

THE DISTRIBUTION OF TERRESTRIAL AND FRESHWATER BIRDS ON LORD HOWE ISLAND, IN COMPARISON WITH NORFOLK ISLAND

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INTRODUCTION

Lord Howe Island was settled in 1834, 46 years after its discovery in 1788, and is of considerable interest to zoogeographers; the conservation of its native fauna and flora is a matter of considerable scientific importance.

We visited the island from 18th-30th November, 1969, during which time observations were made on the present distribution of terrestrial and freshwater birds in relation to the habitats available to them.

VEGETATION

Oliver (1917) has given an account of the plant formations and associations of the island from a botanical viewpoint.

"The classification of plant communities as bird habitats does not always coincide with the communities which would be defined by a plant ecologist; in many cases, general physiognomy is a more important factor in determining the suitability of an area as a bird habitation than the species of plants present. Also, it is sometimes necessary to distinguish areas as habitats for birds which would be meaningless to a student of natural plant associations e.g. urban environments" (Smithers and Disney, 1969). This is true of Lord Howe Island, although with modification the formations of Oliver (loc. cit.) can be used as a practical basis.

The following formations can be considered to have been available to birds as habitats when the island was settled by man.

ORIGINAL HABITATS

1. Temperate evergreen rainforest
 - (a) Lowland tall forest
 - (b) Lowland low forest
 - (c) Mountain forest (low)
2. Palm associations
3. Moss forest
4. Scrub
 - (a) Coastal scrub
 - (b) Hill scrub
5. Rocky shores
6. Sand dunes
7. Beach
8. Marsh
9. Streams
10. Ponds

Temperate Evergreen Rainforest

Oliver (1917, p. 102) describes several distinct associations of this forest. They differ in component species, the degree of liane development and in height but offer a generally similar physiognomy. The differences can

be correlated with height, exposure and soil type. Much of the island was originally covered by one or other of the temperate evergreen forest associations. The tall forest associations occurred in the southern areas up to a height of about 300 metres, above which a low forest occurred, merging into the moss forest on the mountain summits. On the northern hills a lowland low forest occurred.

(a) The *lowland tall forest* included undergrowth, although not dense, of young palms and trees and there was a low growth of seedlings of trees and ferns. Lianes were present "their numerous rope-like stems forming regular entanglements" (Oliver, 1917, p. 102).

(b) The *lowland low forests* which covered the northern hills were similar to those of the taller forest, but the upper storeys were lower.

(c) *Mountain low forest* occurred on the slopes of the southern mountains above about 300 metres. The lianes were fewer than at lower altitudes and the canopy not as high as that on the lower slopes. Much of the area on which this association occurred is devoid of soil, the trees growing amongst stones, rocks and boulders. Ground cover, under these circumstances, as can be expected, is minimal.

Palm association

Palms occurred scattered naturally through the forest formations and form a natural element of the forest, the species varying from one association to another. There were, however, areas in which palms occurred in pure stands naturally. Few plant species other than palms grew in these groves the nature of the palm growth and fallen palm leaves giving these areas a particular character.

Moss forest

The plateau at the summit of Mount Gower was covered with a unique moss forest. This is the locality from which many of Lord Howe Island's endemic invertebrate species have been collected and described. Zoologically and botanically it is truly unique. Oliver (1917, pp. 106-108) has described this formation and mentioned undergrowth and floor mosses and plant growth of a luxuriance not found at lower altitudes. The undergrowth was described as often extremely dense and almost impenetrable, especially on exposed places.

Scrub

Low scrub, consisting mainly of thickets of woody plants, occurred in some areas. This formation was found mainly along the coast and in other exposed situations where sea winds are prevalent e.g. along cliff tops and exposed ridges.

Rocky shores, Sand Dunes and Beach

These habitats do not require any comment.

Marsh

There were a few small areas of marshy or boggy land where small streams over-ran their banks on flat land.

Streams and Ponds

There were many streams on the island; areas of open standing water were few and small.

SECONDARY HABITATS

It is clear from early accounts of the island and even from that of Oliver (loc. cit.) that changes have taken place and are still taking place in the vegetation structure and composition and that the habitats now available are not in the same condition as those present on the arrival of man. The degree of change is not easy to determine in many cases, although in some areas has been so gross as to be obvious e.g. where pastures now replace forest. It is extremely doubtful whether any area of the island has remained completely

unchanged since human occupation and in this sense all the present habitats can be considered as being secondary to some degree. The main causes of alteration to the environment have been the activities of man, rats, pigs and goats.

The present bird habitats coincide with those listed as original plant associations above and to these can now be added the Pasture and Urban Habitats.

The Lowland tall forest

This now has an appearance different from that described by Oliver (1917, p. 104). There is very little undergrowth and the entanglements of lianes are uncommon. Seedlings of forest trees are few and it is clear that the death of the upper storey plants, in due course, with so little regeneration, will cause a major change to the forest environment. It is interesting to note that on Transit Hill the amount of undergrowth and seedling regeneration is considerably greater than on the lower eastern slopes of the southern mountains. This is undoubtedly due to the fact that pigs and goats are not permitted to remain for long in the Transit Hill area but are soon detected and shot out; also, a rat eradication campaign is being very intensively pursued in the northern half of the island and has resulted in considerable reduction in rat populations. In general terms it can be said that the temperate forest areas are now much thinner and more open in the lower and ground storeys and certainly would afford less bird cover in consequence.

Lowland Low Forest

This has been altered in a similar way; in most places there is virtually no ground cover nor is there much indication of regeneration. For example, lianes were common but are hardly in evidence now. It is now possible to see through the forest for long distances at heights below a few feet. The lower storeys have largely disappeared in many areas.

Mountain Low Forest

The nature of the soils on which this type is found make it unlikely that dense undergrowth could grow. This type is probably the least altered of the forest habitats; also, we were informed by residents that goats and pigs are less often seen in these areas. This is probably due to lack of ready food supply; pigs would find it hard to grub up in this area and there is little low growth on which goats could browse. The vegetation is here eaten off to a height which goats can conveniently reach.

Palm Association

This association is, by nature of its dominant plant, a clearly defined habitat. The peculiarities of the association are reinforced, in those areas in which the palms are definitely cultivated, by virtue of weeding practices and such general care of the plants as removal of dead fronds.

Moss Forest

This unique forest type, so important scientifically and so small in area (a few hundred acres at most) has clearly been altered considerably in the last 60 years. The luxuriance of the lower storey is so much reduced that, in capturing woodhens for marking, it was found very easy to move through this area wielding a long-handled net without hindrance. The amount of undergrowth has clearly been reduced by the activities of pigs, goats and rats. The rat extermination programme, understandably, is less intense on the southern mountains than other areas of the island.

Scrub Areas

The scrub areas have been invaded extensively by goats and the ground storey almost cleared in some areas. It is possible to kneel down in some scrub areas and have a long, unimpeded view between the bushes at low levels. Regeneration and undergrowth are being reduced to a minimum.

Marshes

These occur in small areas, either in open pasture or where there is still some forest cover overhead.

Streams and ponds

These are found in covered as well as open habitats; they vary in extent depending on rainfall but all ponds are relatively small.

Pasture

Clearing of forest and scrub has resulted in pasture formation, of which there are quite extensive areas in the northern half of the island. These areas are usually well cared for and weed encroachment held in check in most cases although weeds which find this type of environment suitable for colonizing in case of neglect are present on the island e.g. lantana. Some pasture areas are on exposed land adjacent to the coast; others away from the coast are in more protected situations.

Urban areas

The "urban", more closely settled areas are largely confined to the northern parts of the island although isolated gardens occur nearer the major forested areas further south. In all areas, the gardens remain well stocked with native plants, either as remnants of the original forest or as planted specimens. The roads are usually lined with remnants of native forest which form a reticulation of native vegetation through much of the settled area. The importance of this and the garden trees is great in that they provide a continuous remnant of the initial forest and form corridors along which forest birds travel and in which they can maintain themselves.

BIRDS**White-faced Heron, *Ardea novae-hollandiae***

During our stay 3 were recorded on different days on the pastures of Old Settlement Beach and Moseley Park. This is where there is fresh water. One was also seen on the pasture behind "Pine Trees" Guest House. This species is a frequent visitor and up to 15 have been recorded in a flock (Nicholls, 1952). Occasionally they stay to breed and this happened in the summer of 1937-38 (Hindwood, 1940). As on Norfolk island they have also been seen feeding on the beach at low tide.

Black Duck, *Anas superciliosa*

This is a casual visitor. None was recorded by us. A pair nested along Moseley Creek in September, 1963 and 100 ducks were seen in October, 1956 but they gradually left and had all gone by April 1957 (McKean and Hindwood, 1965). In Norfolk they appear to be resident.

Californian Quail, *Lophortyx californica*

This was introduced in 1880 and fairly large flocks were observed until the advent of rats in 1918. This would indicate that, as on Norfolk Island, there was sufficient suitable habitat of open areas for this bird to maintain itself.

Eastern Swamphen, *Porphyrio melanotus*

This is a casual visitor and from our observations there is not any very suitable habitat for it except, perhaps, in Moseley Park. Although it feeds in open pasture it seems to like to be able to retreat to fairly dense cover near water. These conditions are found by several of the streams in Norfolk Island and there it is a resident.

Lord Howe Island Woodhen, *Tricholimnas sylvestris*

This woodhen is endemic to Lord Howe Island and now apparently found only on the tops of the mountains; occasionally wandering birds are seen lower down. It is considered by us that the population is now very low. We spent two nights on the top of Mt. Gower and saw only 16 birds, of which we banded six. Each pair seems to have its own particular territory.

Norfolk Island has no similar rail. There is a related species in New Caledonia, but it has not been seen for many years, although one was possibly seen in 1936 (Delacour 1966). It would appear that many of the habits of the woodhen are similar to the New Zealand Weka or woodhens (*Gallirallus* spp.). The Lord Howe bird has a much longer and more slender bill. Unless the rats, pigs and goats are removed this rail will probably be soon extinct.

Golden Plover, *Pluvialis dominica*

These were found in the same habitats as on Norfolk Island. During our visit they could be found in ones or twos on small pasture fields either near the beach or, even, on a small field by the road to Ned's Beach. There was always one in the paddock behind "Pine Trees" Guest House at the bottom of Transit Hill. The largest number seen was 20 on Old Settlement Beach on 30th November when the creek was full and there were large pools from recent heavy rain.

Whimbrel, *Numenius phaeopus*

Unlike Norfolk Island, where so far the records are few, Whimbrel are regularly recorded. The greatest number so far recorded appears to be 30 (Hull, 1909). Our own observations on this species were similar to those for the Golden Plover. Three or four were seen on most of the bigger pastures and open areas, such as Middle Beach and Old Settlement Beach. The largest number seen was 10 in Moseley Park on 18th November. One was also seen in the same small paddock with the Golden Plover on Ned's Beach road. This compares with one seen by us at the same time of year on Norfolk Island in 1968 and four there in September, 1969 by Mr. Southwell (in litt.).

Eastern Curlew, *Numenius madagascariensis*

None was seen and this bird has rarely been recorded on Lord Howe Island but it is regularly seen on Norfolk Island.

Turnstone, *Arenaria interpres*

Flocks from 3 to 25 birds were seen on pasture at Moseley Park and Old Settlement Beach and they were also seen in pasture on the seaward side of Lagoon Road. None was seen feeding on the beach but little time was spent making observations on the beach.

Greenshank, *Tringa nebularia*

One was seen on the rough pasture at Moseley Park on 18th November, 1969.

Black-tailed Godwit, *Limosa limosa*

One was seen at Moseley Park on 18th November, 1969 and also present were 10 Whimbrel and two Golden Plover. The first record for this Godwit on Lord Howe Island was exactly five years before when Mr. J. D. Gibson saw one at Old Settlement Beach on 19th November, 1964 (McKean and Hindwood, 1965).

Bar-tailed Godwit, *Limosa lapponica*

Two were seen on Old Settlement Beach on pasture on 9th November and when disturbed they flew over to the beach.

Japanese Snipe, *Gallinago hardwickii*

This has been recorded several times on Lord Howe Island (McKean and Hindwood, 1965) and two were seen by us on Norfolk Island in the swamp below the Melanesian Mission in March, 1969.

Waders

We did not make special searches along the beaches for feeding waders and the only suitable wader habitats away from the beaches are by the pools and creeks at Old Settlement Beach and Moseley Park. From previous records of waders seen on Lord Howe Island any of the migrating waders which visit the east coast of Australia can be expected to be seen. Mr. Southwell, on Norfolk Island, is beginning to find the same for that island; he is the first ornithologist resident on the island to keep continuous records since the late Roy Bell.

White Tern, *Gygis alba*

Ten were seen over "Pine Trees" early in the morning of 19th November, 1969. White terns first came to the island during the war (1943) when an avenue of Norfolk Pines was cut down to make the airstrip on Norfolk Island (Mr. Dignam, pers. comm.). Nicholls (1952) also recorded their arrival and mentioned that they had increased to 50 by March 1946, but by the end of 1950 they had all gone. They are now known to breed on the island. Mr. Dignam (pers. comm.) suggests that the introduced Tasmanian Masked Owl finds it less trouble to catch the obvious white roosting birds at night rather than rats and he has found the remains of as many as 16 birds under some trees. The first nestling was seen in 1967/68 season by Master Dean Retmook, in a tree. In January, 1969 he found the first egg and showed it to Mr. Alan Rogers from Sydney. This nest was later photographed by Mr. Norman Chaffer. The egg was laid in a close horizontal fork of a Grey Bark, *Hemicyclia australasica* (Chaffer, pers. comm.).

Green-winged Pigeon, *Chalcophaps chrysochlora*

No Green Pigeons were seen or heard on the mountains in the true forest at the southern end of the island, but they were frequently seen (as Hindwood found in 1936) on the paths in the settled areas and were very tame. One was found in the evergreen forest on Transit Hill behind "Pine Trees" and another feeding under the palms at the bottom of the hill at the north end of Old Settlement Beach. It was not recorded in the literature until Hill mentioned it in 1869 (cf. Hindwood, 1940). Perhaps it does not like heavy thick bush but prefers fairly tall trees giving shade through which it can readily fly with the ground underneath open, as it feeds on the ground. Not until 1869 were conditions with paths and open tracks sufficient for it to feed along these tracks and the edges of pasture. The forest on Norfolk Island is more modified and open, with large trees such as White Oaks (*Lagunaria patersonia*) giving shade, under which the pigeons feed.

Crimson Rosella, *Platycercus elegans*

In contrast to its great abundance on Norfolk Island, the birds released from the beached S.S. Makambo in 1918 did not succeed in establishing themselves on Lord Howe Island (Hindwood, 1940). The reason for this is not clear; there does not seem any reason why they did not breed unless there were no suitable hollows or there were no true pairs. They may have perhaps rapidly suffered the same fate as the indigenous parrot and been shot as potential pests of the islanders' crops.

Lord Howe Island Green Parrot, *Cyanoramphus novae-zelandiae subflavescens*

This parrot was destroyed within 36 years after the first settlement of the island by the islanders because of the damage it did to their crops. The last recorded pair was observed in 1869 (Hindwood, 1940 from Hill, 1870, p. 46). There are still a few pairs of the Norfolk Island race on that island. These parrots are races of the New Zealand Red Fronted Parrot, *Cyanoramphus novae-zelandiae*.

Nankeen Kestrel, *Falco cenchroides*

On 21st November at 11 a.m. a kestrel was seen to fly past "Pine Trees" Guest House. On 25th November a bird was seen on the saddle between Mt. Gower and Mt. Lidgbird at the top of Erskine Valley. A pair was also seen here in January, 1970, by Mr. Lyndsay Hyem (in litt.). Three were seen between 12-24th February, 1967 by Mr. Garry Sefton (in litt.). Hindwood and Cunningham (1950) previously have recorded this bird from Lord Howe Island. Here it would seem to be a frequent visitor or perhaps a resident. On Norfolk Island it may be only an infrequent visitor. One was seen on this island on 24th November, 1969 (Southwell, in litt.).

Tasmanian Masked Owl, *Tyto novae-hollandiae castanops*

No owls were seen or heard by us, but as mentioned above (see under White Tern) Mr. Dignam said these owls found the White Terns easy prey. Mr. Chaffer in 1969 took a photograph of White Terns killed by owls which showed the terns had been eaten by plucking in the usual owl manner and not

killed by cats. These owls were introduced between December 1922 and October 1930 (Hindwood, 1940). Mr. & Mrs. Beaglehole saw one in daylight on 18th September, 1963 (Hindwood and McKean, 1965). One was recently found and photographed by Master Dean Retmock (Mr. Alan Roger, pers. comm.).

Barn Owl, *Tyto alba*

One was seen in February, 1967 by Mr. Garry Sefton (in litt.). This species was introduced in October, 1923, but there have been few sightings or reports of the birds being heard since. Hindwood (1940) observed one in 1936. Calls of *Tyto* species have been heard at other times and McKean and party heard a bird in Erskine Valley and at Middle Beach in September 1963 (Hindwood and McKean, 1965).

Mr. George Southwell, in a letter from Norfolk Island in September 1969 informed us that the Barn Owl had been heard from February to August, and that Mr. Gostling had an excellent tape of the call, which had been heard over the last four years.

Boobook Owl, *Ninox novaeseelandiae*

Neither the endemic race *Ninox n. albaria* nor any of the introduced Australian races appear to have been recorded on Lord Howe Island in recent years, although Hindwood (1940) often heard their call at night. On Norfolk Island, although we have not heard the call, Mr. Southwell, in his letter of September, 1969 confirmed that its call is still heard.

Cuckoos, Cuculidae

None of the five cuckoo species recorded by Hindwood (1940) were seen by us.

Long-tailed Cuckoo, *Eudynamis taitensis*

This species is regularly reported from both Norfolk and Lord Howe Islands, presumably on passage to and from New Zealand where it breeds. In January 1967, Mr. Chaffer (in litt.) and in February, 1967, Mr. G. Sefton (in litt.) both recorded cuckoos which were almost certainly this species. Shining Bronze Cuckoo, *Chalcites lucidus*

This cuckoo is also regularly recorded on both islands on migration to and from New Zealand. It has bred on Norfolk and apparently sometimes on Lord Howe, but has not been recorded breeding on this island since the Lord Howe Island Warbler, *Gerygone insularis* became extinct.

Spine-tailed Swift, *Hirundapus caudacutus*

This swift was recorded on Norfolk Island flying over the top of Mt. Pitt in November 1968 (Smithers and Disney, 1969). It has been recorded several times on Lord Howe Island. There are several records for New Zealand, where it occurred in large numbers in the summer of 1943 (McCaskill, 1943).

Lord Howe Island Sacred Kingfisher, *Halcyon sancta adamsi*

This race of Sacred Kingfisher is large, as are the Norfolk Island and New Zealand races. It is frequent near open areas, such as a small, rough, paddock on Middle Beach road, where a bird was seen to take an insect on the wing from the top of a flowering weed. Another was seen to swoop down onto the ground to catch a long green caterpillar (?). It was not seen in the thick natural forest. The earliest collectors did not record it and it was first recorded by Hill in 1869 (Hindwood, 1940). It would thus seem that like the Green-winged Pigeon it did not appear until clearing by the islanders had provided a suitable habitat.

Welcome Swallow, *Hirundo neoxena*

Frequently one or more is seen on Lord Howe Island. One was seen by us near the jetty on 19th November, 1969. On Norfolk Island about twelve were seen by us on the top of Mt. Pitt in March, 1969. These were mainly young birds. Smithers again saw swallows present in the same place in June, 1970. Swallows do not seem to have been previously reported on Norfolk.

Vinous tinted Blackbird, *Turdus poliocephalus vinitinctus*

This race of *T. poliocephalus* was still present when Bell visited the island in 1913 although not in great numbers and quickly disappeared after the rats arrived in 1918 (Hindwood, 1940). Mr. Phil Dignam informed us that the "Doctor bird", so named after Dr. Foulis, who wore a long brown coat, (cf. Nicholls, 1952), nested in the fallen palm fronds at the base of the palms, and was readily taken by rats, which also eat the green dates. The nominate race on Norfolk Island is still present in small numbers in the Mt. Pitt forest reserve.

European Blackbird, *Turdus merula*

There is little to add to the report of McKean and Hindwood (1965). Blackbirds were seen by us frequently in the settled northern end of the island and a male bird sang every evening from the top of a tree at "Pine Trees" during our stay. They were also seen in the forest on Transit Hill above "Pine Trees". McKean and Hindwood (1965) recorded them on the middle slopes of Mt. Gower in 1962. We did not see any when we climbed Mt. Gower in November, 1969, but Mr. Lyndsay Hyem (in litt.) observed them on the summit in January, 1970. They were first reported on the island in December 1953 by Nicholls and Cpt. McComish noted them on Norfolk Island in 1939 (McKean & Hindwood, 1965). It would appear that this species is self introduced on both islands, probably from New Zealand. With the apparent reduction of the rats in their preferred areas by the use of poison, they can be expected to increase on Lord Howe Island.

Song Thrush, *Turdus ericetorum*

Like the previous species this bird also seems to have been self introduced to both islands, probably from New Zealand. On Norfolk Island it arrived in 1913 (cf. Hindwood, 1940). It was first seen on Lord Howe Island in 1928 by Mr. Whiting (Sharland, 1929) but nesting was not confirmed until January 1955 by Mr. Nicholls (McKean and Hindwood, 1965). Several birds were seen by us in the settled areas and two in forest on Transit Hill.

Lord Howe Island Warbler, *Gerygone insularis*

This warbler was possibly made extinct by the rats but was still common in 1928 (Sharland 1929). The Norfolk Island species, *Gerygone modesta*, is successfully inhabiting a wide range of habitats both natural and those modified by man (Smithers & Disney, 1969).

Lord Howe Island Fantail, *Rhipidura cervina*

After the rats came, this species soon became extinct; by 1924 it was very scarce and could not be found in 1928 (Sharland, 1929). The Norfolk Island species, *Rhipidura fuliginosa pelzelni* is still very common in any habitat in which trees and shrubs are available (Smithers & Disney, 1969).

Lord Howe Island Whistler, *Pachycephala pectoralis contempta*

This whistler, as Hindwood (1940) recorded, is one of the few native birds which have survived the rat onslaught. It seems to prefer evergreen scrub 20-30 ft. high and was seen in this type of forest on the hills and top of Mt. Gower and also along roadsides in the settled areas where native bush had not been cut down. A juvenile, still with rufous on head and breast, was seen on Transit Hill with an adult male on 27th November, 1969. It would appear that the Norfolk Island Whistler, *Pachycephala xanthoprocta*, is now less frequently seen in gardens on that Island because the road verges have all been cleared of natural forest remnants along which the whistlers travel to enter gardens.

Lord Howe Island Silvereye, *Zosterops tephroleura*

We are in agreement with McKean (McKean and Hindwood, 1965) that the dominant silvereye is *Z. tephroleura*, although once or twice the birds seen appeared larger and almost the size of a sparrow. There has been no definite record of the Robust Silvereye, *Z. strenua*, since the rats reached the island in 1918. It is not clear why one species should survive and the other disappear when both are faced with the same alteration of habitat. The similarly large White-breasted Silvereye in Norfolk Island (*Zosterops albogularis*) is also now very

scarce and rarely seen (Smithers & Disney, 1969). It is also not clear what happened to the Eastern Silvereye, *Z. lateralis*, introduced in 1924 from New South Wales and from Norfolk Island in 1925, 1931, and circa 1936 (Hindwood, 1940). *Z. tephropleura* on Lord Howe Island was readily seen in the native bush and also in the gardens feeding in hibiscus plants.

House Sparrow, *Passer domesticus*

On Norfolk Island this is abundant in urban areas, but it is not present on Lord Howe Island.

Starling, *Sturnus vulgaris*

These were only seen in or near open paddocks and never in any numbers, the largest number being 12; most had probably paired off to breed at the time of our visit. It would appear from previous records that their numbers are remaining much the same. Neither on this island nor on Norfolk do they appear to have invaded the native forest.

Magpie-Lark, *Grallina cyanoleuca*

This was common in the settled areas and was seen on the pasture areas. Large numbers were seen from "Pine Trees" Guest house to Salmon Beach along Lagoon Road. Two pairs were seen in a small patch of native forest beside the road. One young bird which had recently left the nest was seen. There were two nests about 50 yards apart in Norfolk Pines near "Pine Trees" Guest house. The male bird was sitting on one nest when seen and the other nest was still being built. It would appear that with the successful campaign against rats in the settled areas the Magpie-Lark is increasing.

The Magpie-lark has not reached nor been introduced to Norfolk Island. Lord Howe Island Currawong, *Strepera graculina crissalis*

This bird was only observed in ones or twos by us, both in the forest on the slopes of Mt. Gower and Lidgbird and in the settled area. They were tame and two in a Pandanus grove by Old Settlement Beach came very close, one with a piece of Pandanus fruit in its bill. Currawongs are not present on Norfolk Island.

COMPARISONS BETWEEN NORFOLK ISLAND AND LORD HOWE ISLAND

It would appear that the main differences in the present vegetational habitats on Norfolk and Lord Howe Islands result from the fact that on Norfolk there has been more extensive and greater direct clearing by man, followed by grazing by cattle which has prevented regeneration, whereas on Lord Howe, although the forest appears at first very similar to the original, it has been greatly affected by wild goats and pigs with almost the complete removal of lianes and vines. With shooting now not permitted the goats and pigs are present in large numbers, especially in the southern mountains.

Another striking and important habitat difference is that in the settled areas of Lord Howe the road verges retain original forest which forms a reticulation in which bird populations are maintained whereas on Norfolk Island the road verges in the settled areas are very largely cleared and the many more gardens are more open.

Also, in many parts of Norfolk Island, areas which were once cleared as pasture or which were used for crop production have been allowed to degenerate into lantana thickets of varying degree of density or into tangled wood thickets.

The area which has been cleared of forest on Lord Howe is relatively less than that which has been cleared on Norfolk and the units of cleared area are individually smaller and have not been allowed to become invaded by weed thickets.

The smaller species of passerines were nearly all common to both islands, although they had evolved recognizable subspecific populations. On Lord Howe Island it is clear that the arrival of rats in 1918 and their breeding up to plague proportions probably caused the extinction of several bird species, namely, the Vinous-tinted Blackbird, Fantail, Warbler, and the Robust Silvereye. Only the Whistler and Smaller Silvereye managed to survive. It would appear from Hull

(1909) and Bell (Diary MSS., 1913) that the Vinous-tinted Blackbird nested on the ground or low down in the fallen fronds on the *Kentia* palms and that the Robust Silvereye placed its nest among the masses of fibre clothing the under side of the crown of palms. Here they would be readily found by the rats which also ate the green palm seeds. The rats would also seem to have prevented success in the attempts to introduce the Eastern Silvereye; this species usually nests on a horizontal branch not more than 15 feet up in a shrub. The nesting site of the silvereye, *Z. tephropleura*, has not been recorded (and neither Hull nor Bell found a nest) but birds were seen by us in November, 1969 carrying material up at least 15 ft. into a dark evergreen tree growing on the lawn at "Pine Trees". It is possible that this silvereye nests where it is less likely to be found by rats. The rats, by eating the seeds of plants, will have combined with the goats and pigs in removing most of the low scrub suitable for nesting sites. It is certain that pigs, goats and cats have been present for over 100 years and they must have modified the forest understorey and prevented regeneration. Hill (1870), who visited the island in 1869, recorded that pigs, cats and goats appeared to be abundant. Oliver (1909) referring to goats on the Kermadec Islands states that they do allow a certain number of palm seedlings to grow up as they only browse on the young palms.

The Lord Howe Island Warbler's nest site has not been recorded so no suggestion can be given as to why it disappeared except that it, too, must have nested in a position readily accessible to the rats.

The Fantail apparently nested usually only 3-15 ft. from the ground on a horizontal branch and presumably was readily found by the rats.

On the evidence available it is not clear how the Lord Howe Island Whistler managed to survive. Hull (1909) describes the site of the nest found by him as being only 8 ft. up in a shrub thickly overgrown with lawyer-vines in a palm glen.

On Norfolk Island it seems likely that the first noticeable reduction of the native birds came when cat distemper occurred on the island in 1951. This disease reduced the cat population and allowed the rat population to increase to the extent that not even vegetables could be grown, as these were destroyed by the rats (pers. comm. P. Ralston). Cats were reintroduced and the rat population declined, but they are still numerous. This, however, took place in time to prevent complete destruction of native birds. This would help to explain why the Grey Headed Blackbird, *Turdus poliocephalus*, is now present only in small numbers. Also, the clearing of the road verges with increased cattle grazing removed the usual avenues by which the forest birds reached the gardens.

The presence of large rat populations could account for the disappearance, on both islands, of *Aplonis fuscus* (Island (Shining) Starlings). This species nested in tree holes, which the rats would be certain to investigate. Rats would also account for the disappearance of the Black and White Sparrow, *Lalage leucopygius* on Norfolk Island. Hull (1909) found two nests, both built in introduced pine trees near a residence.

FINAL COMMENTS

It seems that to retain the indigenous birds on these two islands the rats must first be destroyed and then the wild cats removed in order to protect the sea birds. Ratsak or a similar poison might be used. An eradication programme is apparently giving good results in the settled areas of Lord Howe Island, where the islanders have noticed the reappearance of native lizards and snails. It is understood that poisoning is also now being carried out on the top of Mt. Gower. It is certain that unless this part of the campaign is successful the Woodhens will not survive, as recent observation by Mr. Lindsay Hyem and Ray Schick (pers. comm.) have shown that the rats take many of the eggs. In order to retain the remaining native vegetation and permit regrowth, a vigorous campaign of goat and pig extermination must also be carried out and other usual protective measures taken to prevent

deterioration of the environment. The area on top of Mount Gower should immediately be completely protected from further alteration in any way in order to retain a suitable environment for the small, rapidly disappearing, population of woodhens.

ACKNOWLEDGEMENTS

We wish to thank the Lord Howe Island Board for permission to carry out this survey, the Board's Superintendent on the island and many islanders who helped us, in particular Mr. Phil Dignam and Paul and Bruce Thompson, who were our guides and helpers on Mt. Gower.

The late Mr. K. A. Hindwood took a great interest in our work on Lord Howe Island. We would like to record here our deep appreciation of his help and also our thanks to his correspondents, Mr. Norman Chaffer, Mr. Gary Sefton, and Mr. Alan Rogers, for allowing us to make use of their unpublished observations.

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