

The Birds of Curieuse Island, Seychelles

P.J Woods

Global Vision International (GVI), Seychelles

[p_j_woods@hotmail.co.uk]

Abstract

There has not previously been an established, systematic and long term bird monitoring programme on Curieuse Island, Seychelles. This study established a long term bird monitoring programme on Curieuse and began collecting baseline data. A species list of 39 species was compiled for Curieuse Island, this is likely to be added to with continued monitoring. A vagrant Little Egret (*Egretta garzetta*) was recorded, a new record for Curieuse Island, based on records available from the Seychelles Bird Records Committee (SBRC), highlighting the importance of continued monitoring. Curieuse Island appears to be important for migratory shorebirds as a wintering ground, resulting in high species richness in the coastal and mangrove habitats. The forested and upland areas were species poor, compared with coastal and mangrove habitats, likely due to habitat degradation caused by fire and erosion in the forested and upland areas of Curieuse. One species of seabird, White Tern (*Gygis alba*) successfully nested on Curieuse, while one pair of White-tailed Tropicbirds (*Phaethon lepturus*) made an unsuccessful nesting attempt.

Introduction

Curieuse Island is the fifth largest inner granitic Seychelles Island, and has an area of 286ha (Hill et al. 2002). Curieuse Island is designated as a National Park and its surrounding ocean as a marine park. Curieuse is government owned and managed by the Seychelles National Parks Authority (SNPA), a parastatal organisation. Global Vision International (GVI) currently occupies a permanent expedition base at Anse Jose (Figure 1). GVI is a conservation and community development organisation with a regular influx of volunteers to help undertake their work. Curieuse has several associated habitats; the bulk of the island consists of central hills with exposed red granite, up to 172m (Hill et al. 2002). Surrounding these hills are forested lowland coastal plateau areas. There are four main plateau areas, Anse Badamier on the north of the island and Anse Jose to the south (Hill et al. 2002). Baie Laraie has two distinct plateau areas, the area of mangroves to the north west of the turtle pond and surrounding the Park Rangers Headquarters to the east of the turtle pond (Hill et al. 2002) (Figure 1).

Curieuse Island appears to be deficient of systematic and regular records of its birdlife and has lacked a regular bird monitoring programme. There is very little published information about birdlife on Curieuse although there may be considerable local knowledge. An assessment of various taxa over 23 days, including birds, by Hill et al. in 2002 on Curieuse identified 14 land and sea bird species as being present on Curieuse. Of these 14 species, 2 species were seabirds and 3 species were endemic to the Seychelles. In comparison, the Seychelles Bird Records Committee (SBRC), according to its publicly available species list, has documented 56 different species on Curieuse, as of 31st May 2013.

The aim of this study was to identify the bird species present on and visiting Curieuse Island. In addition, the different habitats on Curieuse Island were compared using species richness and

encounter rates of all species found in a habitat and encounter rates of individual species within each habitat. A further aim was to share any seabird nesting activity with the Seychelles Seabird Group (SSG). Additionally, this study was designed to become a regular, systematic and long term bird monitoring programme in an effort to collect baseline data for future study.

Materials and Methods

This study took place on Curieuse Island, Seychelles between 21st January 2013 and 13th September 2013. The survey method used was point counts. Point counts were chosen over line transects because point counts suit dense habitats, such as mangroves and are more useful for high density, species rich populations (Gregory et al. 2006). Point counts also allow the observers to concentrate fully on observations, without concentrating on walking, giving more time to identify cryptic species (Bibby et al. 2000).

Vantage points were positioned throughout Curieuse Island, covering four habitat types, coastal, mangroves, scrub and forest. The coastal habitat consisted mainly of sandy beaches and freshwater pools and was defined as any vantage point on a beach or within 20m of the ocean. The mangrove habitat was defined as brackish areas where species of mangrove tree were present. Tides of less than 0.8m exposed a mud flat at the seaward edge of the mangroves at Baie Laraie, providing an additional foraging habitat for shorebirds (Figure 1). The forest habitat was defined as vantage points further than 20m from the sea with predominantly mature trees that formed a canopy. The scrub habitat was defined as patchy vegetation, dominated by shrubs and sporadic Coco de Mer trees. Vantage points were marked with a waypoint using a GPS (Garmin etrex 10) accurate to 3m.

Thirteen vantage points (A1-A13) were positioned in the coastal habitat (Figure 1). The vantage points were spaced 250m apart, however the distances between vantage points varied slightly due to impassable physical obstacles. The distance between vantage points was chosen as a trade off between dense vegetation, limiting the observer's field of view, the distance individual birds regularly move and logistics of walking between points. The distance between coastal vantage points was recorded, as the walking distance, using the GPS trip odometer.

In the mangrove habitat vantage points were positioned on previously established permanent transects relating to a separate plant study. Vantage points were placed on transects that ran perpendicular to the ocean. Along the transects points were placed every 100m, starting at the seaward edge, along transects 50m apart, where possible (Figure 1). Sixteen vantage points (M1-M16) completely covered the mangrove habitat (Figure 1). Dense vegetation in the mangroves restricted observers' field of view and so a smaller distance between vantage points was chosen. Point A8 (Figure 1) was also included as part of the mangroves for the data analysis as the vegetation was predominantly mangrove species within a shallow lagoon.

Vantage points throughout the rest of Curieuse Island (B1-B24) were positioned using a stratified random technique (Figure 1) and covered open scrub, elevated coastal areas and forest. Vantage points B1, B2 and B8 were on steep rocky terrain, which was too treacherous to reach. Therefore, data was collected from 21 of 24 vantage points. Stratified random positioning of vantage points along the coastline and in the mangroves was not suitable due to the extremely dense stands of vegetation. The dense vegetation would have made visiting points logistically difficult without

regular habitat destruction and path clearance. Therefore it was decided to use previously established paths and transects to limit damage. Outside of the coastal plateau the vegetation was more open allowing for easier access, making a stratified random technique suitable.

Point counts were surveyed in alternate orders i.e. A1-A7 and then A7-A1 to ensure points were surveyed at different times within the monitoring period to avoid bias (Bibby et al. 2000). This study was a multi species study and diurnal activity patterns vary between bird species in tropical habitats (Bibby et al. 2000; Blake 1992). Terrestrial species, particularly forest species show a significant decline in activity from peak activity at dawn, reducing the ability of the observer to detect individuals (Blake 1992). A pilot study found this also to be the case on Curieuse for terrestrial species. However seabirds and shorebirds did not show a decline in activity throughout the day. Therefore observations were conducted throughout the day but only observations of terrestrial species until 10am were analysed.

Each survey team comprised of 3-4 individuals, 2-3 observers and a recorder. The data recorded for each observation can be found in Table 1. Distance estimation is very subjective and can be heavily influenced by observer skill and experience. To reduce the effect of inter observer differences, distances were grouped into 3 bands: 0-25m, 25m-100m and 100m+. To reduce error in distance estimation observers practiced estimating distances at the GVI base and a member of staff with more experience of distance estimation was always present during observations.

On arriving at a vantage point there was a 2 minute 'settling time' to allow for any disturbance caused by the arrival of the survey team (Bibby et al. 2000; Gregory et al. 2006). The observation period was 10 minutes, to allow time for more inconspicuous species to be identified (Bibby et al. 2000). During the observation period, observers recorded all individuals encountered by sight and sound. To avoid pseudoreplication observers were trained not to count the same bird as each other during the observation period through good communication. In addition, observers were careful to avoid recounting an individual that they believed left and then returned to the survey area. However, some pseudoreplication was unavoidable as individual birds were not individually marked.

GVI relies on volunteers to carry out all of its fieldwork. These volunteers stay for periods of 4, 8 or 12 weeks. To ensure precision and continuity all volunteers were intensively trained and had to take an exam before they were permitted to survey. In addition, to maintain reliability one of the observers was always a staff member who was trained to a higher level and had more identification experience than the volunteers.

Microsoft Excel was used to calculate encounter rates of individual species and of all species within each of the 4 habitats surveyed. The taxonomy and status categories used while compiling the species list for Curieuse Island was as described in *Birds of Seychelles* (Skerrett and Disley 2011).

Results

A total of 33 species of bird were observed on Curieuse during the study period, between 21st January 2013 and 13th September 2013 and an additional 6 species were recorded outside of this study period (Table 2). Of these 39 species, 27 were annual visitors to Curieuse, 9 were resident species, 2 were endemic, and 1 was a vagrant species (Table 2). An annual visitor is a migratory

species that does not breed on Curieuse but occurs yearly. A resident species is a non-endemic breeding species that is present all year. An endemic species is a species that is confined to the Seychelles. A vagrant species is migratory but does not occur each year (Skerrett and Disley 2011). The 6 species that were observed outside the observation period for this study were: Crab Plover (*Dromas ardeola*), Lesser Sandplover (*Charadrius mongolus*), Greater Sandplover (*Charadrius leschenaultii*), Eurasian Curlew (*Numenius arquata*), Barn Swallow (*Hirundo rustica*) and Bar-tailed Godwit (*Limosa lapponica*) (P. Woods pers. obs.). The Eurasian Curlew, Lesser Sandplover and Barn Swallow were all observed once in November 2012. The Greater Sandplover and Crab Plover were observed once in November 2012 and again in October 2013. A single Bar-tailed Godwit was observed in October 2013. All of these observations were made on Anse Jose (Figure 1).

One notable observation was that of the Little Egret (*Egretta garzetta*) between 23/01/2013 and 23/05/2013. According to the SBRC species list of Seychelles islands, the little egret has not previously been recorded on Curieuse and so is a new species record for Curieuse. Two individuals were initially recorded on 23/01/2013 with additional observations of 2 individuals made on 30/1/2013, 5/2/2013 and 22/3/2013. A further 10 observations were made of just one individual between 5/2/2013 and 23/5/2013. This record along with photo identification has been sent to SBRC for verification and documentation in the Seychelles records.

A further interesting observation was that of 2 breeding pairs of Grey Herons (*Ardea cinerea*) on Curieuse at A8 (Figure 1). Both breeding pairs nested in mature *Rhizophora mucronata* and from both nests 2 chicks successfully fledged. This observation is of particular interest as the SBRC bird list states that the Grey Heron is an annual visitor to Curieuse. However, as Grey Herons were recorded in every month of the study and were observed breeding on Curieuse, the Grey Heron's status on Curieuse is likely to be resident.

Species Richness and Encounter Rate

The coast and the mangroves were the most species rich habitats on Curieuse (Table 3). The forest and scrub were relatively species poor when compared with the coast and mangroves (Table 3). However, this pattern was not repeated when encounter rate of all bird species in each habitat was considered. The encounter rate in the coastal habitat was significantly greater than that of any other habitat. There was only a slight difference in encounter rate in the mangroves and the forest despite the large difference in species richness of the 2 habitats. The low encounter rate in the scrub habitat reflected the low species richness also found in the scrub (Table 3).

The most frequently encountered bird species on Curieuse was the Lesser Noddy (*Anous tenuirostris*), followed by the Seychelles Sunbird (*Cinnyris dussumieri*), Common Myna (*Acridotheres tristis*) and White Tern (*Gygis alba*) (Table 2). The most frequently encountered shorebird species were the Whimbrel (*Numenius phaeopus*) and Ruddy Turnstone (*Arenaria interpres*) (Table 2); both species were recorded in every month during the study period. The encounter rates of individual species in each of the 4 habitats were also calculated (Figure 2). Only 4 species were recorded in all 4 habitats, Seychelles Sunbird, Common Myna, Madagascar Fody (*Foudia madagascariensis*) and Seychelles Blue Pigeon (*Alectroenas pulcherrima*). Of the 12 species of shorebird recorded within the study period, only 1 species (Common Sandpiper) was encountered more frequently in the coastal habitat than in the mangrove habitat (Figure 2).

Seabird Breeding Activity

Only 1 species of seabird was observed to successfully breed on Curieuse, the White Tern. A total of 7 White Tern nests were found on Curieuse. Of these 7 nests, 3 were located at Anse Jose, 2 near vantage point A6 and 1 at A4. Three more nests were situated in the mangroves at points M3 and M8 and 1 nest was found on Grand Anse at point B17 (Figure 1). Potential nesting activity was seen at Anse Badamier around vantage point A13, however no evidence of additional nests was found. The fledging success of the white tern nests was 42.85% (n=7).

A pair of White-tailed Tropicbirds (*Phaethon lepturus*) made an unsuccessful nesting attempt between 6th June and 19th August. Adult birds were seen circling close to the rocky headland between Anse Papaie and Grand Anse, between points A10 and A11 (Figure 1). On 2 occasions (6th June and 16th July) adult birds were seen sitting in a potential nest cavity between rocks. However, no egg was laid and no further breeding activity was observed beyond 19th August.

Discussion

This study has generated a species list for Curieuse Island of 39 species. This species list is not complete, as new species were observed throughout the study period and the SBRC has recorded 56 species on Curieuse. Therefore further monitoring would likely reveal additional species, particularly migratory species and vagrant species.

Only 2 of the species recorded on Curieuse in this study are endemic to the Seychelles, the Seychelles Sunbird and the Seychelles Blue Pigeon. Although only 2 endemic species were observed, both of these species were common and had high encounter rates across the 4 habitats surveyed (Figure 2). The Seychelles Sunbird had the second highest encounter rate over all 4 habitats (213.836 birds/20 hours) and the Seychelles Blue Pigeon the sixth highest (63.292 birds/20 hours) (Table 2). Hill et al. 2002 reported a population of 6 Seychelles Black Parrots (*Coracopsis (nigra) barklyi*) however during this study no observations were made of Black Parrots. A recent study on the status and distribution of the Seychelles Black Parrot found no evidence of the Seychelles Black Parrot on Curieuse (Reuleaux et al. 2013). Another notable endemic species that is absent on Curieuse is the Seychelles Bulbul (*Hypsipetes crassirostris*), the absence of the Seychelles Black Parrot and the Seychelles Bulbul is likely to be due to a lack of suitable habitat. Reuleaux et al. 2013 described Curieuse as 'probably unable to support a resident population of parrots'. The low number of endemic species is also likely due to predators (rats and cats) having been established on Curieuse for a long period of time (Hill et al. 2002).

Annual migratory species account for 27 species of the 39 bird species recorded on Curieuse Island during this study, considerably more than any other status category (Table 2). Of these 27 migratory species, 13 were shorebirds and were only found in the mangrove or coastal habitats. This indicates that the coastal and mangrove habitats of Curieuse may be an important wintering and feeding ground for migratory shorebird species. Both the mangrove and coastal habitats appear to be important for these migratory species. However, all migratory shorebird species, with the exception of the common sandpiper and sanderling, were more frequently encountered in the mangroves. This demonstrates the importance of the mangroves to migratory shorebirds on Curieuse, particularly to the most frequently encountered species, the Ruddy Turnstone, Whimbrel, Grey Plover (*Pluvialis*

squatarola) and Greenshank (*Tringa nebularia*) (Figure 2). Individuals of all 4 of these species were also recorded on Curieuse throughout the northern hemisphere spring and summer, so Curieuse could also be an important feeding area for maturing, non-breeding individuals of these species. It is important that wintering grounds are maintained and conserved, as the quality of wintering ground has been shown to affect reproductive success at the breeding grounds (Norris et al. 2004).

The habitat with the greatest species richness and highest encounter rate was the coastal habitat (Table 3). Seabirds are the most abundant species group of birds in the Seychelles (Burger and Lawrence 2003). Curieuse does not have a large breeding population of seabird species. However, Curieuse is designated as a marine park and is in close proximity to Aride, Cousin and Cousine, which have seabird colonies and are Important Bird Areas (Rocamora and Skerrett 2001). The most frequently encountered bird during this study was the Lesser Noddy (Table 2). The Lesser Noddy is one of the most abundant seabird species in the inner granitic Seychelles islands (Burger and Lawrence 2003). During the 2013 breeding season an estimated 57,304 pairs of Lesser Noddies bred on Cousin Island (Burt 2013). Large foraging flocks between an estimated 100 and 800 individuals were seen regularly inside the Curieuse Marine Park throughout the main Lesser Noddy breeding season (May to August).

Roseate Terns (*Sterna dougallii*) were also recorded foraging within the marine park along the coast at Anse Jose (Figure 1, A1-A7). This is an important observation as the population of Roseate Terns in the Indian Ocean has been declining and the reason for this decline is unknown (Burger and Lawrence 2003). This data indicates that the marine park that surrounds Curieuse may be important in protecting the food sources for inshore feeding seabird species, such as the Lesser Noddy. However, further comparative studies between food availability inside and outside of the marine park would be needed to confirm this.

The forest and scrub could be considered as species poor when compared to the relatively species rich coast and mangroves habitats. The encounter rate in the scrub habitat was the lowest of the habitats studied (Table 3) and only 4 species were recorded. High levels of erosion in the upland areas due to fire damage has led to considerable damage to the vegetation, which has not yet recovered (Hill et al. 2002; Reuleaux et al. 2013). Therefore poor species richness and a low encounter rate were expected in the scrub habitat. In the forest 9 different species were recorded. The low species richness in the forest is most likely due to the absence of endemic terrestrial species, for example the Seychelles Black Parrot and Seychelles Bulbul. The long term presence of predators on Curieuse and unsuccessful eradication attempts is likely to have had an effect on endemic terrestrial species (Hill et al. 2002).

Seabird Breeding Activity

The White Tern has previously been recorded as breeding on Curieuse (Hill et al. 2002). The presence of predators, such as rats is undoubtedly a cause of the lack of breeding seabird species on Curieuse (Hill et al. 2002). However, the fledging success found on Curieuse for White Terns was high at 42.85% (n=7), breeding success is usually below 20% (Burger and Lawrence 2003). This figure for Curieuse was calculated from a very small sample size of 7 and so is not likely to be precise and further monitoring would be needed to increase the sample size and achieve a more reliable number.

The cause of the White Tern nest failure could not be determined, as more intense nest monitoring would be necessary than was possible in this study, but lack of food and disturbance by rats are plausible causes. Predation of nests by Barn Owls (*Tyto alba*) may also cause breeding failure in White Terns (Burger and Lawrence 2003). An observation of a Barn Owl at point M7 (Figure 1) was made on 30th April 2013 indicating the presence of barn owls on Curieuse. No surveys were carried out at night during this study, but Hill et al. 2002 also recorded Barn Owls on Curieuse using playback experiments and SBRC lists the Barn Owl as a resident on Curieuse. This study cannot make reliable conclusions on the White Tern breeding population on Curieuse, due to the small sample size. Further, in depth study into the breeding population size and trend of White Terns, along with the effect of introduced predators would be needed to build on the initial observations made in this study.

White-tailed Tropicbirds have not previously been recorded as breeding on Curieuse, although the pair observed on Curieuse were unsuccessful in their nesting attempt, it is an encouraging sign for the future. White-tailed Tropicbirds nest on the ground, so are vulnerable to predation by introduced predators, such as rats and cats (Burger and Lawrence 2003). White-tailed Tropicbirds have been observed breeding on islands with predators, but in less accessible locations, for example cliffs or trees (Burger and Lawrence 2003). The site of the attempted nest recorded during this study was on a cliff, between Anse Papaie and Grand Anse (Figure 1) in a crevice between the rocks. There was no sign of egg laying and the cause of the nesting failure was unclear. White-tailed Tropicbirds breed all year round (Burger and Lawrence 2003) and so any future potential nesting behaviour of White-tailed Tropicbirds observed should be recorded and then closely monitored for signs of laying. Steps should then be taken to prevent disturbance of the nest by predators.

This is the first time that long term, systematic monitoring of birds has been conducted on Curieuse Island. The presence of GVI and permanent research scientists has facilitated a long term monitoring bird programme on Curieuse, which has generated a species list totalling 39 different species. With a continuing monitoring programme on Curieuse Island this species list can be added to and the baseline data collected during this study used for future studies. It is of particular importance to monitor seabird breeding activity, particularly White Terns and White-tailed Tropicbirds and the presence and arrival times of migratory shorebird species.

Acknowledgements

I would like to thank all the GVI staff and volunteers for their help in data collection. In particular my thanks go to, Noël Dunn, Reggie Lang, Kate Quinton, Pascal Lovell, Zach Jones and Florence Parker-Jurd. I would also like to thank SNPA, their collaboration made this study possible.

References

- Bibby C, Jones M, Marsden S (2000) Expedition field techniques, Bird surveys. Birdlife International, Cambridge
- Blake JG (1992) Temporal variation in point counts of birds in a lowland wet forest in Costa Rica. *Condor* 94:265-275
- Burger A E and Lawrence A D (2003) Seabird monitoring handbook for Seychelles 2nd Edition. Nature Seychelles, Mahe
- Burt AJ (2013) Census of white-tailed tropicbird, white tern, lesser noddy, brown noddy, sooty tern, bridled tern, tropical shearwater and wedge-tailed shearwater breeding colonies on Cousin Island, July 2013. Unpublished report, Nature Seychelles, Republic of Seychelles.
- Gregory R D, Gibbons D W & Donald P F (2006) Bird survey and census techniques. In Sutherland WJ (ed) *Ecological census techniques: A Handbook*. Cambridge University Press, pp 17-55
- Hill MJ, Vel TM, Parr SJ, Shah NJ (2002) Curieuse. In Hill MJ (ed) *Biodiversity surveys and conservation potential of inner Seychelles islands*. Atoll Research Bulletin No. 495, Smithsonian Institution, Washington DC, pp 73-94
- Norris RD, Marra PP, Kyser TK, Sherry TM, Ratcliffe LM (2004) Tropical winter habitat limits reproductive success on the temperate breeding grounds in a migratory bird. *Proceeding of the Royal Society London B* 271:59-64
- Reuleaux A, Bunbury N, Villard P, Waltert M (2013) Status, distribution and recommendations for monitoring of the Seychelles black parrot *Coracopsis (nigra) barklyi*. *Oryx* 47:1-8
- Rocamora G, Skerrett A (2001) Seychelles. In: Fishpool L, Evans MI (eds) *Important bird areas in Africa and associated islands*. Newbury and Cambridge, UK, Birdlife International, pp 751-768
- Skerrett A, Disley T (2011) *Birds of Seychelles*. Christopher Helm Bloomsbury Publishing, London

Tables

Table 1. The categories to be completed in the field by the recorder for each observation.

Category	Description
Weather and Tide	Brief weather description, tide height checked before leaving base.
Survey Area	E.g. Mangroves, name of the beach
Point Number	E.g. A1-A12, M1-22
Start Time/End Time	Time 10 minutes of observations starts and ends
Time	Time of each observation
Species	Species name ideally, family if unsure e.g. tern
Number	Number of individuals of that species
Distance From Point	Distance of individual from observers
Observation Type	Identified using sight or sound
Behaviour	Resting, foraging, fly over, social interaction or escaping
Photo	To be encouraged if unsure of identification
Comments	Any Additional information

Table 2. Species list for Curieuse Island including common name, scientific name and the status of each species on Curieuse. The categories for status are as used by the Seychelles Bird Records Committee. An annual visitor is a migratory species that does not breed on Curieuse but occurs yearly. A resident species is a non-endemic species. An endemic species is a species that is confined to the Seychelles. A vagrant species is migratory but does not occur each year. The encounter rate of each species on Curieuse is recorded as the number of individuals observed per 20 hours. An X indicates the species was observed outside of the study period (January 21st 2013 – September 9th 2013)

Common Name	Scientific Name	Status on Curieuse	Birds/20 hours
Wedge-tailed Shearwater	<i>Puffinus pacificus</i>	Annual Visitor	1.398
Red-footed Booby	<i>Sula Sula</i>	Annual Visitor	0.200
White Tailed Tropicbird	<i>Phaethon lepturus</i>	Annual Visitor	11.780
Great Frigatebird	<i>Fregata minor</i>	Annual Visitor	27.952
Lesser Frigatebird	<i>Fregata ariel</i>	Annual Visitor	0.998
Green Backed (Striated) Heron	<i>Butorides striata</i>	Resident	27.952
Little Egret	<i>Egretta garzetta</i>	Vagrant	5.191
Grey Heron	<i>Ardea cinerea</i>	Resident	7.986
Common Moorhen	<i>Gallinula chloropus</i>	Resident	14.176
Crab Plover	<i>Dromas ardeola</i>	Annual Visitor	X
Lesser Sand Plover	<i>Charadrius mongolus</i>	Annual Visitor	X
Greater Sand Plover	<i>Charadrius leschenaultii</i>	Annual Visitor	X
Grey Plover	<i>Pluvialis squatarola</i>	Annual Visitor	18.169
Ruddy Turnstone	<i>Arenaria interpres</i>	Annual Visitor	52.710
Bar-tailed Godwit	<i>Limosa lapponica</i>	Annual Visitor	X
Eurasian Curlew	<i>Numenius arquata</i>	Annual Visitor	X
Whimbrel	<i>Numenius phaeopus</i>	Annual Visitor	49.316

Common Greenshank	<i>Tringa nebularia</i>	Annual Visitor	10.183
Terek Sandpiper	<i>Xenus cinereus</i>	Annual Visitor	0.399
Common Sandpiper	<i>Actitis hypoleucos</i>	Annual Visitor	2.795
Curlew Sandpiper	<i>Calidris ferruginea</i>	Annual Visitor	1.597
Sanderling	<i>Calidris alba</i>	Annual Visitor	0.399
Greater Crested Tern	<i>Sterna bergii</i>	Annual Visitor	10.981
Lesser Crested Tern	<i>Sterna bengalensis</i>	Annual Visitor	10.183
Roseate Tern	<i>Sterna dougallii</i>	Annual Visitor	3.594
Common Tern	<i>Sterna hirundo</i>	Annual Visitor	6.189
Sooty Tern	<i>Onychoprion fuscatus</i>	Annual Visitor	29.350
Bridled Tern	<i>Sterna anaethetus</i>	Annual Visitor	66.886
Brown Noddy	<i>Anous stolidus</i>	Annual Visitor	1.797
Lesser Noddy	<i>Anous tenuirostris</i>	Annual Visitor	902.266
White Tern	<i>Gygis alba</i>	Resident	95.238
Madagascar Turtle Dove	<i>Streptopelia picturata</i>	Resident	19.167
Barred Ground Dove	<i>Geopelia striata</i>	Resident	30.548
Seychelles Blue Pigeon	<i>Alectroenas pulcherrima</i>	Endemic	63.292
Barn Owl	<i>Tyto alba</i>	Resident	0.200
Barn Swallow	<i>Hirundo rustica</i>	Annual Visitor	X
Seychelles Sunbird	<i>Cinnyris dussumieri</i>	Endemic	213.836
Common Myna	<i>Acridotheres tristis</i>	Resident	101.827
Madagascar Fody	<i>Foudia madagascariensis</i>	Resident	60.297

Table 3. The species richness and encounter rate of all bird species, in birds per hour in the 4 different habitat types surveyed on Curieuse Island.

Habitat	Species Richness	Encounter Rate (Birds/hour)
Scrub	4	16.90
Forest	9	54.50
Mangroves	25	52.93
Coastal	28	144.44

Figure Legends

Figure 1. A satellite image of Curieuse Island, taken from Google Earth. All beaches are labelled along with the turtle pond at Baie Laraie. The location of vantage points used during the bird monitoring programme is also shown. Red dots (A1-A13) show vantage points situated in coastal habitat, blue dots (M1-M16) show vantage points in the mangrove habitat and yellow dots (B1-B24) show vantage points that are in forest and scrub habitats.

Figure 2. The encounter rate in birds per 5 hours of all the species recorded within the study period. The lesser noddy (599.67 birds/5 hours in the coastal habitat and 2.46 birds/5 hours in the mangroves) was removed as an outlier. The black bars show the encounter rate in the coastal habitat, the white bars show encounter rate in the mangroves, the dark grey refer to the forest and the light grey bars refer to the scrub habitat.

Figures

