16. LITTLE CAYMAN: ECOLOGY AND SIGNIFICANCE

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Introduction

In this final paper I wish to emphasize some of the conclusions drawn by contributors to this report, consider some of the gaps in our knowledge of the ecology of Little Cayman, and place what we now know of the fauna and flora in a wider Caribbean context. The purpose of this Expedition has been to provide the Cayman Islands Government, and through them the wider scientific community, with basic data on which future development proposals can be evaluated. It is not the purpose of this concluding discussion to comment on any particular set of development proposals, but it is nevertheless possible to draw attention to aspects of the ecology of Little Cayman which are of high intrinsic importance and which are also potentially at risk of disturbance or destruction.

The fauna of the Cayman Islands is dominantly Greater Antillean, and especially Cuban, in its relationships and derivation. This is now well-documented for the insects, especially the butterflies (H.K. Clench 1964, Scott 1972, Askew, this volume), and the land birds (Diamond, this volume), in both cases the main affinity being with Cuba and to a lesser extent with Jamaica. Similarly the reptiles are of Cuban (*Anolis, Cyclura*) or Jamaican (*Aristelliger, Diploglossus, Sphaerodactylus, Alsophis, Tropidophis*) affinity (Grant 1940, Savage 1966, Schwartz and Thomas 1975). Of the 48 recorded species of Cayman Islands land molluscs, 30 are endemic, and 17 of these are related to Jamaican species, 10 with Cuban, 1 with the Isles of Pines, and 2 with Central America (W.J. Clench 1964); Pilsbry's (1930) inference of a former land connection with Jamaica cannot now be sustained (Thompson 1974). Both the fauna and the flora of Little Cayman have presumably been derived from the Greater Antilles by chance dispersal, and it is to these islands that we should turn in looking for analogues of Cayman ecosystems, as well as to islands of similar geology, topography and climate such as the Swan Islands, Anegada and Barbuda.

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Extinct species

Little Cayman has the distinction of being one of the least settled and hence least disturbed of all the islands of the Caribbean. It owes this distinction to its rugged topography on dissected limestone; its low and erratic rainfall, its brackish watertable, and hence erratic water supply; its tangled and often impenetrable vegetation, dominated by scrub woodland; and its astonishing level of infestation by the mosquito *Aedes taeniorhynchus*. Nevertheless, in spite of its handfull of inhabitants, and partly because of its proximity to Cayman Brac, the island has not been wholly unaffected by change in post-Columbian times. This Expedition had for its main purpose the documentation of the present fauna and flora of the island: there are, however, important components of the biota already now extinct.

Reptiles

Both ground and arboreal reptiles form a conspicuous element in the fauna of Little Cayman, with two gekkoes (one not seen in 1975), four species of iguanid, one anguid, and two snakes (one also not seen in 1975). The crocodile is probably now extinct, however, and marine turtles probably hardly ever now breed on Little Cayman shores.

In 1642 William Jackson mentioned "ye multitude of Alligators" in the Caymans as a whole (Jackson 1924, 21), and early Spanish charts named the islands 'Lagartos' (alligators), a name, however, which Grant (1940, 5) thinks referred to *Cyclura* rather than to crocodiles. The first scientific report of crocodiles is that by C.J. Maynard in Garman's (1888, 108) paper on the former's collections. Maynard states that "Two species of crocodile have been taken on this island and one on Cayman Brac. I saw but a portion of one specimen. The natives assured me that the species were similar to those found in Cuba". Chapman Grant collected on Little Cayman in April 1938, as did C. Bernard Lewis in May-June the same year. They evidently did not see the crocodile, but Grant (1940, 14) records that "On October 27, 1939, Captain James Banks of Little Cayman sent the writer the head and feet of a crocodile which he took on that island. The head measures 310 mm in length. The dentition agrees with the Jamaican specimens of *acutus* in the author's collection. The crocodile was about seven feet long and was one of two which Captain Banks came upon near Charles Bay — about half-way along the south coast of Little Cayman". There is no subsequent record of living crocodiles on the island, and it is highly unlikely that the species still exists there. There is no means now of knowing with certainty whether there was a large and resident local population, or whether occasional individuals drifted to the island from Jamaica or Cuba; it is possible that recolonisation might occur from these islands.

Marine turtles have been equally extirpated locally. Turtling apparently began on a considerable scale in the Caymans in the second half of the seventeenth century (Dampier 1729, 30), although Columbus in 1503 had found the islands to be "full of tortoises, as was all the sea about". Hans Sloane passed through the Lesser Caymans in March

1688, when Cayman Brac already had "some Huts for the Turtlers", though by that time the turtles there "were but few" (Sloane 1725, 342). He described 40 sloops from Port Royal, Jamaica, as constituting the turtling fleet, with a four-man sloop bringing in 30-50 turtles which in good conditions might be collected in a single day (Sloane 1707, xvii, lxxxviii). It was believed that the turtles migrated from the Gulf of Honduras and the Nicaraguan Banks to breed in the Caymans and along the south coast of Cuba during May-September. Long (1774, 309-313) gives a detailed account of the natural history of the turtle and of the Cayman turtle trade. By the early nineteenth century, however, Caymanian turtlers were obtaining all their turtles on the Mosquito Keys and the coast of Nicaragua (Young 1842, 17-18), as well as off Cuba.

All of this information relates to the Green Turtle *Chelonia mydas*. Undoubtedly its main nesting grounds were in West Bay, Grand Cayman, with subsidiary populations on the more restricted beaches elsewhere. On Little Cayman the main nesting areas were probably at Sandy Point and on the narrow but long beaches of the north and south coasts. Lewis (1940, 62-64) also referred to the Loggerhead *Caretta caretta* as "still common" and breeding on all three islands in June; the Hawksbill *Eretmochelys imbricata* as "fairly common" though rarely laying; and the Leatherback *Dermochelys coriacea* as "rarely seen" but occasionally breeding. Breeding of any species of turtle in the Cayman Islands is probably now a rather unusual event, though perhaps least so on Little Cayman. As populations, however, the Cayman turtles now no longer exist.

We have no information on the present status of the gecko *Aristelliger praesignis* and the snake *Tropidophis caymanensis parkeri*, previously recorded but not found by Hounsome in 1975.

Mammals

No native mammals have been recorded from Little Cayman. In 1965, however, Patton (1966) discovered remains of the insectivore *Nesophontes* and the rodent *Geocapromys* on Cayman Brac. Both genera are representatives of a distinctive native Greater Antillean mammal fauna. *Nesophontes* is represented by fossil remains on Cuba, Hispaniola and Puerto Rico. *Geocapromys*, the short-tailed hutia, is represented by fossil and living species in Cuba, Jamaica, the Bahamas, and Little Swan Island (where it has recently been reported to have become extinct: Clough 1976). In addition, Darlington (1965, 391) records a fossil long-tailed hutia *Capromys* from the Cayman Islands; this genus is represented by living species in Cuba and the Isle of Pines. Though not so far recorded on Little Cayman, it would be surprising if the study of cave deposits did not lead to the discovery of fossil vertebrates on the island. So far nothing is known of their age on Cayman Brac, or of the reasons for their extermination, but at least on Little Swan *Geocapromys* survived until ca 1950.

Species at risk

Although conservation of species is best considered in terms of conservation of habitats, it is nevertheless useful to consider which taxa might be at risk if development of Little Cayman takes place.

Molluscs

Hounsome and Askew (this volume) have fully documented the rarity of the Little Cayman pulmonate *Cerion nanus*. It is clear that this species would immediately become extinct if its habitat of *Evolvulus* scrub were to be cleared, and since the main area of this scrub lies on the trans-island track from Blossom Village, close to possible development sites, this seems highly likely to occur. It is more difficult to estimate the seriousness of such an extinction, especially in so widespread and variable a genus as *Cerion*, which, moreover, S.J. Gould and his collaborators are currently subjecting to major revision.

Reptiles

The large iguanid of the genus *Cyclura* is of particular interest in the Cayman Islands. This genus is widespread in the Greater Antilles: in Cuba, the Isle of Pines, Hispaniola, Jamaica, Puerto Rico, Navassa, the Bahamas, Anegada, and the Turks and Caicos Islands, though over some of this range it is represented only by fossil or recently extinct species (Schwartz and Thomas 1965). Ecologically, it may be compared with the Central American genera *Ctenosaura* (which reaches out into the Caribbean at Half Moon Cay, Lighthouse Reef, Belize) and *Iguana* (found on Swan Island), and to a lesser degree with *Amblyrhynchus* and *Conolophus* in the Galápagos Islands. The species on Little Cayman (*Cyclura nubila caymanensis* Barbour and Noble) is also native on Cayman Brac, and has been introduced to Grand Cayman, where there is another native subspecies, *C. n. lewisi* Grant.

Grant (1940, 29-37) described the Cayman Islands *Cyclura* in detail, including ecological notes by C.B. Lewis. The lizards are herbivorous, and on Little Cayman feed on *Ipomoea pes-caprae, Ernodea littoralis* and *Cordia sebestena*. Lewis noted that they were only seen within 100 yards of the shore. Carey (1966) has studied *C. n. caymanensis* on Cayman Brac, where in 1965 it was confined to a small area on the southwest side of the island. Lewis (1944, 95) considered that the colonies of *Cyclura* on both islands "are reproducing, generally flourishing and are in no danger of extinction". However, he also stated (in Grant 1940, 34) that "the populations are rapidly being reduced by dogs, which these lizards seem unable to escape, although fighting well and occasionally injuring their attacker. There is a large colony on the south shore of Little Cayman at mid-island, which is at present sufficiently isolated to escape persecution by dogs and man".

There is no doubt that *Cyclura* is particularly vulnerable to predation by introduced mammals. In Jamaica *Cyclura collei* is now

extinct, despite efforts to preserve it, as a result of the introduction of mongoose in 1872 (Lewis 1944). *C. cornuta onchiopsis* has also become extinct on Navassa, and *C. mattea* and *C. portoricensis* are known only from fossil material on St Thomas, Virgin Islands, and in Puerto Rico, respectively. The rapidity with which extinction can take place has been documented for Pine Cay, Turks and Caicos Islands, by Iverson (1978), where in the early 1970s there was a population of 5500 individuals of *C. carinata*. A hotel was built on the island in 1973, and domestic cats and dogs introduced. These preyed on the lizards, which had become extinct by 1978. Iverson comments (1978, 63) that these rock iguanas are "among the most rapidly declining of the world's reptile species".

C. nubila caymanensis is only commonly seen on Little Cayman in the vicinity of South Hole Sound. The former isolation of this area has disappeared with the construction of the circum-island road and the airfield. It would seem almost inevitable that dogs and cats would be introduced in consequence of any industrial or tourist development, and even if they were controlled the areas in which the lizards are found would be at great risk from direct habitat modification. There is an urgent need for a full investigation of this species on Little Cayman, since at present our information is inadequate for the formulation of a conservation policy for it. Indeed, cyclurid lizards are only well known in the similar habitat of Anegada, where *C. pinguis* has been studied by Carey (1975). On scientific grounds, too, it would be of great interest to compare *Cyclura* with the mainland iguanid *Ctenosaura similis*, recently studied in Belize and Nicaragua (Henderson 1973, Fitch and Henderson 1978).

Birds

As Diamond (this volume) has shown, the land birds are generally numerous and not immediately at risk, except as a result of massive habitat change; this appears unlikely to occur except on a very local scale. The seabirds are, however, more vulnerable. This is particularly true of the colony of Red-footed Booby on the northern margins of the Blossom Village salt-pond. While this is now known to consist of the pantropical species *Sula sula*, rather than the originally described endemic *S. coryi*, it is nevertheless of considerable importance in Caribbean terms, and may indeed be the largest colony of this species in the area. Diamond estimates that it includes at least 7100 birds. The only comparable colonies appear to be those on Half Moon Cay, Lighthouse Reef, Belize, where Verner (1961) estimated a population of 3500, excluding nestlings, and on Little Swan Island. There is no estimate of the size of the latter population, though it has been described as large by Lowe (1909), Fisher and Wetmore (1931), and Stewart (1960); there is no subsequent information on its status.

The number of Magnificent Frigatebirds *Fregata magnificens* in the same colony on Little Cayman is much smaller, and there are much larger colonies on Barbuda (2500 pairs: Biamond 1973), the north coast of Yucatan (2500 nests, quoted by Diamond 1973), and on Little Swan Island, where, however, there is no recent information on the size of

the colony.

Habitats at risk

As Diamond (this volume) has succinctly stated: "It is in the almost completely undisturbed nature of the island as a whole that its chief biological interest lies". It follows that the arguments for conservation lie less in concern for particular individual species than for undisturbed habitats. The interest of Little Cayman lies in its rugged and difficult terrain; its undisturbed scrub, scrub woodland, and woodland; its reptile fauna dominated by the ground iguana *Cyclura* and abundant arboreal lizards; its enormous decapod crustacean populations, especially of *Cardisoma guanhumi;* its 600 species of insects; its land-birds; and its seabirds, all co-existing under conditions little affected by man. The main habitats of conservation interest are as follows (Figure 34).

Interior woodland

The area of tall Dry Evergreen Forest in the interior of the island is, ecologically, one of the most remarkable habitats of Little Cayman. On most other smaller Caribbean islands (e.g. Barbuda) such woodland has long since disappeared, but on Little Cayman it remains extremely isolated and virtually undisturbed. Its preservation is thus of far more than local significance: it is of Caribbean-wide importance. This is so in spite of the fact that it is not obviously associated with spectacular, rare or threatened species, though Hounsome (this volume) collected some 16 species of terrestrial animals (other than insects) only in this habitat.

Mangrove woodland

Two areas of mangrove woodland require conservation. One is that on the north shore of the Blossom Village salt-pond, used by the nesting boobies. This is not only susceptible to clearance, but also to disturbance by repeated visiting, and by overflying from the adjacent airfield. Diamond has shown that the booby colony is one of the largest in the Caribbean, and its conservation is thus of regional importance. The second area is the tall mangrove woodland around Tarpon Lake. This is of local importance as a representative of this type of habitat on Little Cayman, though of course widespread in other parts of the Caribbean, including Grand Cayman; it also has some amenity potential. Inland areas of dwarf *Rhizophora* are also ecologically interesting, and less widespread in the Caribbean than other types of mangrove habitat.

Evolvulus heath

The importance of this habitat has already been discussed in the context of the preservation of the land snail *Cerion nanus*.

Sesuvium marsh

The inland monospecific herbaceous marsh dominated by *Sesuvium portulacastrum* at the east end of Little Cayman represents a very unusual habitat. It is important for its insect populations, especially of dragonflies, and possibly also for the tree duck *Dendrocygna arborea*. It is difficult to imagine so remote an area being directly disturbed, however.

Coastal flats

These areas have already been greatly disturbed, especially by the general planting of coconuts at the end of the nineteenth century, by other cultivation and clearing, and by settlement. This has had the result of replacing what was probably a rather uniform strand woodland by new types of woodland, scrub, and open herbaceous habitats. Askew (this volume) has noted the diversity of insects in these coastal areas. Now that access by road is possible along almost the entire coast, it has become more important to preserve the surviving remnants of native coastal woodland, and to attempt to control the activities of introduced animals. Rats are now ubiquitous in the coastal areas, but cats and dogs appear still to be confined to the settlements. The prevention of erosion during storms is also critically dependent on the preservation, wherever possible, of beach-crest scrub and scrub woodland.

Marine habitats

During the 1975 Expedition marine studies were concentrated on the habitats of South Hole Sound, in view of its tourist potential and also susceptibility to change in the event of expanding settlement at Blossom Village, and on the littoral fauna and flora round the whole island (Potts, this volume). It is likely that reef-flat and reef faunas and floras are closely comparable with those more intensively investigated on Grand Cayman (Rigby and Roberts 1976, Raymont, Lockwood, Hull and Swain 1976a, 1976b). There is no reason to suppose that Cayman marine habitats differ in any fundamental way from those characteristic of Caribbean coral reefs in general (Stoddart 1977), but it is certainly true that, especially in the Lesser Caymans, disturbance by man has been minimal, in contrast to many other Caribbean localities. As a result, reef fish faunas have not been disrupted by spearfishing and are thus of considerable scientific interest (Potts, in preparation).

Two main marine areas have been recommended by Potts (1975) as marine reserves (Figure 34). They are:

(a) The eastern, windward end of the island, with well-developed coral reefs, remote from any settlement.

(b) The area on the northeast coast from Salt Rocks to Jackson's Point.

This second area includes the interesting intertidal and supratidal exposure of Ironshore at Salt Rocks, and the so-called 'Cayman Wall', a

steep reef-edge drop-off in Bloody Bay, which plunges vertically from 10 to 200 m. This latter is already well-known to divers.

Conflict between conservation requirements and development proposals would appear, however, to be inevitable in the marine sphere. Proposals now being implemented call for tanker trans-shipment facilities, with shore installations, at Salt Rocks, and for docking facilities along the Bloody Bay drop-off. There remains the possibility of establishing a marine reserve at the eastern end, and also of emphasising the need for further studies in the reef areas likely to be directly affected by development.

Conclusion

As so often, the scientific interest and importance of an island only becomes recognized when large-scale development is planned. Although the Oxford University Expedition of 1938 supplied the groundwork of our knowledge of the fauna and flora of Little Cayman, it was not until 1975 that an attempt was made to distinguish marine and terrestrial habitats which might be at risk in the event of development. We are now in a position to appreciate with greater precision than before the impact of industrialisation on such an island, and we have been able to define areas of scientific importance which should be conserved during any such development. At the same time, we should emphasise that this report is based on only one month's investigation, and note that not only is there a great deal of further work to be done but that such studies should form an integral part of any scheme for the future of the island. The natural habitats of Little Cayman are of sufficient importance to be considered in a Caribbean rather than simply a Caymanian context, since few similar undisturbed environments still survive elsewhere, and it would be short-sighted in the extreme to damage a heritage and resource of this character for immediate economic advantage without the fullest consideration of the irreversible consequences of development and of the alternative strategies which may still be open for the future.

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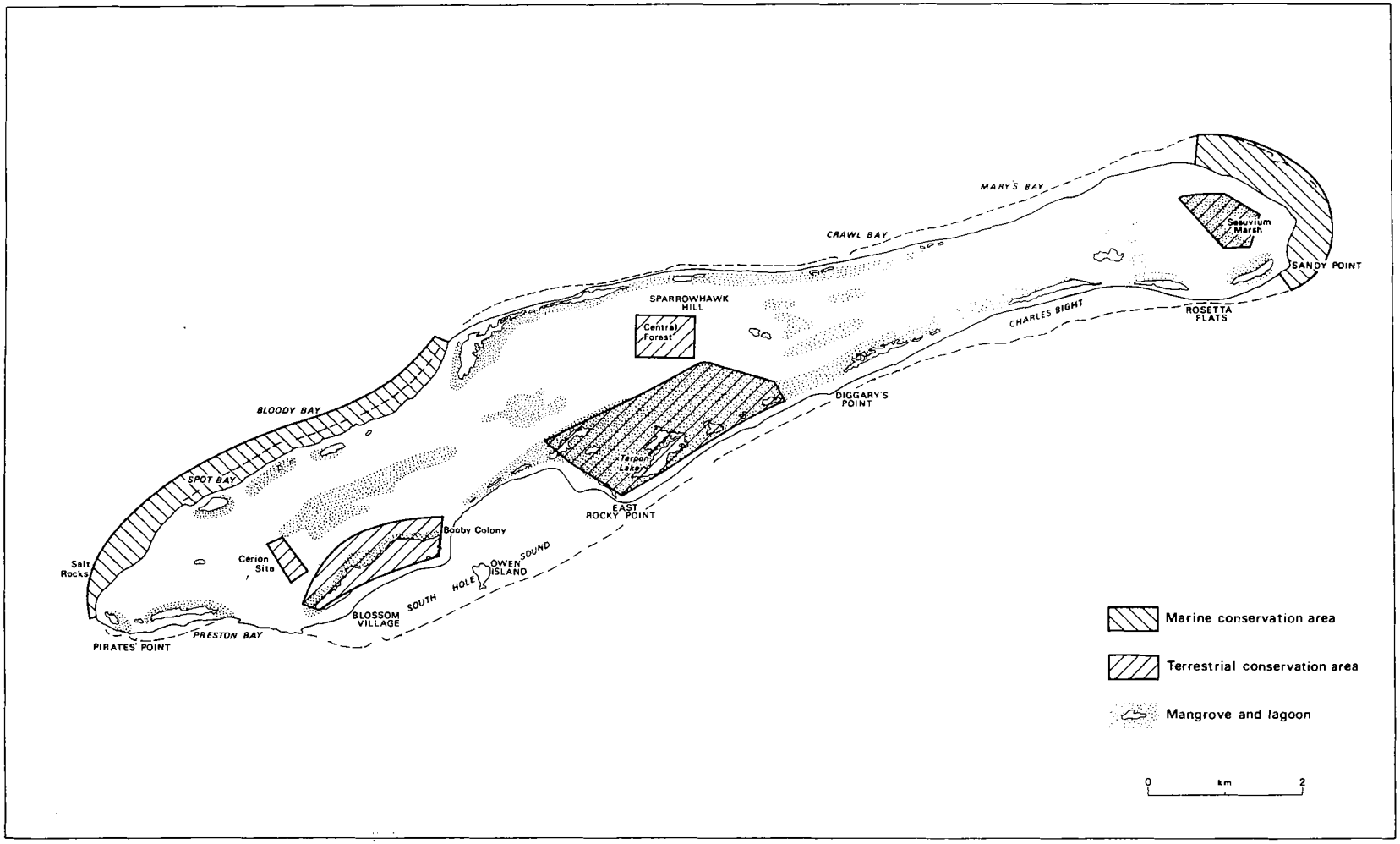

Figure 34. Recommended marine and terrestrial conservation areas, Little Cayman