from 2003-2007

<b>Migrant Species</b>			
	<b>2003</b>	<b>2004</b>	<b>2007</b>
<b>Osprey</b>	0	0	1
<b>Cliff Swallow</b>	0	0	2
<b>Myrtle Warbler</b>	4	0	0
<b>Prairie Warbler</b>	2	1	1
<b>Prothonotary Warbler</b>	1	1	0
<b>Northern Waterthrush</b>	5	7	4

Table 22. Comparisons of high counts for resident species encountered during area surveys of mangrove forest site from 2003-2007.

<b>Resident Species</b>			
	<b>2003</b>	<b>2004</b>	<b>2007</b>
<b>Green Heron</b>	0	0	1
<b>American Kestrel</b>	0	0	1
<b>Belted Kingfisher</b>	3	1	2
<b>White-winged Dove</b>	0	0	8
<b>Common Ground Dove</b>	8	5	6
<b>Zenaida Dove</b>	0	2	1
<b>Cliff Swallow</b>	0	0	1
<b>Mangrove Cuckoo</b>	0	0	7
<b>Green-throated Carib</b>	0	0	2
<b>Caribbean Eleania</b>	4	7	16
<b>Gray Kingbird</b>	5	6	9
<b>Black-whiskered Vireo</b>	2	0	0
<b>Golden Yellow Warbler</b>	28	41	25
<b>Bananaquit</b>	52	43	58
<b>Black-faced Grassquit</b>	11	5	9
<b>Lesser Antillean Bullfinch</b>	5	0	9