

15. THE RED-FOOTED BOOBY COLONY ON LITTLE CAYMAN:  
SIZE, STRUCTURE AND SIGNIFICANCE

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The boobies of Little Cayman were described by Maynard (1889) as a new species, Cory's Gannet *Sula coryi*; at that time the plumage sequences and morphs of the Red-footed Booby *Sula sula* were not understood, and Maynard mistook the brown-morph adults for young birds. In many populations of *Sula sula* the adults are dimorphic, being either white with dark primaries and secondaries, or generally brown with white rump, tail and vent. The colour pattern of the brown morph varies geographically; those on Little Cayman, which constitute nearly 90% of the population, are generally brown except for the tail, rump, vent and sometimes the scapulars, which are white. Immatures are wholly brown, including the tail, rump and vent, and can always be distinguished from brown-morph adults by the dark bill and the pale orange, not deep red, legs and feet.

The colony on Little Cayman is one of the largest in the Caribbean, and is of special value because it is so accessible; more than any other seabird colony in the West Indies it has great potential, properly managed, both as a tourist attraction and for scientific research. The objectives of this short study were to estimate the size of the population, the proportions of juveniles and of the two adult colour-morphs, and to advise on possible interactions between the booby colony and the oil terminal that it is proposed to build on the island.

Location of the colony

Figure 32 shows the present location of the colony, and also the approximate positions it is known to have occupied in the past. When Maynard (1889) visited Little Cayman in 1888, the colony was chiefly in sea-grape trees *Coccoloba uvifera* between the sea and a coconut plantation, extending to landward partly into what is now the lagoon, but is now a mangrove swamp, immediately north of the settlement at Blossom Village (position 2, Figure 32). Maynard was told that the

boobies "had formerly occupied a small key, containing about three acres, that lay just opposite the present gannetry, a few hundred yards from the shore; but this spot was burnt over, some thirty years ago, when the birds all removed to the section now occupied by them". The approximate location of this former colony is numbered 1 on Figure 32.

This second colony did not stay long, for by the time Nicoll (1908) visited the island in 1904, the boobies were nesting in the mangrove swamp itself (position 3, Figure 32). In 1935, a hurricane destroyed most of these mangrove trees, whose roots still scatter the shallow lagoon there. The booby colony is now situated in the low mangroves that fringe the northern border of this lagoon, between the open water and the dry limestone scrub woodland behind (positions A to F, Figure 32).

The limits of the present colony were determined partly by inspection from the south side of the lagoon, partly by exploration on foot within the mangroves, and partly by inspection and photography from the air. The birds had finished breeding some time before, so strictly speaking it was the roosting area, rather than the nesting colony, that was delimited. However I did visit the colony briefly in 1971, when the boobies were nesting, and found then that they nested in the same areas as they were roosting in 1975.

#### Size of the colony

Census method Birds on the southern edge of the colony were clearly visible from the opposite shore of the lagoon and were counted from there, with 8 x 30 binoculars, between 0800 and 1000 on 1st August 1975. These counts, divided into sections delimited by easily identified landmarks, are given in Table 31. Birds not visible in this way, were estimated by two direct counts made on foot in quadrats within the mangroves, one of 23 birds in about 550 m<sup>2</sup> and one of 8 birds in about 150 m<sup>2</sup>; both these were underestimates because some birds flew off when they were approached, but every effort was made to reduce this bias to a minimum. The total area of mangrove occupied by the colony was then calculated by tracing the area of the colony from a 1:5,000 map onto graph paper and summing the area covered. The calculation of the population size was as follows:

(i) Birds visible on the edge This is simply the sum of the counts for each section, A to F, of the southern boundary of the colony, as in Table 30: Total 1,670.

(ii) Birds not so visible Total counted in two sample areas = 31 birds in 700 m<sup>2</sup>. Total area occupied by colony = 45,575 m<sup>2</sup>.  
Therefore total number of birds =  $\frac{45,575 \times 31}{700} = \underline{2,018}$ .

(iii) Combined total 1,670 + 2,018 = 3,688

(iv) Correction for time of day The number of birds present in the colony changed markedly with the time of day. It was not possible to determine whether there was any time at which all the birds were

Table 31. Census of boobies along southern edge of colony, 0800 - 1000, 1 August 1975

Sections as in Figure 32.

Section	Total	Brown morph adult	White morph adult	Juvenile
A	181	86	15	15
B	327	81	31	52
C	560	122	35	35
D	440	49	32	20
E*	117	-	17	-
F	45	15	3	5
TOTAL	1,670	353	133	127

\*Section E was too distant to distinguish between brown-morph adults and juveniles.

present; if this happens at all, it is probably at night. The best estimate was therefore to take the count at the time at which the maximum number was present, divide this by the number present at the time the census was carried out (these counts being carried out in a small area on 30 July, every hour throughout the day - Figure 33), and multiply the census figure by this factor. The maximum number was 241 at 0600, and the average number during the time of day the census was carried out (0800 - 1000) was 124. Accordingly the total in (iii) should be multiplied by  $\frac{241}{124}$ ;  $3,688 \times \frac{241}{124} = \underline{\underline{7,168}}$ .

This calculation includes two sources of low bias: (i) some birds in the mangrove quadrats flew off before they could be counted; (ii) the figure of 241 birds in the sample area at 0600 is not a true maximum, since some birds were seen leaving the colony before it was light enough to count. The total of over 7,100 birds is therefore a minimum.

#### Composition of the colony

Three classes of booby could be distinguished easily in the colony: juveniles; brown-morph adults; and white-morph adults. The latter category could always be distinguished from the first two, but these two were not always distinguishable from each other.

(i) White morphs During the census of 1,670 birds on the colony edge, 133 white morphs were seen. Assuming that the proportion of white morphs was the same elsewhere in the colony, the total number of white adults in the colony =  $\frac{133}{1,670} \times 7,168 = \underline{571}$  or 8% of the total population (including juveniles).

(ii) Brown morphs Of the  $1,670 - 133 = 1,537$  "brown" birds (i.e. brown morph adults plus juveniles) counted during the census, only 480 could be identified positively as either adult or juvenile. Of these, 353 were adults and 127 were juveniles. Applying these proportions to the colony as a whole, the total number of brown morph adults in the colony is estimated as follows:

Total no. birds less total no. white morphs =  $7,168 - 571 = 6,597$ .

Proportion of brown morph adults, from above, is  $\frac{353}{480} = 73.5\%$

Total number of brown morph adults is therefore  $6,597 \times .735 = \underline{4,852}$ .

The proportion of brown morphs in the adult population is therefore  $\frac{4,852}{5,423} = 89.5\%$ .

(iii) Juveniles The number of juveniles is the number of brown birds less the number already estimated as brown morph adults, i.e.  $6,597 - 4,852 = \underline{1,745}$ , or 24.3% of the total population of the colony.

An independent method of assessing these proportions was by counting the birds entering and leaving the colony in flight lines overland. This was done from the main jetty in Blossom Village on 30th July and 1st August; birds were counted for ten minutes in each hour from 0620 to 1830. The totals seen were: 625 brown morph adults, 70 white morph adults, 198 juveniles. Brown morph adults were here 89.9% of the adult population, *c.f.* 89.5% from the census figures; and juveniles were 22.2% of the whole population, *c.f.* 24.3% in the census.

The census of the colony, and its composition, can be used to estimate the approximate breeding population. The breeding season on Little Cayman is probably similar to that on Half Moon Cay, British Honduras, where Verner (1961) found it to be from November to April. When I visited Little Cayman briefly in February 1971, many birds had young in the nest, and in July-August 1975 there were no occupied nests but a great many recently-fledged juveniles. These observations are consistent with a November-April breeding season.

The number of flying young — i.e. birds produced in the breeding season immediately preceding my visit in 1975 — can be used to estimate the breeding population, given a knowledge of the breeding success. Unfortunately this is not known, but it must be less than 100%, so the population must be more than the 1,745 pairs needed to produce the 1,745 juveniles counted. Alternatively, one can assume that all the adults counted were breeders, in which case the number of breeding pairs

is half the number of adults, i.e.  $\frac{5,423}{2} = 2,712$  pairs. These two

figures represent, respectively, the minimum and maximum likely breeding population, which is likely to lie nearer the maximum figure than the minimum, i.e. it is almost certainly over 2,000 pairs. The only other Caribbean colony of this species that has been counted is Half Moon Cay, where Verner (1961) counted 1,389 occupied nests.

### Development implications

#### Effect of development on boobies

The present pattern of development on Little Cayman has probably had little effect on the boobies. The birds appear to be disturbed by people very little, if at all. However the proposed construction of an oil terminal in the area immediately behind the colony will inevitably result not only in destruction of the habitat immediately adjacent to the colony, but in a greatly increased level of general disturbance, both human and mechanical. There is little evidence that can be used to predict the effect on the birds, but it is very likely that they would be disturbed sufficiently at least to interfere with breeding success, and possibly to desert the colony altogether.

#### Effect of boobies on development

The present flightlines of the boobies between the colony and the sea are chiefly over Blossom Village, at the east end of the lagoon, and at the west end near the airstrip (Figure 32). Increased development will mean increased air traffic and probably larger aircraft; the presence of a booby flightline across the end of the airstrip will constitute a bird-strike hazard of major proportions. An adult booby weighs about 1 kg and flies into the colony probably at about 60 kph; it would certainly cause considerable damage to any aircraft that struck it. Although most birds enter and leave the colony within a couple of hours of dawn and dusk, there is some activity on the flightlines throughout the day.

In addition to the bird-strike hazard that it represents, the booby colony should constitute a constraint on development for other reasons. It is one of the largest seabird colonies in the Caribbean, and probably the most accessible; properly managed it could generate considerable revenue from tourism, and as a site for scientific research.

### References

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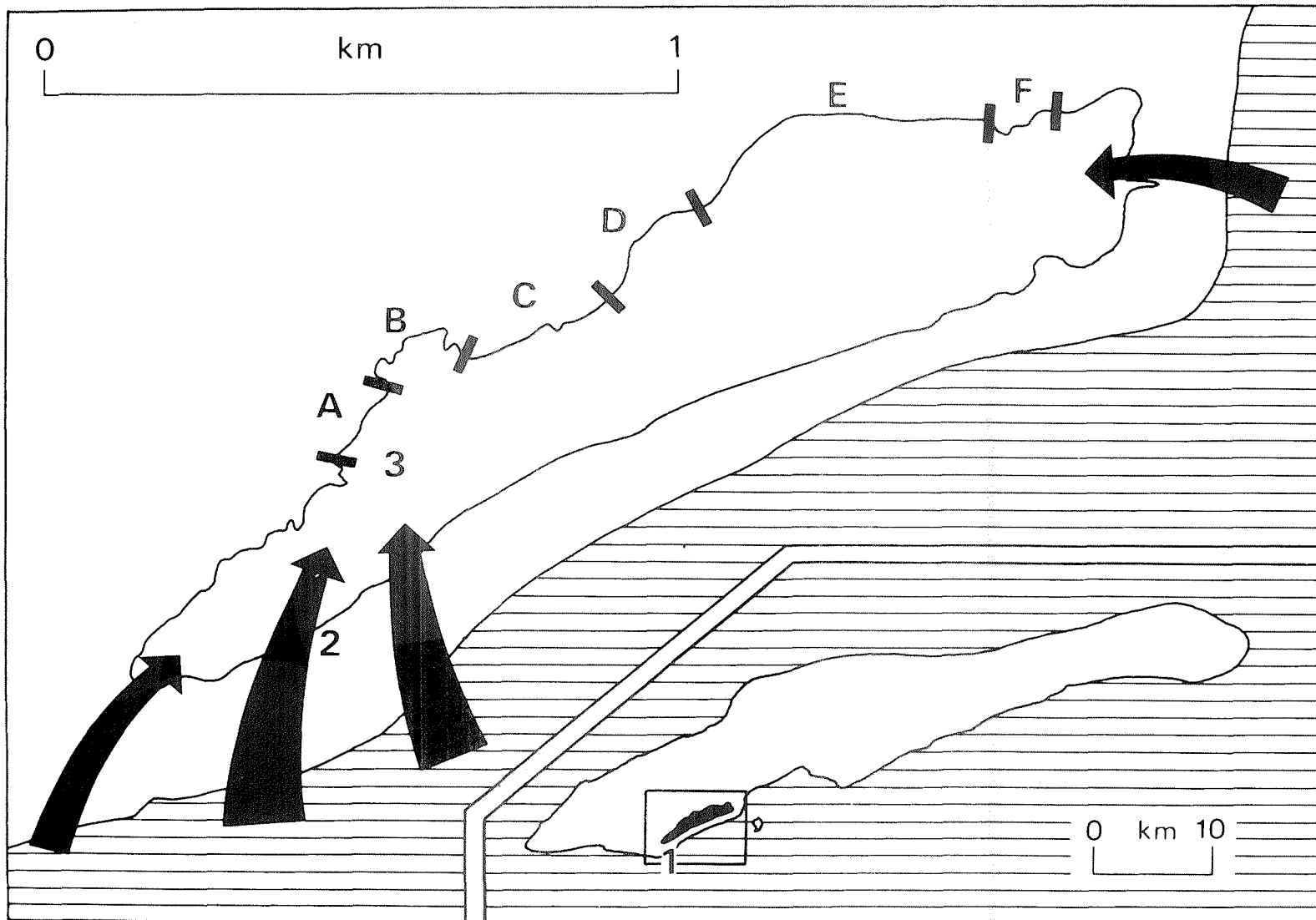


Figure 32. Outline map of Little Cayman, showing the location of the booby colony and detail of the colony area. Numerals refer to previous sites of the colony (see text). Letters represent sections of the present colony used in the census (see Table 30). Arrows represent main flight lines

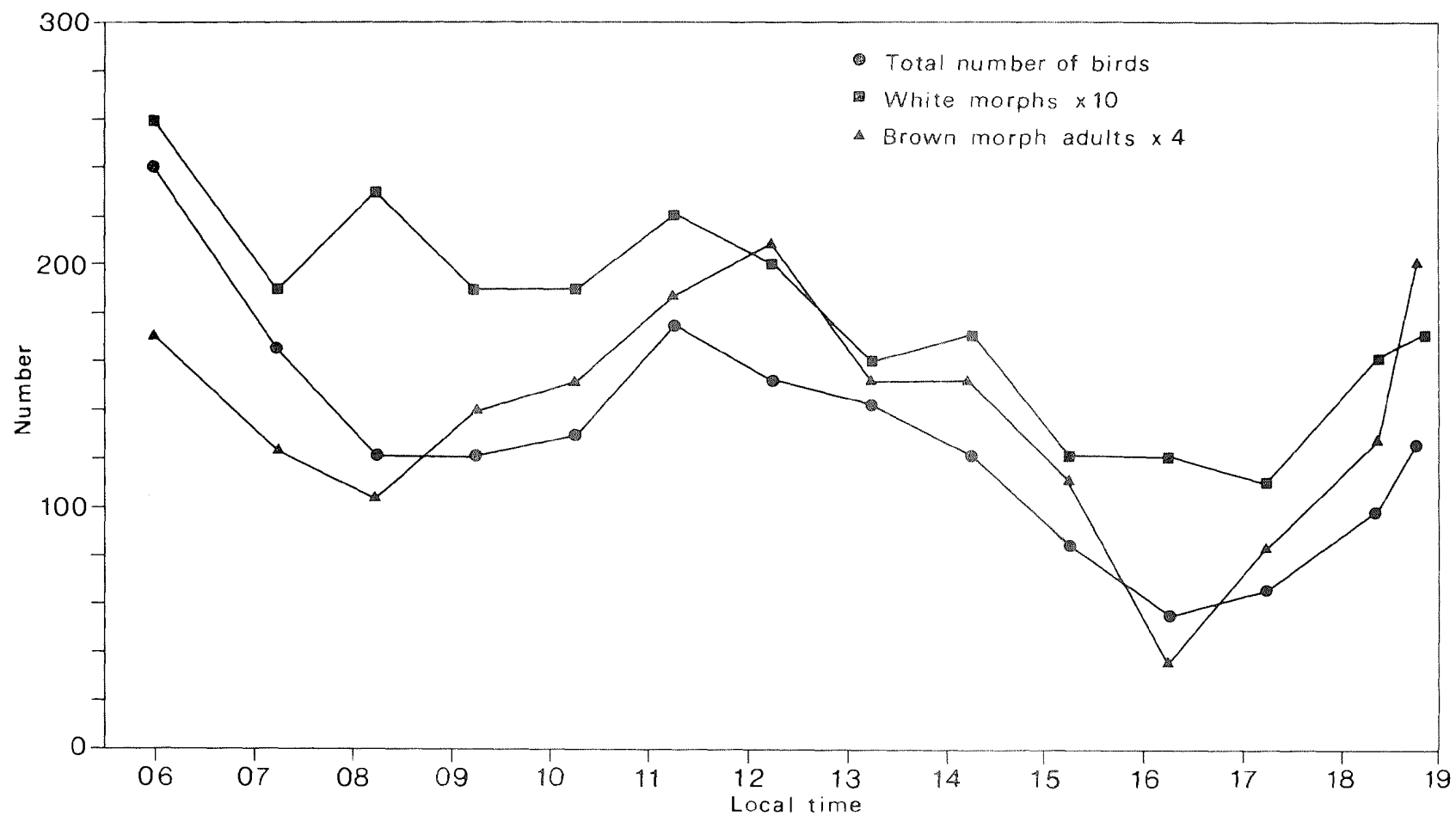


Figure 33. Diurnal variation in number of boobies present in the sample area of the colony