

HALF MOON CAYE

Belize

TERRESTRIAL SURVEY RESULTS and MANAGEMENT IMPLICATIONS

Report of field visit October 1995
Final report to the Belize Audubon Society
April 1996.

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Belize Environmental Consultancies Ltd. (BEnCo)
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INTRODUCTION

This research and report is donated to the Belize Audubon Society by Belize Environmental Consultancies Ltd. Logistics during the field visit were a joint effort of the Belize Audubon Society and the Fisheries Department.

Half Moon Caye is a protected area managed by the Belize Audubon Society. For its small size it boasts a number of very interesting animals of which the Red-footed Boobies are the best known. Marine turtles nest on its beaches and no less than 6 lizard species occur, although some of these lizard populations may be the result of accidental or deliberate introductions. One of the lizards, the Belize Atoll Gecko, has a world distribution limited to 2 Belizean Atolls and is therefore, of high conservation concern. A second species, the Giant Anole is more widely distributed but the Half Moon Caye population appears subspecifically different (subspecies as yet un-described) from the populations elsewhere in the Caribbean and is therefore of equal concern.

In spite of all these biological values, Half Moon Caye is little more than a coconut plantation. Coconuts (*Cocos nucifera*) originate from the Pacific and have, during the past 4 or 5 centuries, been distributed world wide by human agency. On Half Moon Caye they probably got established around the year 1700 and the first documented record stems from 1720 (Stoddart, 1962). Currently the eastern half of the island is virtually devoid of all natural vegetation and only widely spaced coconut palms remain. Most visitors to the island will perceive this as something of high scenic value but it bears no relation to the original situation. Stoddart (1962) already commented on the erosion caused by this situation. About 50% of the western half of the island is also under coconut plantation but here the coconut palms are more dense and small fraction of the "original" vegetation remains. Only the remainder ¼th of the island is under a natural vegetation cover (although some of it may be secondary regrowth) and even in this section, small pockets of coconut palms or even just individual trees can be found.

The account of Stoddart (1962) about vegetation change on Half Moon Caye are of great interest and should be considered in the preparation of a management plan.

The coconut palms on Half Moon Caye greatly add to the subjective beauty of the island but offer little in biological value. Grackles breed in them and they are the preferred habitat for the Giant Anole (this species has successfully accepted the coconuts as a new habitat, the now extinct Salt-water Palmetto probably formed part of it's original habitat). But other than that they just constitute a major management problem for Half Moon Caye.

Major conclusions from this report include:

- Local reptile fauna is of high management importance.
- Coconut palms should be removed from areas with remaining natural vegetation.
- Natural vegetation on western half of the island should be restored by gradual reduction of coconut palms. Salt-water Palmetto's should be reintroduced.

TERRESTRIAL BIODIVERSITY AND MANAGEMENT IMPLICATIONS

MAMMALS

Rats

Rats (*Rattus rattus* ?) have long been considered a major threat to the Booby colony on Half Moon Caye. There have been several halfhearted attempts to control the rat population of the island but none of these attempts have resulted in a serious decline.

Rats are omnivorous. They eat anything that is remotely edible. From my observations on the reptile fauna (see below), it is my opinion that rats are the main factor for keeping the lizard populations lower than could be expected (also based on experiences on other islands). Predation on the endemic Belize Atoll Gecko was actually observed and predation on the other species is more than likely. No doubt they also prey on migratory birds as well. Predation on young Boobies has always been suspected but has never been documented.

All the lizards and Boobies together (as a possible food source) cannot explain the high density of rats that I observed during my visit to the island in October 1995. There has to be another "staple" food for them. This staple is the coconut. Rats climb trees including coconut palms with surprising ease and feed heavily on coconuts of all size classes. A fact that was confirmed by the lighthouse keeper who sees his potential crop diminished this way. Also Stoddart (1962) reported the rats as a pest for the coconut cultivation. Apart from providing the rats with food, the coconuts also provide them with shelter. The thick mat of fallen, dry coconut fronds provides an ideal hideout for the rats.

Based on their perceived threat to the Booby birds, several attempts have been undertaken to lower the rat population. If there is a desire to continue the efforts to eliminate the rats one should consider the following:

a) How much damage do they actually do?

-Yes, they probably keep the lizard populations down to un-naturally low levels. But still, the lizards have managed to coexist with the rats for many decades.

-Predation on Boobies has not been substantiated and again, the Boobies have managed to coexist with the rats for many decades.

b) What are the chances of success?

-Elimination efforts need to be 100.00% effective. A single, pregnant female survivor puts us back where we started in very little time.

-Efforts to REDUCE the rat population by constant, but located poisoning efforts are a waste of money and time. Every short relaxation of the poisoning effort will result in a return of the rat population to the original levels.

c) What are the costs?

-Costs will probably be phenomenal, especially because of the above need of 100.00% elimination.

If it should be decided that the rats can not be exterminated completely but that it would be desirable to reduce their population density permanently, it has to be realized that this is only feasible by reducing their habitat and main food source: the coconut palm.

While eradicating every single coconut will not be acceptable to the general public it has to be remembered that the island has been declared a protected area for sake of the birds and not to protect coconut palms, which are not a threatened species anyhow. The presence of the unique reptile fauna is an added reason to focus on proper management of the island. The protection of this combination of rare birds and unique reptiles puts a heavy responsibility on the shoulders of the managing agency.

A vegetation map, based on aerial pictures should be produced. Based on this map with an the Booby colony as an overlay, an area should be declared " inner sanctum" from which all coconuts palms (and Australian Pines if any) should be removed (during the fieldvisit I noticed, even in the *Pouteria* and *Cordia* forest that houses the Booby colony, pockets of coconut palms, thereby occupying Booby habitat). This eradication is a simple matter, it takes one person with a chainsaw, less than one morning to cut all trees in this section. With a machete, all coconut seedlings can be removed. This action should be performed outside the breeding season of the Boobies. *Pouteria* seedlings will quickly fill the gaps thus created, although planting of *Cordia* trees in these gaps may be considered as well. Reintroduction of *Thrinax radiata* palms is strongly recommended to provide habitat for the Giant Anole.

After this action it could be decided to gradually push back the coconut palm from the western half of the island as a part of the ongoing management. In this way gradually increasing the natural habitat. "Gradual" is very important in this aspect. Too rigorous removal of coconuts could lead to instant famine among the rats, which would certainly turn them on the lizards and birds. Also, care has to be taken not to remove this Giant Anole habitat entirely until sufficient Salt-water Palmetto's are available.

Bats

Few bats species occur on Half Moon Caye (possibly only one) .A bat survey was conducted simultaneously by Miller and Miller (1995).

BIRDS

Grackles

The Great-tailed Grackle (*Quiscalus mexicanus*) is very common on the island. They prey on lizards (observed!) and migratory birds (observed!). Their population appears unnaturally high. Probably this high population is a result of them being fed by tourists. Also they might rely on the rats for providing access to coconuts as a food source. It appears desirable to lower the density of the Grackle population by instructing visitors not to feed the birds.

Boobies and Frigatebirds

The colony of **Red-footed Boobies** (*Sula sula*) and **Magnificent Frigatebirds** (*Fregata magnificens*) formed the rationale for declaring Half Moon Caye a protected area in 1981. As such it was the first protected area in Belize. Several studies were carried out to monitor the size of the colony but in spite of this it is still unclear whether the colony is expanding, decreasing or generally stable. Fact is, that during my visit at the start of the breeding season in October 1995, the colony looked quite healthy. At that same moment Miner & Miner (1995) conducted a survey of the birds of the island and tried to assess the colony size in relation to the figures presented by Cross (1992) .

Other birds

Other resident birds on Half Moon Caye are very few and include the **Mangrove Warbler** (*Dendroica petechia "bryanti "*), and the **Osprey** (*Pandion hillaetus*). The various migratory birds are addressed in the report of Miller & Miller (1995).

REPTILES: LIZARDS

Half Moon Caye has a highly interesting lizard fauna, which is very fragile and in need of protection. The Belize Atoll Gecko as an endemic species has the highest conservation priority followed by the Giant Anole as an endemic subspecies. The status of the Green Anole is still unclear.

Iguana iguana Green Iguana (Iguanidae)

The common Green Iguana is a curious component of the Half Moon Caye fauna. Its presence was already confirmed by the Cambridge Expedition (Neil and Allen, 1962), while Cross (1992) conducted a population census on the species.

Of all the Belizean Cayes the Green Iguana is known only from Half Moon Caye. Half Moon Caye being the island furthest away from the mainland as well. Arrival by swimming or rafting over this distance is not entirely impossible but judging its absence on other cayes this seems unlikely in this case. Also the Half Moon Caye population appears subspecifically identical to the Belizean mainland population, which indicates a relatively recent arrival. The occurrence of this species on Half Moon Caye has therefore to be explained as the result of human introduction. Since Green Iguanans are widely considered a delicacy, introduction as a future source of food is more than likely, possibly as long ago as in pirate days. (Unsuccessful) attempts to introduce Green Iguana's have also been reported from Caye Caulker (Meerman, 1993).

Green Iguanans are distinguished from the Spiny-tailed Iguana by their large size and high crest of conical scales on back and tail. Adult males are usually orange-brown. Only juveniles and younger females are actually green.

Green Iguanans were only seen in the western section of the island and most commonly inside the Booby colony. This preference for the Booby colony is probably the result of shared habitat preference. Green Iguana's are strict herbivores and are not expected to prey on the birds.

A population census as conducted by Cross (1992) was not possible within the time available on the island. The impression I got was that there were fewer Green Iguanans than I expected based on the data provided by Cross. Most striking was the fact that I saw ONLY full size adult Green Iguanans and no young or subadult. This may indicate a very low reproduction success, possibly caused by heavy predation by the omnipresent rats. Once the Iguana has managed to reach a certain age, it is probably safe from the rats and can live to become one of the very large adults that I saw.

***Ctenosaura similis* Spiny-tailed Iguana (Iguanidae)**

The Spiny-tailed Iguana is another very large lizard although it does not approach the size of the previous species. Its color is usually grayish with darker bands but the most distinguishing feature is the many whorls of conical spines around the tail.

Spiny-tailed Iguanas are a common component on many of the Belizean cayes. The presence of this species on Half Moon Caye is, therefore, not surprising. Spiny-tailed Iguana's also occur on the mainland of Belize where they usually inhabit dry and stony habitats.

Spiny-tailed Iguana's were only seen in the western section of the island and most commonly inside the Booby colony. This preference for the Booby colony is probably the result of shared habitat preference. Spiny-tailed Iguana's are omnivorous and are definitely known to eat birds (own observation) and predation on young Boobies can definitely be expected although this has never been documented. Possibly the adult Boobies defend their young too vigorously. Spiny-tailed Iguana's will no doubt eat rats should they discover a nest with helpless young rats!

A population census as conducted by Cross (1992) was not possible within the time available on the island. The impression I got was that there were fewer Spiny-tailed Iguanas than I expected based on the data provided by Cross. Most striking was the fact that I only saw virtually full size adult Spiny-tailed Iguanas, no subadults and only one young. This indicates a very low reproduction success possibly caused by heavy predation by the omnipresent rats. Once the Iguana has managed to reach a certain age, it is probably safe from the rats and can live to become one of the large adults that I saw.

During a brief visit to Long Caye, Lighthouse Reef, I noticed a very dense Spiny-tailed Iguana population on that island. Numbers there were definitely higher than on Half Moon Caye and what's more, the age distribution appeared more normal. Many subadults and several young were seen. I also confirmed rats from Long Caye but possibly the rat population here is lower resulting in a lower predation on young Iguanas. Notable is the fact that Long Caye has a higher percentage of its natural vegetation left.

***Anolis sagrei* Brown Anole (Iguanidae)**

This small lizard is a common component of all coastal areas of Belize including the cayes. The species also occurs on coastal Yucatan, Cuba and on the Bahamas. It is tolerant to human presence and consequently has spread over the country and can now be found in most of the larger towns and villages.

The species was found to be common on Half Moon Caye. Pomeroy (1989) misidentified this species as *Basiliscus vittatus*. It was also observed during my brief visit to Long Caye, Lighthouse Reef on October 21st.

The Brown Anole is a small brown lizard. Sometimes males are dotted with lighter spots and the females often have a light vertebral stripe or zig-zag pattern. Males have a conspicuous nuchal crest and a low dorsal crest on the upper tail.

The preferred habitat of this species includes the lower sections of the vegetation including coconut palm trunks. This is the only lizard that was found in the eastern coconut-desert section of the island.

Although this species was undoubtedly the most common lizard on the island, numbers appeared lower than is usually the case in similar habitats. The lizards are being preyed upon by the Grackles (observed!) and no doubt also by the numerous rats.

***Anolis allisoni* Giant Anole (Iguanidae)**



Figure 1. Male *Anolis allisoni* from the Bay Islands in Honduras. Picture F. Henke

The anole *A. allisoni* is one of the larger members of the *A. carolinensis* group. Its distribution includes Cuba (where it is common in the Las Villas, Camaguey and western Oriente provinces), the Islas de Bahia (Honduras) and Lighthouse Reef (Belize) (Ruibal & Williams, 1961; Wilson & Hahn, 1973). Its occurrence on Lighthouse Reef is probably natural and not a result of human interference (Ruibal & Williams, 1961).

Specimens of this species were collected by Schmidt (Schmidt, 1941) and by the Cambridge expedition of 1959/1960. A picture of a museum specimen was depicted by Neill and Allen (1962). Recent researches (Pomeroy, 1989 and Cross, 1992) failed to recognize it

and there was some fear that the Belizean population of this species (which is probably subspecifically distinct from the other populations) might have gone extinct.

I found this lizard to be fairly common on Half Moon Caye. I did not see any specimens on October 20th, 1996 and saw only one specimen on October 21st. This lack of observations, no doubt being the result of adverse weather conditions. On October 22nd, with sunny weather, I counted 17 specimens .

The Belizean distribution of this lizard is not restricted to Half Moon Caye as generally assumed. During my brief visit to Long Caye, Lighthouse Reef on October 21st, I saw 1 pair of this species (new distribution record) and Greg Smith (pers. corn.) has since reported having seen the species on Northern Caye and Sandbore Caye, Lighthouse Reef (new distribution records). It may reasonably be expected on Hat Caye.

A.allisoni is one of the larger anoles and definitely the largest Belizean anole. Snout-vent length is at least 10 cm while the tail is a little longer than the body. The color of the males that I have seen is

bright green, the lower jaw and throat is white and the forehead is blue. Also the forelegs can be bluish. The dewlap is bright pink. The head is large and appears out of proportion compared with the rest of the body. The snout is conspicuously pointed. There is a distinctive nuchal crest. Females are smaller, and their smaller head is brownish, never blue. The dewlap is small or even absent, no nuchal crest. Both sexes can change color from green to dull brown very rapidly. Ruibal & Williams (1961) report on the differences in scalation and coloration between the Cuban, Roatan and Half Moon Caye populations. From these differences they concluded that migration to Half Moon Caye took place long ago, thus allowing subspecific radiation.

Future researchers should attempt to take photographs of living specimens and describe in more detail the coloration of these living specimens (including ventral side). This information is still lacking and of high importance in the needed description as a separate subspecies.

The preferred habitat of this species appear to be the crown of coconut palms (all specimens observed were seen either on the top half of the trunk of the palm or in the heart of the crown). Before the

introduction of coconuts, the lizard probably inhabited Salt-water Palmetto's *Thrinax radiata* (Ruibal & Williams, 1961; Williams, 1969), but this species has since 1982 been exterminated from the island. On two occasions one male and one female lizard were seen sitting close together. Some lizards were seen moving from one palm crown to another and it may be assumed that the territory of a pair of lizards includes several coconut palms.

It would be advisable to reintroduce the Salt-water Palmetto to Half Moon Caye in order to provide habitat for this lizard, especially when considering a (partial) eradication of coconut palms.

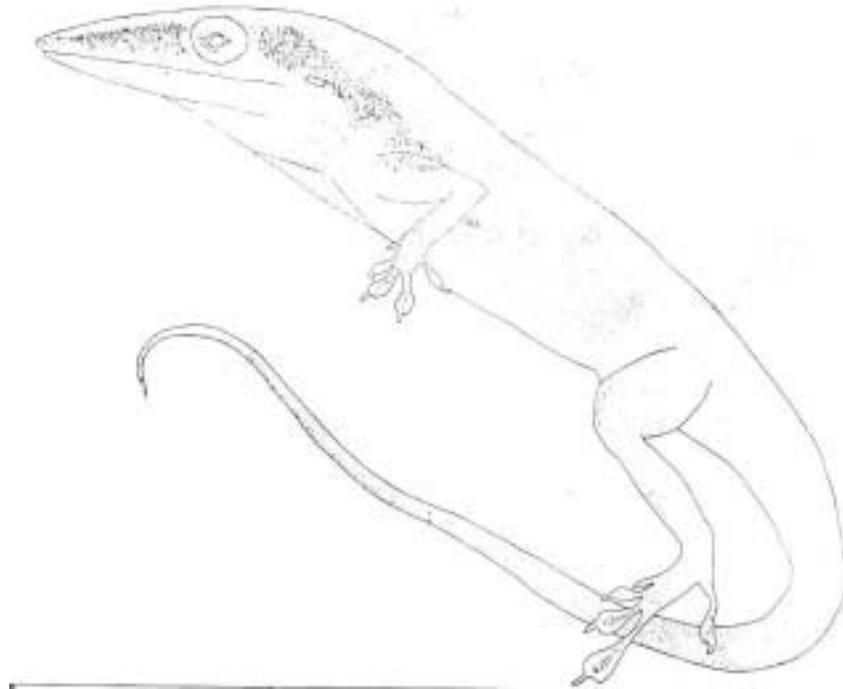


Figure 2. Drawing of a male *Anolis allisoni* (After Ruibal & Williams, 1961).

***Anolis carolinensis* Green Anole (Iguanidae)**

The Green Anole *A. carolinensis* is another lizard with a probable Cuban origin. Its known distribution includes Cuba, the Bahamas and the southeastern states of the USA. Williams' (1969) account on the species is confusing. In his paper he deals with the *A. carolinensis*- complex and although he mentions *A. carolinensis* from Half Moon Caye, it appears that he is referring to *A. allisoni* as the representative of the *A. carolinensis*-complex on this island. More significant is the fact that the species was not collected during the Cambridge expedition of 1959/1960. The careful conclusion thus may be that the Half Moon Caye population represents a very recent colonization.

The first record of this species comes from a person named Warren Prince who collected one specimen on Half Moon Caye in 1966 and deposited it in the Florida State Museum collection. From this one specimen it was not known whether this species was established or not {Henderson & Hoever, 1975}. Again, recent researchers {Pomeroy, 1989 and Cross, 1992} failed to recognize it and it was assumed likely that the species never got established on the island.

However, already on the first day of my visit, I was able to collect several specimens that I attributed to this species and also during the two days thereafter I managed to observe many more. Later examination of the specimens however revealed that they were probably immature *A. allisoni* and not *A. carolinensis*. Yet, the behavior (dewlap display) of the specimens seen indicate that the specimens were mature rather than immature. Further research is required to solve this taxonomic problem.

Careful conclusion may be that this species was introduced to the island after 1960 but that meanwhile it got firmly established on the island. Similar specimens were also collected during my brief visit to Long Caye, Lighthouse Reef on October 21st (new distribution record) and its presence on the other islands of the Lighthouse Reef may be expected.

The density of this lizard on Half Moon Caye was found to be not overly high. But individuals were seen an over the western half of the island. A nice population inhabits the observation tower in the Booby colony.

This lizard is relatively small. Snout-vent length being maximally 7 cm. Its color (including the head) is light green but they can change rapidly to a dull brown. There is no conspicuous nuchal crest. The dewlap is either pink, blue or a combination of the two. Henderson and Hoever (1975) indicate that in *A. allisoni* the mid ventral scales are distinctly and strongly keeled while this is not the case in *A. carolinensis*. The "*A. carolinensis*" that I examined had weakly keeled to smooth ventral scales. Unfortunately I have not been able to catch any adult *A. allisoni* to compare. In general habitus it appears a miniature *A. allisoni*. Actually, in the field it may be difficult to distinguish between juvenile *A. allisoni* and adult *A. carolinensis*.

The “*A. carolinensis*” seen and collected on Half Moon Caye appear distinctly different from the *A. carolinensis* that I know from the Miami, Florida, area. Both Conant (1975), Ruibal & Williams (1961) and Williams (1969) remark on the variability of the species and the possibility of more than one species being involved (even on the North American mainland).



Figure 3. Picture of male “*A. carolinensis*” (or immature *A. allisoni*?) from Half Moon Caye, Oct. 1995 (Picture by J. C. Meerman.

The lizards inhabit the mid and higher layers of the vegetation, including the outer crown of coconut palms.

***Phyllodactylus insularis* Belizean Atoll Gecko (Gekkonidae)**

This small, nocturnal, lizard is the only known endemic lizard of Belize. It is very similar to *P. tuberculatus* which occurs on the coastal mainland of Belize and on many of the "barrier reef" cayes, including Ambergris Caye, Caye Caulker and Rendezvous Caye. It differs from this species in the number of tuberculate scale rows on the abdomen. Until recently the Belizean Atoll Gecko was known only from Half Moon Caye but recently it was also confirmed from Long Caye, Glovers Atoll (Meerman, 1995).

A short day survey on October 20, revealed 3 Geckos, a nightly survey that same evening revealed another 5 individuals. A nightly survey on the evening of October 21, revealed another 15 individuals. Most specimens were seen while foraging between the foliage of low shrubs (mostly *Erithalis fruticosa*). The population density appeared to be relatively low, probably as a result of heavy predation by rats (observed!). During a short visit to Long Caye, Lighthouse Reef on the afternoon of October 21, I also found the species to be present on that island (new distribution record). Within half an hour I located 6 Geckos suggesting a higher density on Long Caye than on Half Moon Caye. This higher density on this island possibly resulting from an (assumed) lower density of rats on that island.

Based on the information now available, the world population of the Belize Atoll Gecko is restricted to the islands on Lighthouse Reef and Glovers Atoll. It would be interesting to find out whether (any) geckos on Turneffe belong to this species or to *P.tuberculosis*.



Figure 4. Picture of *Phyllodactylus insularis* from Half Moon Caye (Picture by J. C. Meerman).

REPTILES: MARINE TURTLES

No Marine Turtles were seen during the field visit. **Green Turtles** (*Chelonia mydas*) and **Loggerhead** (*Caretta caretta*) are reported to nest on the island (Smith et al. 1992). Although individuals of both species smaller than 60 cm curved carapace length can still be legally hunted outside the closed season from the 1st of April to the 31st of October, none of this is allowed within the boundaries of the Natural Monument. Nevertheless, tourists (pers.comm., 1995) have reported adult turtles being taken by fishermen within the Half Moon Caye Natural Monument boundaries.

VEGETATION

The vegetation of Half Moon Caye has been studied by Stoddart (1962) and an enumeration of these plants is available in Fosberg et al. (1982).

Fosberg et al. (1982) and Stoddart & Fosberg (1982) mentioned 43 higher plants on Half Moon Caye. Ten were trees, 6 shrubs and 27 herbs. During the field trip I found 43 species of higher plants on Half Moon Caye, exactly the same number as mentioned in Fosberg et al. (1982) and Stoddart & Fosberg (1982). But remarkable enough, the overlap between both list is only 28 spp. or 65%. This discrepancy may be caused by incomplete sampling but some species are hard to miss. Distinctive species such as the Salt-water Palmetto *Thrinax radiata* and Red Mangrove *Rhizophora mangle* were not observed during the October 1995 survey and appear to have become extinct on the island. Stoddart (1962) already mentioned the ephemeral character of Half Moon Caye.

The below list should be considered fairly complete (55 species but possibly only 43 extant). The majority of the plants was identified with relative ease, although a few question marks remain. Sometimes these question marks result from the fact that the plant was not flowering at the time of sampling, while in other cases it is a result of the fact that specialized literature was not available at the time of writing.

The most unusual find was the *Aristolochia pentandra* that was found to be common in the sands along the north beach. Never before have I encountered any *Aristolochia* on any of the Belizean cayes. This observation constitutes a new country record for this species. The origins of the species lie in North America.

The vegetation on the south side of the island, and especially many of the *Cordia* trees appeared to be in bad health. The general impression was one of fire damage. This is probably the result of wind-damage {tropical storm Roxane passed only a few days before}. All this coastal vegetation is wind-shorn. Branches die and the trees get a stunted appearance. This is a natural phenomenon and this stunted appearance is probably what makes the trees so attractive as a nesting site for the birds. The *Cordia* trees were also being attacked by the larva of some Microlepidoptera. Again, this is natural and no reason for concern. The larvae actually served as a food source for the migratory warblers.

PLANT LISTS

M = Meerman, 1995 survey

F = Fosberg et al. 1982

TREES AND SHRUBS

		M	F
<i>Echites (umbellata)?</i>	Apocynaceae	x	-
<i>Avicennia germinans</i> Black Mangrove	Avicenniaceae	x	-
<i>Cordia sebestena</i> Zircote	Boraginaceae	x	x
<i>Bursera simaruba</i> Gumbo limbo	Burseraceae	x	x
<i>Capparis flexuosa</i>	Capparidaceae	x	x
<i>Casuarina equisetifolia</i> Australian Pine	Casuarinaceae	x	-
<i>Conocarpus erectus</i> Buttonwood	Combretaceae	x	x
<i>Laguncularia racemosa</i> White Mangrove	Combretaceae	x	-
<i>Terminalia catappa</i> Almond	Combretaceae	x	-
<i>Pithecolobium keyense</i>	Mimosaceae	x	x
<i>Ficus (citrifolia?)</i> Fig	Moraceae	x	x
<i>Ficus (aurea ?)</i> Fig	Moraceae	x	?
<i>Neea choriophylla</i>	Nyctaginaceae	?	x
<i>Ximenia americana</i>	Olacaceae	-	x
<i>Cocos nucifera</i> Coconut Palm	Palmae	x	x
<i>Thrinax radiata</i> Salt-water Palmetto	Palmae	-	x
<i>Dalbergia ecastophyllum</i>	Papilionaceae	x	-
<i>Sophora tomentosa</i>	Papilionaceae	x	-
<i>Coccoloba uvifera</i> Sea Grape	Polygonaceae	x	x
<i>Rhizophora mangle</i> (<i>Chiococca alba?</i>)	Rhizophoraceae	-	x
<i>Erythalis ftuticosa</i>	Rubiaceae	x	-
<i>Erythalis ftuticosa</i>	Rubiaceae	x	x
<i>Hamelia patens</i>	Rubiaceae	-	x
<i>Bumelia retusa</i>	Sapotaceae	x	x
<i>Pouteria campechiana</i> Mamey Ciruela	Sapotaceae	x	x

Unidentified shrub I (Glabrous ovoid leaf, apex acuminate, 9x4 cm. Leaf base acuminate and unequal, long petioled. Leaves subopposite to whorls of 3. Fruits a cluster of reddish berries 1 x 0.5 cm. Occuring typically in pairs. 1 large, spheric seed. Common in Booby colony = *Neea choriophylla* ?) .

HERBS AND GRASSES

		M	F
<i>Sesuvium portulacastrum</i>	Aizoaceae	x	x
<i>Aristolochia pentandra</i>	Aristolochiaceae	x	-
<i>Alternanthera ramosissima</i>	Ameranthaceae	x	x
<i>Iresisne celosia</i>	Ameranthaceae	-	x
<i>Argusia gnaphalodes</i>	Boraginaceae	x	x
<i>Ipomoea violaceae</i>	Convolvulaceae	x	x
<i>Ipomoea pes-caprae</i>	Convolvulaceae	-	x
<i>Wedelia trilobata</i>	Compositae	x	x
<i>Cakile lanceolata</i>	Cruciferae	-	x
<i>Cyperus planifolius</i>	Cyperaceae	x	x
<i>Fimbristilis spathaceae</i>	Cyperaceae	x	x
<i>Chamaesyce mesembrianthemifolia</i>	Euphorbiaceae	x	x
<i>Chamaesyce blodgettii</i>	Euphorbiaceae	x	-
<i>Cassytha filiformis</i>	Lauraceae	x	x
<i>Hymenocallis latifolia</i>	Liliaceae	x	x
<i>Sida acuta</i>	Malvaceae	-	x
<i>Passiflora suberosa</i>	Passifloraceae	x	-
<i>Canavalia maritima</i>	Papilionaceae	x	x
<i>Cenchrus incertus</i>	Poaceae	-	x
<i>Digitaria horizontalis</i>	Poaceae	-	x
<i>Eragrostis ciliaris</i>	Poaceae	x	x
<i>Sporobolus virginicus</i>	Poaceae	x	x
<i>Acrostichum aureum</i>	Polypodiaceae	-	x
<i>Rivina humilis</i>	Phytolaccaceae	x	x
<i>Borreria sp.</i>	Rubiaceae	x	-
<i>Ernodea littoralis</i>	Rubiaceae	-	x
<i>Suriana maritima</i>	Simaroubaceae	x	x
<i>Solanum blodgettii</i>	Solanaceae	-	x
<i>Lippia nodiflora</i>	Verbenaceae	x	-
<i>Stachytarpheta jamaicensis</i>	Verbenaceae	x	x
Unidentified herb (behind beach at western most tip).		x	-

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