

Figure 1. North Island physical, with locations of vegetation plots.



# NORTH ISLAND

BY

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## GEOLOGY, TOPOGRAPHY AND CLIMATE

North Island has an area of 201 ha, and is the ninth largest of the granitic Seychelles Islands. At its highest point (Grand Paloss) it reaches over 180 m above sea level. The island's north-south axis is made up of raised rocky hills with an outlier (Congoment) to the east. Along the eastern and western sides of the island are two large low-lying "plateau" areas.

Geologically, the island differs from most of the granitic islands of Seychelles apart from its nearest neighbour Silhouette. Both islands are made up of syenite resulting from volcanic activity. These rocks are of much more recent origin than the bulk of Seychelles granite; Mahé and Praslin granites have been dated at about 650 million years old (Braithwaite, 1984) and Silhouette syenite at 63 million years old (Stephens, 1996). The plateaux are made up of recent calcareous sediments covered (on the landward side) with 20–30 cm depth of weathering products from the syenite hills (Baker, 1963) and, in places, marsh deposits.

The island's soils are varied. On the lower slopes of the hills Bernica and Basin Jean, and parts of the eastern plateau, Seychelles red earths occur, with some river valley soils in seasonal stream beds. On the western plateau, soils are of the Jemo series. The eastern plateau has soils of the Shioya series (DOS, 1966). Around the base of the hill, on the eastern plateau, is a complex of marshes varying in extent according to season. North Island is relatively remote. The nearest island is Silhouette, *c.* 7 km away.

The Seychelles islands experience a seasonal humid tropical climate (Walsh, 1984). Historical weather data for North Island are limited, although more complete data have been collected in recent years. Monthly rainfall for the period 1975-80 is shown in Table 2. Total rainfall on North Island for this period was considerably lower than that on the nearby higher island of Silhouette which reaches an altitude of 621 m asl (annual mean rainfall for Silhouette = 2,082.5 mm: North Island = 1,516.9 mm).

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Table 1. Area of North Island by altitude (calculated from maps published by Directorate of Overseas Survey (UK)/Seychelles Government).

Altitude range (m. asl.)	Area (ha)	Percentage total area
150 - 200	5	2.5
100 - 150	17	8.5
50 - 100	51	25.4
10 - 50	61	30.3
0 - 10	67	33.3

Table 2. North Island: monthly rainfall (mm), 1975-1980.

(Data: National Meteorological Services, Seychelles, unpublished data).

n/a = not available.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1975	454.9	151.6	65.7	30.4	84.8	15.4	6.3	48.7	n/a	3.8	286.0	224.0
1976	260.1	366.0	50.0	78.0	20.3	35.5	21.0	29.7	20.3	26.9	n/a	279.4
1977	315.7	142.7	51.8	174.7	65.0	29.2	76.5	48.3	15.0	223.3	132.1	125.2
1978	349.0	220.5	84.8	246.9	66.3	40.9	24.4	0.8	39.1	95.8	397.3	n/a
1979	240.0	159.5	290.8	208.0	17.8	10.4	83.1	21.3	0.0	159.0	n/a	169.7
1980	127.5	330.7	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>Mean</b>	291.2	228.5	108.6	147.6	50.8	26.3	42.3	29.8	18.6	101.8	271.8	199.6

## HISTORY

Written references on the island's history are few although it was one of the first islands to be visited by man. On the fourth voyage of the East India company in 1609, the granitic Seychelles were first discovered by western mariners (Lionnet, 1986). In a written account of the voyage by John Jourdain, there are records of landings on two islands, one of which (later identified as North Island by W. Wharton) had no fresh water but did have giant land tortoises, which were collected for food (Foster, 1905).

"Pirate markings" inscribed on rocks on Congoment may pre-date official settlement of the Seychelles islands, which occurred in 1770. Within 17 years of permanent human settlement of the archipelago, North Island was overrun by rats, although the tortoises mentioned by Jourdain were still present. Malavois (1787: in Fauvel, 1909) records that North Island

"...is now little wooded, having been burned down several years ago. In the small plain...one would find sufficient land to have a small habitation, but it would require the destruction of rats that now populate the island. The most beautiful tortoises of the archipelago are to be found there, and [green] turtles also come ashore. But Caret [hawksbill turtle] is almost never seen."

The tortoises, presumably species of the granitic islands, became extinct before 1875 (Bour, 1984). In the early twentieth century, North Island guano was exploited on a



small scale for export. The guano was low grade; it was reported to contain 2-3% iron oxide and was also unusually rich in magnesium and aluminium as a result of contamination with syenitic soil (Baker, 1963). Evidence of guano processing remains in physical features and soils; an artificial mound at Petite Anse (between Congoment and Bernica) is labelled “guano siftings” on the map of 1976 (Seychelles Government and UK Directorate of Overseas Surveys, 1976). The eastern plateau of North Island has Jemo series soils (DOS, 1966), which form on the plateaux of seabird islands and are also found on Cousin, Cousine, Aride and Frégate.

In the late nineteenth or early twentieth century, extensive plantations of coconut and fruit trees were made over the plateau areas. North Island exported a variety of agricultural produce to Mahé. In recent years, the plantations of North Island have declined and been abandoned; in 1997, there was one family managing a small farm with domestic animals on the island (Shah and Parr, 1997). North Island was bought by Wilderness Safaris Ltd. in 1997, with the purpose of developing a tourism and conservation project. Since this time there has been intermittent human presence on the island and some domestic animals survive in a feral state.

## FLORA AND VEGETATION

### Flora

In total, 188 plant species were recorded on North Island, including 12 ferns, one cycad and 175 angiosperms (Appendix 1). Of the angiosperms, 108 species (61.7%) are regarded as introduced (Friedmann, 1994) and 42 (24.0%) native. Only one of these native species (*Pandanus balfourii*) was endemic to the Seychelles, although the list also included an endemic subspecies (*Ficus reflexa seychellensis*).

The flora of North Island shows a greater proportion of introduced species and a smaller number of endemics than the flora of Seychelles as a whole (of the total Seychelles flora, around 54% are introduced and 9% endemic; Procter, 1984). Within the granitic Seychelles, larger islands tend to have more endemic species, but the number on North Island was similar to that on a much smaller island, Cousin (29 ha). The small number of endemic taxa probably reflects the island's history of cultivation and the accessibility of most of the island (compared with, for example, the broken rocky topography of Félicité). Fire may also have contributed to the loss of endemic species; in 1972, a bush fire destroyed vegetation throughout the northern hill including Grand Paloss and Basin Jean. The area destroyed by fire included the highest parts of the island and those of lesser economic value where endemic species might have survived.

It has been suggested that an endemic labiate (called *Coleus subfrutescens* Summerhayes by Robertson, 1989) survives on North Island. However, this plant is probably a vigorous variety of the introduced *Plectranthus amboinicus* (Friedmann, 1994). Of the introduced plants established on North Island, at least 16 can be regarded as invasive weedy species (Carlström, 1996a; Fleischmann, 1997). The most abundant are lantana *Lantana camara*, cocoplum *Chrysobalanus icaco*, guava *Psidium guajava*, strawberry (Chinese) guava *Psidium cattleianum*, and *Alstonia macrophylla*. One potentially invasive species *Clidemia hirta* appears to be a recent introduction from



Silhouette, probably arriving as bird-sown seed. In addition to these alien species, the coconut *Cocos nucifera*, although probably native to the Seychelles, is present in extremely high numbers to the exclusion of other plants.

Several previous workers have produced plant species lists for North Island; species recorded in the past but not in the current survey are shown in Appendix 1. While some of these species (notably cultivated herbs) may now be extinct, others such as fruit trees probably survive in small numbers, and grasses may have been overlooked in the current survey. Eighteen species recorded by previous authors may survive on North Island (13 of these introduced species), bringing the total species list to 206.

## Vegetation

The extents of major vegetation types on North Island are shown in Table 3 and Figure 2. The plateaux are dominated by former coconut plantations, with a dense shrub layer of *Lantana camara* and *Psidium guajava*. The plateau also has areas of native woodland (mainly takamaka *Calophyllum inophyllum* and *Terminalia catappa*), mixed woodland (rich in fruit trees) and marshland vegetation. The hills are generally dominated by mixed coconut woodland and scrub with large areas of open rock.

In total, 40 vegetation plots were completed, 20 in August and 20 in January-February. In total, these covered 4,000 m<sup>2</sup> or 0.2% of the island's surface. Twenty vegetation plots were in plateau broad-leaf woodland (excluding areas identified on the map as coconut), covering 2,000 m<sup>2</sup> or 0.8% of this habitat type. Twenty vegetation plots were in hill woodland/scrub (excluding areas identified on the map as bare rock), covering 2,000 m<sup>2</sup> or 0.2% of this habitat type. A summary of results is shown in Table 4.

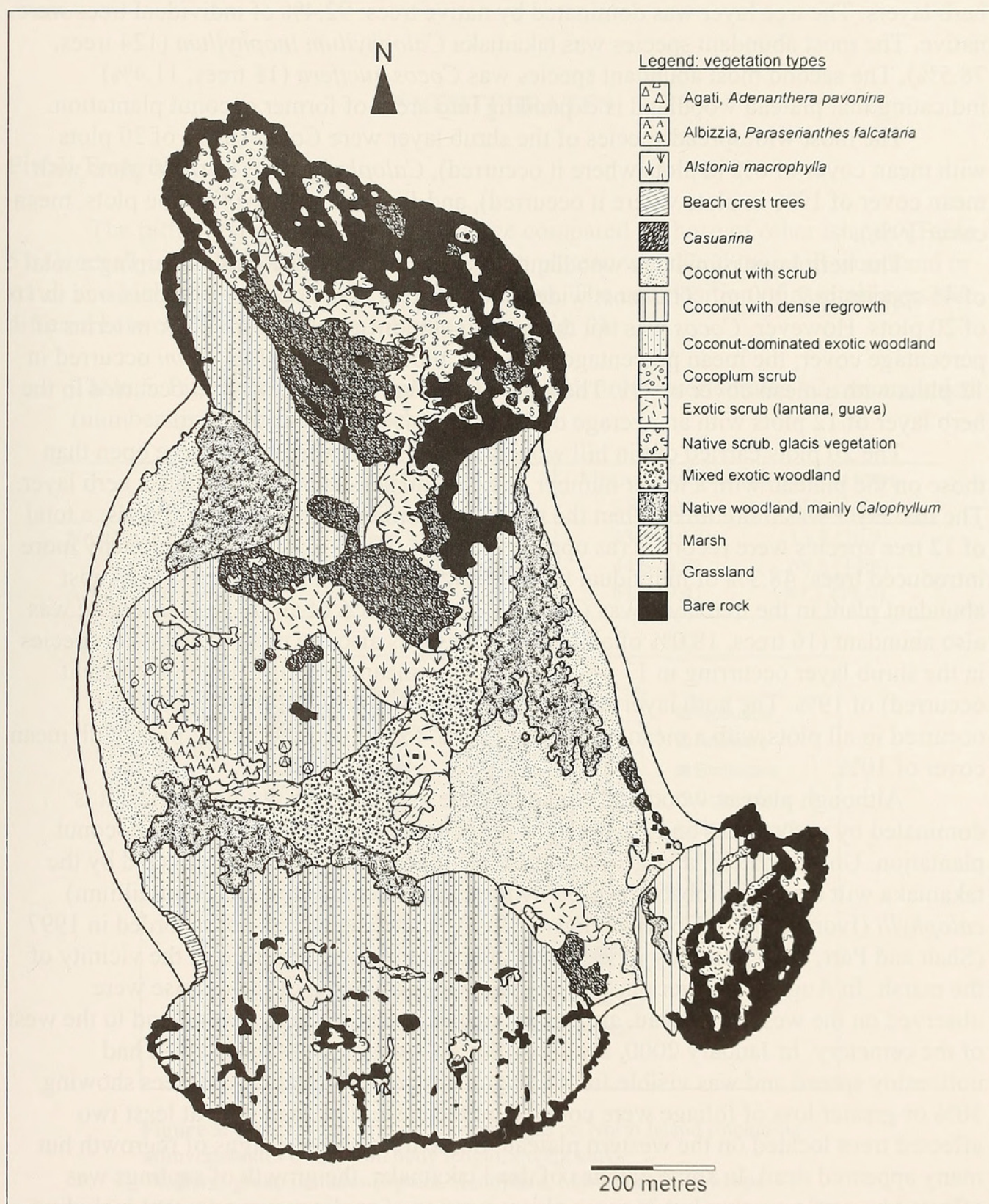
Table 3. Extent of major vegetation types, North Island.

Vegetation type		Approx. area (ha)
<b>Hill</b> (>10 m asl)	Woodland (predominantly native)	4
	Woodland (predominantly introduced)	86
	Coconut with regeneration	2
	Scrub (mixed)	12
	Scrub (introduced)	9
	Bare rock	22
<b>Plateau</b> (<10 m asl)	Woodland (predominantly native)	12
	Woodland (predominantly introduced)	12
	Coconut with regeneration	28
	Scrub (introduced)	2
	Beach crest vegetation	< 1
	Freshwater marsh	1
	Grassland/garden	3
	Bare rock	9

Table 4. Vegetation plot summary.

Habitat	Plots	Mean altitude (m asl)	Mean trees ha <sup>-1</sup>	Mean shrub layer cover (%)	Mean herb layer cover (%)	Open leaf litter cover (%)	Bare rock (%)	Dead wood (pieces per plot)
Plateau woodland	20	<5	785	31.2	33.5	60.8	1.8	0.3
Hill woodland	20	54.6	445	25.9	52.4	18.3	29.7	0.4





**Figure 2.** North Island vegetation.



Plateau woodland plots had a relatively high density of trees and sparse shrub and herb layers. The tree layer was dominated by native trees: 92.4% of individual trees were native. The most abundant species was takamaka *Calophyllum inophyllum* (124 trees, 78.5%). The second most abundant species was *Cocos nucifera* (18 trees, 11.4%) indicating that plateau woodland is expanding into areas of former coconut plantation.

The most widespread species of the shrub layer were *Cocos* (in 17 of 20 plots with mean cover of 6% in plots where it occurred), *Calophyllum* (in 15 of 20 plots with mean cover of 19% in plots where it occurred), and *Psidium guajava* (in nine plots, mean cover 19%).

The herb layer of plateau woodland was relatively species-rich containing a total of 45 species in 2,000 m<sup>2</sup>. The most widespread species was *Cocos*, which occurred in 16 of 20 plots. However, *Cocos* was not the major component of the herb layer in terms of percentage cover; the mean percentage cover per plot was 4%. *Calophyllum* occurred in 12 plots with a mean cover of 4%. The native fern *Nephrolepis biserrata* occurred in the herb layer of 12 plots with an average of 24% plot cover where it occurred.

The 20 plots carried out in hill woodland and scrub were much more open than those on the plateau with a lower number of trees and shrubs but with a dense herb layer. The tree layer was more mixed than the takamaka-dominated plateau woodlands; a total of 12 tree species were recorded (as opposed to eight on the plateau) but had many more introduced trees; 48.3% of individual trees belonged to introduced species. The most abundant plant in the tree layer was *Cocos* (35 trees, 39.3% of all trees). *Casuarina* was also abundant (16 trees, 18.0% of all trees). *Cocos* was also the most widespread species in the shrub layer occurring in 17 of 20 plots with a mean coverage (in plots where it occurred) of 19%. The herb layer was dominated by *Nephrolepis biserrata*, which occurred in all plots with a mean coverage of 39%. *Cocos* occurred in 12 plots with mean cover of 10%.

Although plateau woodland contains some introduced fruit tree species, it is dominated by native trees and shows signs of natural expansion into areas of coconut plantation. Unfortunately, a large number of takamaka trees have been affected by the takamaka wilt disease, probably caused by the fungus *Leptographium* (*Verticillium*) *calophylli* (Ivory *et al.*, 1996; Wainhouse, 1998). This disease was not recorded in 1997 (Shah and Parr, 1997). In May 1999, a few infected trees were noticed in the vicinity of the marsh. In August, a larger number of trees with symptoms of the disease were observed on the western plateau, around the marsh and in takamaka woodland to the west of the cemetery. In January 2000, the area of infection on the eastern plateau had noticeably spread and was visible from Congoment peak. A total of 126 trees showing 50% or greater loss of foliage were counted on the eastern plateau with at least two affected trees located on the western plateau. Some trees showed signs of regrowth but many appeared dead. In some patches of dead takamaka, the growth of saplings was affected by cattle grazing but in some places a range of saplings were present including *Alstonia*, *Chrysobalanus*, *Calophyllum*, *Terminalia* and fruit trees. The worst-affected forest areas were inland, with few beach-crest trees suffering symptoms. Takamaka wilt disease probably spread to North Island from Silhouette.

Most of the hill has *Cocos*-woodland dominated by palms and introduced species occurring at low densities. On the northern hills, some of the older palms show signs of



blackening that probably occurred in the 1972 fire, showing that some trees survived this event.

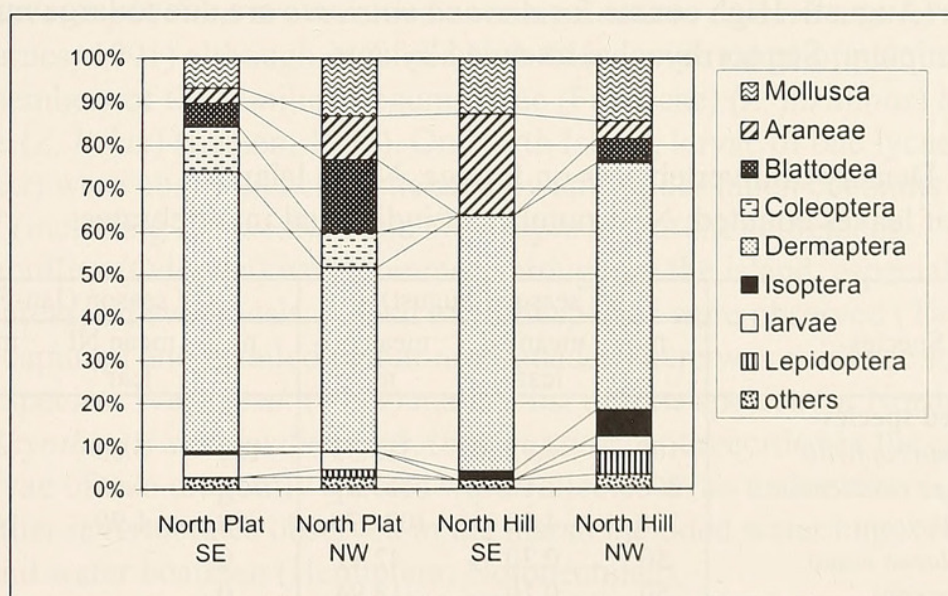
## INVERTEBRATES

### Pitfall Trapping

The pitfall trap assemblages were large compared to those of other islands (Table 5). Generally, pitfall assemblages were larger in plateau woodland than hill woodland or scrub and higher in the northwest monsoon season. The composition of assemblages also differed between the plateau and hill woodland (Fig. 3).

Table 5. Pitfall assemblages from North Island: only invertebrates >2 mm included. (numbers in parentheses = excluding ants).

Habitat		Mean no. individuals per five traps	
		SE season	NW season
North	Plateau woodland	93.5 (16.2)	113.3 (20.9)
	Hill woodland/scrub	44.6 (4.7)	68.5 (14.6)
All granitic islands		61.8 (9.4)	61.1 (16.0)



**Figure 3.** Composition of pitfall assemblages on North Island (including all invertebrates over 2 mm body length, except ants).

“Others” group includes Diptera, Hemiptera, Myriapoda, and wasps (Hymenoptera, exc. ants).

Plateau woodland sites were dominated by ants which made up 72% of pitfall assemblages. The most abundant species was the native *Technomyrmex albipes* (35% of individuals) followed by *Odontomachus troglodytes*, which formed 31% of all individuals. Assemblages excluding ants were dominated by Dermaptera (earwigs) which made up 43% of plateau assemblages in the northwest monsoon season and 65% in the



southeast season. Blattodea (cockroaches) were also abundant on the plateau, forming up to 17% of the assemblage (in the northwest season).

Hill sites were also dominated by earwigs, which formed 58-60% of the assemblage. Araneae (spiders) made up a larger part of the hill assemblage but cockroaches were less important.

The crazy ant *Anoplolepis gracilipes* was not collected in pitfall assemblages suggesting that this introduced pest species is not present on the island. Since its arrival in Seychelles in the early 1960s (Haines *et al.*, 1994), this ant has been introduced to many islands including Marianne and Félicité. On Bird Island especially high concentrations of ants have caused tree death (Hill, in prep.) and the eradication of native reptiles from large parts of the island (Feare, 1999). If North Island is free of crazy ants as these data suggest, it is important that efforts are made to prevent invasion.

### Leaf-insect Counts

Leaf-insect counts were carried out for 13 tree and shrub species, seven of these in both seasons (Table 6). Six of the trees surveyed in both seasons had higher leaf counts in the August survey; only one had higher counts in the north west monsoon (Jan-Feb). As found on some other islands, the highest counts were for the shrub *Morinda citrifolia* (status uncertain-possibly introduced; Friedmann, 1994). *Morinda* is uncommon on North Island. Some introduced fruit tree species show exceptionally high counts, particularly in the dry season (August). High counts for *Annona muricata* are due to large numbers of soft bugs (Hemiptera; Sternorrhyncha) attended by ants.

Table 6. Density of invertebrates on foliage, North Island.  
n = no. of leaves counted; NI = number of individual invertebrates.

Species	SE season (August)			NW season (Jan-Feb)		
	n	mean NI leaf <sup>-1</sup>	mean NI m <sup>-2</sup>	n	mean NI leaf <sup>-1</sup>	mean NI m <sup>-2</sup>
<b>Introduced species</b>						
<i>Alstonia macrophylla</i>	100	4.95	385.33	150	5.85	444.95
<i>Anacardium occidentale</i>	300	1.12	167.51	350	0.66	84.44
<i>Annona muricata</i>	300	4.00	1024.79	800	1.90	452.52
<i>Chrysobalanus icaco</i>	50	0.20	42.11	0		
<i>Ixora finlaysoni</i>	50	0.10	18.94	0		
<i>Mangifera indica</i>	150	0.31	62.62	100	0.32	55.88
<i>Psidium cattleianum</i>	0			350	0.09	20.97
<i>Psidium guajava</i>	200	0.98	267.56	450	0.44	118.79
<i>Tabebuia pallida</i>	0			300	1.29	226.30
<b>Native species</b>						
<i>Calophyllum inophyllum</i>	650	1.45	188.95	1350	1.40	167.13
<i>Ficus lutea</i>	310	8.76	616.31	150	4.73	338.74
<i>Terminalia catappa</i>	150	3.62	58.43	0		
<b>Status unknown</b>						
<i>Morinda citrifolia</i>	150	65.75	5571.75	0		



## Malaise Trapping

Malaise trapping was carried out in hill and plateau woodland habitats in both seasons. Four Malaise traps (two in each habitat) were run in August 1999 and four in January/February 2000. Assemblages were larger in August (mean number of individuals (NI) = 830) than in Jan/Feb (mean NI = 346), but there was no consistent pattern between habitats. In August catches were higher on the plateau, and in January on the hill.

Malaise trap assemblages included members of 12 invertebrate orders. In both seasons, the Diptera dominated assemblages (Diptera accounted for 80.3% of individuals in August, 66.7% in Jan/Feb). Other important orders included Lepidoptera (9.2% of assemblage in August, 8.0% in Jan/Feb) and Hymenoptera (5.9% of the assemblage in August, 16.5% in Jan/Feb).

## Observation

A list of species observed or collected is given in Tables 7 and 8. Most invertebrates observed on North Island were of introduced or cosmopolitan species. In contrast to a previous recent list (Shah & Parr, 1997), no endemic species of butterfly (Lepidoptera, Rhopalocera) were recorded, suggesting that none are resident on the island. One lycaenid species, *Zizula hylax*, was present in extremely large numbers on plateau grassland/scrub habitats. This species, together with another of the lycaenids collected, *Leptotes pirithous* are recorded as using *Lantana camara* as a larval food plant (Davis & Barnes, 1991) although in Africa both take a wide range of plant species, especially members of the families Leguminosae (Fabaceae) (*L. pirithous*) and Acanthaceae (*Z. hylax*) (Larsen, 1996). On North Island, larvae of one lycaenid species (?*Zizula hylax*) were observed being attended by ants under fallen coconuts in short-cropped turf (including *Desmodium* and *Stenotaphrum*) at the settlement.

Dragonflies (Odonata) were common throughout the island, especially close to the wetland areas, on every visit. A total of eight species were observed (Table 7) most of which were captured and detailed colour notes made. There was evidence for breeding of at least four species. Wain *et al.* (1999) made a list of nine species for North Island (including *Rhyothemis semihyalina* and *Anax guttatus*, not recorded in the present survey). Larvae of two dragonfly species were collected in an underwater light trap in February. Other invertebrates observed in the marsh included water bugs (Hemiptera: ?Veliidae) and water boatmen (Hemiptera; Notonectidae).

Table 7. Invertebrates: Odonata.

		Evidence for breeding	Dates
Coenagrionidae	<i>Ceriagrion glabrum</i> (Burmeister, 1839)	Egg laying, August	August
	<i>Ischnura senegalensis</i> (Rambur, 1842)	-	January
Aeshnidae	<i>Hemianax ephippiger</i> (Burmeister, 1839)	-	August
Libellulidae	<i>Diplocodes trivialis</i> (Rambur, 1842)	Egg laying, January	August, January
	? <i>Pantala flavescens</i> (Fabricius, 1798)	-	January
	? <i>Orthetrum stemmale wrightii</i> (Selys, 1869)	-	August, January
	<i>Tholymis tillarga</i> (Fabricius, 1798)	Egg laying, January	August, January
	<i>Tramea limbata</i> (Selys, 1869)	Egg laying, January	August, January



Table 8. Invertebrates observed, excluding Odonata.

Order	Family	Species	Notes
<b>Mollusca:</b>			
Gastropoda	Subulinidae	<i>Lamellaxis ?javanicum</i> (Reeve)	In pitfall traps
		? <i>Opeas</i> sp.	In pitfall traps
		<i>Subulina octona</i> Bruguière, 1792	In pitfall traps
<b>Crustacea:</b>			
Decapoda	Coenobitidae	<i>Coenobita brevimanus</i> Dana, 1852	On beaches
	Ocypodidae	<i>Ocypode ceratophthalmus</i> (Pallas, 1772)	
		<i>Ocypode cordimana</i> Desmarest, 1825	
<b>Arachnida:</b>			
Scorpiones	Buthidae	<i>Isometrus maculatus</i> (de Geer, 1778)	
Araneae	Tetragnathidae	<i>Nephila inaurita</i> (Walckenaer, 1841)	
<b>Myriapoda:</b>			
Diplopoda	Trigoniulidae	<i>Spiromanes braueri</i> (Attems, 1900)	In pitfall traps
Chilopoda	Geophilidae	? <i>Mecistophalus</i> sp.	In pitfall traps
	Scolopendridae	<i>Scolopendra subspinipes</i> Leach, 1918	Observed eating skink
<b>Insecta:</b>			
Coleoptera	Scarabaeidae	<i>Oryctes monoceros</i> (Olivier, 1789)	
Diptera	Chironomidae	?	Larvae in marsh
Hemiptera	Cicadoidea	? <i>Antankaria</i> (Chremistica) <i>pulverulenta</i> (Distant, 1905)	Heard on E. plateau, Jan.
	Notonectidae	Water boatman	Observed in marsh, August
	?Veliidae	Water bug	Specimens collected, May
Hymenoptera	Anthophoridae	<i>Xylocopa caffra</i> (Linnaeus, 1767)	
	Apidae	<i>Apis mellifera adansoni</i> Latreille 1804	
	Formicidae	<i>Camponotus hova</i> Forel, 1891	In pitfall traps
		<i>Cardiocondyla emeryi</i> Forel, 1881	In pitfall traps
		<i>Monomorium ?fossulatum</i> Emery, 1894	In pitfall traps
		<i>Odontomachus troglodytes</i> Santschi, 1914	In pitfall traps
		<i>Plagiolepis ?alluaudi</i> Emery, 1894	In pitfall traps
		<i>Tapinoma melanocephalum</i> (Fabricius, 1793)	In pitfall traps
		<i>Technomyrmex albipes</i> (F. Smith, 1861)	In pitfall traps
		<i>Technomyrmex ?foreli</i> Emery, 1893	In pitfall traps
		<i>Tetramorium bicarinatum</i> (Nylander, 1846)	In pitfall traps
Lepidoptera	Vespidae	<i>Polistes olivaceus</i> (de Geer 1773)	
	Lycaenidae	<i>Zizula hylax</i> Fabricius, 1775	Abundant, grassland
		<i>Zizeeria knysna</i> Trimen, 1862	Abundant, grassland
		<i>Leptotes pirithous</i> Linnaeus, 1767	Abundant, grassland
	Hesperiidae	<i>Borbo</i> sp.	Abundant, grassland

## VERTEBRATES

### Reptiles and Amphibians

Five terrestrial reptiles and one amphibian were observed (Table 9). At least three of these species are introduced on North Island. Since breeding seabirds occurred there in the recent past, it is likely that Wright's skink *Mabuya wrightii* also occurred on the island at least until alien mammals were established.



In addition to the land reptiles, two sea turtle species breed on the beaches of North Island: green sea turtle *Chelonia mydas* (L.) and hawksbill *Eretmochelys imbricata* (L.). Tracks of the latter species were observed on the western beach in August. One of the native land tortoise species of the granitic Seychelles was recorded on North Island in 1609 and again in 1787, but the species had become extinct by 1875 (Bour, 1984). The Aldabra giant tortoise was introduced to the island in the twentieth century and a few large free-ranging individuals were present at the time of the survey. There was also evidence of successful breeding; two young tortoises (both with plastron length under 10 cm) were found.

Table 9. Reptiles and amphibians, North Island.

Status: E =endemic, I = introduced, N = native (in central Seychelles).

Family	Species		Status
<b>Amphibians</b>			
Raniidae	<i>Ptychadaena mascareniensis</i> (Dumeril & Bibron, 1836)	Mascarene frog	?I
<b>Reptiles</b>			
Gekkonidae	<i>Gehyra mutilata</i> (Wiegmann, 1835)	Pacific house gecko	I
	<i>Phelsuma</i> sp. [? <i>P. longinsulae</i> (Rendahl, 1939)]	day gecko	E
Scincidae	<i>Mabuya sechellensis</i> (Dumeril & Bibron, 1836)	Seychelles skink	E
Testudinidae	<i>Geochelone gigantea</i> (Schweigger, 1812)	Aldabra giant tortoise	I
Typhlopidae	<i>Ramphotyphlops braminus</i> (Daudin, 1803) Robb, 1966	Brahminy blind snake	I

## Birds

In total, 17 land birds and waders were recorded (Table 10). Three endemic species were observed; two of these (Seychelles sunbird and kestrel) undoubtedly breed on the island but one (Seychelles swiftlet) was only recorded for a few days, and these birds were probably temporary visitors from Mahé (the species is absent from Silhouette; Rocamora and Skerrett, 2001). Two of the introduced bird species recorded, barn owl and common mynah, are potential nest predators of endemic birds. Barn owls were regularly observed on the island (by day and night), and 11 pellets were retrieved from one roost site. None of the pellets contained bird remains; all included rat bones and hair and three pellets had small pieces of cockroach (*Periplaneta* sp.) exoskeleton.

In addition to sight records, tape playback was used to give data on presence or absence of four species. In both August 1999 and January 2000, calls of black paradise flycatcher *Terpsiphone corvina*, Seychelles white-eye *Zosterops modestus*, Seychelles scops owl *Otus insularis* and barn owl *Tyto alba* were played. There was a positive response for only one of these species, the barn owl (two birds flew to a palm close to the tape when calls were played on the night of 31/1/00).



Table 10. Land birds and waders recorded, North Island.

M = migrant species; E = species endemic species.

Species		Notes
<i>Butorides striatus</i>	Green-backed heron	Common at marsh. One nest on Congoment May
<i>Nycticorax nycticorax</i>	Black-crowned night heron	One individual observed on eastern plateau, 10/5/99
<i>Falco araea</i> E	Seychelles kestrel	At least one pair, around Congoment (above settlement)
<i>Gallus gallus</i>	Domestic (feral) chicken	At least seven birds present (R. Slater-Jones, <i>pers. comm.</i> )
<i>Gallinula chloropus</i>	Common moorhen	Abundant at marsh (at least 30 individuals)
<i>Dromas ardeola</i> M	crab plover	One individual, 30/1/00 and 1/2/00
<i>Pluvialis squatarola</i> M	grey plover	One on E. beach 23/8/99.
<i>Numenius phaeopus</i> M	Whimbrel	Two or more individuals, on beaches, January One regularly at marsh and E. beach (August). Several, marsh and beaches (January)
<i>Calidris alba</i> M	Sanderling	One individual with other shore birds, Grande Anse, January
<i>Arenaria interpres</i> M	Ruddy turnstone	One, in marsh, 7/5/99. Several on beaches, January
<i>Geopelia striata</i>	Barred ground dove	Common on plateau
<i>Streptopelia picturata</i>	Madagascar turtle dove	Very common on plateau, especially in plateau and low hill woodland
<i>Tyto alba</i>	barn owl	One individual seen on Bernica, pellets found in two locations (May). One individual in two locations by day (Bernica and Basin Jean), pellets collected (August). Heard regularly from settlement (January), two individuals responding to taped call 31/1/00, marsh.
<i>Collocalia elaphra</i> E	Seychelles swiftlet	Two individuals flying over settlement for several days in August.
<i>Nectarinia dussumieri</i> E	Seychelles sunbird	Rarely observed. One group of five seen on Bernica (May)
<i>Acridotheres tristis</i>	Common mynah	Common on plateau, especially in plateau coconut plantation
<i>Foudia madagascariensis</i>	Madagascar fody	Occurring throughout the island, particularly glacis. Three nests observed. Occasionally in large groups (12-15).

Table 11. Seabirds observed on North Island.

Species		Notes
<i>Phaeton lepturus</i>	white-tailed tropicbird	Several observed flying over the island, especially on the North and West sides of Grand Paloss.
<i>Fregata</i> sp.	(?great) frigatebird	Large group of frigatebirds (40 or more) observed in flight over Grand Paloss, January (KH).
<i>Anous tenuirostris</i>	lesser noddy	One dead individual on western plateau (?shot), May 99. Feeding flock of noddies (?common or lesser) observed off eastern beach August 99.
<i>Gygis alba</i>	fairy tern	One observed at sea off eastern coast, May 99: several observed in a feeding flock of noddies, off eastern beach August 99.



Although the presence of guano deposits on North Island suggests that colonies of seabirds occurred in the past, few seabird species were observed in the current survey (Table 11), and there was no evidence of breeding in any species.

## Mammals

Mammals observed in the course of fieldwork were recorded (Table 12). In addition, rodent trapping was carried out in May and August 1999 and January 2000 (Table 13). On all occasions, only one species of rodent, the ship rat *Rattus rattus*, was trapped. Two traplines were established, one in coconut plantation on the eastern plateau (on DOS map of North Island, series DOS 104, edition 1-DOS 1976, grid ref. CL 0580 1428 – CL 0550 1425), and one in hill woodland (grid ref. CL 0513 1420 – CL 0495 1414). Trapping rates were highest in May, with very low rates in January/February. This observation fits the trend for rats to be more easily trapped in the dry season when water and food stress is more acute (Merton, 1999).

Rats have a considerable conservation impact as do several other species present on the island including cats (as predators of vertebrates) and cattle. The herd of feral cattle on North Island (numbering about 30 individuals) has a great impact upon plateau ecosystems, destroying beach-crest vegetation (especially *Scaevola*) and freshwater vegetation (through grazing on *Typha* when marsh water levels are low), and causing physical disturbance and eutrophication of the marsh. Overgrazing and selective grazing may have favoured the establishment of an understorey of *Lantana* over much plateau grassland and the animals are responsible for distributing guava *Psidium guajava* around the plateau. Cattle also appear to have inhibited succession in some areas including the marsh and woodland habitats where heavy grazing and disturbance by cattle must have restricted the regeneration of *Cocos*. These effects are not entirely detrimental; disturbance of the marsh has probably prevented successional change and browsing affects mainly introduced species. However, if habitat restoration were to be initiated, cattle would have to be removed. In this case, an increase in the number of land tortoises would help to maintain open water in the marsh.

Table 12. Mammals observed, North Island.

Species	Status
<i>Bos taurus</i> L.	20-30 individuals
<i>Felis catus</i> L.	several individuals observed around settlement, one individual caught in rat trap 1/2/00
<i>Mus domesticus</i> Ruty, 1772	not trapped on island, but a single individual found in grocery box prior to disembarkation to island May 2000
<i>Pteropus seychellensis</i> Milne Edwards 1887	common throughout the island
<i>Sus domesticus</i> Erxleben, 1777	at least one individual survived in 2000: not seen, but signs observed
<i>Rattus rattus</i> L.	abundant



Table 13. Results of rat trapping.

Dates	Trap-nights	No. of rats	Rats per 100 trap-nights (uncorrected)	Rats per 100 trap-nights (corrected)*
14/5 – 19/5/99	47	38	74.5	-
23/8 – 28/8/99	140	39	27.9	33.8
27/1 – 1/2/00	140	5	3.6	3.8

\*Corrected to account for the effect of closed traps; Cunningham and Moors, 1996.

## DISCUSSION

North Island has been radically changed by human activities. Repeated fire, the early introduction of rats (prior to permanent human settlement) and plantation agriculture together destroyed almost all natural vegetation and nesting seabird colonies. The endemic flora and fauna (which originally included giant tortoises) were largely eliminated by these factors with only a small number of native and endemic species surviving (some of these species, such as takamaka *Calophyllum inophyllum* and *Ochrosia oppositifolia* probably owe their present abundance or occurrence to deliberate planting). The remaining endemic flora of the island is equivalent to that of a far smaller island.

Although little remains of the original vegetation of the island, the Jemo series soils of the eastern plateau suggest that this area was formerly covered with *Pisonia grandis* forest and supported breeding colonies of seabird (Fosberg, 1954). Lower hill slopes would probably have included species such as takamaka *Calophyllum inophyllum*, *Mimusops sechellarum*, *Ficus lutea* and *Ficus reflexa*. Native scrub on upper slopes would have included a number of shrub species no longer found on the island.

At the time of the survey, the island was dominated by coconut and introduced trees and shrubs. The only areas of semi-natural vegetation were hill glacia vegetation and the plateau takamaka forests. Glacia vegetation had been heavily invaded by introduced species, and was poor in native taxa. The plateau takamaka forest was threatened by wilt disease and invasion by introduced tree species. Plateau takamaka forests probably offer the most suitable habitat on the island for Seychelles magpie-robin. Some introduced tree species support large numbers of invertebrates on their foliage (especially mealy bugs and scale insects) so they could be valuable for small insectivorous endemic birds such as the Seychelles white-eye. However, introduced plants tend to be invasive, displacing native plants and generally supporting introduced and pantropical invertebrates, rather than endemic invertebrate species.

## CONSERVATION RECOMMENDATIONS

Despite its current condition, North Island has great potential for the conservation of endemic birds (and other taxa). Its large coastal plateau area and marsh system, if appropriately restored, would provide suitable conditions for a number of endangered endemic species including Seychelles' rarest land bird the magpie-robin and, with



appropriate habitat restoration, the Seychelles black paradise flycatcher, currently restricted to La Digue and Marianne.

Although, at the time of the survey described, the island was abandoned and uninhabited, it had been purchased for the development of a tourist resort and concurrent habitat restoration with the aim of introducing some endemic bird species. Development has now begun on the island. Major conservation actions that must be undertaken before such translocations can occur are outlined below:

#### 1) Control of introduced animals

Ship rats, cats and barn owls must be removed before bird introductions can take place. Cattle should be removed, or controlled, before attempting vegetation rehabilitation.

#### 2) Rehabilitation of coconut plantation

Former plantation areas on coastal plateaux should be cleared of invasive shrubs and coconut palms and succession to native-dominated forest encouraged.

#### 3) Clearing invasive plant species

Hill woodland is of lesser conservation importance. However, as it is dominated by exotic species and coconut palms, it acts as a reservoir of seed for invasion of lowland forest. Exotic species growing on the hills should be removed and replaced with native species such as *Ficus* spp. The most invasive species (e.g. *Alstonia macrophylla*) should be targeted. *Clidemia hirta* (at the time of the survey, restricted to a few plants on the plateau) should be destroyed before it becomes established. Some alien fruit trees have high invertebrate counts on foliage: less invasive species could be left to provide a food source for endemic insectivorous birds.

#### 4) Control of takamaka wilt

Takamaka wilt disease was already well established on North Island in 2000, and control would be difficult or impossible. However, affected trees should be removed to allow areas of forest which have been badly affected (e.g., on the east plateau) to be planted with other native species (probably *Terminalia catappa*).

#### 5) Replanting

To encourage rapid succession to native forest (especially where takamaka wilt has taken hold) replanting should be considered. Some species should be reintroduced including *Pisonia grandis*, *Morinda citrifolia* and *Mimusops sechellarum*.

Beach crest vegetation (especially *Scaevola sericea*) should be replanted. Beach crests have been particularly badly grazed by cattle. Replanting will provide shelter for inland plantings and inhibit coastal erosion.

#### 6) Animal reintroductions

The large ground invertebrate assemblages suggest that food supply would be adequate for Seychelles magpie-robin *Copsychus sechellarum*. Old plateau takamaka forest would have provided an ideal foraging habitat, due to its open structure. However, this habitat is threatened by takamaka wilt disease. Replanting of the takamaka area



should use *Terminalia catappa* or other native species which support dense populations of invertebrates.

Leaf-invertebrate counts were also particularly high on North Island, including on introduced trees. Birds that feed by gleaning invertebrates from leaves, including Seychelles warbler *Acrocephalus sechellensis*, Seychelles white-eye *Zosterops modestus* and black paradise flycatcher *Terpsiphone corvina* could be introduced. Leaf-invertebrates were dominated by soft bugs (mainly mealy bugs) and ants but the Seychelles white-eye has been observed feeding on mealy bugs (Feare, 1975) and the warbler on ants (Bathe, 1982). These bird species would be particularly appropriate for reintroduction.

The Seychelles blue pigeon *Alectroenas pulcherrima* was not observed on the island; North Island was the only one of the granitic islands visited where this species appeared to be absent. Although not endangered, this endemic species could be introduced if native fruit trees and shrubs were planted (for example, *Canthium bibracteatum*).

Reptiles that should be considered for reintroduction include the Seychelles terrapins *Pelusios castanoides* or *P. subniger*, provided that sustained searches for the species demonstrate that it is absent. The North Island herd of *Geochelone gigantea* could be supplemented to fill the ecological role of cattle.



## Appendix 1. Plant species recorded from North Island

Taxonomy of dicotyledons as given by Friedmann (1994). Of monocotyledons, as in Robertson (1989). Families arranged in alphabetical order.

Status: E = Endemic; N = Native; I = Introduced.

Abundance: A = Abundant (>1000 individuals observed); C = Common (100 – 1000 individuals observed); F = Frequent (10 – 100 individuals observed); Occasional (3 – 10 individuals observed); R = Rare (1 or 2 individuals observed).

Habitats: Se = Settlement area (on buildings); PG = Plateau grassland; PW = Plateau woodland; HW = Hill Woodland; Gl = Glacis; BC = Beach Crest; Ma = Marsh.

Prior records (in notes): 1 = in Robertson, 1989; 2 = Shah and Parr, 1997.

	Species	Status	Abund.	Habitats	Notes
<b>PTERIDOPHYTA</b>					
Adiantaceae					
1	<i>Acrostichum aureum</i> L.	N	O	BC, Gl	
2	<i>Pellaea ?doniana</i> Hooker	N	O	HW, Gl	
3	<i>Pteris tripartita</i> Sw.	?	O	PW	
4	<i>Pteris vittata</i> L.	I	R	Se	
Aspleniaceae					
5	<i>Asplenium</i> sp. (cf. <i>A. pellucidum</i> Lam.)	N	O	HW	
6	<i>Pityrogramma calomelanos</i> (L.) Link.	N	C	HW	
Davalliaceae					
7	<i>Davallia denticulata</i> (Burm.) Mett.	N	R	HW	
8	<i>Nephrolepis biserrata</i> (Sw.) Schott	N	A	HW, PW, Gl, [PG]	
Parkeriaceae					
9	<i>Ceratopteris cornuta</i> (Pal.) Lepr.	N	F	Ma	
Polypodiaceae					
10	<i>Phymatosorus scolopendria</i> (Burm. f.)	N	A	HW, PW	
Psilotaceae					
11	<i>Psilotum nudum</i> Sw.	N	F	HW, PW	
Thelypteridaceae					
12	? <i>Thelypteris</i> sp.	?N	R	PW	
<b>GYMNOSPERMAE</b>					
13	<i>Cycas thuarsii</i> Gaud.	I	R	PG	
<b>ANGIOSPERMAE: Dicotyledons</b>					
Acanthaceae					
14	<i>Asystasia</i> sp. B ( <i>sensu</i> Friedmann)	?I	A	Gl	
	<i>Asystasia gangetica</i> (L.) T. Anders.	?	-	-	Prior record <sup>1</sup> ; = <i>A.</i> sp. B?
15	<i>Justicia gendarussa</i> Burm. f.	?I	R	PW	
Aizoaceae					
16	<i>Glinus oppositifolius</i> (L.) A. DC.	?N	A	Ma	
Amaranthaceae					
17	<i>Achyranthes aspera</i> (L.) DC.	I	O	HW	
	<i>Amaranthus dubius</i> Thell.	I	-	-	Prior record <sup>1</sup>
18	<i>Alternanthera sessilis</i> L. DC.	I	C	Ma	
19	<i>Amaranthus viridis</i> L.	I	O	Ma	



	Species	Status	Abund.	Habitats	Notes
Anacardiaceae					
20	<i>Anacardium occidentale</i> L.	I	A	HW	
21	<i>Mangifera indica</i> L.	I	F	PW, [HW]	
22	<i>Spondias cytherea</i> Sonn.	I	O	PW	
Annonaceae					
	<i>Annona cherimola</i> Mill.	I	-	-	Prior record <sup>1</sup>
23	<i>Annona muricata</i> L.	I	A	PW	
24	<i>Annona reticulata</i> L.	I	F	PW	
25	<i>Annona squamosa</i> L.	I	O	PW	
Apocynaceae					
26	<i>Alstonia macrophylla</i> Wall ex G. Don.	I	A	HW	
27	<i>Catharanthus roseus</i> (L.) G. Don.	I	C	PG, Gl [HW]	
28	<i>Nerium oleander</i> L.	I	O	PG	
29	<i>Ochrosia oppositifolia</i> (L.) K. Schum.	N	F	PW, Gl	
30	<i>Plumeria rubra</i> L.	I	C	HW	
31	<i>Tabernaemontana coffeoides</i> Boj. ex A. DC.	N	C	Gl	
Asclepiadaceae					
32	<i>Sarcostemma viminale</i> (L.) Alton	N	F	Gl	
Bignoniaceae					
33	<i>Tabebuia pallida</i> (Lindl.) Miers.	I	A	PW, HW	
Boraginaceae					
34	<i>Cordia subcordata</i> Lam.	N	O	BC	
35	<i>Heliotropium indicum</i> L.	I	A	PG, PW, Ma	
Cactaceae					
36	<i>?Hylocereus undatus</i> (Haw.) Britt. & Rose	I	O	HW	
37	<i>Rhipsalis baccifera</i> (J. Mill.) Stearn.	N	R	Gl	
Caesalpinaceae					
38	<i>Caesalpinia bonduc</i> (L.) Roxb.	N	O	PW, HW	
39	<i>Delonix regia</i> (Hook.) Raf.	I	O	PG	
40	<i>Peltophorum pterocarpum</i> (DC.) Hayne	I	O	PW	
41	<i>Senna occidentalis</i> (L.) Link	I	C	PG, Ma	
42	<i>Tamarindus indica</i> L.	I	F	PG, PW, HW	
Capparidaceae					
43	<i>Cleome viscosa</i> L.	I	O	PG, Gl	
Caricaceae					
44	<i>Carica papaya</i> L.	I	R	PG	
Caryophyllaceae					
45	<i>Drymaria cordata</i> (L.) Roem. & Schult.	I	O	PW	
Casuarinaceae					
46	<i>Casuarina equisetifolia</i> J. R. & G. Foster	I	A	BC, HW	
Chrysobalanaceae					
47	<i>Chrysobalanus icaco</i> L.	I	A	HW, Gl	
Combretaceae					
48	<i>Terminalia catappa</i> L.	?N	C	PW, HW [BC]	
Compositae					
49	<i>Ageratum conyzoides</i> L.	I	O	PG, Ma	
50	<i>Emilia sonchifolia</i> (L.) Wight	I	F	Gl, PG	
51	<i>Melanthera biflora</i> (L.) Wild	?N	R	PG	
52	<i>Synedrella nodiflora</i> (L.) Gaertn.	I	C	PG, [Ma]	
53	<i>Tridax procumbens</i> L.	I	C	PG	



	Species	Status	Abund.	Habitats	Notes
54	<i>Vernonia cinerea</i> (L.) Less.	I	A	PG	
	Convulvulaceae				
55	<i>Ipomoea aquatica</i> Forssk.	I	O	Ma	
56	<i>Ipomoea mauritiana</i> Jacq.	?I	F	PG, PW, HW	
57	<i>Ipomoea pes-caprae</i> (L.) R. Br.	N	C	BC, Gl	
	Crassulaceae				
58	<i>Kalanchoe pinnata</i> (Lam.) Pers.	I	F	PG, HW	
	Cucurbitaceae				
59	<i>Momordica charantia</i> L.	I	R	PG	
60	<i>Trichosanthes cucumerina</i> L.	I	R	PG	
	Ebenaceae				
61	<i>Diospyros philippensis</i> (Desr.) Gürke	I	R	HW	
	Euphorbiaceae				
62	<i>Acalypha indica</i> L.	I	F	PG	
63	<i>Euphorbia hirta</i> L.	I	A	PG	
64	<i>Euphorbia ?hypericifolia</i> L.	?I	R	PG	
65	<i>Euphorbia thymifolia</i> L.	I	A	PG	
66	<i>Euphorbia tirucalli</i> L.	I	O	PG	
67	<i>Jatropha curcas</i> L.	I	F	PG, PW	
	<i>Manihot esculenta</i> Crantz	I	-	-	Prior record <sup>2</sup> ; now extinct?
68	<i>Phyllanthus amarus</i> Schumach. & Thonn.	I	F	PG, PW, HW	
69	<i>Phyllanthus pervilleanus</i> (Baillon) Müll. Arg.	N	C	HW, Gl	
70	<i>Phyllanthus urinaria</i> L.	I	F	PG	
	Goodeniaceae				
71	<i>Scaevola sericea</i> Vahl.	N	F	BC	
	Guttiferae				
72	<i>Calophyllum inophyllum</i> L.	N	A	PW, HW [BC]	
	Hernandiaceae				
73	<i>Hernandia nymphaeifolia</i> (Presl) Kubitzki	N	O	PG	
	Labiatae				
	<i>Leonotis nepetifolia</i> (L.) R. Br.	I	-	-	Prior record <sup>1</sup> ; now extinct?
74	<i>Leucas lavendulifolia</i> J. E. Sm.	I	F	PG, Gl	
75	<i>Ocimum basilicum</i> L.	I	R	Ma	
	<i>Ocimum gratissimum</i> L.	I	-	-	
76	<i>Plectranthus amboinicus</i> (Lour.) Spreng.	?I	O	HW, PG	
	Lauraceae				
	<i>Cinnamomum verum</i> Presl.	I	-	-	Prior record <sup>2</sup> ; if still present, very rare
77	<i>Persea americana</i> Mill.	I	R	PW	
	Lecythidaceae				
78	<i>Barringtonia asiatica</i> (L.) Kurtz	N	O	BC	
	Malvaceae				
79	<i>Abutilon indicum</i> (L.) Sweet	?I	R	PG	
80	<i>Hibiscus tiliaceus</i> L.	N	O	HW, Gl	
81	<i>Sida acuta</i> Burm. f.	I	A	PG, PW	
82	<i>Sida pusilla</i> Cav.	?N	F	PG, BC	
83	<i>Sida rhombifolia</i> L.	?I	C	PG	
	<i>Sida stipulata</i> Cav.	I	-	-	Prior record <sup>1</sup>



	Species	Status	Abund.	Habitats	Notes
84	<i>Urena lobata</i> L.	?I	O	PW	
	Melastomataceae				
85	<i>Clidemia hirta</i> (L.) D. Don.	I	O	HW	
	Meliaceae				
	<i>Sandoricum koetjape</i> (Burm. f.) Merrill	I	-	-	Prior record <sup>1</sup>
86	<i>Xylocarpus moluccensis</i> (Lam.) Roem.	N	O	BC	
	Mimosaceae				
87	<i>Adenanthera pavonina</i> L.	I	C	HW	
88	<i>Albizia lebbek</i> (L.) Benth.	I	F	HW	
89	<i>Paraserianthes falcataria</i> (L.) Niels.	I	C	HW	
	Moraceae				
90	<i>Artocarpus altilis</i> (Parkins.) Fosb.	I	F	PW	
	<i>Artocarpus heterophyllus</i> Lam.	I	-	-	Prior records <sup>1,2</sup>
91	<i>Ficus lutea</i> Vahl.	N	C	HW	
92	<i>Ficus reflexa</i> Thunb. ssp. <i>seychellensis</i> (Baker) Berg	E (ss)	O	HW	
93	<i>Ficus rubra</i> Vahl.	N	O	HW	
	Myrtaceae				
94	<i>Eugenia uniflora</i> L.	I	C	PW, Gl	
95	<i>Psidium cattleianum</i> Sabine	I	C	PW, HW	
96	<i>Psidium guajava</i> L.	I	A	PG	
97	<i>Syzygium malaccense</i> (L.) Merr. & Perry	I	F	PW	
	Nyctaginaceae				
98	<i>Boerhavia repens</i> L.	?N	C	PG	
	Onagraceae				
99	<i>Ludwigia erecta</i> (L.) Hara	I	F	Ma, Gl	
100	<i>Ludwigia octovalvis</i> (Jacquin) Raven	?I	A	Ma	
	Oxalidaceae				
101	<i>Averrhoa bilimbi</i> L.	I	C	PW, HW	
	Papilionaceae				
102	<i>Abrus precatorius</i> L.	?N	C	PG, PW	
103	<i>Canavalia cathartica</i> Thouars	N	F	HW, BC	
104	<i>Crotalaria retusa</i> L.	I	O	Gl	
105	<i>Desmodium incanum</i> DC.	I	A	PG	
106	<i>Desmodium triflorum</i> (L.) DC.	I	A	PG	
	<i>Indigofera suffruticosa</i> Mill.	I	-	-	Prior record <sup>1</sup>
107	<i>Teramnus labialis</i> (L.) Spreng.	I	C	PG	
	Passifloraceae				
108	<i>Passiflora foetida</i> L.	I	F	PG [HW]	
109	<i>Passiflora suberosa</i> L.	I	C	HW, PG	
	Polygonaceae				
110	<i>Antigonon leptopus</i> Hook. et Arn.	I	R	HW	
111	<i>Polygonum senegalense</i> Meisn.	?N	O	Ma	
	Portulacaceae				
112	<i>Portulaca oleracea</i> L.	?N	F	Ma	
	Rhamnaceae				
113	<i>Colubrina asiatica</i> (L.) Brogn.	N	O	PG, PW	
	Rubiaceae				
114	<i>Coffea canephora</i> Froehner	I	O	PW	
115	<i>Guettarda speciosa</i> L.	N	F	BC	
116	<i>Hedyotis goreensis</i> DC.	?I	O	Ma	
117	<i>Ixora finlaysonian</i> G. Don.	I	C	PW	
118	<i>Morinda citrifolia</i> L.	?I	C	Gl, HW	



	Species	Status	Abund.	Habitats	Notes
	<i>Pentodon pentandrus</i> (Schumach. & Thonn.)	I	-	-	Prior record <sup>1</sup>
119	<i>Vangueria madagascariensis</i> J. F. Gmel	I	C	PW, HW	
Rutaceae					
120	<i>Citrus aurantifolia</i> (Christ.) Swing.	I	O	PG, PW	
121	<i>Citrus aurantium</i> L.	I	O	PG	
122	<i>Citrus limon</i> (L.) Burm.	I	O	PG	
123	<i>Citrus medica</i> L.	I	O	PG, PW	
	<i>Citrus paradisi</i> Macfad.	I	-	-	Prior record <sup>1</sup>
124	<i>Citrus reticulata</i> Blanco	I	R	PG	
	<i>Citrus sinensis</i> (L.) Osbeck	I	-	-	Prior record <sup>1</sup>
125	<i>Murraya koenigii</i> (L.) Spreng.	I	R	PG	
Sapindaceae					
	<i>Cardiospermum halicacabum</i> L.	?N	-	-	Prior record <sup>1</sup>
Scrophulariaceae					
126	<i>Striga asiatica</i> (L.) O. Kuntze	?I	O	PG	
Solanaceae					
127	<i>Datura metel</i> L.	I	F	PG	
128	<i>Physalis angulata</i> L.	I	R	PW	
129	<i>Solanum americanum</i> Mill.	I	R	PG	
130	<i>Solanum lycopersicum</i> L.	I	R	PG	
Sterculiaceae					
131	<i>Heritiera littoralis</i> Ait.	N	O	PG	
Tiliaceae					
132	<i>Triumphetta rhomboidea</i> Jacq.	I	F	Gl	
Turneraceae					
133	<i>Turnera angustifolia</i> Miller	I	C	PG, PW, HW	
Umbelliferae					
134	<i>Centella asiatica</i> (L.) Urb.	?I	A	PG	
Verbenaceae					
135	<i>Lantana camara</i> L.	I	A	PG, Gl	
136	<i>Phyla nodiflora</i> (L.) Greene	I	A	Ma. PG	
137	<i>Stachytarpheta jamaicensis</i> (L.) Vahl.	I	F	PG	
138	<i>Stachytarpheta urticifolia</i> (Salisb.) Sims.	I	A	PW, HW	
<b>ANGIOSPERMAE: Monotyledons</b>					
Agavaceae					
139	<i>Furcraea foetida</i> (L.) Haw	I	F	PW, Gl	
Amaryllidaceae					
140	? <i>Crinum</i> sp.	?I	R	PG	
141	<i>Zephyranthes rosea</i> Lindl.	I	O	PG	
Araceae					
142	<i>Alocasia macrorrhiza</i> (L.) G. Don.	I	F	PW	
143	<i>Epipremnum pinnatum</i> (L.) Engl. Cv. Aureum	I	O	PW	
Bromeliaceae					
144	<i>Ananas comosus</i> (L.) Merr.	I	O	Gl	
Commelinaceae					
145	<i>Commelina benghalensis</i> L.	?I	C	Ma	
	<i>Commelina diffusa</i> Burm. f.	?I	-	-	Prior record <sup>1</sup>
Cyperaceae					
146	<i>Cyperus alopecuroides</i> Rottb.	?	O	Ma	
147	<i>Cyperus articulatus</i> L.	N	O	Ma	
148	<i>Cyperus compressus</i> L.	?	O	Gl	
149	<i>Cyperus rotundus</i> L.	?	A	PG	



	Species	Status	Abund.	Habitats	Notes
150	<i>Fimbristylis complanata</i> (Retz.) Link	?	C	Gl	
151	<i>Fimbristylis cymosa</i> R. Br.	?	A	PG	
152	<i>Fimbristylis</i> sp. (glacis sedge)	?	O	Gl	
153	<i>Kyllinga alba</i> Nees	?	F	PW	
154	<i>Kyllinga monocephala</i> Rottb.	?	C	Ma, PW	
155	<i>Kyllinga polyphylla</i> Willd. Ex Kunth	N	F	PG, Ma	
156	<i>Mariscus dubius</i> (Rottb.) Fischer	N	A	PG, Gl	
157	<i>Pycneus polystachyos</i> (Rottb.) P. Beauv.	?	C	Ma	
Gramineae					
	<i>Axonopus compressus</i> (L.) P. Beuv.	?	-	-	Prior record <sup>1</sup>
158	<i>Bambusa vulgaris</i> Scrad. Ex Wendl.	I	R	PG	
	<i>B. vulgaris</i> var. <i>aureo-variegata</i>	I	R	PG	
159	? <i>Brachiaria</i> sp.	?	O	PW	
160	<i>Chloris barbata</i> (L.) Sw.	?	C	PG	
161	<i>Chrysopogon aciculatus</i> (Retz.) Trin.	?	F	PG	
162	<i>Dactyloctenium ctenoides</i> (Steud.) Bosser	?	A	PG	
163	<i>Digitaria ?didactyla</i> Willd.	N	O	PG	
	<i>Digitaria radicata</i> (Presl.) Miq.	?	-	-	Prior record <sup>1</sup>
164	<i>Digitaria</i> sp.	?	F	PG	
165	<i>Echinochloa colonum</i> (L.) Link	?	C	PG, Ma	
166	<i>Eleusine indica</i> (L.) Gaertn.	?	A	PG	
167	<i>Eragrostis tenella</i> (L.) P. Beuv.	?	F	PG	
	<i>Eragrostis tenella</i> var. <i>insularis</i> Hubb.	?	C	PG	
168	<i>Lepturus radicans</i> (Steud.) Camus	?	F	PG	
169	<i>Oplismenus compositus</i> (L.) P. Beuv.	N	A	PW, HW	
170	<i>Panicum brevifolium</i> L.	N	A	HW, Gl	
171	<i>Paspalidium geminatum</i> (Forsk.) Stapf.	N	F	Ma	
172	<i>Paspalum conjugatum</i> Berg	N	O	PG	
173	<i>Paspalum scrobiculatum</i> L.	?	O	PG	
174	<i>Pennisetum polystachyon</i> (L.) Schult.	?	C	Gl	
175	<i>Rhynchelytrum repens</i> (Willd.) C. E. Hubb.	?	C	Gl	
	<i>Saccharum officinarum</i> L.	I	-	-	Prior record <sup>1</sup> ; now extinct?
	<i>Setaria barbata</i> (Lam.) Kunth.	?	-	-	Prior record <sup>1</sup>
176	<i>Sporobolus virginicus</i> (L.) Kunth.	N	F	BC, Gl	
177	<i>Stenotaphrum dimidiatum</i> (L.) Brogn.	N	A	PG	
	<i>Urochloa paspaloides</i> Presl.	?	-	-	Prior record <sup>1</sup>
Lemnaceae					
178	<i>Lemna</i> sp.	?	F	Ma	
Liliaceae					
	<i>Dracaena reflexa</i> Lam.	N	-	-	Prior record <sup>1</sup>
179	<i>Gloriosa superba</i> L.	I	O	PG, HW	
Marantaceae					
	<i>Maranta arundinacea</i> L.	I	-	-	Prior record <sup>1</sup>
Musaceae					
	<i>Musa</i> sp.	I	-	-	Prior records <sup>1,2</sup> ; now extinct?
Najadaceae					
180	<i>Najas ?australis</i> Bory ex Rendle	?	C	Ma	
Orchidaceae					
181	<i>Vanilla planifolia</i> Andrews	I	F	HW	
Palmae					
182	<i>Cocos nucifera</i> L.	N	A	PG, PW, HW, Gl	



	Species	Status	Abund.	Habitats	Notes
183	<i>Latania lontaroides</i> Gaertn.	I	F	PG	
184	<i>Phoenix</i> sp. (? <i>P. dactylifera</i> L.)	I	R	PG	
Pandaceae					
185	<i>Pandanus balfourii</i> Mart.	E	F	Gl, HW	
186	<i>Pandanus utilis</i>	I	R	PG	
Typhaceae					
187	<i>Typha javanica</i> Schnitz. ex Zoll.	N	A	Ma	
Zingiberaceae					
188	? <i>Zingiber zerumbet</i>	I	O	PW	





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