

Records of the Western Australian Museum
Supplement No. 24

Birds of the Houtman Abrolhos, Western Australia



G.M. Storr, R.E. Johnstone and P. Griffin

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Western Australian Museum
1986

World List Abbreviation:
Rec. West. Aust. Mus. Suppl. no. 24

Cover: A Lesser Noddy perched on a Wooded Island mangrove.

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ISSN 0 313 122X

Published and printed by the Western Australian Museum,
Francis Street, Perth, Western Australia 6000.

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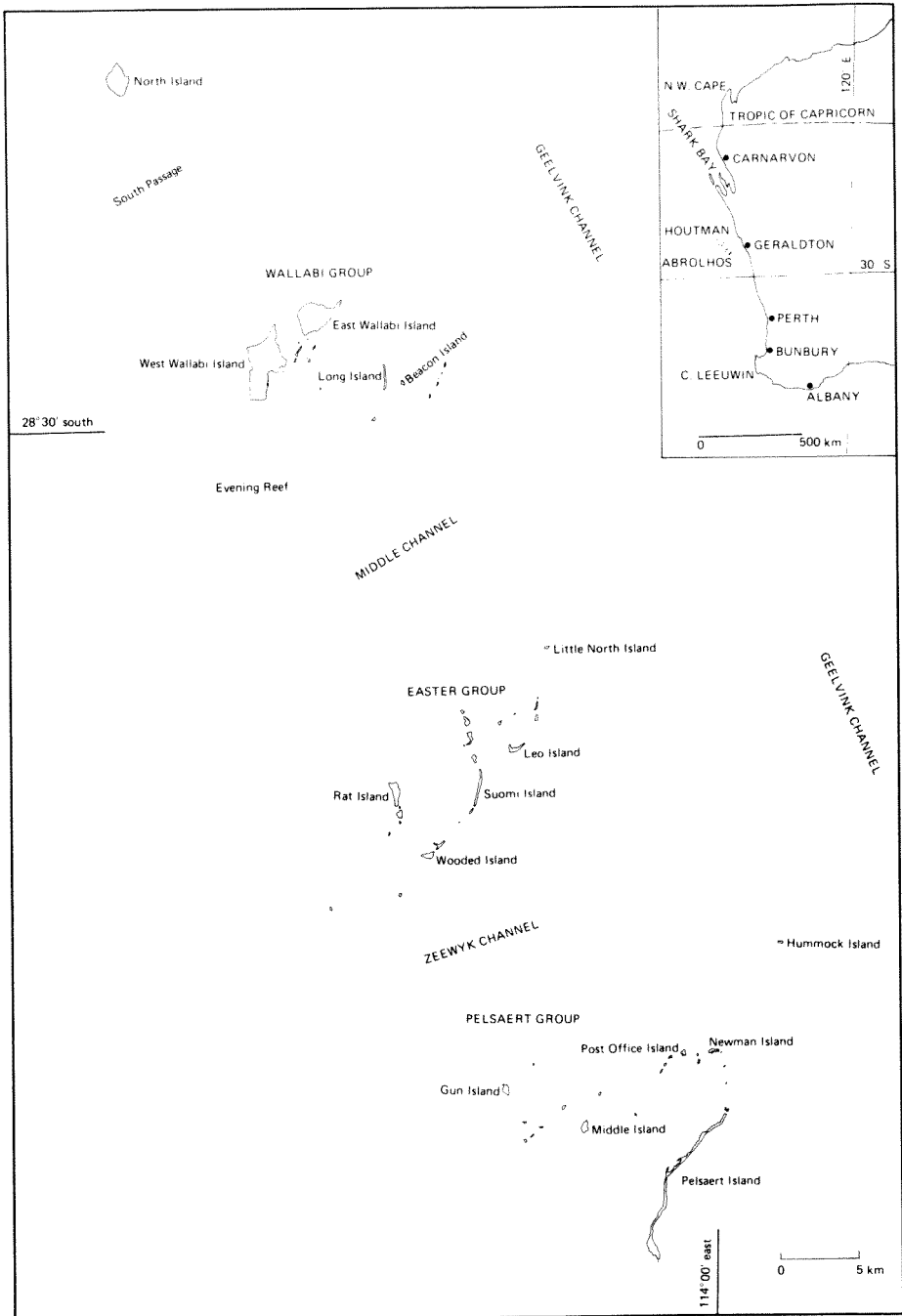


Figure 1 Map of the Houtman Abrolhos.

ABSTRACT

This is an annotated list of the 95 species recorded from the Arolhos and adjacent seas, comprising 40 seabirds (19 breeding), 33 littoral and lake birds (5 breeding) and 22 land birds (6 breeding). The composition of the avifauna, seabird breeding seasons and the vulnerability of the birds to man-made changes are discussed.

INTRODUCTION

In this paper we collate what is known of all birds recorded on or near the Houtman Arolhos. Where applicable, data are given on status, abundance, season of occurrence, breeding season (defined by the months in which eggs are laid), clutch size, nest and food.

The Environment

The Houtman Arolhos are an archipelago of 108 islands and rocks lying 60-80 km off the mid-west coast of Western Australia between latitudes 28° 20' and 29° 00' S. They are located towards the edge of the continental shelf and are clustered, from north to south, in four groups: the isolated North Island and the Wallabi, Easter and Pelsaert Groups, each of which rises from a platform 50 m deep. They were separated from the mainland by rising sea-level 11 000 to 12 000 years ago (Main 1965).

Few climatic data are available for the Arolhos. Mean annual rainfall would be in the order of 30 to 40 cm, most of it falling from May to September. Owing to the offshore southerly Leeuwin Current (Pearce and Cresswell 1985), sea temperatures are markedly higher around the islands than along the mainland coast, which explains how an archipelago with a Mediterranean climate can support a predominantly tropical avifauna.

The islands range in size from West Wallabi (600 ha) down to rocks a few square metres in area. On several of the larger islands there are relictual continental surfaces (dunes and aeolian limestone), which retain a moderately rich vegetation. At the other extreme are islands that consist mainly of recent accumulations of debris cast up by storms from nearby reefs; they have little or no vegetation.

Shallow soils over limestone carry a varied assemblage of sclerophyllous shrubs and low trees up to 3 m tall. The plant cover on shell or coral grit is lower, much less diversified, and dominated by halophytes, mainly the saltbush *Atriplex cinerea*, which is replaced in low-lying areas by the samphire *Halosarcia halocnemoides*. Sandy areas are dominated by the succulent shrub *Nitraria schoberi* where the soil is shallow, and by the tussock grass *Spinifex longifolius* where it is deep. In and around lagoons on Pelsaert, Wooded, Morley, Fin and Uncle Margie Islands there are good stands of the mangrove *Avicennia marina*.

Effects of Man

The identity of the rodents that induced Stokes to give Rat Island its name in 1840 is unknown; possibly they were *Rattus rattus* or *Rattus norvegicus*, descendants of shipwrecked animals. Their effect on the bird life is likewise unknown, but despite their high numbers they did not prevent Rat Island from being one of the greatest breeding grounds in the world for tropical seabirds.

From 1847 to 1946 guano was mined on several islands, especially Rat, Pelsaert and Gun in the period 1885-1915. As this required the removal of vegetation, loose rocks and soil, nesting seabirds were subjected to much disturbance. The guano workers took many eggs, and they introduced certain mammals to the islands. The most damaging of these was the domestic cat, released on Rat Island for the control of rats. By the time of Alexander's visit (1913) the rats were extinct (by 1940 the Common Noddy and Sooty Tern had disappeared from Rat Island, and a few years later the Wedge-tailed Shearwater). At present the cats are living on lizards and house mice (*Mus musculus*). The goats formerly depastured on East Wallabi Island and the rabbits formerly occurring on Pelsaert Island seem to have had no lasting effect.

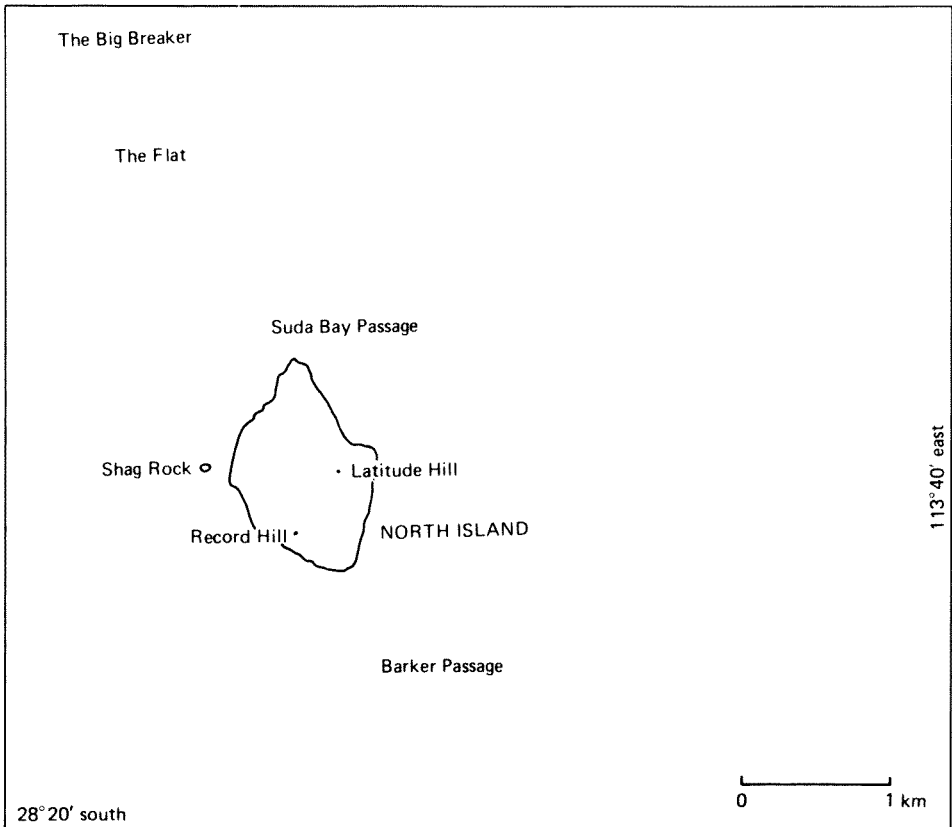


Figure 2 Map of North Island.

In the period between the world wars the principal activity in the region was deep-sea fishing. This involved few people and no residence on the islands. Tammars (*Macropus eugenii*) and rabbits were liberated on North Island as a source of food for storm-bound fishermen, but neither species persisted for long. A much more damaging activity was the commercial harvesting of seabird eggs.

After World War II rock lobster fishing became a major industry, involving hundreds of people and the building of huts, jetties and other installations, which may only be occupied during the season (15 March-30 June). Airstrips have been built on North, East Wallabi and Rat Islands, and one is planned for Newman Island. Rabbits were deliberately released on Leo and Wooded Islands; both colonies have now been exterminated. The *Rattus rattus* accidentally introduced to Pigeon Island have also been exterminated, but the house mice recently established on North Island remain in large numbers. Exotic plants, chiefly winter annuals, continue to be inadvertently introduced on the islands.

The adverse effects of man on Abrolhos seabird colonies are discussed by Fuller and Burbidge (1981).

Sources of Data

The first substantial accounts of Abrolhos birds come from the collector-naturalist John Gilbert, who visited Pelsaert, East Wallabi, West Wallabi and other islands in January-March 1843 on behalf of John Gould. Gilbert published an account of his trip in a Perth newspaper, most of which was reprinted by Whittell (1942) together with extracts from Gilbert's letters to Gould. Other notes from the trip were published by Gould (1865).

A.J. Campbell visited Rat and Pelsaert Is in December 1889; his observations and some of those of G.K. Beddoes (then manager of the Rat I. guano works) were published by Campbell in 1890 and 1900. Then came visits by C.P. Conigrave (1916) in 1897 and presumably also in 1915 with W.J. Dakin, by R. Helms (1902) in 1898, R. Hall (1902) in October 1899, and C.G. Gibson (1908) in November 1907.

Under the leadership of Prof. W.J. Dakin, the Percy Sladen Trust Expedition to the Abrolhos in 1913 and October-November 1915 produced the first detailed accounts of the islands and their fauna. Dakin (1919) wrote up the narrative and physical descriptions of the islands and adjacent seas, and W.B. Alexander (1922) enumerated the vertebrate fauna collected and observed on the expedition (he took part only in the 1913 visit).

Next were visits by P.T. Sandland (1937) to Pelsaert I. in November 1936; V.N. Serventy (1943) to several islands in December-January 1940-41 and 1941-42; H.E. Tarr (1949) to Pelsaert I. in September-October 1948; E.H.M. Ealey (1954) to the Pelsaert Group in August 1953; J. Warham (1956) to Pelsaert I. in November-December 1954; and G.M. Storr (1960, 1965, 1966) to the Wallabi Is in April, June and September 1959 and April 1960 and North I. in September 1959.

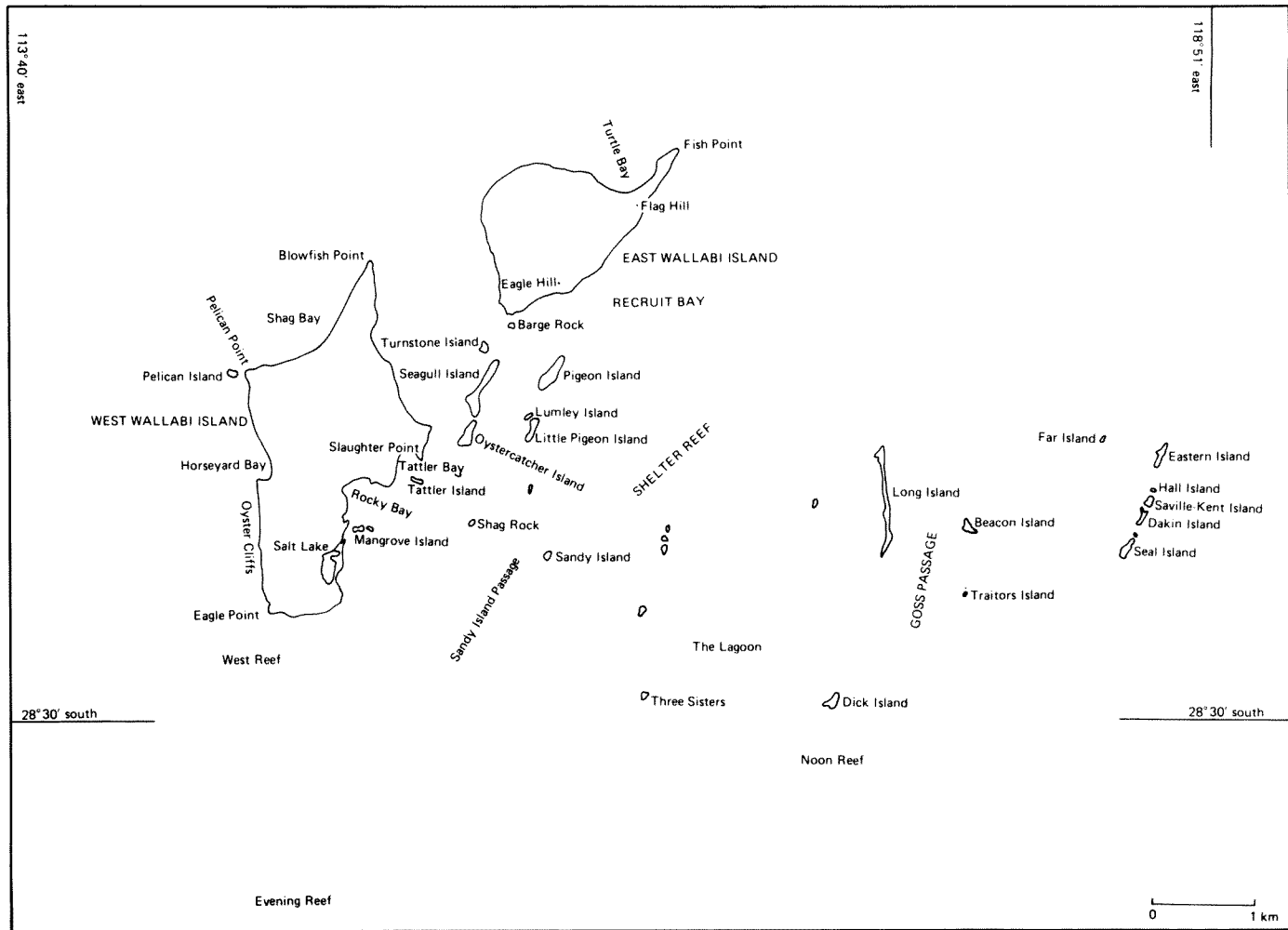


Figure 3 Map of the Wallabi Group.

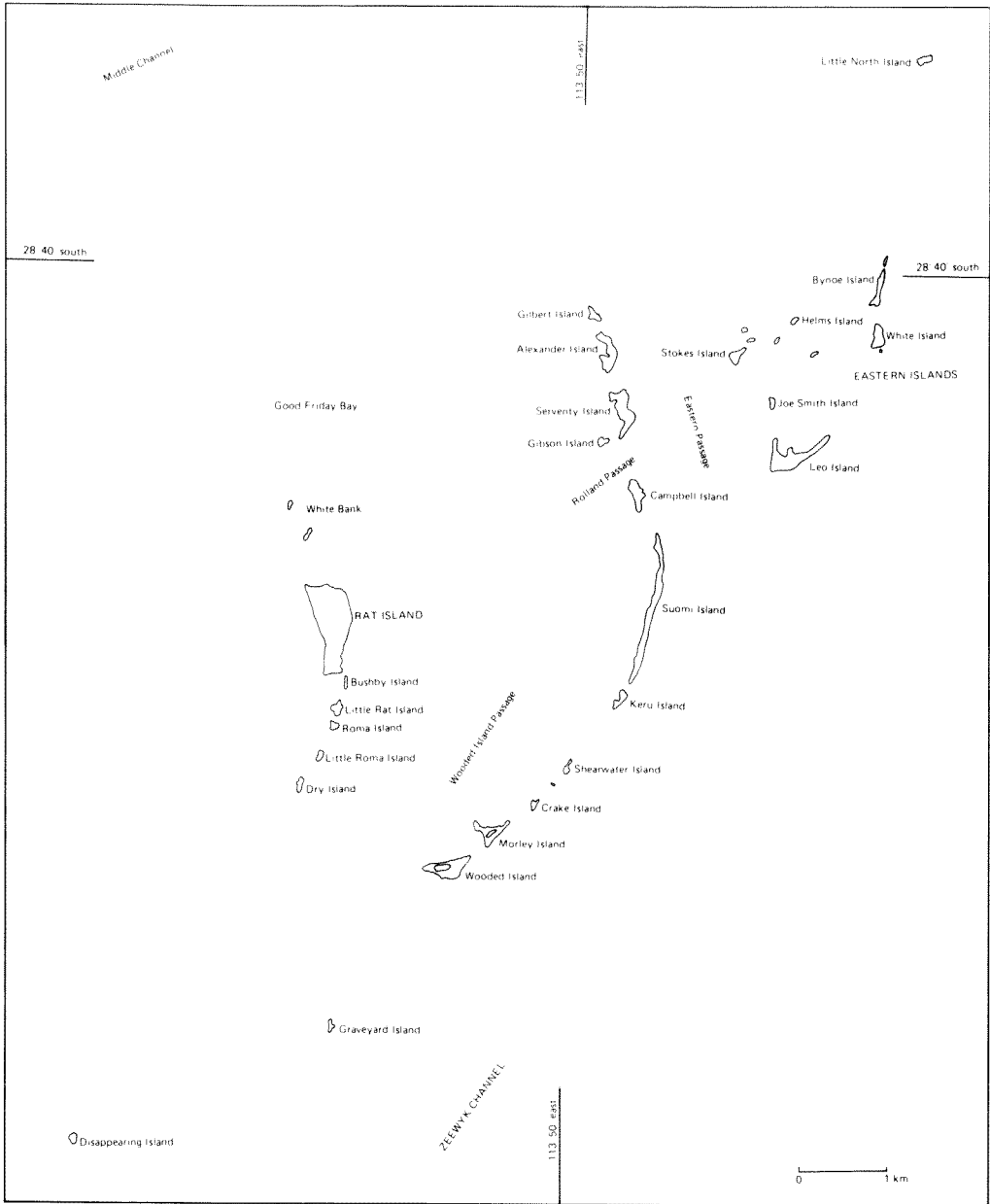


Figure 4 Map of the Easter Group.

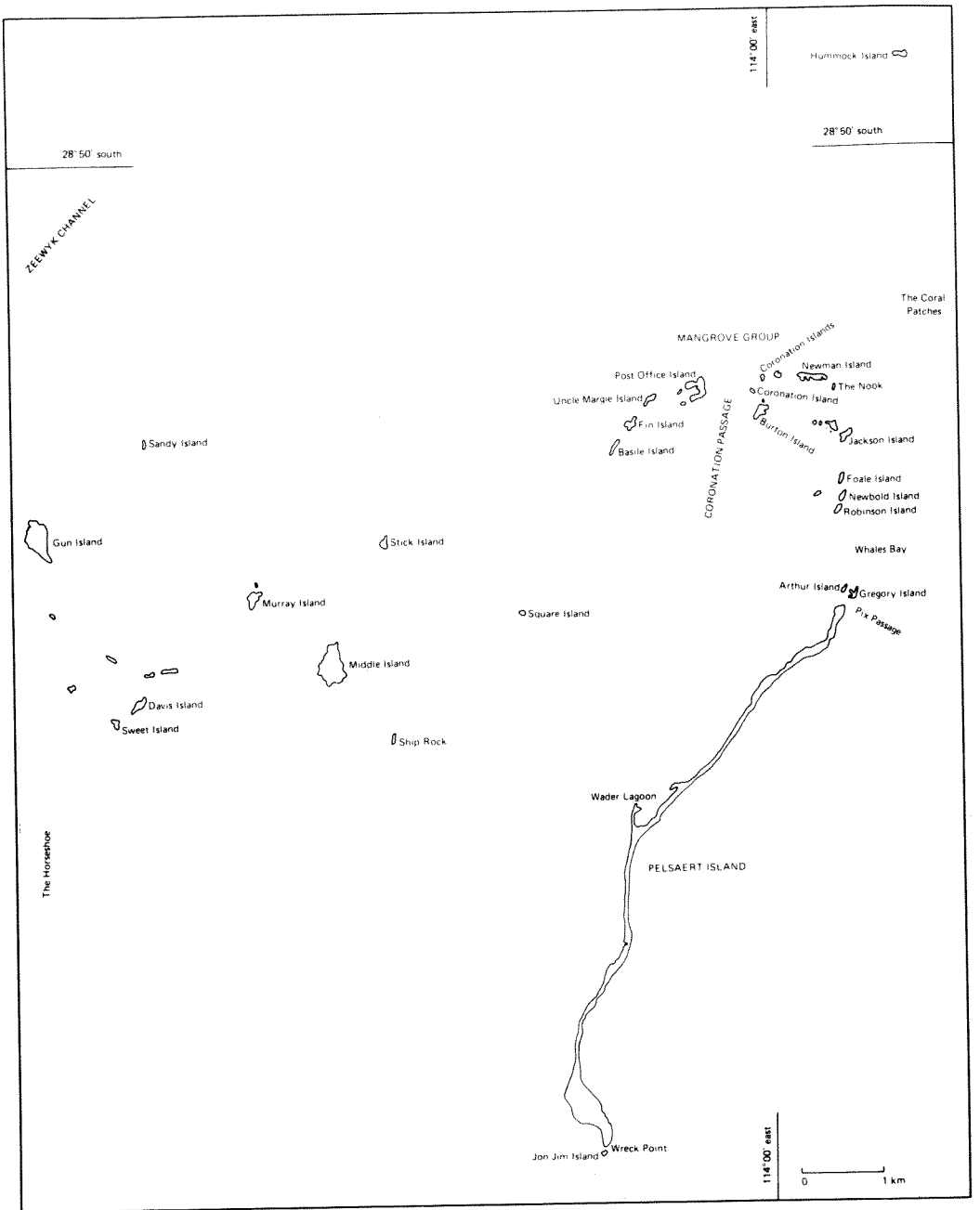


Figure 5 Map of the Pelsaert Group.

The following decade was notable for the Aquinas College expeditions to the Wallabi Group in August 1964 and 1965, the Pelsaert Group in August-September 1966 and January 1968, and the Easter and Pelsaert Groups in August 1970. Accounts of these expeditions were published by O'Loughlin (1965, 1966, 1969) and Green (1972).

In addition to these published sources many unpublished data have been made available to us. We are especially indebted to D.L. Serventy for the loan of MS diaries covering trips to Pelsaert, Mangrove [Uncle Margie] and Square Is in November 1943, to Pelsaert I. in November 1944, and to North, East Wallabi, West Wallabi, Rat, Morley, Wooded and Pelsaert Is in December 1945. Dr Serventy also loaned us a copy of field notes made by V.N. Serventy, G. Pizzey and A.G. Mathews on several islands in December 1963. He also gave us a copy of the notes he made on photographs taken by the Duke of Edinburgh on a visit to Pelsaert I. on 24 March 1963.

Other unpublished data come from T.C. Allen's visit to Pelsaert I. in September 1961 and November 1964 and to West Wallabi I. in August 1976; G.E. Lodge's visit to Pelsaert I. in August 1963 and the Wallabi Is in August 1964; N. Kolichis's visits to Pelsaert I. in August and November 1973 and August 1975 and to the Wallabi Is in July 1974, August 1975 and August 1976; P.R. Howden's visit to North I. in September-October 1974; R.I.T. Prince's visit to North I. in August 1976; A.A. Burbidge and P.J. Fuller's visits to Pelsaert I. in October 1977, February 1978 and 1979, November 1980 and February 1981 and 1984 (many of these data were published by Fuller and Burbidge 1981); P. Griffin's visits to the Pelsaert Group in April 1976, 1977, 1978 and April-May 1979; G.J. Robert's visit to several islands in June-July 1980; and P.J. Fuller's visit to Leo I. in February 1981.

Finally there are the data gathered by R.E. Johnstone in August 1977 on Rat, Wooded, Morley and Pelsaert Is; in May 1981 on Basile, Pelsaert, The Nook, Jackson and satellites, Wooded, Leo, Gilbert, Alexander, Serventy, Helms, Joe Smith, Dick, Long, Beacon, Pigeon, East Wallabi and North Is; in October 1981 on Pelsaert, North, Pigeon, West Wallabi, East Wallabi, Long, Beacon, Rat, Roma, Serventy, Gibson, Campbell, Suomi, Morley, Wooded, The Nook, Jackson and Newman Is; and in August 1983 on Pigeon, West Wallabi and satellites, Seagull, Barge Rock, Turnstone, Oystercatcher, Lumley, Little Pigeon, Beacon, Long, Dick, Seal, Dakin, Saville-Kent, Hall, Far, Eastern, East Wallabi, North, Rat, Little Rat, Wooded, Morley, Crake, Shearwater, Keru, Suomi, Roma, Little Roma, Bushby, White, Bynoe, Helms, Stokes and satellites, Gilbert, Alexander, Serventy, Joe Smith, Basile, Fin, Uncle Margie, Post Office, Coronation, Jackson, Newman, The Nook, Square, Middle, Stick, Pelsaert and Hummock Is.

ACKNOWLEDGEMENTS

We are grateful to the Kwinana/Rockingham/Murray Branch of the Western Australian Naturalists' Club for a donation towards the cost of publishing this paper, to the Fisheries Department for providing one of us (R.E.J.) with transport to and between the islands, and to the Lands and Survey Department for approving our naming of 11 previously unnamed islands in honour of the following naturalists, W.B. Alexander, B. Bynoe, A.J. Campbell, W.J. Dakin, C.G. Gibson, J. Gilbert, R. Hall, R. Helms, W. Saville-Kent, D.L. and V.N. Serventy and J.L. Stokes.



Figure 6 Little Pigeon Island in foreground. Lumley Island in middle distance; Little Shearwaters nest under the huts.

ANNOTATED LIST OF BIRDS

Spheniscidae

Eudyptula minor novaehollandiae (Stephens) Little Penguin

Single birds occasionally stray northwards to the Abrolhos and surrounding seas in the cooler half of year (March-September).

Diomedeidae

Diomedea exulans Linnaeus Wandering Albatross

Rare winter visitor to surrounding seas. Ferguson (1921: 105) observed an immature west of the Abrolhos on 27 May 1919. A skull found on Coronation I. probably belonged to this species rather than to the much rarer *D. epomophora* Lesson.

Diomedea chrysostoma Forster Grey-headed Albatross

Rare winter visitor to surrounding seas. One record: a skull found on Pelsaert I., now in the ANWC, Canberra.

Diomedea chlororhynchos Gmelin Yellow-nosed Albatross

Visitor (mid-April to late November) to surrounding seas. Moderately common in winter (June-September), uncommon in warmer months; usually single, occasionally in small parties (up to 5).

Procellariidae

Macronectes giganteus (Gmelin) Southern Giant Petrel

Visitor (February-November) to surrounding seas, occasionally coming close to islands. Moderately common in mid-winter, but generally scarce; usually single. Some of the sightings could have been of the rarer Northern Giant Petrel *M. halli* Mathews, which was not recognised as a distinct species until recently.

Daption capense (Linnaeus) Cape Petrel

Visitor (early May-early October) to surrounding seas, occasionally coming close to islands. Uncommon; single or in small parties (up to 6).

Pterodroma macroptera macroptera (Smith) Great-winged Petrel

Visitor to seas west of the Abrolhos. Brown (1948: 16) saw two on 27 June 1947, and Harrison (1979: 34) saw up to 12 following the ship on 4 November 1978. Warham (1956) found a head on Pelsaert I. in early summer 1954.

Pterodroma lessonii (Garnot) White-headed Petrel

Rare winter visitor to seas west of the Abrolhos. One observed by Ferguson (1921: 105) on 27 May 1919.

Pterodroma mollis mollis (Gould) Soft-plumaged Petrel

Winter visitor to surrounding seas. Several observed by Ferguson (1921: 105) west of the Abrolhos on 27 May 1919. The remains of a bird found in an osprey nest on Pelsaert I. in November 1982 is now in the ANWC, Canberra.

Pachyptila spp.

Prions are scarce winter visitors (May-September) to surrounding seas. In November 1944 D.L. Serventy found a mummified specimen of *P. belcheri* in a sea eagle nest on Pelsaert I.

Procellaria aequinoctialis Linnaeus White-chinned Petrel

Rare winter visitor to seas west of the Abrolhos. Brown (1948: 16) saw one following the ship on 27 June 1947.

Calonectris leucomelaena (Temminck) Streaked Shearwater

One record: groups of 2, 8 and 20 birds observed by Johnstone (1982) in Geelvink Channel on 10 May 1981.

Puffinus carneipes Gould Fleshy-footed Shearwater

Visitor to seas west of the Abrolhos. Here Brown (1948: 16) considered them the predominant seabird on 27 June 1948, but Harrison (1979: 34) saw only one on 4 November 1978.

Puffinus pacificus (Gmelin) Wedge-tailed Shearwater

Very common visitor (August-May). Breeding in the Wallabi Group (West Wallabi I.), Easter Group (formerly on Rat I.) and Pelsaert Group (Pelsaert, Gun and Middle Is): mid-November to early December; C/1 (invariably). At present the largest colonies are on West Wallabi I. and the south end of Pelsaert I., where tens of thousands of pairs excavate their nest burrows in beds of coral grit covered with the saltbush *Atriplex cinerea*; they also burrow in semi-consolidated dunes carrying *Nitraria schoberi* and *Spinifex longifolius* but rarely lay in rock crevices. The colonies in the central and northern parts of Pelsaert I. and on other islands are much smaller. The Rat I. colony was still flourishing in 1913, but after the introduction of cats it declined; the birds lingered on till at least December 1945, when D.L. Serventy found 10 occupied burrows. It possibly bred on North I. in the distant past; subfossil petrel skeletons found in blown-out dunes were attributed by Storr (1960) to this species.

These shearwaters are absent from the area in mid-winter. They return in the second half of August and begin immediately to clean out their burrows, the birds flying in from the sea as it becomes dark and leaving before dawn. They continue to return to the islands throughout September and October, pairs moaning inside the burrows at night and single birds squatting silently outside them; a few birds remain in the burrows over the day.

Early in November they cease to visit the islands at night. Towards the end of the second week in November they begin to return and to make final preparations of the burrow and egg chamber. On the following evening laying commences; it is largely completed by the end of November. The eggs presumably hatch in January. By early February the chicks are unattended during the day. By late April the young are large but still downy and remain alone deep in the burrow throughout the day; at this time the adults are still returning in numbers at night. By early May many chicks are still downy, but most of them are wholly or partly fledged, e.g. a specimen (WAM A16926) collected on 5 May has the crown, back, wings and tail feathered, the neck partly downy and the abdomen wholly downy; in its stomach were the remains of cuttlefish, indicating that it was still being fed. As late as 10 May considerable numbers of adults are present in adjacent seas. It is unknown if the young are abandoned and when they take to sea.



Figure 7 Long Island. Roseate Terns nest on the coral debris in the middle distance; Little Shearwaters burrow in the distant sand dune.

Common visitor (April-December). Breeding in the Wallabi Group (c. 1 000 pairs on West Wallabi I.; 200-500 on Long, Beacon, Dick, Easter, Dakin, Seal and Saville-Kent Is; and 5-150 on Pigeon, Seagull, Little Pigeon, Lumley and Tattler Is), the Easter Group (c. 3 000 pairs on Morley I.; 300-500 on Wooded, Leo, Suomi, Bynoe and White Is; 100-250 on Campbell, Keru, Shearwater and Helms Is; and 2-50 on Gilbert, Crake, Stokes, Serventy and Little Rat Is), and the Pelsaert Group (c. 2 000 pairs on Stick I., 500 on Hummock I. and 70 on Square I.). The size of the former Rat I. colony is unknown; evidently they were still breeding here in 1945, for D.L. Serventy found a dead bird on the island in December of that year.

They nest mainly in burrows excavated in white sand and to a lesser extent in guano; relatively few nest under dense shrubs and matted succulent vegetation or in crevices in the limestone. In August 1977 Johnstone found that burrows attained a density of 1.2-1.4 per sq. m in the most heavily populated parts of Morley and Wooded Is. Most burrows were 50-100 cm long.

The shearwaters begin to return to the islands in the first half of April, and by the third week some burrows are re-excavated. At this time the birds are commonly found on the surface in the daytime but they are generally silent, even at night. By early May some pairs are calling quietly together in their burrow at night. In late June the colonies are much noisier, the birds calling in their burrows by day as well as night; in the evening the calling of the pairs often increases in volume and pitch to a frenzied caterwauling.

The single egg is laid between early July and late August. The young fledge in November or December. The latest record of an adult is 9 December; presumably the last of the young are abandoned soon after this date. Earlier young are probably abandoned in November, e.g. one found at sea on 7 December, unable to fly, very fat, but only having some cephalopod beaks in its stomach.

Oceanitidae

Oceanites oceanicus (Kuhl)

Wilson's Storm Petrel

Observed in adjacent seas during northward passage (mid-April to late June) and southward passage (mid-August to late October); usually single, occasionally up to three birds together.

Oceanites marinus dulciae (Mathews)

White-faced Storm Petrel

Uncommon visitor (August-February). Breeding in small to moderate numbers in the Wallabi Group (West Wallabi I. and possibly Sandy I.), the Easter Group (Suomi, Keru, Morley and Leo Is and formerly 'Beacon Rock' near Rat I.), and the Pelsaert Group (Pelsaert I. and possibly Post Office I.): early to late October;

C/1 (invariably). As their burrows are easily overlooked or filled in during the off-season, the birds possibly breed on several other sandy islands. The largest colony is on Morley I. (c. 700 pairs). The egg is laid in a long, narrow, steep burrow, usually dug in deep white sand, with or without vegetation.

A few birds (usually single) have been observed at sea from early April to early September. By mid-August some of them are returning to the islands. The eggs are mostly laid in the second and third weeks of October; they hatch in late November or early December. Gilbert observed young in January almost ready to leave the burrow. However, burrows on Leo I. were still occupied (presumably by young birds) as late as 13 February.

The nestlings recorded by Hall (1902: 203) in October 1899 were almost certainly of *Puffinus assimilis*, rather than this species.

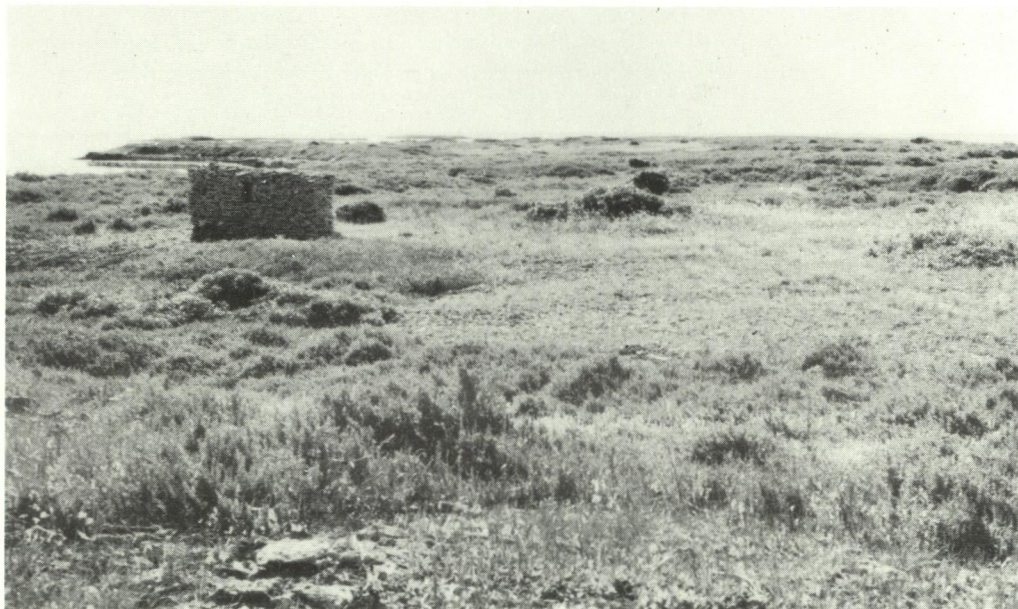


Figure 8 Alexander Island. Bridled Terns nest under the dense *Nitraria* and *Myoporum* in the middle distance.

Phaethontidae

Phaethon rubricauda Boddaert

Red-tailed Tropic-bird

Seldom seen except when nesting on the islands, the birds presumably feeding well out to sea, e.g. at the 'Big Bank' (50 km NNW of North I.). Formerly breeding in the Easter Group (Rat I.) and Pelsaert Group (Pelsaert I.): September (? August) to December (? January); C/1(13), 2(5). Only one young is reared. The nest is a scrape in the bare sand, half-sheltered by a small bush or tussock of grass. No breeding records from Rat I. since the late 1890s, and none from Pelsaert I. since 1954.

There was a build-up of tropic-birds on Pelsaert I. in the 1940s and 1950s. At least three pairs were nesting there during D.L. Serventy's visit in late spring 1949; Serventy was told that the birds had become more noticeable in the past five years, before which they were rare. In spring 1949 Tarr (1949) found five nests. In late spring 1954 Warham (1956) found eight nests.

By 1963 the tropic-birds had abandoned Pelsaert I., V.N. Serventy *et al.* recording none during their visit in December 1963. Indeed no tropic-bird was recorded anywhere in the Abrolhos in the period 1955-75. There was a similar nadir early this century; Gibson (1908) saw none in November 1907 and was told by fishermen that none had been seen for several years and that they used to principally frequent the Wallabi Group.

Perhaps the tropic-birds are now returning to Pelsaert I. In April 1976 P. Griffin saw one over the island. In February 1978 P.J. Fuller saw two birds flying low over the south end of the island; here he found four dead birds. In February 1981 and 1984 Fuller saw two and five birds respectively over the south end of Pelsaert I.

[*Phaethon lepturus* Daudin

White-tailed Tropic-bird

Campbell (1890) listed this species as an occasional visitor. Presumably G.K. Beddoes, manager of the guano works, was his informant.]

Pelecanidae

Pelecanus conspicillatus Temminck

Australian Pelican

Formerly a visitor in small flocks; now a rare vagrant. Breeding in the Wallabi Group: on Pigeon I. some time before 1889 (Campbell 1890) and on Pelican I. in 1907 (Gibson 1908). Subsequently J. Akerstrom observed two in the vicinity of West Wallabi I. for several weeks in summer 1932-33, and P.J. Fuller saw two on a lagoon on Pelsaert I. in February 1978.

Sulidae

Sula bassana serrator (Gray)

Gannet

Uncommon visitor (June-October) to Geelvink Channel; usually single. Most sightings are nearer to the mainland than to the islands, but birds have been seen close to Beacon and Pelsaert Is. A nestling ringed in New Zealand was found dead on a mainland beach near Northampton when less than a year old (Glauert 1956).

Phalacrocoracidae

Phalacrocorax carbo novaehollandiae Stephens

Great Cormorant

Rare visitor; in ones or twos. A few records, mainly in autumn from the Pelsaert Group and one from North I.

Phalacrocorax varius (Gmelin)

Pied Cormorant

Common resident. Breeding in the Wallabi Group (West Wallabi I., Shag Rock and Lagoon I.), Easter Group (Wooded I. and islet off Rat I.) and Pelsaert Group (islet off north end of Pelsaert I., Square I. and Middle I.): mid-August to November; C/2(29), 3(62), 4(13). The largest colony is on Wooded I., where 500-2 000 pairs nest in the mangroves. The colonies on other islands are much smaller (40-200 pairs), and the nests are placed on bushes of *Nitraria schoberi* or *Atriplex cinerea* or on bare rock, as well as in mangroves. The nests are made of green or dry twigs of *Nitraria* and other shrubs and wet or dry seaweed. Among the fishes eaten are cobbler, dragonette and moon wrasse.

Phalacrocorax melanoleucos melanoleucos (Vieillot)

Little Pied Cormorant

Recently established resident. First seen in 1979. Breeding (apparently for first time in 1983) on Wooded I. in the Easter Group: July and August; C/4(2), 5(1). In August 1983 R.E. Johnstone found the colony to contain 10 well-constructed pads of sticks placed on a rock ledge a little more than a metre above the sea; the nests were sheltered from above by overhanging limestone.



Figure 9 Serventy Island. Observe the mangroves on the left, the wind-pruned *Myoporum* in the foreground and the characteristically under-cut limestone cliffs in the background.

Anhinga melanogaster novaehollandiae (Gould)

Darter

Rare vagrant. One observed by M. Glazier (pers. comm.) in lagoon on Pelsaert I. in late 1950s.

Ardeidae

Ardea novaehollandiae Latham

White-faced Heron

Scarce visitor; usually single. Most reports are from salt lakes and lagoons on West Wallabi and Pelsaert Is.

Egretta sacra (Gmelin)

Reef Heron

Moderately common resident throughout the Abrolhos, including North I. Breeding from late July to November; C/2(2), 3(1). The nest is made of sticks and placed on cliff ledges below overhanging limestone or in mangroves. About 3 per cent of birds belong to the white phase.

Anatidae

Cygnus atratus (Latham)

Black Swan

Rare vagrant. Single birds reported in 1894 and 1968.

Tadorna tadornoides (Jardine and Selby)

Mountain Duck

Scarce visitor to saltlakes on West Wallabi and Pelsaert Is; in small parties (3-6).

Anas gibberifrons gracilis Buller

Grey Teal

Uncommon visitor; in small flocks (4-12). Most reports are from lagoons on Pelsaert and Wooded Is.

Accipitridae

Haliaeetus leucogaster (Gmelin)

White-breasted Sea Eagle

Very common resident in the Wallabi Group; moderately common elsewhere, including North I. Breeding in the Wallabi Group (East Wallabi, Pelican, West Wallabi, Long, Seal and Dick Is and formerly Pigeon I.), Easter Group (Serventy, Shearwater, Morley and White Is and formerly Rat I.), and Pelsaert Group (Hummock, Coronation, Uncle Margie, Gun, Stick and Pelsaert Is and islet off north end of Pelsaert I.): early July to late August; C/1(5), 2(21), 3(2). They usually build their own nest, a low, sprawling, loose accumulation of sticks, 0.9-2.4 m in diameter and 0.2-1.1 m high, lined with green leaves and placed on rocky

promontories, sandhills or tops of shrubs, but occasionally they take over an osprey nest. They feed on wallabies, nesting and nestling seabirds (Wedge-tailed Shearwater, Roseate Tern, Common Noddy and Red-tailed Tropic-bird), fishes (buffalo bream, chinaman, cobbler and rock cod) and large lizards (*Egernia kingii* and *E. stokesii*). Much of their food is torn up and devoured on the flattened tops of rigid shrubs, especially *Pittosporum phylliraeoides*.

Pandion haliaetus cristatus (Vieillot)

Osprey

Moderately common on the Wallabi Is; common to very common elsewhere. Breeding on North I. and in the Wallabi Group (East Wallabi, West Wallabi, Little Pigeon, Long, Beacon, Seal and Dick Is), Easter Group (Rat, Bushby, Little Rat, Roma, Alexander, Campbell, Suomi, Keru, Wooded, Helms and Joe Smith Is) and Pelsaert Group (Hummock, Coral Patches, The Nook, Jackson, Newman, Coronation, Burton, Post Office, Fin, Basile, Pelsaert, Gun, Stick, Square and Middle Is): late July to mid-October; C/1(4), 2(13), 3(46), 4(4). Many eggs are infertile and usually only one or two young are reared. Nest typically a truncate cone of sticks and beach debris, including dead seabirds and fishes, 0.9-6.2 m in diameter and 0.7-1.8 m high; usually placed on bare ground, occasionally on man-made structures, e.g. jetties, tanks, radio aerials and poles especially erected by the fishermen for ospreys. Feeding mainly on fish (especially smelt), but also taking White-faced Storm Petrels and large lizards (*Egernia stokesii*).

Falconidae

Falco cenchroides cenchroides Vigors and Horsfield

Australian Kestrel

Scarce visitor: six reports of single birds on North, East Wallabi, West Wallabi and Pelsaert Is in February, April, June, August and November. On the Wallabi Is they quarter the more sparsely vegetated dunes, presumably in search of lizards. A breeding report from Pelsaert I., where Tarr (1949) observed a pair and their C/3 in the top bucket of a disused guano escalator in spring 1948; the birds were said to be recent arrivals.

Phasianidae

[*Coturnix novaezelandiae pectoralis* Gould

Stubble Quail

A large quail observed on Pelsaert I. in February 1978 probably belonged to this species (Fuller and Burbidge 1982).]

Turnicidae

Turnix varia scintillans (Gould)

Painted Button-quail

Common resident on North I. and in the Wallabi Group (East Wallabi, West Wallabi, Seagull and Pigeon Is). On West Wallabi I. favouring low dunes covered with *Spinifex longifolius* and flats of coral grit wherever the halophytic shrubbery

(*Atriplex cinerea* and *Halosarcia halocnemoides*) is relatively open. Breeding from April to October; C/3(14). The nest is a scrape in loose soil c. 10 cm in diameter and 2 cm deep, sheltered from above by an overhanging bush.

This beautiful subspecies is endemic to the Abrolhos (Storr and Johnstone 1984).



Figure 10 Lagoon on Wooded Island. Lesser Noddies nest in the mangroves.

Rallidae

Gallirallus philippensis melli (Mathews)

Banded Land Rail

Resident on Pelsaert I., whence there are a few sightings of single birds, usually among mangroves in the vicinity of Lesser Noddy colonies, but also in the Sooty Tern colony. Also an observation on Rat I. in December 1889 by Campbell (1890).

Porzana fluminea Gould

Spotted Crake

One record: an observation by Garstone (1978) of a single bird at the edge of a mangrove lake on Pelsaert I. in late October 1977.

Porzana tabuensis (Gmelin)

Spotless Crake

Resident in the Wallabi Group (Beacon and Seal Is), Easter Group (Alexander, Crake, Morley, Wooded, Bynoe and Leo Is and formerly Rat I.) and Pelsaert Group (Jackson, Burton, Post Office, Uncle Margie, Fin, Pelsaert, Gun and Middle Is). Very common among mangroves on Morley, Wooded and Pelsaert Is; uncommon to moderately common on other islands, where they favour dense shrubbery (*Atriplex*, *Halosarcia*, *Nitraria*, *Myoporum*) or succulent mats of *Salicornia* and *Carpobrotus*.

Haematopodidae

Haematopus longirostris Vieillot

Pied Oystercatcher

Resident. Common on East Wallabi and West Wallabi Is and west coast of Pelsaert I.; uncommon to moderately common elsewhere (recorded from North, Turnstone, Seagull, Little Pigeon, Long, Beacon, Dakin, Dick, Seal, Rat, Little Rat, Alexander, Suomi, Keru, Shearwater, Wooded, Bynoe, Helms, Stokes, Jackson, Burton, Post Office and Basile Is); usually in ones or twos, occasionally small parties or flocks (up to 20). Favouring sandy beaches. Breeding reported on East Wallabi, Turnstone, West Wallabi and Pelsaert Is: early July to late August (? early September); C/1(2), 2(17), 3(2). Nest typically an unlined scrape in the sand just above highwater mark, c. 15 cm in diameter and 2-3 cm deep.

Haematopus fuliginosus fuliginosus Gould

Sooty Oystercatcher

Uncommon resident on North I. and in the Wallabi Group (East Wallabi, Turnstone, Seagull, West Wallabi and Dick Is), Easter Group (Rat, Bushby, Little Rat, Morley, Wooded and Leo Is) and Pelsaert Group (Uncle Margie, Pelsaert, Gun, Stick, Square and Middle Is); usually in ones or twos, occasionally small parties (up to 8). Found on beaches and reef flats, among coral debris and around lagoons. Breeding reported on West Wallabi I.: late July or early August; C/2(3). There is also a record of an egg (Lipfert *in* Alexander 1922) or eggs (Hall 1902: 205) taken on 24 November 1894 on an undisclosed island.

Charadriidae

Vanellus tricolor (Vieillot)

Banded Plover

Rare summer-autumn visitor from mainland. Single birds reported on North I. (December 1945) and in Easter Group (April 1977).

Pluvialis squatarola (Linnaeus)

Grey Plover

Visitor (September-June). Moderately common on Pelsaert I., uncommon elsewhere; usually single, occasionally in small parties (up to 13).

Pluvialis fulva (Gmelin) Eastern Golden Plover
Rare visitor (October-February). A few reports of single birds on Pelsaert I.

Charadrius cucullatus Vieillot Hooded Plover
Rare visitor (February-September). A few reports of single birds on North, West Wallabi, Gun and Pelsaert Is.

Charadrius ruficapillus Temminck Red-capped Plover
Resident on the larger islands. Common on North, East Wallabi and West Wallabi Is; uncommon to moderately common elsewhere (Rat, Serventy, Leo, Gun and Pelsaert Is); usually in ones or twos, occasionally small parties or flocks (up to 30). Beaches, sparsely vegetated or blown-out dunes, open coral-grit flats, edge of saltlakes, and airstrips. Breeding reported on West Wallabi, Pelican and Pelsaert Is: July-November; C/2(8).

Charadrius leschenaultii Lesson Large Sand Plover
Uncommon visitor (August-April). Reported on North, East Wallabi, Turnstone, West Wallabi, Rat, Morley, Pelsaert and Middle Is. In ones, twos or small parties (up to 7). Usually on sandy beaches and around saltlakes.

Scolopacidae

Numenius phaeopus variegatus (Scopoli) Whimbrel
Uncommon visitor (August-June); in ones, twos or small parties (up to 6). Favouring the sheltered east coast of larger islands (reported from North, West Wallabi and Pelsaert Is).

Numenius madagascariensis (Linnaeus) Eastern Curlew
Scarce visitor (September-June); usually single, one party of six. Reported from West Wallabi and Pelsaert Is.

Limosa limosa melanuroides Gould Black-tailed Godwit
Rare visitor; in ones or twos. Reported from East Wallabi and Pelsaert Is.

Limosa lapponica baueri Naumann Bar-tailed Godwit
Moderately common visitor (all months); in ones, twos or small flocks (up to 45). Reported from North, East Wallabi, West Wallabi, Long, Morley, Leo, Pelsaert and Gun Is. Beaches, tidal flats and saltlakes. The record of *Tringa terek* by Tarr (1949) was probably based on this species, which he did not list.

Tringa nebularia (Gunnerus)

Greenshank

Uncommon visitor (all months); in ones, twos or small flocks (up to 15). Reported from North, West Wallabi, Morley, Pelsaert and Gun Is. Edge of salt-lakes, beaches and tidal rock flats. The record of *T. stagnatilis* by Tarr (1949) was probably based on this species, which he did not list.

Tringa terek (Latham)

Terek Sandpiper

One record: a single bird seen by P.J. Fuller at saltlake on Pelsaert I. in February 1979.

Tringa hypoleucos Linnaeus

Common Sandpiper

Rare visitor (October-April); in ones or twos. Reported from tidal flats and saltlakes on Pelsaert and Gun Is.

Tringa brevipes (Vieillot)

Grey-tailed Tattler

Moderately common visitor (August-June); usually in ones or twos, occasionally small parties or flocks (up to 35). Reported from North, East Wallabi, Turnstone, West Wallabi, Long, Serventy, Morley, Wooded, Leo, Burton, Post Office, Pelsaert, Square and Middle Is. Rock flats, tidal creeks and beaches.

Arenaria interpres interpres (Linnaeus)

Ruddy Turnstone

Common visitor (all months); usually in small parties or flocks (up to 100). Reported from numerous islands (North, East Wallabi, Turnstone, West Wallabi, Long, Beacon, Eastern, Seal, Dick, Rat, Alexander, Serventy, Campbell, Suomi, Morley, Wooded, Hummock, Coral Patches, The Nook, Jackson, Newman, Coronation, Burton, Uncle Margie, Pelsaert, Gun, Square, Middle). Tidal rock flats and creeks, beaches, sandspits, saltlakes and dry coral ridges.

Calidris tenuirostris (Horsfield)

Great Knot

Uncommon visitor (September-April) to West Wallabi and Pelsaert Is; in ones, twos or small parties (up to 12), often in company of other waders. Beaches, saltlakes and tidal creeks. Records of *Gallinago megala* (Tarr 1949) and *Calidris canutus* (Warham 1956) were probably based on this species.

Calidris alba (Pallas)

Sanderling

Uncommon visitor (August-May); in ones, twos or small flocks (up to 20). Reported from North, West Wallabi, Dakin, Seal and Pelsaert Is. Mainly sandy beaches.

Calidris ruficollis (Pallas)

Red-necked Stint

Common visitor (all months, mainly August-April); in ones, twos or flocks (up to 60). Reported from North, East Wallabi, Pelican, Serventy, Wooded, Leo, Pelsaert and Middle Is. Saltlakes, beaches and tidal creeks and rock flats.

Calidris acuminata (Horsfield)

Sharp-tailed Sandpiper

Scarce visitor (September-April); in ones, twos or small parties (up to 7). Reported from West Wallabi and Pelsaert Is. Saltlakes and tidal creeks.

Calidris ferruginea (Pontoppidan)

Curlew Sandpiper

Moderately common visitor (August-April); in ones, twos or small flocks (up to 70). Reported from North, East Wallabi, West Wallabi and Pelsaert Is. Shores of saltlakes, beaches, tidal rock flats and banks of seaweed.

Recurvirostridae

Himantopus himantopus leucocephalus Gould

Black-winged Stilt

Two records from Pelsaert I.: observed by A.A. Burbidge in March 1973 and R.E. Johnstone in August 1977 (two on a shallow lagoon at south-west end of island).

Cladorhynchus leucocephala (Vieillot)

Banded Stilt

One record: two observed by P. Griffin on a Pelsaert I. saltlake in April 1977.

Recurvirostra novaehollandiae Vieillot

Red-necked Avocet

One record: six observed by Garstone (1978) and P.J. Fuller on Pelsaert I. in late October 1977.

Glareolidae

Glareola maldivarum Forster

Oriental Pratincole

One record: one observed by Garstone (1978) on Pelsaert I. in late October 1977.

Laridae

Stercorarius skua lonnbergi (Mathews)

Great Skua

Uncommon visitor (April-August) to adjacent seas; usually single. Not observed to harass local seabirds.

Larus novaehollandiae novahollandiae Stephens

Silver Gull

Common resident throughout the Abrolhos. Well distributed but tending to concentrate around breeding seabirds, notably Pied Cormorants, Sooty Terns and Common Noddies, where they take eggs and steal food intended for nestlings. Breeding colonially (up to 150 pairs together) on North I. and in the Wallabi Group (West Wallabi and Long Is), Easter Group (islet north of Rat I., formerly

Rat I., and Roma, Gilbert, Alexander, Serventy, Suomi, Keru, Wooded, Bynoe, Helms, Stokes and Leo Is) and Easter Group (Coral Patches, The Nook, and Jackson, Newman, Coronation, Burton, Post Office, Uncle Margie, Pelsaert, Stick and Middle Is): early April to mid-November; C/1(7), 2(53), 3(2).

Larus pacificus georgii King

Pacific Gull

Resident. Uncommon to moderately common in the Easter and Pelsaert Groups; scarce in the Wallabi Group; not recorded from North I. Breeding singly in the Wallabi Group (East Wallabi and Long Is), Easter Group (Wooded I. and formerly islet off Rat I.) and Pelsaert Group (Coral Patches and Burton, Post Office, Fin, Pelsaert and Stick Is): August-October; C/1(1), 2(8). One observed to drop a sea-urchin at Pelsaert I. and feed on its contents.

Anous stolidus pileatus (Scopoli)

Common Noddy

Very common visitor (mid-August to late April). Breeding colonially on the south end of Pelsaert I. (in tens of thousands), Wooded I. (in relatively small numbers) and formerly Rat I. (in hundreds of thousands): August-January (mostly October and November); C/1 (almost invariably), 2(1 clutch reported by Gibson). Nests placed on low halophytic shrubs (*Atriplex cinerea*, *Nitraria schoberi*) or on the ground and built mainly of seaweed (i.e. algae, not sea-grasses) and partly of twigs and other material. Many eggs and nestlings are taken by the large skink *Egernia kingii* from nests on the ground. Colonies on Pelsaert I. partly overlap those of Sooty Terns. Like the Sooty Tern, the Common Noddy is sensitive to cold here at the southern limit of its breeding range; according to Campbell the Rat I. noddies once abandoned their eggs and young during a cold wet spell in October.

The former colony on Rat I. was the largest in the Abrolhos, Campbell estimating its numbers as more than a million in December 1889. The colony was still flourishing in November 1913 when Alexander visited Rat I. By 1936 Sandland found the island almost abandoned; he blamed the introduced cat for the demise of the Common Noddy (and Sooty Tern).

After the breeding season the noddies completely desert the Abrolhos and their vicinity. The earliest date for a returning bird is 11 August when R.E. Johnstone saw one off the south-east corner of the Wallabi Group. Campbell (1890) was informed that in 1889 and 1890 the birds first appeared on 14 and 16 August respectively. On 18 August 1983 Johnstone saw a thousand noddies resting on coral rubble and rocks at the edge of a small lagoon on the south end of Pelsaert I.; the birds were squabbling over perches but there was no display. By the end of August 1966 a large colony was present on the south end of Pelsaert I. but nesting had not begun (O'Loughlin 1969). On 24 August 1977 Johnstone found that about 20 000 birds had returned to south Pelsaert; hundreds were engaged in display flights over the island; many others were feeding about 500 m off the southern tip of the island. Most birds had paired and were engaged in mutual

display on the old nests or on the ground, presumably at former nest sites; they were also vigorously defending the nests and presumed nest sites (little or nothing remains of ground nests after winter). Some of the nests in shrubs had already been renovated and seemed ready for eggs. However there is scant evidence for laying before late September. The observation by Tarr of large downy young on 5 October 1948 implies eggs laid in August; and Hall (1902) was informed by Beddoes that his earliest egg date was 9 August.

By early February very few eggs are unhatched and many (in some years, most) young are flying. Large numbers of noddies were still present on south Pelsaert on 24 March 1963 (Duke of Edinburgh). On 28 April 1976 P. Griffin found only 300 birds on Pelsaert I.; he observed a similar number here exactly a year later.



Figure 11 Lagoon on Wooded Island. Among the numerous Pied Cormorants are a few Little Pied Cormorants; the latter nest under the overhanging cliffs in the background.

Very common resident. Breeding in dense belts of mangroves (*Avicennia marina*) in the Easter Group (Morley and Wooded Is) and Pelsaert Group (Pelsaert I.): mid-August to late November (to late December in some years); C/1 (invariably). The nests are massive structures of seaweed (various green and brown algae, especially *Ulva* and *Cystophora* spp.), copiously cemented with white excreta and placed in mangrove forks (horizontal or vertical, 1-120 to the tree). Most of the mangroves grow around lagoons, but on Wooded I. some grow in a limestone gully.

Until at least 1899 the Lesser Noddy was only known to nest on Pelsaert I. By 1907 it had abandoned Pelsaert but had become established on Wooded I., where Gibson (1908) estimated their numbers as 'hundreds of thousands'. This was probably a gross over-estimate, for the mangroves of Wooded and Morley Is together could hardly support more than 20 000 breeding birds. At any rate Alexander (1922) considered the Lesser Noddies far fewer than the Sooty Terns or Common Noddies in 1913. By 1936 they were re-established on Pelsaert I. (Sandland 1937) and have bred there ever since, though their numbers fluctuate enormously from year to year. For example, in mid-summer 1940-41 V.N. Serventy (1943) found the Pelsaert birds in two separate colonies of 1 000 and 5 000 birds; a year later the colonies had coalesced and numbered 20 000. Meanwhile they continued to nest on Wooded I., V.N. Serventy estimating their numbers as 5 000 in mid-summer 1940-41 and 10 000 a year later. R.E. Johnstone found 10-15 000 birds nesting on Wooded I. in late August 1977 and 6-10 000 in October 1981. The colony on Morley I. was first noted in summer 1940-41, when V.N. Serventy found about 1 000 nesting birds, but there was no sign of the species when D.L. Serventy visited the island in December 1945. By 1970 they were re-established on Morley I. (Green 1972). R.E. Johnstone found 5 000 birds breeding here in late August 1977 and 3-4 000 in early October 1981.

At sunset on 13 August 1953 Ealey (1954) observed from the sea hundreds of Lesser Noddies flying in to the Pelsaert I. mangroves; he was unable to land and find out whether they were nesting. By 22 August 1977 Johnstone found breeding on Wooded and Morley Is in full swing; many nests were ready for laying and indeed several of them contained an egg. Most eggs, however, are not laid till October and November. The first of the young go to sea in late January, the last presumably in early April.

Unlike the Common Noddy, the Lesser Noddy remains in the area after breeding. On 28 April 1976, 26 April 1977 and 16 April 1978 P. Griffin saw respectively 150, 150 and 600 birds perched in the daytime in the Pelsaert I. mangroves; on the last date he saw 50 birds fishing in the seas north-west of Pelsaert I. By 5-7 May 1981 the birds had completely left the mangroves on Pelsaert and Wooded Is, and only ones and twos were seen by R.E. Johnstone fishing in the vicinity of the islands. On 9 May 1981, well after the previous breeding season and long before the next, R.E. Johnstone was watching a compact flock of 45 Lesser Noddies resting on a North I. beach when six of them began to pick up pieces of

seaweed and offer them to other birds which occasionally accepted them; perhaps the displaying birds were due to breed for the first time in the following spring. Hundreds of birds were seen by Roberts (1982) in the vicinity of the islands in late June and early July 1980.

They feed on fish, e.g. small herrings, blue sprats, hardyheads and pilchards. They evidently forage well out to sea, mostly in the sector between south and west.

This subspecies is endemic to the Abrolhos.

Sterna caspia Pallas

Caspian Tern

Moderately common resident. Breeding singly or colonially on North I. and in the Wallabi Group (West Wallabi, Long and formerly one of the Pigeon Is), Easter Group (Serventy and Wooded Is) and Pelsaert Group (Burton, Pelsaert, Murray and Square Is): early September to mid-December; C/2(32). Nest a scrape in bare sand, 20-25 cm in diameter and 1-2 cm deep. The largest colonies (13-80 nests) have been reported on West Wallabi I.; here most nests are 2-4 m apart. Elsewhere the largest was a group of eight nests on Wooded I.; on the smaller islands the birds nest singly.

Sterna bergii Lichtenstein

Crested Tern

Common resident. Breeding singly (rarely) or colonially (up to 700 pairs) on North I. and in the Wallabi Group (West Wallabi, Long, Beacon and formerly one of the Pigeon Is), Easter Group (Gibson, Wooded and Leo Is) and Pelsaert Group (islet near The Nook, islet NW of Jackson, and Jackson, Newman, Burton and Post Office Is, islet near Post Office I., Fin I., islet off north end of Pelsaert I., and Pelsaert and Square Is): April and July (? late June) to December, mostly April and late August to early November; C/1(1476). Nest a scrape in sand or grit, usually among low bushes, sometimes lined with grass or twigs.

Sterna dougallii Montagu

Roseate Tern

Very common resident (not as abundant as the Sooty Tern or the two noddies, but much the most numerous of the four resident 'white' terns). Breeding colonially in the Wallabi Group (West Wallabi, Long, Beacon and Seal Is), Easter Group (Wooded I.) and Pelsaert Group (Coral Patches, islet near Jackson I., and Burton, Post Office and Pelsaert Is, islet off north end of Pelsaert I., and Jon Jim and Gun Is): mid-April to early June and early November to late December; C/1(4436), 2(113), 3(1). Nest a scrape in shallow sand or coral grit, with or without a lining of grass; occasionally the egg is laid in a natural depression in bare rock. Colonies shift from one season to another and sometimes overlap those of Fairy Terns. The largest reported colony comprised 2 656 occupied nests on Pelsaert I. in December 1946 (Serventy and White 1951). T.E. Bush saw a colony on Seal I. in May 1969 that contained almost 2 000 nests. Roseate Terns have been seen feeding on pilchards and slender sprats.

Sterna anaethetus anaethetus Scopoli

Bridled Tern

Common visitor (ordinarily early October to early May). Breeding singly or in loose colonies in the Wallabi Group (Pelican, Pigeon, Long and Dick Is), Easter Group (islet off Rat I., and Alexander, Morley and Wooded Is and formerly Rat I.) and Pelsaert Group (Jackson, Newman, Uncle Margie, Pelsaert, Gun and Square Is): ordinarily mid-November to early January: C/1 (invariably). The eggs are laid under bushes (*Nitraria*, *Atriplex*), in rock crevices or beneath overhanging cliffs. The nesting birds are well-spaced in groups of up to 250 pairs. Alexander (1922) mistaking the Wallabi Group birds for Sooty Terns, grossly under-estimated the number of Bridled Terns in the Abrolhos.

The above generalisations on season of occurrence and breeding cover all records except one, viz. R.E. Johnstone's observations on 17 August 1980 of about 50 adults and juveniles on Newman I. The young birds were in the penultimate juvenile plumage and were making the bell-like tinkling call; they must have come from eggs laid in late June or early July and would require a further two or three weeks before leaving the island. In short, eggs were laid and young were reared on Newman I. when Bridled Terns were not normally present anywhere in Australia, let alone the Abrolhos.

Sterna fuscata Linnaeus

Sooty Tern

Very common visitor (late August to very early May). Breeding colonially in the Easter Group (Alexander, Morley and Wooded Is, formerly Rat I., and probably Serventy, Suomi and Campbell Is) and Pelsaert Group (south end of Pelsaert I. and nearby Jon Jim I.): October and November; C/1 (almost invariably), 2 (very rarely). Nest an unlined scrape in bare sand or coral grit, usually located under a halophytic shrub (*Atriplex* or *Nitraria*) but sometimes in open or among low short grasses.

The former Rat I. colony is generally regarded as the largest in the Abrolhos, but the evidence is equivocal. In October 1899 Hall (1902) found them breeding in two colonies, each of a thousand pairs. Gibson (1908) wrote, 'hundreds of thousands were in full laying season on Pelsaert I. on 10 November [1907], but the principal breeding island was Rat Island'. Alexander (1922) wrote, 'on Rat Island their numbers are prodigious, they nest under almost every bush and in many places also amongst the herbage; there is also a very large colony on the south end of Pelsaert Island and another on Wooded Island'. By the time of D.L. Serventy's visit in December 1945 the Rat I. colony was extinct. One fisherman told Dr Serventy that the terns abandoned the island in 1938, which fits in with the observations of two other fishermen who respectively stated that the species was still present in 1934 but absent in 1939. The fishermen attributed the extinction of this colony to the wholesale gathering of eggs by people from Geraldton.

Gibson's estimate of the Pelsaert population seems unduly high. At any rate two subsequent estimates were very much lower: V.N. Serventy (1943) gave 20-30 000 birds nesting or roosting for mid-summer 1941-42; and O'Loughlin (1969) gave 15 000 for early January 1968, presumably exclusive of the 'thousands of runners and immature birds'.

The Wooded I. colony was first mentioned by Alexander (1922), though Gibson implied that the Pelsaert and Rat I. colonies were not the only ones in November 1907. Judging from the remarks of V.N. Serventy (1943), Bridled (rather than Sooty) Terns were nesting on Wooded I. in mid-summer 1941-42. This was still so during D.L. Serventy's visit in December 1945; however Sooty (but not Bridled) Terns were then nesting on neighbouring Morley I. T.E. Bush found Sooty Terns breeding on Wooded I. in November 1970. It is doubtful whether they bred here in 1977, for R.E. Johnstone saw only one bird over Wooded I. on 22 August, at a time when 5 000 birds were engaged in display flights over the south end of Pelsaert I. No one has estimated the size of the Alexander, Wooded and Morley Is colonies, but they are evidently very much smaller than the Pelsaert I. colony.

In early October 1981 Johnstone saw small numbers (up to 100 birds) in high circular display flights over Serventy, Campbell and Suomi Is in the Easter Group; they probably nested on these islands.

Sterna sinensis Gmelin

Little Tern

Non-breeding visitor or passage migrant. In December 1889 Campbell (1890) collected one of two birds in winter plumage on Rat I. On 1 July 1980 G.J. Roberts observed a party of 14 birds in full breeding plumage; they were resting on a sandspit on Wooded I.

Sterna nereis nereis (Gould)

Fairy Tern

Common (at least in warmer months; perhaps a decrease in winter). Occurring throughout the Abrolhos, including North I., and often found in mixed flocks with Roseate Terns. Breeding colonially (in groups of 6 to several hundreds) in the Wallabi Group (East Wallabi and West Wallabi Is), Easter Group (Morley and Wooded Is) and Pelsaert Group (Pelsaert I.): late October to mid-February; C/1 (82), 2(48), 3(1). Nest an unlined scrape on a shelly or sandy beach or on a coral ridge; colonies occasionally adjoining those of Roseate Terns. From May to July Fairy Terns are in eclipse plumage (broad white forehead and black-streaked, white crown), adults being recognisable by their predominantly yellow bill (in birds of the year the bill is dark with only the tip yellow). By early September they are in breeding plumage and engaged in noisy fish pursuits.

Columbidae

Phaps elegans (Temminck)

Brush Bronzewing

Confined to North I. and the Wallabi Group (East Wallabi, West Wallabi, Tattler, Pigeon and Long Is). Common on North I., where they feed on the seeds of the littoral plant *Cakile maritima*; in ones and twos, occasionally in small parties (up to 9); larger aggregations at water (up to 20 at tank near fishermen's huts); the population was estimated as c. 100 in June 1985 (*West. Aust. Bd Notes*, No. 35: 8). Uncommon to moderately common on other islands; usually single, occasionally in twos or threes. In all kinds of vegetation. Breeding in late April and from late July to mid-November; C/1(3), 2(10). Nest made of fine twigs or *Spinifex* roots and placed on ground, in a shrub or on a tussock of the grass *Spinifex longifolius*, in all cases more or less sheltered from above by foliage.

Psittacidae

Cacatua roseicapilla Vieillot

Galah

Accidental. Single birds and small parties occasionally seen in the Wallabi Group after periods of strong easterlies.

Cacatua sanguinea Gould

Little Corella

Accidental. Single birds and small parties occasionally seen in the Wallabi and Pelsaert Groups.

Cuculidae

Chrysococcyx basalis (Horsfield)

Horsfield's Bronze Cuckoo

Rare passage migrant. One heard by G.M. Storr on West Wallabi I. on 10 September 1959, and one seen by A. Chapman on Rat I. on 11 April 1977.

Strigidae

Tyto alba delicatula (Gould)

Barn Owl

Rare vagrant or passage migrant. One flushed by R.E. Johnstone from unoccupied hut on Beacon I. on 13 August 1983.

Apodidae

Hirundapus caudacutus (Latham)

Spine-tailed Swift

Rare summer visitor. P.J. Fuller saw 10-12 birds over Pelsaert I. on 9 February 1984.

Alcedinidae

Halcyon sancta sancta Vigors and Horsfield

Sacred Kingfisher

Rare passage migrant. Hall (1902: 191) collected one of two birds on Pelsaert I. on 27 October 1899, and N. Kolichis saw one on West Wallabi I. on 5 August 1976.

Hirundinidae

Cheramoeca leucosterna (Gould)

White-backed Swallow

Rare visitor. On 8 May 1981 R.E. Johnstone found seven old nest burrows in a blown-out dune on North I.; two nest chambers were excavated and found to contain well-made nests of rootlets and strips of bark, but there was no evidence that the birds had laid or reared young.

Hirundo neoxena Gould

Welcome Swallow

Common resident throughout the Abrolhos. Breeding reported on North, Pigeon, West Wallabi, Leo, Wooded, The Nook, Post Office and Pelsaert Is: early August to mid-December; C/3(3). Nests placed under overhanging limestone, eaves of buildings and jetties. Established on North I. after 1945 (there were no huts and few other nest sites before 1946). In addition to the above islands, it has been observed over East Wallabi, Pelican, Seagull, Lumley, Little Pigeon, Long, Beacon, Saville-Kent, Little North, Rat, Bushby, Little Rat, Alexander, Morley, Burton, Basile and Jubilee Is.

Motacillidae

Anthus novaeseelandiae australis Vieillot

Richard's Pipit

Evidently resident on North I., for it has been recorded by all visiting ornithologists beginning with W.B. Alexander in November 1913. Moderately common; usually in ones or twos. Open areas: beaches, dunes, the airstrip and around the saltlake. Display flights observed by R.E. Johnstone on 14 August 1983. Similar displays were possibly the basis of the record of Brown Songlarks on North I. (Storr 1960).

Rare vagrant to other islands: one observed by Johnstone on the East Wallabi I. airstrip on 8 May and 6 October 1981, and one collected by Helms (1902) on Gun I. in 1898.

Campephagidae

Coracina novaehollandiae (Gmelin)

Black-faced Cuckoo-shrike

Uncommon passage migrant. Four birds observed by R.I.T. Prince in early August 1976, and ones and twos observed by G.M. Storr on East Wallabi and West Wallabi Is in April, June and September 1959.

Pachycephalidae

Petroica goodenovii (Vigors and Horsfield) Red-capped Robin

Rare vagrant. Hall (1902: 132) collected a young bird on Pelsaert I. on 27 October 1899.

Pachycephala rufiventris rufiventris (Latham) Rufous Whistler

Rare vagrant. V.N. Servery *et al.* saw a female on West Wallabi I. on 10 December 1963.

Monarchidae

Rhipidura leucophrys leucophrys (Latham) Willie Wagtail

Rare vagrant or passage migrant. Observed on North I. (four birds by R.I.T. Prince on 2 August 1976, and one by R.E. Johnstone on 14 August 1983) and on Beacon I. (one in late May 1985).

Acanthizidae

Sericornis frontalis balstoni Ogilvie-Grant Spotted Scrub-wren

Common resident on East Wallabi and West Wallabi Is; usually in pairs or small parties. All kinds of dense shrubbery. Breeding in June and July (? early August); C/2(13), 3(7). Nests made of grass, bark, rootlets or fine twigs, lined with feathers and placed close to ground in a bush or low shrub.

In the smaller and paler spots of the throat and breast this population differs markedly from those of the opposite mainland (Kalbarri south to Cliff Head). However, Abrolhos birds are too like those of the Shark Bay region for the recognition of *S.f. houtmanensis* Zietz.

Sylviidae

Megalurus gramineus (Gould) Little Grassbird

Rare vagrant. One heard and seen by P.J. Fuller near mangroves on Pelsaert I. on 17 February 1978.

Cincloramphus mathewsi Iredale Rufous Songlark

Rare vagrant or passage migrant. On 27 October 1899 Hall (1902: 137) collected one of three birds in mangroves on Pelsaert I.

Cincloramphus cruralis (Vigors and Horsfield) Brown Songlark

Rare vagrant or passage migrant. On 5 September 1959 Storr (1960) observed three singing males over the grassy central plain of North I.

Zosteropidae

Zosterops lateralis gouldi Bonaparte

Grey-breasted White-eye

Common resident, usually in small flocks (up to 40). Favouring the taller and denser vegetation (*Avicennia*, *Nitraria*, *Myoporum*) but also visiting *Atriplex* and other low shrubbery. Breeding reported on East Wallabi, Little Pigeon, Long and Rat Is, islet near Newman I., and Burton, Post Office and Pelsaert Is: early August to mid-November; C/1(2), 3(1), 4(1), 6(1). Hall (1902: 141) described a remarkable nest made of seaweed and located almost on the ground in a pigface *Carpobrotus*. Also recorded on North, Pigeon, West Wallabi, Tattler, Mangrove, Beacon, Far, Seal, Little Rat, Roma, Alexander, Serventy, Suomi, Keru, Morley, Wooded, Helms, White, Leo, Hummock, Jackson, Coronation, Uncle Margie, Gun, Stick and Middle Is.

Corvidae

Corvus coronoides perplexus Mathews

Australian Raven

Rare vagrant. P. Griffin observed two on Burton I. in late April 1976. Probably belonging to this species were the two 'crows' that a fisherman saw in the Wallabi Group following offshore winds.



Figure 12 South end of Pelsaert Island, 24 August 1977. The Common Noddies have just returned and are defending the sites at which they will later build their nests. Wedge-tailed Shearwaters burrow under the dense *Nitraria* in the background.

DISCUSSION

The Seabirds

On the Houtman Abrolhos are found the largest breeding colonies in Western Australia of 11 species of seabirds: Wedge-tailed Shearwater, Little Shearwater, White-faced Storm Petrel, White-breasted Sea Eagle, Osprey, Common Noddy, Lesser Noddy, Caspian Tern, Crested Tern, Roseate Tern and Fairy Tern. One of these species (Lesser Noddy) is found nowhere else in Australia, and two species (Little Shearwater and Fairy Tern) are declining in much of their range. The islands are also important breeding grounds for the Eastern Reef Heron, Pacific Gull and Bridled Tern. The abundance of terns is largely due to the huge numbers of small schooling clupeid and atherinid fish.

The Abrolhos are most famous for their breeding tropical seabirds. Four species nest in vast numbers, namely the Wedge-tailed Shearwater, Lesser Noddy, Common Noddy and Sooty Tern. The last two are found in tropical seas throughout the world; the shearwater is widespread in the Indian and Pacific Oceans; but the Lesser Noddy is confined to minute parts of the Indian Ocean (one subspecies in the Seychelles and one in the Abrolhos).

Another category of seabirds are those which occur in warm temperate as well as tropical seas. Eleven such species breed on the Abrolhos: Pied Cormorant, Red-tailed Tropic-bird, Eastern Reef Heron, White-breasted Sea Eagle, Osprey, Silver Gull, Caspian Tern, Crested Tern, Roseate Tern, Bridled Tern and Fairy Tern.

Finally there are two species of warm temperate seabirds that breed no further north, the Little Shearwater and White-faced Storm Petrel. To these we can add the Pacific Gull, whose breeding range terminates in Shark Bay.

When number of individuals is taken into account, the islands are seen to be overwhelmingly a home for tropical seabirds. (The absence of boobies is thus surprising, in view of the breeding of the Masked Booby on Lord Howe Island in $31^{\circ}28'S$.)

The Abrolhos owe their pre-eminence as a tropical seabird nursery to their location near the edge of the continental shelf in the path of the warm sub-saline waters of the south-flowing Leeuwin Current (Pearce and Cresswell 1985). This becomes evident when we compare the Abrolhos ($28^{\circ}20'$ to $29^{\circ}00'S$) with the relatively land-locked waters of Shark Bay ($24^{\circ}40'$ to $26^{\circ}40'S$). Very few seabirds (or shorebirds) live in hypersaline Hamelin Pool, but Denham Sound and Freycinet Estuary support a moderately rich assemblage of seabirds, which however is dominated by the Pied Cormorant. The only tropical seabird is the Wedge-tailed Shearwater, and its numbers only amount to 1 000 breeding pairs (Storr 1985). There are no Noddies or Sooty Terns. Indeed the marine avifauna is much the same as in the seas around Rottneest Island.

Seabird Breeding Seasons

In much of Western Australia autumn is an important season. In the Abrolhos, however, more than 90 per cent of the laying takes place in spring (sometimes including late winter or early summer). Spring breeders include the Wedge-tailed Shearwater, Red-tailed Tropic-bird, Pied Cormorant (in contrast to further north and south, where breeding occurs only or mainly in autumn-winter), Eastern Reef Heron, Osprey, Pacific Gull, Common Noddy, Lesser Noddy, Caspian Tern, Bridled Tern, Sooty Tern and Fairy Tern. There are only two winter breeders, the Little Shearwater and White-breasted Sea Eagle. No birds lay solely in autumn, but Silver Gulls nest continuously from autumn to spring, and Crested and Roseate Terns nest in autumn and again in spring and early summer.

| The reason for the great predominance of spring nesting is unknown. Possibly there is a peak in the food supply in spring-summer. On the other hand there seems to be inadequate food for supporting large populations of seabirds in autumn-winter. At any rate the Wedge-tailed Shearwater, White-faced Storm Petrel, Common Noddy, Sooty Tern and Bridled Tern almost entirely leave the area in autumn.

Littoral and Land Birds

Three species of shorebird nest in the Abrolhos, namely the Pied and Sooty Oystercatchers and the Red-capped Plover. Seventeen Palaeartic species regularly visit the islands during the southern summer. Some of the islands are notable for their large numbers of Spotless Crakes.

Only six species of land bird are resident on the Abrolhos. They include an endemic subspecies of the Painted Button-quail. The Brush Bronzewing is fairly common on the northern islands, which is important in view of the serious decline in mainland populations of this pigeon.

Vulnerability of the Birds

In the Introduction we noted some of the effects of man on the environment. By and large these effects have been local and not enduring. That is not to say that many of the birds are not vulnerable to present and future disturbance.

Spillage of oil, either from tankers or local drilling, constitutes a threat to the birds that exploit the shallows and shores, through both the fouling of plumage and destruction of the food supply. It also poses a threat to the mangroves and consequently to the Lesser Noddy, which nests solely in these trees. Certain stands of mangroves in the Mangrove Group are the least vulnerable in the Abrolhos, because they grow in land-locked lagoons. It is therefore a pity that human occupation would probably bar the noddies from using them in the event of the destruction of mangroves elsewhere.

The deliberate or accidental introduction of predatory mammals is another potential hazard to the birds. Not even the guano industry could destroy the renowned Rat Island colonies of the Wedge-tailed Shearwater, Common Noddy and Sooty Tern, but feral cats did so in a few decades. Much of the low vegetation has returned to Rat Island and it would be very suitable for seabirds,

if it were not for the cats. The indigenous rat *Rattus fuscipes* is harmless, but the larger, stronger and more voracious *Rattus rattus* is a notorious scourge of breeding seabirds in many parts of the world.

Despite the increased food provided by the fishermen, gull numbers are not yet high enough on the Abrolhos to seriously affect surface-nesting seabirds. This is probably because the islands are uninhabited for most of the year. The establishment of a year-round tourist industry could well result in a big increase in gull numbers. Other harmful effects of tourism would be the increased disturbance to the birds, greater pollution of their environment and a reduction in the land area available to them through the construction of buildings, airstrips etc.

Some of the foregoing factors would also apply to land birds, e.g. the introduction of predators and the decline in the area and quality of the vegetation. An additional danger is fire. The vegetation of North Island is especially flammable, as testified by past fires and the consequent blowing-out of dunes.

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