CONSERVATION VALUES OF ISLANDS IN EXMOUTH GULF

A Preliminary Report by A.N. Start and N.L. McKenzie.
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Introduction

There are three groups of islands in Exmouth Gulf. In this paper they will be referred to as the Doole Group, the Simpson Group and the Y Group (Map 1). Some of the islands have official names; some do not. Names applied to the latter for convenience by CALM scientists are used in inverted commas.

There are also several small isolated islets such as Whalebone and Islam Islands.

CALM scientists have briefly surveyed five of the six islands in the Doole Group, all of the Simpson Group, but, as yet, none of the Y Group or singletons. Birds, mammals and reptiles recorded during the surveys have been identified but some plant specimens await identification. Nevertheless there is enough data on the two surveyed groups to demonstrate that they have important conservation values and biogeographical significance. Whilst many of the islands share physiographic units and many associated plants and animals, each is, in one way or another, unique.

Doole Group

The Doole group consists of six islands at the southern end of the Gulf. The group is named for Doole Island which is the largest of the five islands that are permanently isolated from the mainland by sea, even at low tide. One Island, "Sandalwood" is connected to the mainland by mud flats except at high tides. The Islands are:-

Island	Always isolated	Visited	Pit traps
Doole	yes	yes	yes
Roberts	yes	yes	yes
Whitmore	yes	no	no
"North"	yes	yes	no
"South"	yes	yes	no
"Sandalwood"	no	yes	yes

Doole Island, about 2km off shore, is approximately 5km by 0.5km with a north-south axis. It is the largest of the completely isolated islands. The surrounding sea is shallow, often less than a meter deep at low tide, but deeper channels maintain its isolation. The adjacent sea bed is muddy.

There is no evidence of recent fire. There are only two minor occurrences of exotic plants. There is no apparent history of grazing by sheep and there are no feral animals on the island.

Wildlife is diverse with records of 95 species plants from 34 families, 40 species of birds and 13 species of reptile. There are no mammals. (Appendix)

Land units include;

1. An exposed inter-tidal rock platform that runs the length of the east coast supporting mangal (typically mature *Avicennia marina*. The mangal is usually a fringe but there are some patches of several hectares.

2. Sheltered inter-tidal shorelines behind (i) supporting other mangrove species, particularly *Rhzophora stylosa* and, behind the mangal, a variety of samphires.
3. Unstable, exposed beaches and beach ridges composed of course sand of shell fragments with many larger shell and coral pieces. It is best developed along the west shore where it supports low shrubs, typically *Acacia bivenosa* and *Myoporum* insulare over large tussocks of the beach spinifex *Spinifex longifo Jius*. Ephemerals such as *Euphorbia* spp. and the yellow daisy, *Senecio lautus* are common after rain.
4. Stable, inland ridges and swales paralleling the axis of the island and made of coarse lime-sand consisting of shell fragments with many larger shell and coral pieces, often overlaid by a layer to 0.5m of finer sand containing a high content of red silt which has probably been blown by wind to the island from the mainland. The vegetation is dominated by Triodia aff. *pungens* but it is diverse with many perennial shrub species as well as ephemeral herbs that appear after rain.
5. Solution and redeposition of lime has cemented older deposits to form limestones; some are exposed. Thus there is a low limestone break-away about lm high running the length of the east coast behind (ii).
6. Where the sand cover is thin on the more extensive ridges there are localised occurrences of shrubs such as *Acacia gregorii and Melaleuca* aff. *Cardiophylla.*
7. Near the centre of the island there is an area of small knolls made up of limestone blocks which supported some species found nowhere else on any of the islands. Eg *Calandrinia cardiophylla.*
8. On the north-east side, there is a relatively high hill of exposed limestone pavement which has been undercut and collapsed to form a small cliff above a scatter of boulders, now just above sea level and behind mangroves. The hill is capped by rock figs, *Ficus platypoda*, over which scrambles an unidentified parasitic dodder, Cassytha spp. Several other species that were not seen on any other islands were present on the cliff and boulder piles, including an unidentified mulla mulla *Ptilotus* spp.
9. In the centre of the island there is a flat of saline silt which supports a samphire community. It is connected to the east coast by a channel which now lies above normal high tides but which may allow ingress of sea water pushed up by storm surges. This area was probably a shallow lagoon during periods of higher sea level in the relatively recent past.

NOTE. Rocky sites are more extensive and varied on Doole than other islands in this group, (except Sandalwood) but many of the other units are typically found on other islands except

"South" Island. Accordingly descriptions of the others summarise salient points and omit a repetitive listing of units.

Roberts Island, 3 km north of Doole Island, is further off shore and situated in deeper water. It is half the size of Doole. The adjacent sea has a sandy bottom supporting patches of coral reef. Most of the land units found on Doole also occur on Roberts. The exceptions are exposed limestone surfaces. There is a saline flat but it is completely cut off from the sea by a sand ridge and has a different assemblage of halophytes on it.

The known biota of Roberts is less diverse than that of Doole (about 50 species of plant from 23 families, 35 birds and 6 reptiles) but some bird and plant species are not so far recorded on Doole. The most striking feature of the fauna of Roberts Island is the presence of the native rodent *Rattus tunneyi* which, south of the Kimberley, is now known only from Doole and Simpson islands in Exmouth Gulf, a few Pilbara islands and parts of the Shark Bay mainland; it used to be much more widespread, extending coastally nearly to Perth.

There are large predatory varanids on both islands. This is unusual for such small islands off the coast of W.A.

"North " Island to the west of Doole is about the same size as Roberts with a similar diversity of land units but some plants were recorded there that were not seen on other islands in the group. There is an interesting inter-tidal halophytic community behind mangroves on the north-west coast which was not seen on any of the other islands. The mangrove communities are notable for being considerably more extensive and both floristically and structurally more diverse than on any other islands in the group, except, perhaps "South" Island.

Also, like "South" Island it was surrounded by very extensive mud flats at low tide; indeed "North" and "South" may be connected to one another by inter-tidal mud flats at times.

These flats are ideal wader feeding grounds, frequented by large flocks of trans-equatorial migrants as well as adventurous residents of the mangal such as mangrove herons. Although we only spent a few hours there we recorded 20 bird species, all but one, singing honeyeater, being sea birds or mangrove specialists.

"South" Island is no more than a rock rising perhaps a meter above high tide and supporting a predominantly halophytic land flora surrounded by extensive and relatively complex mangal.

It has a near complete compliment of Pilbara mangrove birds (we did not see Mangrove Kingfishers here). Beyond the mangal, at low tide, huge expanses of mud flat provide foraging grounds for many waders. We recorded 23 bird species, (all waders, sea-birds or mangrove birds) in an hour or two.

"Sandalwood" Island is considerably larger than any of the off shore islands (6 km^2) The eastern part of its northern shore is fringed by mangal, mostly *Avicennia marina*. Further west this grades into a series of small beaches of shell grit and then a small break-away at the intersection of a limestone ridge and a submerged limestone platform. These sections front the open waters of the Gulf.

On its east and west sides it is separated from the mainland by large tidal channels, that on the west side running through very extensive mature, zoned mangal. This is the only site on

any of the Exmouth Gulf Islands at which we recorded Mangrove Kingfishers.

To the south the island is separated from the mainland by wide inter-tidal mud flats carrying extensive samphire. This side is easily crossed by feral animals including rabbits and, presumably, foxes, cats and mice. Nevertheless, in contrast to the adjacent mainland, its vegetation did not show the effects of frequent fire or of grazing by stock. Clearly the mud flats have provided effective shelter from some of the serious disturbers affecting this part of the State.

However its connection to the mainland and, possibly its size, are reflected by higher diversity of all the groups we surveyed. For example we caught two species of rodent, a dasyurid, two skinks, two geckos and an agamid that were not found on any of the islands. We did not record Rattus tunneyi on this or any other Gulf island that was connected to the mainland at low tide (see Appendix)

Simpson Group

The Simpson group consists of five islands on the eastern side of the Gulf. The group is named for Simpson Island which is the larger of the two islands that are permanently isolated from the mainland by sea, even at low tide. The islands are:-

Island	Always isolated	Visited by team	Pit traps
Simpson	yes	yes	yes
Burnside	no	yes	yes
"Dugong"	yes	yes	yes
Hope (Point)	no	yes	yes
Tent	no	yes	yes

Simpson Island has many of the units found on Doole. These include:

1. A fringe of *Avicennia marina* on an inter-tidal rock platform running the length of the east coast.
2. Patches of more extensive and more complex mangal (in a bay at the southern end of Simpson Island).
3. A small break-away running the length of the east coast just behind the fringing mangroves.
4. Unstable beach ridges of shell grit sand containing some larger shell sand coral fragments and supporting beach spinifex *Spinifex longifolius*, a variety of Euphorbia species, the beach daisy *Senecio lautus* and, near the crests, *Atriplex paludosa.*
5. Stable sand ridges and swales supporting sparse shrubs, commonly *Acacia bivenosa* or *Scaevola spinescens,* over dense hummock grass, *Triodia* aff. *pungens*.
6. Samphire on saline flats that were once lagoons.

Like Burnside, Simpson had sea cliffs running the entire length of its west coast. Wave action undercutting the cliffs had resulted in boulder piles below them. At the top large

blocks of limestone which had relatively recently broken loose created deep chasms. These cliffs produced ideal eastern reef egret breeding habitat and we found several old nests.

These cliffs were carved by the erosive action of waves from the open waters of the Gulf on north-south trending limestone ridges. The ridges were the cores of earlier dunes made of calcareous marine deposits that had been cemented by solution and redeposition of carbonates.

The crests of the ridges provide spectacular views of the islands and the "mangrove coastline" of the eastern side of the Gulf. They comprise pavements of limestone pocked by depressions and cracks which suffice to trap enough sandy soil to support halophytic, shrubs such as *Frankenia* aff. *pauciflora* and various chenopods. Whilst the back slopes carry little more soil, they are sheltered from salt-laden winds and support a much richer assemblage of plants dominated by

Perhaps the most significant feature of Simpson Island is the presence of two mammals. *Rattus tunneyi* is widespread, but at the time of our visit, much less abundant than it had been on Roberts Island in the Doole group. We usually caught one or two per night. The other mammal is the Euro *(Macropus robustus*). This is probably the smallest island supporting the species and, perhaps the smallest island supporting such a large macropod. This is of considerable interest.

Other significant organisms found on Simpson include a rare pigface previously known from Shark Bay. This supports evidence from other plants found on the Gulf islands that there is a disjunct biogeographical relationship between the two areas. A lumbricid earthworm lives in damp sand under mangrove litter near the landward margin of the mangrove fringe on the east coast. Although the species is well known from beaches elsewhere on the Indian Ocean rim, there are few previous Western Australian records, and none from north of Geraldton.

Dugong Island. The other permanently isolated island is "Dugong", just south of Simpson. "Dugong comprises an east- west, low rise of marine sand completely surrounded by mangal. The mangal on the south side is very extensive, much larger than the supra-tidal area of the island. Vegetation comprises an assemblage typical of beach ridges with several components of the back slopes and swales. *Spinifex* 2ongzfo2zus and Acacia bivenosa were typical but there was also a grass, as yet not identified, that we only recorded on this island. Mangrove birds were plentiful and included mangrove robins.

Burnside Island appeared from charts to be isolated but at very low tides it is connected by an extensive mud flat to mangrove forest on the mainland shore. Euro droppings were found but no animals were seen. However European house mice were trapped and fox tracks were

seen. It would seem that foxes and Euros can move between the mainland and the island at very low tide. The source of mice is more difficult to ascertain: Dutch gin bottles typical of those found in early pearlers' camps about Nickol Bay suggested European occupation about the turn of the century if not earlier and cement slabs, rusting iron and other rubbish in the center of the island is testament to later European occupation (Probably 2nd. World War; D. Bathgate pers. comm. to ANS 1992).

Burnside is the only island showing extensive disturbance to natural communities. Exotic buffel grass, *Cenchrus ciliaris* dominates much of the center of the island. Presumably it was introduced by the war-time occupants and spread in the wake of their disturbance; there was evidence of old fires on this island. The mice may also have been introduced by these early residents. Despite the disturbances Burnside still has a rich assemblage of naturally occurring plants; indeed it is improbable that any have been lost. The mangroves of Burnside Island included *Aegialitis annulata* and *Aegiceras corniculatum*, neither of which have previously been recorded west of the Cossack-Dampier area, in the Pilbara.

The mangroves on this island contained at least two species of the curious tropical air-breathing marine gastropods, family Ellobiidae as well as a rich assemblage of mangrove birds.

Tent Island is a large area of high sand ridges and swales, some of the latter being inundated by sea water to form *Avicennia*-lined lagoons. The sand is of marine origin. The island appears to terminate an inter-tidal, mangrove-clad peninsula about five km long that extends from the vast mangal and salt flats of the adjacent coast. We spent little time there but it was free of stock and appeared to be ungrazed.

There was no evidence of recent fire. However there were fox tracks and we caught house mice. Amongst the eight reptiles recorded there is one (*Ctenotus hanloni?*) that we did not capture on other islands.

"Hope Island" (Hope Point on the maps) is, like Tent, isolated from the mainland by vast tidal mangal and samphire flats. It is unique amongst the Gulf islands for having extensive aeolian, red sand dunes of desert origins as well as dunes of marine sand similar to those found on all the other islands.

Although there were foxes here, the island showed no sign of disturbance from other human activity. The red dunes supported several plant species not found on any of the other islands.

The Y Group.

There is as yet no biological data available on these islands. However, the richness of the other Gulf islands and the more pelagic situation of the group (as well as the isolated Whalebone and Islam Islands) suggests that they may also significant for conservation and possibly as sea bird rookeries.

1. The Gulf Islands are topographically and geologically diverse with inter-tidal mangal, samphire on saline flats, foredunes, beach ridges, hind dunes, swales, red sand dunes, breakaways, limestone pavements, ridges and sea cliffs
2. They support a rich and diverse array of plants and animals, typical of communities

in the Exmouth region.

3. Whilst there are many recurrent associations and some of the species are present on most if not all islands, each island has unique attributes.
4. Some islands are permanently isolated from the mainland by sea. Some of them have native mammals on them. One, Doole is probably a potential release site for other species threatened with extinction: Shark Bay mouse being one candidate.
5. Some islands are accessible to foxes and perhaps house mice at low tide. Nevertheless they are sheltered from fire and grazing stock. The presence of feral pigeons throughout the islands is alarming considering the problems they are causing on the islands of Cockburn Sound.
6. All the islands are in nearly pristine condition except Burnside and it is doubtful that any species have been lost from that one.
7. Almost all of the adjacent supra-tidal mainland has suffered severe degradation from a combination of post-colonial activities including fire and pastoral use.
8. There is a variety of mangrove communities from monospecific Avicenna fringes to clear zonation of relatively large and complex stands.
9. The complex mangrove communities are a particularly important feature. They include a variety of mangrove endemics (birds, bats and plants). One is an undescribed bat, *Mormopterus* sp. nov. (cf. M. loriae), endemic to Western Australia.
10. All specialised mangrove birds, bats and all species of mangrove plants (except *Osbornia octodonta* and a mangrove mistletoe) recorded south of the Kimberley occur on the Gulf islands.
11. There are no significant mangrove stands in any Pilbara/Gascoyne conservation reserves, despite the importance of mangal to the nutrition of biota in inshore waters.

Recommendations

1. For the above reasons it is important that all the Exmouth Gulf islands, and if possible a substantial section of the coastal system of mangal and samphire, be reserved for nature conservation. Most of the islands occur as integrated groups that complement one another. It is thus important that they be managed as such. Piecemeal reservation would result in significant loss of value particularly if some islands were to be alienated for land bases for fishing, mining or other activities.
2. The Science and Information Division of CALM is currently unable continue the Gulf island surveys and write up previous work. The DPUD planning study draft currently available for public comment includes virtually no information on the conservation values of Exmouth Gulf and its hinterland. If another interested department (e.g. DPUD or EPA) could contribute $10,000, CALM scientists would complete the survey and prepare a manuscript for publication within 12 months.

Vertebrates recorded on the Exmouth Gulf islands

DL Doole, Rb Roberts, Nt "North", St "South", Sa "Sandalwood, Si Simpson, Du "Dugong", Bu Burnside, Hp "Hope", Tn Tent

Mammals (* = exotic)	Doole Group					Simpson Group				
Island	DL	Rb	Nt	St	Sa	Si	Du	Bu	Hp	Tn
Mus musculus *								X		X
Notomys alexis					X					
Pseudomys hermannsburgensis					X	X			X	
Rattus tunneyi	X				?					
Oryctolagus cuniculus *					X					
Vulpes vulpes *								X	X	X
Chaerephon jobensis					X					
Mormopterus loriae					X		X			
Tadarida australis					X					
Nyctophilus arnhemensis					X			X		
Nyctophilus geoffroyi					X		X			
Macropus robustus						X		X	X	
Macropus spp										X
Sminthopsis macroura					X					

?=Arat, probably *Rattus tunneyi* seen 5 June 1978

NB: bats were not surveyed on most islands; the lists are certainly incomplete.

Reptiles (* = exotic)	Doole Group					Simpson Group				
Island	DL	Rb	Nt	St	Sa	Si	Du	Bu	Hp	Tn
Heteronotia binoei	X					X		X	X	X
Gehyra variegata	X	X				X	X	X		
Diplodactylus strophurus					X					
Diplodactylus stenodactylus					X					
Ctenotus saxatilis	X	X				X	X	X		X
Ctenotus hanloni?										X

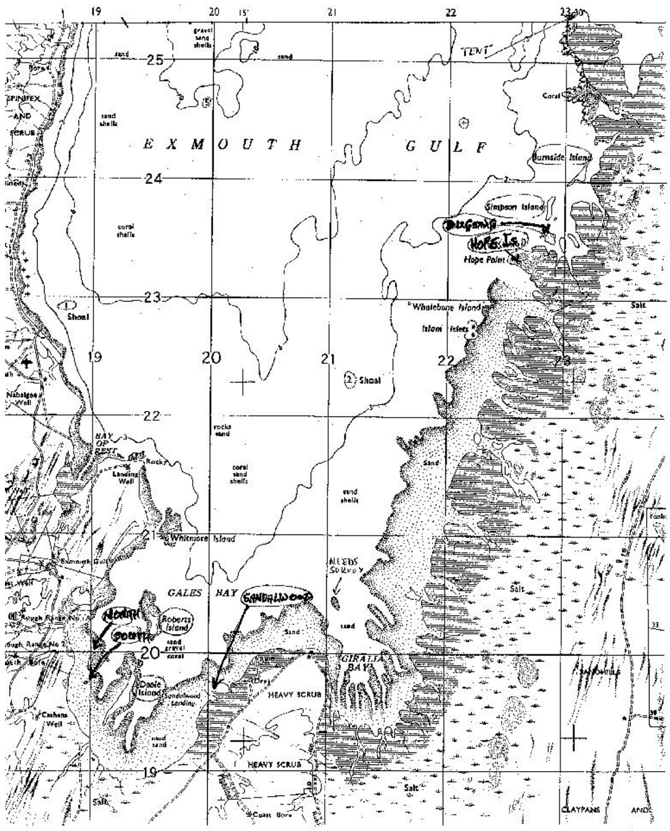
Eremoscincus fasciatus									X	
Lerista bipes	X				X	X		X	X	X
Lerista elegans	X								X	X
Lerista muelleri					X					
Lerista petersoni	X	X								
Menetia greyi	X									
Notoscincus ornatus	X									
Sphenomorphus isolepis	X	X				X	X	X		X
Gematophora gilberti	X	X		X		X	X	X	X	X
Pogona minor					X					
Delma tincta	X									
Varanus gouldii									X	
Varanus tristis						X				
Varanus spp.	X	X	X							
Python spp.	X									

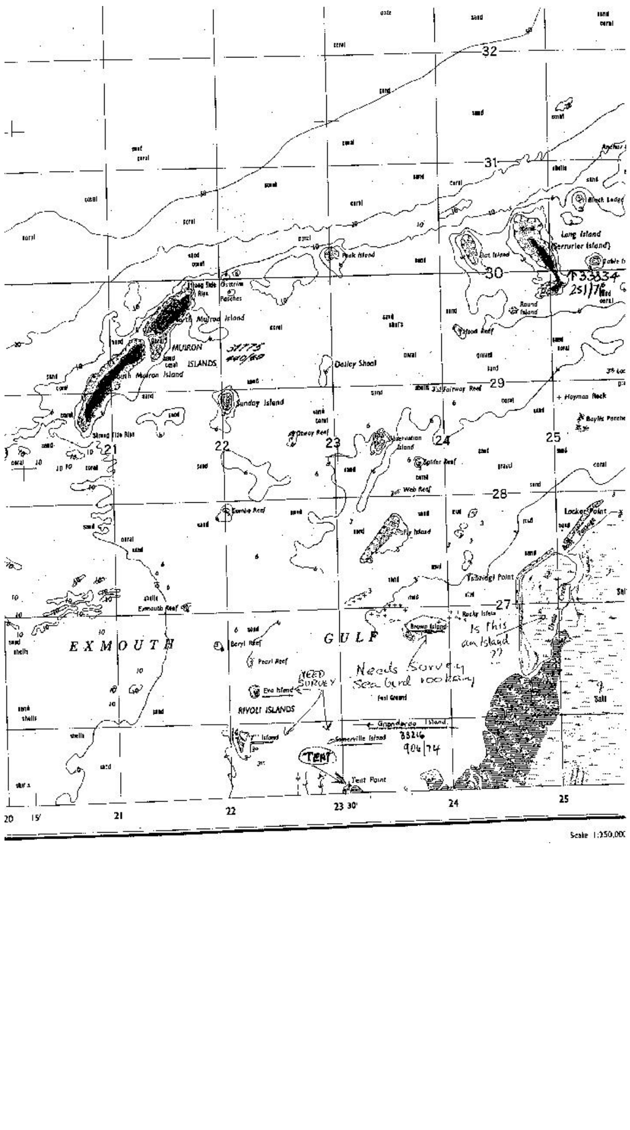
Birds (7 July 1992)	**Doole Group**					**Simpson Group**				
	Dl	**Rb**	**Nt**	**St**	**Sa**	**Si**	**Du**	**Bu**	**Hp**	**Tn**
Australian Bustard										
Australian Hobby						x			x	
Australian Kestrel	x	x			x	x		x		
Australian Magpie-lark										
Australian Pelican	x	x	x	x	x	x		x	x	
Bar-shouldered Dove	x				x	x		x		
Bartailed Godwit	x	x	x	x	x	x		x	x	x
Beach Thicknee		x				x		x	x	
Black Honeyeater	x				x	x	x	x	x	
Black-breasted Buzzard									x	
Black-faced Cuckoo-shrike	x									
Black-faced Woodswallow										

Black-necked Stork		x			x					
Black-shouldered Kite	x					x		x		
Brahminy Kite	x				x	x	x	x		
Bridled Tern										x
Brown Falcon									x	
Brown Goshawk						x				x
Brown Honeyeater	x				x	x	x	x	x	
Brown Quail						x		x	x	
Brown Songlark						x		x	x	x
Caspian Tern	x	x	x	x	x	x		x	x	x
Common Sandpiper	x	x			x			x		x
Corvid	x							x	x	x
Crested Bellbird										
Crested Pigeon										
Crested Tern		x	x			x		x	x	
Crimson Chat						x		x	x	x
Curlew Sandpiper		x	x	x						x
Dusky Gerygone		x	x	x	x	x	x	x	x	
Eastern Curlew	x		x	x	x					
Eastern Reef Egret	x	x	x	x		x		x	x	x
Fairy Martin	x			x						
Fairy Tern	x	x				x				
Galah								x		x
Great Egret										x
Great Knot	x	x		x		x		x	x	x
Greenshank	x	x		x					x	
Grey Fantail		x	x	x	x	x	x	x	x	
Grey Plover	x	x	x		x	x			x	
Grey Shrike-thrush						x				
Grey-tailed Tattler	x	x	x	x	x	x		x	x	x

Gull-billed Tern									x	x
Horsfield's Bronze-cuckoo						x	x	x	x	
Large Sand Plover	x	x		x		x			x	x
Lesser Crested Tern						x				
Little Button-Quail	x				x	x	x	x	x	
Little Corella	x					x		x	x	
Mangrove Golden Whistler						x	x	x		
Mangrove Heron	x	x		x	x	x		x	x	
Mangrove Kingfisher					x					
Mangrove Robin						x	x	x	x	
Mongolian Plover						x				
Orange Chat		x							x	
Osprey	x	x				x		x		x
Pied Butcherbird										
Pied Cormorant	x	x			x	x		x	x	
Pied Honeyeater									x	
Pied Oystercatcher	x	x	x	x	x	x		x	x	x
Pigeon (domestic)	x	x	x	x	x	x		x	x	
Rainbow Bee-eater							x	x		
Red-capped Plover	x	x		x	x	x		x	x	x
Red-capped Robin								x		
Red-necked Stint	x	x	x			x		x	x	x
Richard's Pipit	x	x			x	x		x	x	x
Roseate Tern					x	x				x
Ruddy Turnstone	x	x	x	x	x	x			x	x
Sacred Ibis						x				
Sacred Kingfisher						x		x	x	
Sharp-tailed Sandpiper		x				x		x		
Silver Gull	x	x		x	x	x		x	x	x
Singing Bushlark										

Singing Honeyeater	x	x	x		x	x	x	x	x	x
Sooty Oystercatcher	x	x				x				
Spotted Harrier						x		x	x	x
Terek Sandpiper			x	x				x		
Torresian Crow						x		x	x	
Tree Martin						x		x		
Variegated Fairy-wren					x					
Welcome Swallow						x	x	x	x	
Whimbrel			x	x	x					x
Whiskered Tern										x
White-bellied Sea-eagle	x	x			x	x	x	x	x	x
White-breasted Whistler	x						x	x	x	
White-breasted Woodswallow	x	x	x	x	x	x	x	x	x	x
White-faced Heron						x	x	x	x	x
White-plumed Honeyeater										
White-winged Fairy-wren					x		x		x	x
Willie Wagtail						x	x		x	x
Yellow Silvereye	x	x	x	x	x	x	x	x	x	x
Yellow-throated Miner										
Zebra Finch	x				x	x			x	
TOTALS	**41**	**36**	**21**	**24**	**35**	**59**	**20**	**52**	**52**	**35**


EXMOUTH GULF
TENT
Burnside Island
Simpson Island
DUGONG
HOPE IS.
Hope Point
Whalebone Island
Shoal
BAY OF REST
Whitmore Island
GALES BAY
SANDALWOOD
NEEDS SURVEY
NORTH
SOUTH
Roberts Island
Doole Island
Sandalwood Landing
HEAVY SCRUB
GIRALIA BAY
CLAYPANS


Long Island (Serrurier Island)
Round Island
MUIRON ISLANDS
Sunday Island
Daisy Shoal
Locker Point
Tubridgi Point
EXMOUTH
GULF
Is this an Island ??
Needs Survey Sea bird roosting
NEED SURVEY
RIVOLI ISLANDS
TENT
Tent Point
Scale 1:250,000