

III. BIRDS OF COCKLESHELL GULLY RESERVE AND ADJACENT AREAS

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INTRODUCTION

Coastal areas of southern Western Australia offer wide habitat diversity for birds, ranging from oceans, islands, beaches, small lakes, streams, coastal dunes, interdune thickets, heaths and woodlands. However, in only three such areas have the birds been studied in detail and related to habitat. These are the Murchison River area (Sedgwick, 1949) and the Swan River district (Alexander, 1921; Serventy, 1948) on the west coast and Cape Le Grand National Park (Dell, 1975) on the south coast.

It is reasonable to suppose that a floristically rich area would have many species of birds. Gardner (1949) has indicated that the Hill River district, in which the present study is located, is exceedingly rich in plant species, although nothing is known about the total number of species present. The fact that three major botanical districts—Darling, Irwin and Avon—meet here (Gardner and Bennetts, 1956) probably explains the large number of plants present.

There is a pressing need to evaluate the bird assemblage in this area because of possible disturbance from farming and mining. The vertebrate survey of the Cockleshell Gully area (see Chapman, this report) gave us an opportunity to assess the avifauna in the area north of the Hill River. We were fortunate also that Johnstone had commenced a study of seabirds on the Fisherman Islands in 1970 and was able to contribute to this study.

METHODS

The data presented here were obtained by Dell as part of the biological survey of Cockleshell Gully Reserve during 22 October–11 November 1973 and 12–29 May 1974. Dell also made short trips to the Green Head area on 2–4 October 1970, 28–31 March 1975 and 25 May 1976. Johnstone obtained his data during 42 trips (mainly weekends) to the Green Head area since 1970; dates of these trips are listed overleaf, an asterisk indicating a visit to the Fisherman Islands and the figure in brackets number of trips.

January	— 1971, 1973(2)*, 1974*, 1975(2)*
February	— 1971*, 1976
March	— 1972, 1973*, 1974*, 1975(2)*, 1976*
April	— 1971(2)*, 1972(2)*, 1976*
May	— 1973*
June	— 1973*
September	— 1971, 1974*
October	— 1970, 1971*, 1972*, 1973(2), 1974*
November	— 1971*, 1973(2)*, 1974*
December	— 1971(3)*, 1972(3)*, 1973(3)*

Unpublished data from G.M. Storr obtained on 28-29 March 1959, 28-31 March 1964 and 11-13 May 1965 and from D.L. Serventy obtained on 11-13 August 1954 and 2-5 September 1954 are included.

We follow Muir's (1977) vegetation classification. Where we know the vegetation density we use the appropriate structural term (a term commencing with a capital, e.g. Low Woodland A, is a direct quote from Muir's key) but where we do not know the density we use a formation term, e.g. 'shrubland,' which comprise shrubs greater than 2 m tall but of unrecorded density. Similarly 'heath' refers to any shrubs less than 2 m tall and of unrecorded density and these could be any one of sixteen different structural groups. In nearly every case we have only categorised the upper stratum and omitted mention of any other strata that may have been present.

Status at the time of these surveys is listed as scarce, uncommon, moderately common and common. We take into consideration our experiences with each species elsewhere in the South-west in evaluating its status. For example, if we saw about 10 pairs of Wedge-tailed Eagles we would list it as common, but if we saw only 10 pairs of Silvereyes we would call it scarce or uncommon.

Most of our data refer to Reserve 15018 but we have included data for adjacent areas because we felt that by looking at contiguous areas we would get a better understanding of the avifauna of the area. The area covered by us (Fig. 1) includes approximately 50 km of coastline from Snag Island in the north to Jurien Bay in the south, and inland to the western edge of the dissected plateau of the Gairdner Range. A number of islands are included, the most important for breeding sea-birds being the Fisherman Islands for which we have considerable data. Information for the other islands comes from publications, especially those of J.R. Ford (see references).

Lowry (1974) has mapped the geology of the Dongara-Hill River region. We consider there are six broad vegetation and soil habitats for birds in our area.

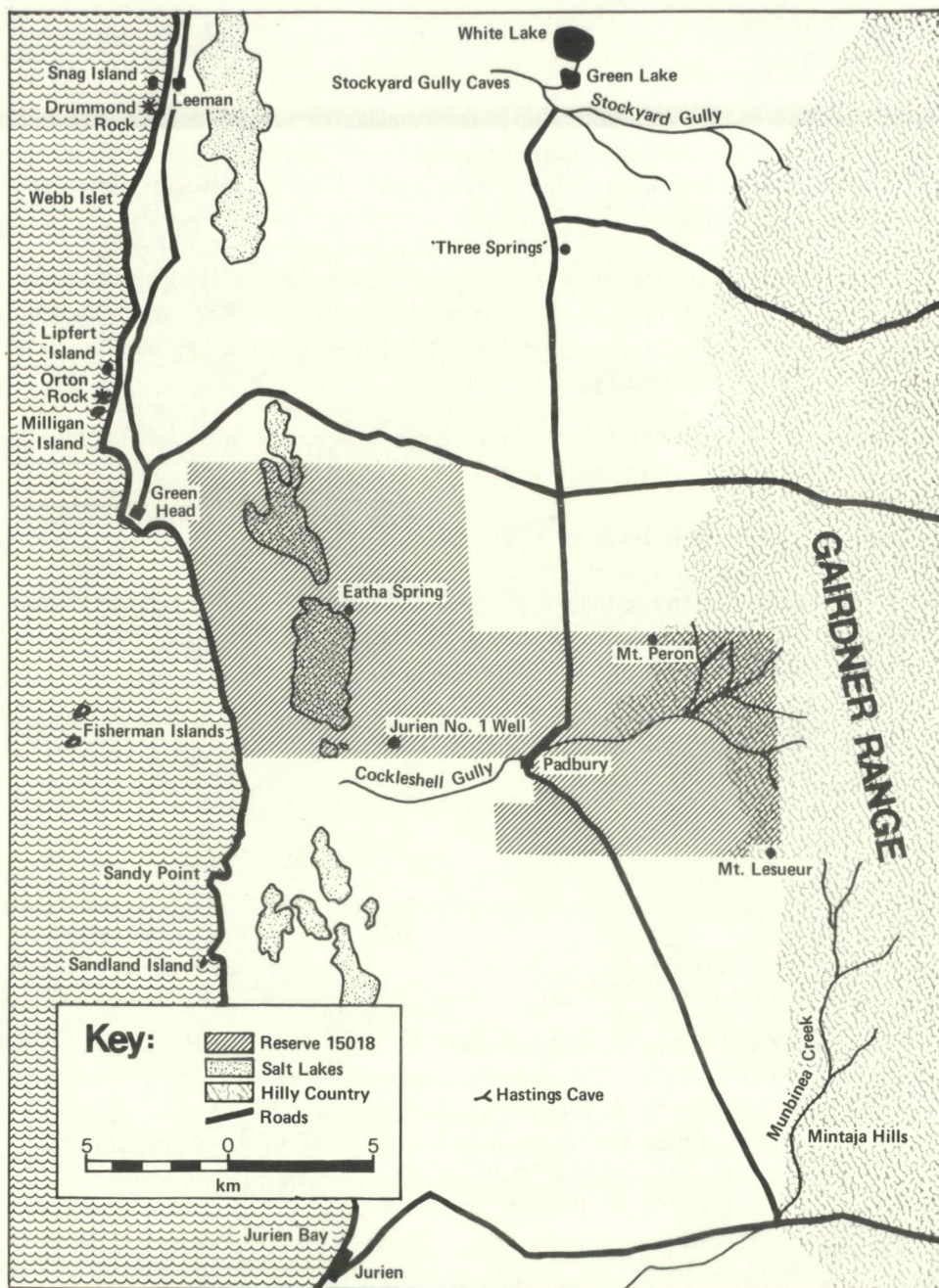


Fig. 1: Map of part of the west coast of Western Australia showing location of Cockleshell Gully Reserve, major physiographic features and location of places mentioned in the text.

1. Sea and coastline including aeolian limestone islands and headlands and sandy beaches.
2. Safety Bay sand (Quindalup dunes) consisting of aeolian and beach sands forming mobile and consolidated dunes. Dunes are generally heath covered and many of the interdune areas have dense shrublands especially of *Acacia rostellifera*.
3. Lacustrine deposits of clays with associated saltlakes and samphire flats. Several freshwater springs and streams empty into the saltlakes and provide important habitat for waterfowl. Edges of saltlakes usually have woodlands of *Casuarina obesa*.
4. Spearwood dunes of lithified limestone covered with heath and shrubland. In parts covered with colluvial sands.
5. Colluvial quartz sand heaths.
6. A dissected plateau consisting of the Gairdner Range and associated hills of Mt Peron and Mt Lesueur. Heath covered or with *Eucalyptus* spp. woodland. Clay, sandstone and laterite.

ANNOTATED LIST

Emu (*Dromaius novaehollandiae*)

Scarce throughout uncleared areas. Low Woodland A (*Eucalyptus wandoo* and *E. accedens*) on Gairdner Range, along creekbeds in dense creekside vegetation, in Low Heath C (samphires) on edge of saltlakes and on mobile and consolidated dunes. Single birds and groups of up to 3 adults in May 1974, October 1973, November 1973 and December 1971. Storr saw tracks of a juvenile along Cockleshell Gully in March 1964. Adult with 4 chicks on 26 October and adult with 6 chicks on 28 October. All chicks lacked stripes. One drumming near saltlakes on 27 May. Faeces in May contained *Casuarina* seed cones.

Grebe (*Podiceps* sp.)

Scarce. Two pairs on temporary freshwater (White Lake) in May 1974.

Little Penguin (*Eudyptula minor*)

Scarce. One on North Fisherman Island on 4 January 1975. It was resting under dense *Nitraria schoberi* and was moulting, one-third of its body was covered in glossy blue plumage, the rest was downy.

Wedge-tailed Shearwater (*Puffinus pacificus*)

Common on North and South Fisherman Islands from September to late April. Eggs are laid in October, hatch in January, and young leave the nest in April. Johnstone (in press a and b) lists numbers of breeding pairs and situations of nest burrows. Breeding population present on Sandland Island (Ford, 1965a).

Little Shearwater (*Puffinus assimilis*)

Formerly breeding on South Fisherman Island (Ford, 1965a, Johnstone, 1977b). No recent records.

White-faced Storm-petrel (*Oceanites marinus*)

Common breeding visitor on Fisherman Islands (Johnstone, in press a and b), scarce on coastline. One in bay at Green Head in October 1964 (A. Hobbs, pers. comm.). Adults arrive on Fisherman Islands in late-September/early-October, eggs are laid by 14 October, and birds depart in February. Also breeds on Sandland Island (Ford, 1965a).

Wilson's Storm-petrel (*Oceanites oceanicus*)

Scarce. Up to 10 near North Fisherman Island in April 1976. Recorded on Sandland Island (Ford, 1965a).

Little Black Cormorant (*Phalacrocorax sulcirostris*)

Scarce. Sixteen flying south over mudflats near Green Head in November 1973.

Black Cormorant (*Phalacrocorax carbo*)

Scarce. Storr recorded 1 on fresh portion of Lake Leeman in March 1964.

Little Pied Cormorant (*Phalacrocorax melanoleucos*)

Status not known. Storr recorded 1 at 'Three Springs' in March 1964 (for location see Fig.1). Breeds on Webb Islet and probably on Snag Island and Drummond Rock (Ford *et al.* 1963).

Pied Cormorant (*Phalacrocorax varius*)

Scarce on coastline, common resident on coastal islands. Four at Green Head in May 1974, 3 in October 1970 and 2 in November 1973. Storr recorded 1 at Leeman in March 1964. Breeding colony sometimes present

on Sandland Island (Ford, 1965a). Previously breeding on North Fisherman Island but not done so since at least 1970 (Johnstone, in press a). About 150 pairs breeding on South Fisherman Island (Johnstone, in press b). Old nests on Milligan, Lipfert, Webb and Snag Islands (Ford, 1965a).

Australian Gannet (*Sula bassana*)

Scarce. A speckled juvenile over bay near Green Head in May 1973. Dead bird recorded on mainland opposite Sandland Island (Ford, 1965a).

Red-tailed Tropic-bird (*Phaethon rubricauda*)

Scarce. One in bay between Green Head and North Fisherman Island in March 1975.

Australian Pelican (*Pelecanus conspicillatus*)

Scarce. Single birds on Webb Island and adjacent mainland (Ford, 1965a).

White-faced Heron (*Ardea novaehollandiae*)

Uncommon. Swamps, freshwater pools (including temporary ones between mobile dunes) and samphire margins of saltlakes. Single birds and groups of up to 4 in March 1975, October and November 1973, and December 1971. Storr recorded occasional birds around Lake Leeman and 'Three Springs' in March 1964.

Reef Heron (*Egretta sacra*)

Scarce on coast, uncommon on coastal islands. One on rocky point at Green Head in March 1973. Recorded at Sandy Point by Sandland (1931). Pairs or single birds on North Fisherman Island in January 1973, 1976, March, 1973, 1975, April 1971, June 1973, October 1971, 1972 and December 1971, 1972. All were dark-phase birds. Probably breeding on North Fisherman Island (Johnstone, in press a). Sandland (1931) recorded both dark and pale-phase birds on Sandland Island.

Black Swan (*Cygnus atratus*)

Moderately common. Four pairs on saltlakes and 1 pair on temporary freshwater lake at Stockyard Gully in May 1974. Old nests in samphires fringing saltlakes in May. Serventy recorded nineteen on saltlakes in September 1954 and Storr recorded 44 on freshwater spring at Lake Leeman in March 1964.

Mountain Duck (*Tadorna tadornoides*)

Common on saltlakes, scarce on freshwater lakes and coastal bays. Flocks recorded on saltlakes in May 1974 and 1976, October 1973, November 1973, December 1971 and by Serventy in September 1954. Recorded on freshwater lake near Green Head in October 1972 and 1973. Flocks on salt-

lakes in May had up to 20 birds and in October-November had up to 70 birds. In a run along Lake Leeman in March 1964 Storr recorded 400 birds. One on sea just off North Fisherman Island in June 1973 and 3 in October 1973. Serventy and Whittell (1967) state that the record clutch for this species is 18 from Cockleshell Gully.

Black Duck (*Anas superciliosa*)

Moderately common on freshwater pools, springs and saltlakes. Several pairs on temporary freshwater pools near Stockyard Gully and Padbury farm, and up to 25 on saltlakes in May 1974. One at Padbury farm dam, pair at Eatha Spring and pair with 1 young on temporary freshwater lakes in mobile dunes in November 1973. Up to 6 birds at Eatha Spring in March 1975, November and December 1973 and December 1971. Ten at freshwater pool near Green Head in October 1972. Serventy recorded 20 on saltlakes in September 1954 and Storr recorded 100 at Lake Leeman in March 1964.

Grey Teal (*Anas gibberifrons*)

Uncommon on freshwater lakes, common on saltlakes. Pair at Eatha Spring in March 1975, 5 in May 1976 and 1 in December 1971 and 1973, several on temporary freshwater lakes in mobile dunes and about 130 on salt lakes in May 1974. In a run along Lake Leeman in March 1964 Storr recorded flocks of 500, 500, 600, 150, 1500 birds.

Wood Duck (*Chenonetta jubata*)

Scarce. About 20 birds at Eatha Spring in December 1971.

Black-shouldered Kite (*Elanus notatus*).

Scarce. One over heath in May 1974 and October 1973.

Whistling Kite (*Haliastur sphenurus*)

Uncommon. One over Cockleshell Gully in May 1974, October 1973, November 1973; one over swamps near Jurien Bay in October 1973. Storr recorded 1 at Cockleshell Gully in March 1959 and 2 over Lake Leeman in March 1964.

Brown Goshawk (*Accipiter fasciatus*)

Scarce. Pair at nest in Marri (*Eucalyptus calophylla*) 13 m from ground near creek 2 km southeast of Mt Peron on 25 October 1973.

Collared Sparrowhawk (*Accipiter cirrocephalus*)

Scarce. One flying over (*Acacia rostellifera* shrubs on Quindalup dunes in May 1974 and 1 over heath near Cockleshell Gully in November 1973.

Australian Little Eagle (*Aquila morphnoides*)

Scarce. One calling over saltlakes in November 1973.

Wedge-tailed Eagle (*Aquila audax*)

Uncommon throughout area. Pair over Mt Peron and pair over saltlakes in May 1974. Pair over Padbury farm in October 1973 and 2 juveniles along Cockleshell Gully in November 1973. Storr recorded single birds at Cockleshell Gully, Lake Leeman and 'Three Springs' in March 1964. Nest with eggs 2 m from ground in a Christmas Tree (*Nuytsia floribunda*) at Cockleshell Gully on 27 July 1932 (F.A. Grigson pers. comm. to D.L. Serventy).

White-breasted Sea-eagle (*Haliaeetus leucogaster*)

Uncommon along coast and coastal islands. One at Green Head in March 1975 and 1 in May 1974; 2 over saltlakes in May 1974; single birds or pairs over Fisherman Islands in January 1974, March 1972, April 1971, May 1973, and June 1973. One in April was juvenile, being speckled on breast and abdomen. One eating a Bridled Tern on North Fisherman Island in December 1971. Breeding on Sandland and Milligan Islands (Ford, 1965a).

Spotted Harrier (*Circus assimilis*)

Scarce. One feeding on Bridled Terns on North Fisherman Island in March 1975. It flew from a *Nitraria schoberi* bush and left behind the wings, beak and legs of a freshly killed tern. Eight partly eaten Bridled Terns were found nearby. One hawking over dunes at Green Head in December 1975 and January 1976. One recorded by Serventy over sandplain south of Padbury farm in September 1954.

Osprey (*Pandion haliaetus*)

Scarce on coast, moderately common on coastal islands, One over Green Head in September 1971. Pairs on North Fisherman Island in January 1973, March 1973, April 1972, May 1973, June 1973, October 1971, 1972, 1974, and December 1971, 1972, 1973. Pairs at South Fisherman Island in April 1971, 1972, June 1973, and December 1973.

We record the following breeding data:

10 October 1971: 2 large young in nest on south end of North Fisherman Island;

14 October 1972: 2 large young in nest on south end of North Fisherman Island;

3 December 1972: 2 adults on nest on south end of North Fisherman Island;

24 December 1972: 1 young in nest on north end of North Fisherman Island;

21 September 1974: Pair defending nest on south end of North Fisherman Island. One attacked a Crested Tern;

13 October 1974: 1 young in nest on south end of North Fisherman Island. This young left nest before 16 October (A. Hobbs pers. comm.).

Ford (1965a) lists other breeding localities at Sandland Island, Sandy Point, islets between Sandy Point and Green Head, Milligan Island, Webb Island, Drummond Rock and Snag Island.

Little Falcon (*Falco longipennis*)

Scarce. One over saltlakes in March 1975 and 1 near Stockyard Gully in May 1974.

Peregrine Falcon (*Falco peregrinus*)

Scarce. One at Green Head in November 1973.

Brown Falcon (*Falco berigora*)

Scarce. Heath. One in February 1971 and May 1974, single birds totalling six in October-November 1973 and one in December 1971.

A clutch of eggs was taken by F.A. Grigson at Cockleshell Gully on 19 August 1932.

Kestrel (*Falco cenchroides*)

Moderately common. Heath and farmland. Single birds or pairs recorded in January, February, March, May, June, October, November and December. Forty-four sightings were between October and February, twelve were between March and September. One over North Fisherman Island in October 1973.

Pair with two juveniles near Cockleshell Gully on 25 October 1973. Nest with 4 eggs in limestone cliff at Green Head on 9 October 1971; another nest with 5 eggs was about 0.5 km further north on 10 October. Serventy recorded nest with 3 eggs in cave south of Padbury farm on 4 September 1954.

Ford (1965a) records Kestrels on Sandland Island and breeding on Webb Island.

Mallee Fowl (*Leipoa ocellata*)

F.A. Grigson (pers. comm. to Storr, March 1959) said that Mallee Fowl formerly occurred near Padbury farm in the wattle thickets (presumably *Acacia rostellifera*) and that their old nest mounds still persisted.

Stubble Quail (*Coturnix novaezelandiae*)

Scarce. Two on edge of saltlake near Eatha Spring in December 1973; one, a juvenile female, was collected. An unidentified quail was flushed from swampy heath on Gairdner Range in May 1974.

Banded Landrail (*Gallirallus philippensis*).

Not recorded by us, but Ford (1965a) lists a possible record for Sandland Island.

Spotless Crake (*Porzana tabuensis*)

Not seen by us but recorded by Ford (1965a) on North Fisherman Island. Ford (1962) lists several mainland localities but not in the area covered by us.

Spotted Crake (*Porzana fluminea*)

Scarce. Several in *Typha* and *Juncus maritimus* at Eatha Spring each time the spring was visited. Recorded in March 1973, May 1974, 1975, October 1973, November 1973 and December 1971. Nest with one egg among *Typha* on 29 November 1973. Egg was chipping and was coloured fawn with darker blotches. This implies egg laying about 12 November. Nest was just above water surface, was constructed of *Juncus* and *Typha* and had an external diameter of ca 12 cm with a shallow cup. The nest was empty on 5 December.

A female collected in December 1971 had insect remains in its stomach.

Australian Bustard (*Otis australis*)

Scarce. One in samphire fringe of saltlake and one in coastal dune heath near Green Head in May 1974. Pair in heath near Cockleshell Gully in October 1973 and pair near Green Head in November 1973. Seventy recorded 1 in heath near Cockleshell Gully in September 1954. There is a clutch of 3 eggs in the F.A. Grigson collection from Cockleshell Gully collected 24 September 1931.

Pied Oystercatcher (*Haematopus ostralegus*)

Moderately common on coastline and coastal islands; scarce on saltlakes. Up to 7 near Green Head in January 1973, May 1973, October 1971, 1972, November 1973 and December 1971, 1973, seven on saltlake in November.

Up to 6 on North Fisherman Island in March 1973, 1975, June 1973, October 1972, 1973, 1974 and November 1971. Juvenile at Beagle Islands on 16 October 1974.

This species probably breeds on coastal islands and visits the mainland in the non-breeding season. An adult bird attacked us on North Fisherman Island in September 1974. Three pairs on North Fisherman Island on 14 October 1972 were very noisy and apparently territorial. Ford (1965a) records breeding on Milligan Island and on the mainland at Sandy Point. Most of Ford's mainland records are in summer and his island records are in spring.

Sooty Oystercatcher (*Haematopus fuliginosus*)

Two at Green Head in February 1971.

The absence of rocky coasts limit this species in this region. Ford (1965a) had no records between Dongara and Lancelin.

Banded Plover (*Vanellus tricolor*)

Uncommon. Samphires on fringe of saltlakes and in cleared areas. Two pairs on edge of saltlakes in May 1974; 1 on saltlake in October 1970; calling over saltlake in October 1973; 3 on saltlake, 15 in samphires on edge of saltlakes and 5 in paddocks at Padbury in November 1973; flocks of 6 and 8 on saltlake in December 1973. Storr recorded birds at Padbury farm in March 1959, and 1 at Lake Leeman and 6 on farms north of Mt Peron in March 1964.

Grey Plover (*Pluvialis squatarola*)

Uncommon. In summer on sandy beaches. Recorded at Green Head in January 1971, 1973, February 1971 and December 1971. Recorded on North Fisherman Island in March 1974, 1975, September 1974 and October 1973. Ford (1965a) records this species on North Fisherman Island in May and on beaches north of Green Head in September.

Red-capped Dotterel (*Charadrius ruficapillus*)

Common on saltlakes and beaches on all visits. Not recorded on the Fisherman Islands during our visits.

Nest with small downy chick at base of *Arthrocnemum* bush on edge of saltlake on 6 December 1971.

Hooded Dotterel (*Charadrius cucullatus*)

Scarce. Small flock on saltlakes near Eatha Spring in December 1971. Storr recorded 6 on Lake Leeman in March 1964. Ford (1965a) records a juvenile near Sandland Island and a specimen collected by Orton at Sandy Point in 1928.

Double-banded Dotterel (*Charadrius bicinctus*)

One collected at Leeman saltlake on 30 March 1964 (Ford, 1967).

Black-fronted Dotterel (*Charadrius melanops*)

Scarce, temporary freshwater lakes and edges of saltlakes where they are relatively fresh.

Three on freshwater lakes among mobile dunes and 1 on saltlake in May 1974, 1 on freshwater lake in mobile dunes in November 1973 and 4 at Eatha Spring in December 1971 and 2 in December 1973.

Whimbrel (*Numenius phaeopus*)

Recorded at Sandy Point by Sandland (1931).

Bar-tailed Godwit (*Limosa lapponica*)

Uncommon summer visitor. Four on beach at Green Head in February 1971, up to 2 on beach at Green Head in December 1971. 1972, 1973, 1975, 17 on small freshwater lake near Green Head in October 1970, 1 on small freshwater lake in mobile dunes in November 1973, 1 on North Fisherman Island in December 1971.

Greenshank (*Tringa nebularia*)

Uncommon. One on margin of saltlake in May 1974, one on margin of saltlake and three on shallow temporary freshwater lakes in mobile dunes in November 1973. Serventy recorded 1 on saltlakes on 3 September 1954 and Storr recorded 2 at fresh spring at Lake Leeman in March 1964.

Grey-tailed Tattler (*Tringa brevipes*)

Scarce. One on beach at Green Head in March, May and December 1973.

Common Sandpiper (*Tringa hypoleucos*)

Scarce. One on beach at Green Head in December 1973. Ford (1965a) records single birds on Sandland and South Fisherman Islands and at Leeman.

Turnstone (*Arenaria interpres*)

Common between October and March, otherwise scarce. Rocky and sandy beaches, islands and coasts.

Six on North Fisherman Islands in April 1971 and 3 flocks of up to 14 birds in April 1972; 12 at Green Head in May 1973 and 4 in May 1974; many sightings of up to 5 birds and some sightings of up to 40 at Green Head and North Fisherman Island in January 1973, 1974, 1976, February 1976, March 1972, 1973, 1974, 1975, April 1971, 1972, 1976, October 1970, 1971, 1972, 1973, November 1973, 1974 and December 1971, 1972, 1973 and 1975. Ford (1965a) lists sightings in May, September, October and December.

Knot (*Calidris canutus*)

Ford (1965a) records about 40 on mainland opposite Sandland Island.

Sanderling (*Calidris alba*)

Scarce. Eight feeding on beach at Green Head in December 1973. Ford (1965a) records sightings by Orton in March 1928.

Red-necked Stint (*Calidris ruficollis*)

Seasonal visitor between October and March. Moderately common on salt-lakes and freshwater lakes; scarce on coastal beaches.



Plate 2. Eatha Spring (Coastal Belt)



Plate 3. Foredune vegetation (Coastal Belt)



Plate 4. Consolidated Dune (Coastal Belt)



Plate 5. Heath on laterite (Dissected Region)



Plate 6. Woodland in Gairdner Range (Dissected Region)



Plate 7. Heath on sand (Dissected Region)

Up to ten at Green Head beach in January 1973, February 1971, October 1970 and December 1973. Flocks of up to 150 birds on saltlakes and about 40 on shallow temporary freshwater lakes in mobile dunes in November 1973. Two on North Fisherman Island in December 1973. Ford (1965a) has mainland records in October and December. Storr recorded 1250 birds in flocks of up to 500 on Lake Leeman in March 1964.

Sharp-tailed Sandpiper (*Calidris acuminata*)

Seasonal visitor between October and January. Uncommon, freshwater springs and on North Fisherman Island. Small flocks of up to 30 birds at Eatha Spring in January 1971, November 1973 and December 1971; 1 on North Fisherman Island in October 1972.

Curlew Sandpiper (*Calidris ferruginea*).

Scarce. One amid flock of Red-necked Stints at shallow temporary freshwater lakes in mobile dunes in November 1973. Storr recorded 8 on Lake Leeman in March 1964.

White-headed Stilt (*Himantopus himantopus*)

Uncommon. On saltlakes and freshwater lakes. One at Eatha Spring in March 1975, four in May 1974, about in October-November 1973 and adult and 2 juveniles in December 1973. Two on freshwater pools near Green Head in December 1971. Serventy recorded 50 birds on saltlakes in September 1954.

Birds in November were giving persistent alarm calls and diving at human intruders but no nests were found.

Banded Stilt (*Cladorhynchus leucocephalus*)

Uncommon on saltlakes, scarce on freshwater lakes. One at freshwater pool near Green Head in October 1972, 2 on saltlakes in October 1970, six pairs on saltlake in October-November 1973, 1 near Eatha Spring in December 1973. Birds in October-November were giving aerial displays over saltlake.

Storr recorded flocks totalling 4,700 on Lake Leeman in March 1964. 89% were unbanded, 1% fully banded and 10% had pale bands, indicating recent breeding.

Silver Gull (*Larus novaehollandiae*)

Common on coastline and islands, uncommon on saltlakes. Approximately 10 always present at Green Head. Twenty-five on saltlakes in November 1973. Common breeding resident on Fisherman Islands (Johnstone, in press a and b); also breeding on Sandland, Milligan, Lipfert, Webb and Snag Islands and Drummond Rock (Ford, 1965a). Storr recorded 20 at Leeman in March 1964.

Pacific Gull (*Larus pacificus*)

Scarce. Two at Green Head in February 1976, juvenile on North Fisherman Island in January 1973. Ford (1965a) does not record this species on the islands included in our paper.

Lesser Noddy (*Anous tenuirostris*)

Ford (1965a) records a dead specimen on Webb Island.

Caspian Tern (*Sterna caspia*)

Uncommon resident on islands. On North Fisherman Island breeding in October (Johnstone, in press a) and in August-September on Sandland, Milligan, Lipfert and Webb Islands and Drummond Rock (Ford 1965a).

Crested Tern (*Sterna bergii*)

Common resident on islands, visiting coast occasionally. Johnstone (in press a and b) records breeding on both Fisherman Islands and Ford (1965a) records about 100 birds nesting on Sandland Island.

Gull-billed Tern (*Sterna nilotica*)

Storr recorded 1 on Lake Leeman in March 1964.

Marsh Tern (*Sterna hybrida*)

Storr recorded 4 on fresh portion of Lake Leeman in March 1964.

Roseate Tern (*Sterna dougallii*)

Common visitor on Fisherman Islands between March and June and between October and early February (Johnstone, in press a and b). Breeding on South Fisherman Island in autumn (Johnstone, in press b) on North Fisherman Island in autumn and spring (Johnstone, in press a). Breeding on the Fisherman Islands is probably a recent phenomenon (for range expansion in this species, see Storr & Ford, 1962).

Arctic Tern (*Sterna macrura*)

Scarce. On 4 October 1970 after strong westerly overnight gales *ca* 100 birds were sheltering on the leeward side of the frontal dunes at Green Head. Most birds were reluctant to fly but during the day some were noticed hawking over shallow pools about 300 m inland. They were obviously exhausted after their long migration flight (for sea route and explanation for beached specimens see Storr, 1958).

A female in non-breeding plumage was collected on 4 October. This bird weighted 85 g compared with average weight of 4.5 oz = 127 g. (Serventy *et al.* 1971) and must have been in poor condition.

Fairy Tern (*Sterna nereis*)

Apparently seasonal, October to May. Scarce on mainland, sometimes common on islands. Up to 4 birds recorded at Green Head in October 1970 and January 1973 and 1975. About 400 birds on North Fisherman Island in October 1972 and about 100 in October 1974. During other months (January 1973, 1974, 1975 March 1973, 1974, April 1971, November 1974 and December 1971) sightings were of groups of up to 10 birds. A. Hobbs (pers. comm.) recorded *ca* 1000 birds on Beagle Islands during the day and thousands came in at dusk on 16 October 1974. Ford (1965a) records this species on the mainland opposite Sandland Island in May and December and on Beagle Islands in May, September (including 400 birds) and December. See Storr (1960) for movements.

Bridled Tern (*Sterna anaethetus*)

Common visitor on islands, arriving in mid-October and departing in late-March or early-April (Johnstone, in press a and b). About 500 pairs nest on South Fisherman Island and about 2000 pairs on North Fisherman Island. Ford (1965a) records 100-200 birds breeding on South Fisherman Island and 200-300 breeding on North Fisherman Island.

The ten to twenty-fold increase in breeding birds between 1962 and 1971 supports the hypothesis of Storr and Ford (1962) that this species is expanding its breeding range southwards.

Sooty Tern (*Sterna fuscata*)

Seasonal visitor (November-April) on islands. Single birds, pairs or flocks of up to 6 birds seen on North Fisherman Island in January 1974, 1976, March 1973, April 1971, November 1974 and December 1973.

Breeds on the Abrolhos Island, 150 km north of the area covered by this paper. Unlike the other two tropical terns, Bridled and Roseate, this tern is not extending its breeding range southwards.

Common Bronzewing (*Phaps chalcoptera*)

Scarce. Single bird seen three times in heath near Cockleshell Gully in October 1973, single bird seen several times in Low woodland A (*Casuarina obesa*) near Eatha Spring in December 1971. Storr recorded 1 on Munbinea Creek (upper reaches of Hill River) in March 1964.

Crested Pigeon (*Ocyphaps lophotes*)

Scarce. Recently penetrating the northern parts (farms). One in paddock *ca* 10 km south of Stockyard Gully in May 1974.

White-tailed Black Cockatoo (*Calyptorhynchus baudinii*)

Moderately common. Low Forest A (*Eucalyptus wandoo*, *E. accendens*)

and *E. calophylla*) on dissected plateau. Eleven seen in May 1974; between 22-29 October 1973 small flocks of up to 9 birds seen throughout hilly country including feeding in heath. On 29 October there small flocks began massing into a large group of *ca* 100 birds. Storr recorded flocks at Padbury farm and south of it in March 1959 and near Mt Lesueur in March 1964, Serventy recorded flocks roosting in river gums at Padbury farm in August 1954.

Corella (*Cacatua sanguinea*)

Scarce. In Low Woodland A (*Eucalyptus wandoo* and *E. accedens*) in dissected plateau. One pair in May 1974, 4 pairs and flock of 4 birds in October 1973. One pair at entrance of a nest hollow in a Wandoo tree (*E. wandoo*). Serventy recorded 7 at Cockleshell Gully in August 1954 and 10 in September 1954.

There is a clutch of 4 eggs dated 5 September 1931 and a clutch of 3 eggs dated 18 September 1930 from Cockleshell Gully in the F.A. Grigson egg collection. The I.C. Carnaby egg collection has 2 clutches dated 5 September 1931 from Cockleshell Gully (data from D. L. Serventy, pers. comm.).

Galah (*Cacatua roseicapilla*)

Moderately common in Low Woodland A (*Eucalyptus wandoo*, *E. accedens* and *E. calophylla*) on dissected plateau; uncommon in heath. Recorded in March 1974, May 1974, October 1970, 1972, 1973 and November 1973. In May 1974 pairs were scattered throughout forest in hills and along Cockleshell and Stockyard Gullies (in *E. rudis*). Several pairs at nesting hollows in *E. accedens* and two pairs at nesting hollows in *E. rudis*. Similar status in October-November 1973 when several pairs were still associated with nesting hollows. Feeding in heath near Mt Peron in October.

Storr (from data obtained in March 1959 and 1964) and Serventy (from data obtained in August and September 1954) made observations on several small flocks throughout the area covered by us. F.A. Grigson (pers. comm, to Storr) considered that the Galah arrived at Cockleshell Gully before World War I.

Cockatiel (*Nymphicus hollandicus*)

Scarce, probably vagrant. About 10 birds at Green Head in March 1974.

Smoker Parrot (*Polytelis anthopeplus*)

Scarce. Flock of 15 near Eatha Spring in December 1971. Storr recorded 7 at Padbury farm in March 1959 and 1 in March 1964. Serventy recorded 15 at Padbury farm in August 1954 and 12 near Hastings Cave in September 1954.

Port Lincoln Parrot (*Platycercus zonarius*)

Scarce. Woodland and paddocks. In Low Woodland A: 3 in *Casuarina obesa* fringing saltlakes, 5 in *Eucalyptus accendens* — *E. wandoo* on dissected plateau, 8 in *E. rudis* and *E. calophylla* along Cockleshell Gully and 3 in *E. camaldulensis* at Stockyard Gully; 6 in paddock at Padbury in May 1974 and October 1972; one in Low Woodland A (*E. wandoo* — *E. calophylla*) on dissected plateau in October 1970 and a few in October-November 1973. Storr recorded a few at Padbury farm in March 1959 and at Mt Lesueur and Munbinea Creek in March 1964. Serventy recorded a few at Stockyard Gully and Cockleshell Gully in August 1954.

Rock Parrot (*Neophema petrophila*)

Common on North Fisherman Island, uncommon on other islands and in coastal heaths.

Recorded on coast in January 1975, October 1970, 1971, 1973, November 1973, 1974; recorded on North Fisherman Island (usually small groups and flocks of up to 30 birds) in March 1972, 1974, April 1971, 1972, May 1973, June 1973, October 1971, 1972, 1973, 1974, November 1971, 1972, 1973, 1974 and December 1971, 1972, 1973. We record the following breeding data on 14 October 1972 on North Fisherman Island:

Nest with 4 newly hatched young 20 cm down a Wedge-tailed Shearwater (*Puffinus pacificus*) burrow. The nest was just a scrape in the sand *ca* 10 mm deep. The sitting bird moved further down the burrow and remained still. The burrow was placed under a dense *Nitraria schoberi* bush.

Nest with 4 newly hatched young at entrance to a Wedge-tailed Shearwater burrow under dense *Nitraria schoberi* bush. Egg-shell remains at edge of nest scrape.

Nest containing 2 newly hatched young and 2 eggs at entrance of a Wedge-tailed Shearwater burrow.

Nest with 2 young and 2 eggs at entrance of collapsed burrow. Adult flushed.

Pallid cuckoo (*Cuculus pallidus*)

Uncommon. Low Woodland A. Several calling in *Casuarina obesa* fringing saltlakes and several in *Eucalyptus wandoo* on dissected plateau in May 1974. Two calling in *E. wandoo* in October 1973. Serventy recorded calling at Cockleshell Gully in August 1954.

Horsfield Bronze Cuckoo (*Chrysococcyx basalis*)

Uncommon. Heath and Low Woodland A. Several calling heath in May 1974, juvenile collected in *Casuarina obesa* on edge of saltlake in October 1970.

Golden Bronze Cuckoo (*Chrysococcyx lucidus*)

Uncommon. Low Woodland A. Several calling in *Eucalyptus wandoo* — *E. accedens* — *E. calophylla* woodland on dissected plateau in October 1973. Serventy recorded calling along Cockleshell Gully in August and September 1954.

Barn Owl (*Tyto alba*)

Scarce. One seen in cave (Stockyard Gully Archway) in May 1974. Pellets contained bones of *Mus musculus*. One observed on road at night 5 km E of Green Head. Recorded at Stockyard Gully Caves by Serventy in August 1974.

Boobook Owl (*Ninox novaeseelandiae*)

Uncommon. Low Woodland A. One flushed in daytime from *Eucalyptus rudis* trees along Cockleshell Gully in May 1974 and October 1973, 1 calling in *E. wandoo* — *E. accedens* woodland on dissected plateau in May 1974 and October 1973. Storr recorded calling at Padbury farm in March 1959. Recorded calling at Padbury farm in August 1954 and 1 seen near Stockyard Gully caves in August 1954 by Serventy.

Crested Owlet-nightjar (*Aegotheles cristatus*)

Scarce. Low Woodland A. One calling at dusk in *Eucalyptus wandoo* — *E. accedens* woodland on dissected plateau in May 1974.

Spotted Nightjar (*Caprimulgus guttatus*)

Scarce. Heath. Pair on track in heath with thickets of *Acacia rostellifera* in May 1974.

Tawny Frogmouth (*Podargus strigoides*)

Uncommon. Shrubland and heath. Pair in dense *Melaleuca* shrubland near saltlake and one in laterite heath on slopes of Mt. Peron in May 1974. One in *Acacia rostellifera* shrubland near Padbury farm in October 1973.

Laughing Kookaburra (*Dacelo gigas*)

Uncommon. Low Woodland A. A few in *Eucalyptus rudis* and *E. calophylla* along Cockleshell Gully and its tributaries each time the area was visited. F.A. Grigson (pers. comm. to D.L. Serventy) stated that Kookaburras came to Stockyard Gully about 1908.

Sacred Kingfisher (*Halcyon sancta*)

Uncommon. Low Woodland A and heath. One in heath at Green Head in May 1974; several pairs at nest spouts in *Eucalyptus rudis* and *E. calophylla* along Cockleshell Gully and several at nest spouts in *E. wandoo* on dissected plateau in October 1973. Pair excavating a nest hollow in *E. wandoo* on 28 October.

Fork-tailed Swift (*Apus pacificus*)

Scarce. Recorded twice during hot dry weather with easterly wind on 4 March 1973. Four over Green Head for about 30 minutes before heading out to sea. Later the same day about 30 birds were over North Fisherman Island. Five observed over N. Fisherman Island on 18 April 1976. Storr recorded 11 at Leeman in March 1964.

Black-tailed Bee-eater (*Merops ornatus*)

Uncommon, seasonal. Heath and Low Woodland A. Two over Cockleshell Gully woodland in October 1972, several over heath in October 1973, 17 roosting in *Eucalyptus calophylla* tree in heath on 23 October 1973.

White-backed Swallow (*Cheramoeca leucosternum*)

Moderately common. Heath especially in vicinity of vertical road-cutting in sand. Usually pairs and groups of up to 6 birds. Recorded in March 1973, 1975, April 1971, May 1974, June 1973, September 1971, October 1971, 1973, November 1973 and December 1971, 1973.

Birds entering burrows on 10 October 1971 on side of ditch at Green Head; burrows in sandy ridge alongside Green Head airstrip in December 1971; and burrows in roadside cutting near Jurien Bay in May 1974.

Welcome Swallow (*Hirundo neoxena*)

Common. Coastline, islands, heath and lakes. Mainly in groups of up to 10 birds. Recorded in March 1972, 1975, April 1971, May 1974, June 1973, October 1971, 1972, 1973, November 1974 and December 1971. In October-November 1973 most birds in flocks of up to 50, mainly feeding over saltlakes.

Protracted breeding season at Green Head:

17 May 1974: 6 active nests on limestone cliffs, one with 1 egg, others beyond reach.

7 October 1973: nest with large young in galvanized iron tank; 4 nests on limestone cliffs, 2 with 3 eggs, others beyond reach.

22 September 1974: 3 nests on limestone cliffs, all with fully fledged young.

14 October 1972: 3 juvenile birds on cliffs. Eggs presumably laid about beginning of September.

Ford (1965a) considers this species to be a common breeding species on all the islands between Dongara and Lancelin and in the area covered by us records breeding on Sandland Island (October, eggs and young), North Fisherman Island (September, eggs), Webb Island (September, young), Drummond Rock (September, eggs) and Snag Island (September, young).

This species has a much longer breeding season at Green Head than at Rottnest Island where Storr (1965) found it breeding from August to November. The May breeding at Green Head is the first autumn record for

Western Australia. The breeding season on the southern coast of Western Australia is not known but Dell (1975) reports nests with young in mid-December.

Tree Martin (*Hirundo nigricans*)

Generally uncommon; sometimes very common passage migrant. Salt-lakes and heath.

Eight flying north over heath on 15 May 1974, 3 flying north over salt-lakes on 16 May 1974, 5 flying south over saltlake on 7 November 1973, between 600 and 1000 birds over saltlakes on 19 November 1973 later perched in dead *Casuarina obesa* trees before moving south, between 100 and 200 birds at Green Head on 20 November 1973, one at Eatha Spring on 6 December 1971. Storr recorded *ca* 100 in small groups at Leeman in March 1964.

We have not recorded this species on the Fisherman Islands nor did Ford (1965a) record it on any island between Dongara and Lancelin. Storr (1965) records it as an uncommon visitor to Rottnest Island during most summers.

Australian Pipit (*Anthus novaeseelandiae*)

Moderately common. Paddocks, roads and tracks in heath, saltlake edges and samphires, settlements and beaches. Recorded in January 1974, February 1971, March 1975, May 1973, 1974, June 1973, September 1971 1974, October 1971, 1972, 1973, November 1973, and December 1973.

Breeding at Green Head: 5 September, nest with eggs near boat-shed.

Black-faced Cuckoo-shrike (*Coracina novaehollandiae*)

Moderately common in autumn, uncommon in spring. Heath and Low Woodland A in autumn, Low Woodland A in spring.

Single birds or pairs totalling 27 in May 1974, 16 of which were flying north, 4 were flying east, and one flying south. Six sightings of pairs or single birds in October-November 1973. Storr made two sightings in Gairdner Range in March 1964 and May 1965. Serventy recorded 5 at Padbury farm in August 1954. Pair feeding young in nest 15 m from ground in *Eucalyptus wandoo* tree on dissected plateau on 25 October 1973; juvenile, just flying, along Cockleshell Gully on 25 October 1973.

White-browed Babbler (*Pomatostomus superciliosus*)

Scarce. Shrubland. One very shy bird in *Acacia rostellifera* — *Melaleuca huegillii* thickets near Padbury farm on 29 May 1974.

Little Grassbird (*Megalurus gramineus*)

Uncommon. Dense Tall Sedges. Several in *Juncus maritimus* on edge of

saltlakes in May 1974, several in *J. maritimus* and *Typha* sp. at Eatha Spring in November 1973. Seen and heard by Storr in *Gahnia* beds on Lake Leeman in March 1964. Present in *Nitraria* overgrown with *Zygophyllum* on Sandland Island in October and December 1961 and July 1962 (Ford, 1965a).

Brown Songlark (*Cinclorhamphus cruralis*)

Scarce. Open Low Grass (paddocks). Pair 4 km south of Stockyard Gully on 28 May 1974, male displaying and singing.

Splendid Blue Wren (*Malurus splendens*)

Common. Dense Thickets, Thickets, Dense Heath A, and Heath A. Mainly in valleys of dissected plateau, along Cockleshell Gully and low-lying areas in vicinity of saltlakes.

Nest with 3 young along creek 3 km southwest of Padbury Farm on 2 November 1973, juveniles being fed along creek east of Mt Peron on 28 October 1973.

White-winged Wren (*Malurus leucopterus*)

Very common. Heath and shrubland. Very common in heath ranging from less than 0.5 m tall on beach dunes and samphire flats to 1.5 m tall on limestone and on laterites in dissected plateau. Less plentiful in shrubland above 2 m tall.

Variegated Wren (*Malurus lamberti*)

Common. Shrubland and heath taller than 1.5 m. Common in dense vegetation along streams particularly in *Acacia* spp., *Calothamnus quadrifidus*, *Hibiscus* sp., *Melaleuca* spp. and *Eucalyptus calophylla* and *E. rudis* regrowth. Less frequent in heath 1.5-2 m tall, particularly in presence of an overstorey of Open Low Woodland A (*E. calophylla*).

Blue-breasted Wren (*Malurus pulcherrimus*)

Status unknown. Heath A with tree emergents. Only definitely identified once in patch of *Eucalyptus todtiana* suckers near base of Mt Lesueur in October 1973. Many birds in eclipse plumage in May 1974 could not be positively identified. They were either *M. pulcherrimus* or *M. lamberti*.

Specimens in the Western Australian Museum have been collected at Cockleshell Gully, the mouth of the Hill River, Cliff Head and Namban River. This species possibly inhabits areas with lush vegetation.

Southern Emu-wren (*Stipiturus malachurus*)

Not seen by us but probably widespread in heath. Recorded near Sandy Point by Sandland (1931) and on slopes of Mt Lesueur by Storr in March 1964.

Western Warbler (*Gerygone fusca*)

Uncommon. Low Woodland A (eucalypts only). Single birds or pairs totalling 9 in *Eucalyptus wandoo* on dissected plateau and in *E. rudis* — *E. calophylla* along Cockleshell Gully in May 1974. Six pairs and two single birds along Cockleshell Gully and a few single birds in *E. wandoo* in October-November 1973. Recorded in eucalypt woodland by Serventy in August and September 1954. Storr recorded it in eucalypts in March 1959 and 1964.

Broad-tailed Thornbill (*Acanthiza pusilla apicalis*)

Common. Heath greater than 1.5 m tall, shrubland greater than 2 m tall, and Low Woodland A. Probably resident, recorded in May 1974, October-November 1973 and December 1971.

Western Thornbill (*Acanthiza inornata*)

Uncommon. Low Woodland A with understory of Thickets, Scrub, Heath A, or Low Scrub A. Groups of up to five birds in May 1974 and October-November 1973 in *Eucalyptus wandoo* — *E. accedens* and *E. calophylla* woodland. Most northerly sightings were along tributaries of Cockleshell Gully immediately east of Mt Peron. Storr recorded birds at Munbinea Creek, Cockleshell Gully and Mintaja Hills in March 1964.

Serventy & Whittell (1962) give the northern limits of range as Moora. Ford (1965b) noted it along Cockleshell Gully and its tributaries east of Mt Peron which induced Serventy & Whittell (1967) to revise its distribution.

Yellow-tailed Thornbill (*Acanthiza chrysorrhoa*)

Locally common. Low Woodland A. Common in *Casuarina obesa* on fringes of saltlakes, less common in *Eucalyptus wandoo* — *E. accedens* on dissected plateau, and in *E. rudis* — *E. calophylla* along Cockleshell Gully. Recorded in March 1975, May 1974, October-November 1973 and November 1975.

Pair feeding young in *E. wandoo* woodland on 23 October. Nest containing young in *C. obesa* at edge of Eatha Spring on 4 November 1973.

Spotted Scrub-wren (*Sericornis maculatus*)

Common. Shrubland and heath more than 1 m tall. Throughout coastal dunes, limestone shrublands, and gullies in dissected plateau especially in dense creekside vegetation of *Calothamnus quadrifidus*, *Viminaria juncea*, *Melaleuca raphiophylla* and *Acacia alata*. Particularly common in coastal thickets of *Acacia rostellifera*.

Weebill (*Smicrornis brevirostris*)

Uncommon. Low Woodland A (eucalypts only). Six sightings of up to 6 birds in *Eucalyptus calophylla* and *E. rudis* along Cockleshell Gully and in

E. wandoo — *E. accedens* on dissected plateau in May 1974 and similar sightings in October 1973. Birds calling at Cockleshell Gully in October 1972 and December 1973.

Pair building nest in *E. wandoo* tree 13 m from ground on 26 October.

Field Wren (*Calamanthus fuliginosus*)

Common. Heaths between 0.5 and 1.5 m tall. Especially common in heaths between 0.5 and 1 m tall on plateau laterites. Recorded but not plentiful in samphires on edges of saltlakes. Not recorded in heath on coastal dunes.

Pair feeding 2 young in heath on slopes of Mt Peron on 25 October 1973.

White-fronted Chat (*Epthianura albifrons*)

Uncommon. Dwarf Scrub D (Samphires) and Open Low Grass (paddocks). Several in paddocks in May 1974, several flocks of up to 8 birds in samphires in November 1973.

Scarlet Robin (*Petroica multicolor*)

Uncommon. Low Woodland A. Several pairs in Low Woodland A (*Eucalyptus calophylla*, *E. rudis* and *E. wandoo*) along Cockleshell Gully and its tributaries. Recorded by us in May 1974 and October 1973, by Serventy in August 1954 and by Storr in March 1964.

Cockleshell Gully is the northernmost locality for this species (Serventy & Whittell, 1967).

Red-capped Robin (*Petroica goodenovii*)

Uncommon. Low Woodland A and shrubland. In *Casuarina obesa* and *Melaleuca cardiophylla* fringing saltlakes and at edges of *Acacia rostellifera* clumps on exposed limestone. Recorded each time these areas were visited.

Hooded Robin (*Petroica cucullata*)

Scarce. Dwarf Scrub D (samphires). A female seen in November 1973.

White-breasted Robin (*Eopsaltria georgiana*)

Moderately common. Shrubland and Low Woodland A. Common under clumps of *Acacia rostellifera* particularly where aeolianite limestone is exposed. Uncommon in *Casuarina obesa* and *Melaleuca cardiophylla* woodland on fringes of saltlakes. Calling prominently at dawn in mid-May 1974 in period of territorial fighting. Recorded by Storr at 'Three Springs' in March 1964 and at Cockleshell Gully in March 1959.

Grey Fantail (*Rhipidura fuliginosa*)

Seasonally common. All vegetation except heath less than 1 m tall.

Common in May 1974, not recorded in September-October 1974. Recorded along Cockleshell Gully by Serventy in August and September 1954.

Willie Wagtail (*Rhipidura leucophrys*)

Moderately common. Edges of saltlakes, freshwater lakes, farm dams, open areas among *Acacia rostellifera* clumps on aeolianite limestone and at Green Head settlement. Single birds or pairs totalled 13 in May 1974 and 15 in October-November 1973. Single birds or pairs recorded at Green Head in February 1971, March 1975, June 1973, October 1971, 1973, November 1973, 1974 and December 1971.

Ford (1965a) records it on Sandland Island.

Golden Whistler (*Pachycephala pectoralis*)

Uncommon. Shrubland and Low Woodland A. Several in *Acacia rostellifera* clumps in Spearwood Dune system, and a few in *Casuarina obesa* fringing saltlakes. Recorded in May 1974, October-November 1973 and by Serventy in September 1954. Storr recorded it in *Acacia* on Quindalup dunes near Sandy Point in March 1959.

Rufous Whistler (*Pachycephala rufiventris*)

Uncommon. Low Woodland A and shrubland. In *Casuarina obesa* fringing saltlakes, *Eucalyptus wandoo* — *E. accedens* on dissected plateau, *E. calophylla* — *E. rudis* along Cockleshell Gully, open areas among *Acacia rostellifera* clumps on exposed aeolianite limestone, and in *Banksia littoralis* swamps. Recorded in May 1974, October 1972, 1973, November 1973 and December 1971, 1973. Recorded at Padbury farm by Serventy in September 1954 and by Storr in March 1964.

Western Shrike-thrush (*Colluricincla rufiventris*)

Uncommon. Similar status to Rufous Whistler and in same areas. Recorded during May 1973, 1974, October 1973, November 1973, December 1971, 1973, and by Storr in March 1959 and May 1965 and by Serventy in September 1954.

Mistletoe-bird (*Dicaeum hirundinaceum*)

Uncommon. Low Woodland A. Mainly at saltlakes in vicinity of *Casuarina obesa* and occasionally in *Eucalyptus wandoo* on dissected plateau. Recorded in March 1975, May 1974, October 1973 and November 1973 and by Storr in March 1959.

Feeding on berries of *Amyema linophyllum* subsp. *linophyllum* in May.

Red-tipped Pardalote (*Pardalotus striatus substriatus*)

Uncommon. Low Woodland A, or migrating. Five sightings of up to 4

birds in May; these were mobile flocks, giving migratory calls and probably moving in a northerly direction. A few in *Eucalyptus wandoo* on dissected plateau and in *E. calophylla* along Cockleshell Gully in October 1973. Recorded by Storr in March 1959, 1964 and May 1965 and by Serventy in August and September 1954.

Western Silvereve (Zosterops lateralis gouldii)

Common. All plant formations except Samphires. Recorded in March 1975, April 1972, May 1974, October 1972, 1973, November 1973 and December 1971. Pairs and groups of up to 10 birds on North Fisherman Island in January 1973, March 1973, April 1971, 1972, May 1973, June 1973, October 1972, 1974, and December 1972. Recorded by Storr in March 1959 and by Serventy in August and September 1954.

Flocks over the sea, flying between North Fisherman Island and the mainland.

Nest with 3 young in creekside thickets east of Mt Peron on 28 October 1973. Nest with 3 eggs in *Banksia littoralis* — *Melaleuca preissiana* swamp south of Padbury farm on 4 November 1973. Old nest on North Fisherman Island in January 1973.

Brown Honeyeater (Lichmera indistincta)

Locally common. Low Woodland A, Low Woodland B, shrubland and heaths. Common in *Adenanthos cygnorum* heath near Mt Peron and Mt Lesueur and in creekside vegetation in dissected plateau; less common in *Acacia rostellifera* shrubland and flowering *Banksia* south of Padbury farm in May 1974. Very common in October-November 1973 in same areas as May 1974. Not recorded in coastal heaths. Serventy found it common at Stockyard Gully, Cockleshell Gully and Mt Lesueur in August and September 1954. Storr recorded several in flowering *E. calophylla* in the Gairdner Range and at 'Three Springs' in March 1964.

Feeding on flowers of *Melaleuca raphiophylla* along creeks, and in flowering *Eucalyptus drummondii*, *Banksia menziesii*, *B. attenuata* and *B. prionotes* in heaths in October.

Nest with 2 eggs in creekside vegetation along Cockleshell Gully on 29 October 1973.

Singing Honeyeater (Meliphaga virescens)

Uncommon. All plant formations. Two near beach at Green Head in February 1971, 2 at Green Head township in March 1974, 1 in *Acacia rostellifera* at Green Head in March 1975 and 1 in April 1971; single birds or pairs totalling 10 in *Casuarina obesa* on edges of saltlakes, in mobile dunes, at Green Head, along Cockleshell Gully and in heath with *Eucalyptus*

calophylla emergents in May 1974, 3 at Green Head in June 1973, 2 at Green Head in October 1971, 5 single birds in October-November 1973 in same areas as in May 1974, single birds at Green Head and Cockleshell Gully in November 1973 and 1974 and December 1971. Recorded by Storr in coastal dunes at Sandy Point in March 1959 and at Cockleshell Gully in March 1964.

Brown-headed Honeyeater (*Melithreptus brevirostris*)

Scarce. Low Woodland A. Pair feeding newly-flying young in *Eucalyptus wandoo* on dissected plateau east of Mt Peron on 28 October 1973.

Western Spinebill (*Acanthorhynchus superciliosus*)

Scarce. Creekside vegetation. Four pairs along Cockleshell Gully in May 1974; 3 feeding on flowers of *Melaleuca raphiophylla* along Cockleshell Gully in October 1973. Recorded by Serventy at Padbury farm in August 1954 and by Storr in *Banksia* near Cockleshell Gully in March 1964. Ford (1965b) recorded it in *Banksia menziesii* — *Eucalyptus todtiana* sandplain near Cockleshell Gully; Cockleshell Gully is the northern limit of this species (Serventy & Whittell, 1967).

Tawny-crowned Honeyeater (*Phylidonyris melanops*)

Common. Heath below 1.5 m tall. Recorded in May 1974, October-November 1973, August 1954 (Serventy) and March 1964 (Storr).

Three nests, each with 2 eggs in unnamed species of *Dryandra* on 24, 27 and 28 October; nest with 2 eggs in *Eremaea violacea* on 2 November; nest with 2 chicks in *Casuarina humilus* on 28 October. Young still being fed on 25 October. Serventy found a nest with 2 eggs on top of Mt Lesueur on 12 August 1954.

White-cheeked Honeyeater (*Phylidonyris niger*)

Locally common. Low Scrub A and Open Low Scrub A over heaths of varying densities. Only seen where *Adenanthos cygnorum* constituted most of the upper stratum. Recorded in May 1974 and 1976 and October 1973.

Pair giving 'broken-wing' decoy display on 23 October. Young scarcely able to fly on 22 October.

Feeding on flowers of *Banksia attenuata* and *B. menziesii* in October and *B. menziesii* in May.

Red Wattle-bird (*Anthochaera carunculata*)

Uncommon, probably seasonal. Highly mobile in most vegetation types. Small groups of up to 5 birds in all wooded areas in May 1974 and October-November 1973; 1 at Green Head settlement in October 1971, 2 at Cockle-

shell Gully in November 1973, 2 in *Casuarina obesa* near Eatha Spring in December 1971. Recorded by Storr in March 1959, 1964 and by Serventy in August and September 1954. Feeding on flowers of *Banksia menziesii* in May and October.

Little Wattle-bird (*Anthochaera chrysoptera*)

Uncommon. Low Woodland B. Four in flowering *Banksia prionotes* in May 1974, several in flowering *B. menziesii* in October-November 1973.

Spiny-cheeked Honeyeater (*Acanthagenys rufogularis*)

Scarce. Shrubland. Several in *Acacia rostellifera* on limestone in May 1974.

Yellow-throated Miner (*Manorina flavigula*)

Scarce. Low Woodland B. Two in *Banksia* sp. 9 km south of Cockleshell Gully in October 1972.

Magpie-lark (*Grallina cyanoleuca*)

Scarce. Farm dams and towns. Three at dam on Padbury farm in May; 1 at dam 10 km northeast of Mt Peron and 1 at Jurien in October. One around Green Head in December 1973. Storr recorded 2 near Stockyard Gully in March 1964. Serventy recorded an old nest at saltlake near Padbury farm in September 1954 and several old nests and 1 with 4 eggs near Hastings Cave on 4 September 1954.

Dusky Wood-swallow (*Artamus cyanopterus*)

Scarce. Aerial. Five flying south over upper reaches of Cockleshell Gully in May 1974.

Black-faced Wood-swallow (*Artamus cinereus*)

Uncommon. Heath and saltlakes. Five in heath near Padbury farm in May 1974 and 2 in October and November 1973, 4 in heath on slopes of Mt Lesueur in October 1973, one on edge of saltlake in November 1973 and flocks of up to 30 birds there in May 1976 and December 1971.

Grey Currawong (*Strepera versicolor*)

Scarce. Low Woodland A. Pair in *Eucalyptus accedens* 5 km east of Mt Peron in May 1974. Storr recorded birds in the Mintaja Hills in March 1964.

Grey Butcher-bird (*Cracticus torquatus*)

Uncommon. Low Woodland A and shrubland. Single birds in *Casuarina obesa* on fringes of saltlakes, *Acacia rostellifera* shrubland on limestone and *Eucalyptus calophylla* — *E. rudis* along Cockleshell Gully. Recorded in March 1975, May 1974, October 1973, November 1973 and December 1971 and by Storr in March 1959 and 1964 and by Serventy in September 1954.

Pied Butcher-bird (*Cracticus nigrogularis*)

Scarce. Low Woodland A and farm paddocks. In *Casuarina obesa* fringes of saltlakes, *Eucalyptus wandoo* east of Mt Peron and in paddocks near Stockyard Gully. Recorded in May 1974 and October-November 1973 and by Storr in March 1964 and May 1965 and by Serventy in September 1954.

Western Magpie (*Cracticus tibicen dorsalis*)

Uncommon. flocks of up to 10 birds. Cleared areas and edges of saltlakes. In samphire margins of saltlakes, Green Head airstrip and farm paddocks towards Stockyard Gully. Recorded in May 1974, 1976, October 1973, November 1973 and December 1971. Recorded by Storr in March 1959, 1964 and May 1965 and by Serventy in August and September 1954. Nest with 3 young in eucalypts at Padbury farm noted by Serventy on 3 September.

Australian Raven (*Corvus coronoides*)

Moderately common. Low Woodland A, townships and farm country. Occasional birds in *Eucalyptus wandoo* — *E. accedens* on dissected plateau, in *E. calophylla* — *E. rudis* along Cockleshell Gully, in *Casuarina obesa* on edges of saltlakes and in farmland towards Stockyard Gully. About 30 birds usually present at Green Head rubbish tip and flock of 20 at Eatha Spring in May 1976. One on North Fisherman Island in March 1975.

Young flew from nest in *C. obesa* on edge of saltlakes on 3 October 1970. Nest with 4 addled eggs on cliffs at Green Head on 6 September 1976 (K. Griffiths, pers. comm.).

Little Crow (*Corvus bennetti*)

Scarce, passage migrant. Fifteen flying southwest over Mt Peron on 23 October 1973 and about 30 over saltlakes on 7 October. Birds, probably of this species, recorded at Green Head, including rubbish tip, and at saltlakes on four occasions in December 1971.

DISCUSSION

A total of 146 species of birds have been recorded from the area covered by this paper. These comprise 94 non-passerine and 52 passerine species. This total is compared to 124 species at Cape Le Grand National Park (Dell, 1975) and 239 species for the Swan River District (Serventy, 1948). Serventy's list, however, contains a great many sea-bird storm-derelicts, numerous waterfowl and a number of vagrants. When we also take into

account that Serventy's list is based on over 100 years of recording by a large number of resident ornithologists, and that we spent only a limited time in our area, we can appreciate the richness of the Cockleshell Gully area avifauna.

Except for a few species like the Red-eared Firetail (*Emblema oculatum*), Red-winged Wren (*Malurus elegans*) and Yellow-winged Honeyeater (*Phylidonyris novaehollandiae*), the Cockleshell Gully area includes most of the resident passerine birds recorded by Serventy in the Swan River district. Not only do they occur in the Cockleshell Gully area but they are in far larger numbers than are now present in the heavily populated part of the coastal plain further south. Because the Cockleshell Gully area is relatively undisturbed by clearing or mining it is of considerable importance in maintaining large breeding populations of birds; and, from the viewpoint of number of species and individuals, could be the most important portion of the Southwest for conserving coastal passerine birds.

The area is very rich in heath-dwelling species. The genus *Malurus* is represented by four species, and the genera *Stipiturus*, *Sericornis*, *Calamanthus* and *Acanthiza* are present. The central-west coast is probably the only area where the four *Malurus* occur sympatrically in the same heath formations; at least three of them are common in the heaths at Cockleshell Gully.

Since the expansion of two tropical terns—the Bridled (*Sterna anaethetus*) and Roseate (*S. dougallii*)—into south-western Australia (Storr and Ford, 1962), coastal limestone islands from the Abrolhos south to about Mandurah have become important breeding areas for these species as well as other seabirds. The islands in the area covered by this paper, especially the Fisherman Islands, are particularly important because they are relatively undisturbed and are not close to main population centres such as Geraldton or Perth. Compared to other islands including the Abrolhos, Rottnest, etc., they receive little disturbance from tourists and fishermen.

Nine species of sea-birds and waders breed on the Fisherman Islands. Numbers of breeding pairs are given by Johnstone (in press a and b) and in this paper. The Pied Cormorant (*Phalacrocorax varius*), Roseate Tern, Bridled Tern and White-faced Storm Petrel (*Pelagodroma marina*) are the most important, each having fairly large breeding populations.

The Osprey (*Pandion haliaetus*) breeds mainly on islands, several nests were located on islands in this area. Pied Oystercatchers (*Haematopus ostralegus*) probably breed on several of the islands and move to the mainland in the non-breeding season. Rock Parrots (*Neophema petrophila*) breed frequently on the Fisherman Islands. It is likely that they do most of

their feeding on the adjacent mainland; therefore, it is important to have a long stretch of uninhabited coastland adjacent to breeding islands.

Beaches near Green Head are probably important as resting areas for migratory waders. Many of the beaches further south are used extensively for human recreation and birds suffer much disturbance. Both the Sanderling (*Calidris alba*) and the Turnstone (*Arenaria interpres*) frequent sea beaches but are rarely found in riverine and lakeside situations.

The saltlakes north of Jurien Bay are important summer refuges for several species for waterfowl. The Mountain Duck (*Tadorna tadornoides*) is common on these saltlakes in summer and breeds at Cockleshell Gully. The Grey Teal (*Anas gibberifrons*) is also common in summer, particularly on Lake Leeman. Black Swans (*Cygnus atratus*) are moderately common and breed in the fringing samphires.

The Banded Stilt (*Cladorhynchus leucocephalus*) is sometimes very common on Lake Leeman. For example in March 1964, there were flocks of about 4,700 birds almost all of which were juveniles.

Freshwater springs flowing into saltlakes provide important feeding areas for Black Duck (*Anas superciliosa*), Spotted Crake (*Porzana fluminea*), Black-fronted Dotterel (*Charadrius melanops*), Sharp-tailed Sandpiper (*Calidris acuminata*) and Little Grassbird (*Megalurus gramineus*). Usually these springs have areas of *Juncus maritimus* and *Typha* sp. where Spotted Crakes and probably Little Grassbirds breed. Eatha Spring flowing into the saltlakes east of Green Head and the springs of Lake Leeman are noteworthy examples of freshwater habitat.

The Cockleshell Gully area is important zoogeographically. It is an area where three major botanical districts meet (Gardner and Bennetts, 1956) and has several species of bird at the limit of their range. Three south-west Bassian species, Scarlet Robin (*Petroica multicolor*), Western Thornbill (*Acanthiza inornata*) and Western Spinebill (*Acanthorhynchus superciliosus*) are not found more than a few kilometres north of Cockleshell Gully. Their distributions terminate near the northern end of the continuous distribution of several south-western species of plants including Marri (*Eucalyptus calophylla*), *Viminaria juncea* and *Banksia littoralis*. Although these and other species of plants associated with their ecosystems, may extend further north, we believe their distributions are too broken to afford sufficient habitat for the birds mentioned.

The woodland in the Cockleshell Gully area is mainly Low Woodland A. Along Cockleshell Gully it consists of *Eucalyptus calophylla* and *E. rudis*, on the dissected plateau of the Gairdner Range it is *E. calophylla*, *E. wandoo* and *E. accedens* and along the edges of the saltlakes it is *Casuarina obesa*.

The Port Lincoln Parrot (*Platycercus zonarius*), Yellow-tailed Thornbill *Acanthiza chrysorrhoa*, and Mistletoe-bird (*Dicaeum hirundinaceum*) inhabit Low Woodland A irrespective of the genus of the dominant stratum. The Western Thornbill (*A. inornata*), Scarlet Robin (*Petroica multicolor*), Western Warbler (*Gerygone fusca*) and Weebill (*Smicrornis brevirostris*) only inhabit Low Woodland A if the dominant stratum consists of eucalypts.

Thirty-seven of the 146 species have been recorded as breeding in the area covered by this paper. In all probability most of the land-birds are resident and breed here. Of the 37 breeding species, 12 breed on islands in the area and the remainder breed on the mainland. Only 5 species of waterbirds have so far been found breeding.

Little can be said yet about breeding seasons except that most species breed in spring and early summer. An exception is the Welcome Swallow (*Hirundo neoxena*) which breeds in May, September and October.

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Plate 8. Heath on sand (Coastal Belt)