



A MILLION SEABIRDS

BY ANDREW BURBIDGE AND PHIL FULLER

Pelsaert Island, in the Houtman Abrolhos off Geraldton, has more species of breeding seabirds - and more individual seabirds - than any other island in Western Australia. Andrew Burbidge and Phil Fuller go there regularly to monitor this amazing avian spectacle.

The Houtman Abrolhos lie roughly 50-70 kilometres off the Western Australian coast near Geraldton. They are windswept, waterless places. They appear bleak, barren and inhospitable, at least to humans. Seabirds, however, find them very attractive and they support many nesting species, including tropical species not usually found so far south. The warm, off-shore, southerly-flowing Leeuwin Current leads to sea temperatures being markedly higher around the Abrolhos than inshore, explaining how an archipelago with a Mediterranean climate supports a predominantly tropical seabird fauna.

The islands were first sighted by the Dutch navigator Frederik Houtman in 1619. The name Houtman Abrolhos is probably derived from combining the names of the discoverer and a group of shoals off Brazil; the Portuguese word *abrolhos* is applied to 'spiked obstructions' - a fitting phrase for the coral reefs that lie in ambush just beneath the waves.

Interestingly, the Pelsaert Group in the southern Abrolhos was named in error. Pelsaert, the southernmost island of the group, was so called by the explorer J. Lort Stokes, who visited the Abrolhos in HMS *Beagle* in April 1840. He named the island after Francois Pelsaert, commander of the *Batavia*, which was wrecked in the Abrolhos in June 1629. The *Batavia* actually met its end on Morning Reef in the Wallabi Group, but for many years it was thought to have been wrecked in the southern part of the Abrolhos. In 1840 Stokes noted the beams



of a large vessel near Wreck Point, the southern tip of Pelsaert Island; as the same wreck was reported by the crew of the *Zeewijk*, itself wrecked on nearby Half Moon Reef in 1727, Stokes mistakenly presumed the beams to be the remains of the *Batavia*. The identity of the ship they belonged to is not known: the mysterious wreck has not been rediscovered.

Pelsaert Island is 12 km long but is very narrow (between 20 and 500 metres wide), and has an area of about 120 ha. Most of the island consists of coral boulders and shingle thrown up by the ocean waves. In some areas, notably at the southern end, there are accumulations of white sand, with a few low dunes. Low, undercut limestone cliffs are found near the southern tip and along the western and eastern shores and patches of mangroves are found in sheltered places. These different habitats meet the nesting requirements of a wide variety of seabird species.

COUNTING COLONIES

The first person to write of Pelsaert's seabirds was John Gilbert, who worked for the famous naturalist John Gould. He visited the island in 1843. Since then, many noted ornithologists (including

Prince Philip, Duke of Edinburgh, in 1963) have visited Pelsaert to see the birds.

We travel to Pelsaert on a patrol boat by courtesy of the Fisheries Department, or on a lobster boat kindly provided by John and Beth Fitzhardinge, and we camp in the ruins left behind by guano miners (see box). Our camp is away from the major seabird colonies to avoid disturbing them, but is often invaded by the large king skinks that live on the island.

We have been visiting Pelsaert regularly since 1977. Since 1986 we have been counting or estimating the numbers of all breeding species. A few species, such as the bridled tern, have nests that are very hard to find and accurate counts are not possible - in these cases we have to make an educated guess. Every nest in small, dense seabird colonies of up to a few hundred pairs, such as those of crested, roseate and fairy terns, can be counted without too much difficulty.

However, some species are so abundant that we have to make statistically valid estimates, based on sampling. In the case of shearwaters, sooty terns and common noddies we use a procedure developed by CALM scientist David Ward, which he has named the 'triangular tessellation method'. This involves picking sample points scattered throughout a colony, finding the three nests that circumscribe a triangle around the point and measuring the length of the sides of that triangle. We then punch the figures into a hand-held computer, which calculates the area of the triangle and



Previous page: Crested terns rise from their nests on a patch of sandy soil on Pelsaert.

Photo - Michael Morcombe

Ruined guano-loading jetty, a relic of mining during World War II.

Photo - Bert Wells ◀

Common noddies are found in most tropical oceans but nest only on islands.

Photo - Andrew Burbidge ▶

A young osprey, almost ready to fly, rears up to try and frighten an intruder.

Photo - Andrew Burbidge ▶▶

On the mainland, fairy terns nest on beaches, but on Pelsaert they nest among coral rocks.

Photo - Bert Wells ▶▶▶

from it the number of nests per hectare. The area of the colony is worked out by plotting its boundaries onto an air photograph of known scale. Because of fluctuating densities, many samples are needed to get a good estimate.

Lesser noddy numbers can not be estimated using this method, because their nests occur in three dimensions and one nest may be immediately over another. Instead, we use a different sampling method involving counting every nest in many sample 'quadrats' - measured areas of 20 square metres. This is no fun since it involves crawling through muddy, dense and tangled mangrove thickets with bird droppings raining from above! The seabirds on Pelsaert are very tame and if we are careful when we walk (or crawl) though the colonies our movements have no effect on them.

Why bother to count the nests? The aim is to detect any long-term fluctuations in numbers. Concern has been expressed that there could be negative effects on seabird numbers in the future, for example from excessive catches of the small fish (such as pilchards) that they feed on - in the eastern Pacific Ocean seabird numbers have crashed following the collapse of the pilchard population there from over-fishing - or perhaps from the effects of a rise in sea level. Another concern is that the world-wide reduction in tuna numbers, also caused by over-fishing, might affect seabirds because tuna may herd shoals of pilchards and other small fish to the surface when they are feeding. Along our



coast it is common to see seabirds feeding on schools of fish brought to the surface by tuna and other predators.

CHOICE OF THE FAMILY HOME

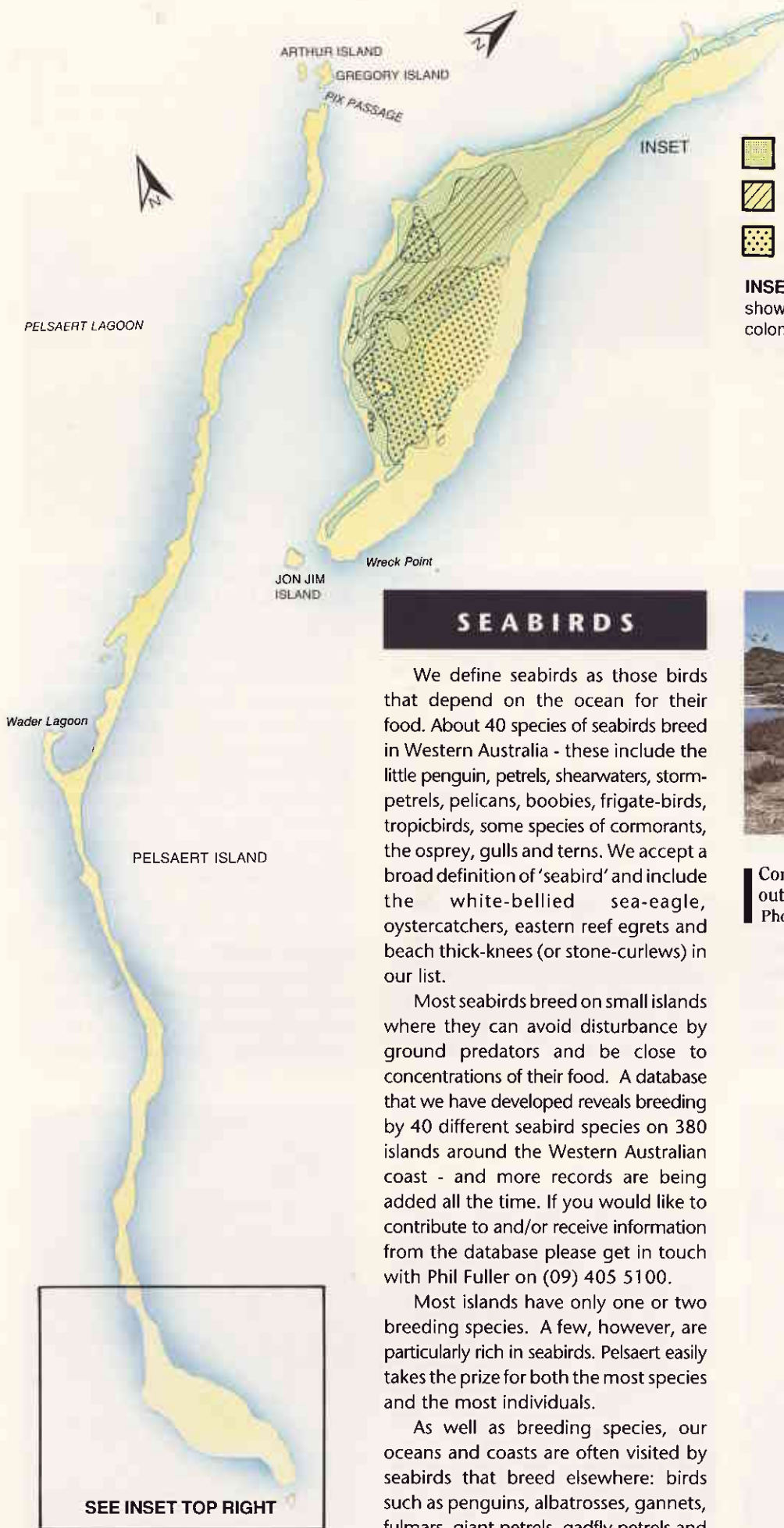
Eighteen species of seabird nest on Pelsaert Island and a further one on an adjacent islet (see box). With a total of over 400 000 nests during an average summer, well over a million birds would be resident, either building nests, incubating eggs, feeding young, being fed by their parents or just feeding themselves from the adjacent ocean.

Each seabird species has different requirements for a nest site. On Pelsaert, crested terns nest on sand in the open while roseate and fairy terns lay their eggs on small stones among coral rock.




Bridled terns like a roof over their heads and lay under overhanging cliffs, low mangrove trees or even under a large slab of coral. (On some Abrolhos islands they nest under lobster fishermen's huts.) Ospreys build large structures of sticks (which also include plastic and other flotsam); the same nest can be used by generations of birds and grow to over 1.8 metres tall. Sea-eagles build low stick nests or sometimes use an old osprey nest. Shearwaters dig burrows. Noddies like a room with a view - common noddies often place their nests on low shrubs while lesser noddies always build on mangrove branches.

Four species are particularly abundant on Pelsaert Island: the wedge-tailed shearwater, sooty tern, common noddy and lesser noddy. The first three of these





KEY

-  WEDGE - TAILED SHEARWATER
-  SOOTY TERN
-  COMMON NODDY

DEC. 1989

INSET - Southern end of Pelsaert Island showing location of seabird breeding colonies, December 1989.

SEABIRDS

We define seabirds as those birds that depend on the ocean for their food. About 40 species of seabirds breed in Western Australia - these include the little penguin, petrels, shearwaters, storm-petrels, pelicans, boobies, frigate-birds, tropicbirds, some species of cormorants, the osprey, gulls and terns. We accept a broad definition of 'seabird' and include the white-bellied sea-eagle, oystercatchers, eastern reef egrets and beach thick-knees (or stone-curlews) in our list.

Most seabirds breed on small islands where they can avoid disturbance by ground predators and be close to concentrations of their food. A database that we have developed reveals breeding by 40 different seabird species on 380 islands around the Western Australian coast - and more records are being added all the time. If you would like to contribute to and/or receive information from the database please get in touch with Phil Fuller on (09) 405 5100.

Most islands have only one or two breeding species. A few, however, are particularly rich in seabirds. Pelsaert easily takes the prize for both the most species and the most individuals.

As well as breeding species, our oceans and coasts are often visited by seabirds that breed elsewhere: birds such as penguins, albatrosses, gannets, fulmars, giant petrels, gadfly petrels and prions.



Common noddies nest among mined-out tidal claypans.
Photo - Andrew Burbidge



have huge overlapping nesting colonies at the southern end of the island. Wedge-tailed shearwaters nest in deep burrows in sandy soil, sooty terns nest on sand under low shrubs and common noddies nest on shrubs or on bare ground. Because of these different nest site requirements some areas have three layers of birds - underground, on the surface and in shrubs.

Wedge-tailed shearwaters (shearwaters are often called mutton-birds) are commonly seen at sea all along the west coast of WA. They nest on many islands from Perth's Carnac and Rottnest northwards, but Pelsaert has easily the largest nesting colony in the State. On Pelsaert shearwater burrows riddle the ground wherever the soil is deep enough. During the breeding season, which lasts from August to April, birds arrive at their burrows at late dusk and stay all night; only incubating birds stay in the burrows during daylight.

Our campsite on Pelsaert is surrounded by burrows, so we are relegated to camping on very shallow, stony soil and have to attach our tent ropes to boulders rather than to tent pegs. Wedge-tailed shearwaters are a very vocal species. However, even their constant wailing and groaning calls cannot keep us awake after a hard day's work!

Sooty terns are found in all tropical oceans of the world. On Pelsaert 'sooties' are the most abundant species. In late October 1990 the colony covered an area of 16.1 ha; however, colony size varies from year to year. The single egg is laid in a scrape in bare sand under shrubs.

Egg-laying commences in October and may continue until late November; runners (young chicks that have left the nest) are present until February or March.

Small colonies of sooty terns are found on five other islands in the Abrolhos. Elsewhere in the eastern Indian Ocean sooties also nest on Bedout Island off the Pilbara and on East Island, Ashmore Reef, an Australian External Territory near Indonesia.

HOMES OF TWIGS AND SEAWEED

Also abundant on Pelsaert are noddies - dark-coloured terns that are seldom seen near land. The common noddy is found in most tropical oceans. Nests are built from twigs and seaweed, some being decorated with small shells and pieces of coral. Some are placed on soil with little or no added material; most are on low shrubs. After the breeding season (August to April) common noddies completely desert the Abrolhos and apparently move north to the tropics, where flocks may be seen hundreds of kilometres from land. At sea, huge flocks of common noddies can sometimes be mistaken for smoke!

The Pelsaert colony is by far the largest in Western Australia. Elsewhere in the Abrolhos there is only a small colony on Wooded Island, and there are only two other colonies in the State: on Bedout Island off the mouth of the De Grey River in the Pilbara, and on the Lacepede Islands to the north of Broome. There was once a very large colony on Rat Island, further north in the Abrolhos, estimated in 1889

In suitable places, common noddy nests are at pecking-distance from each other.

Photo - Andrew Burbidge ◀ ▲

Bridled terns (top), also seen around islands near Perth, have a white forehead extending behind the eye.

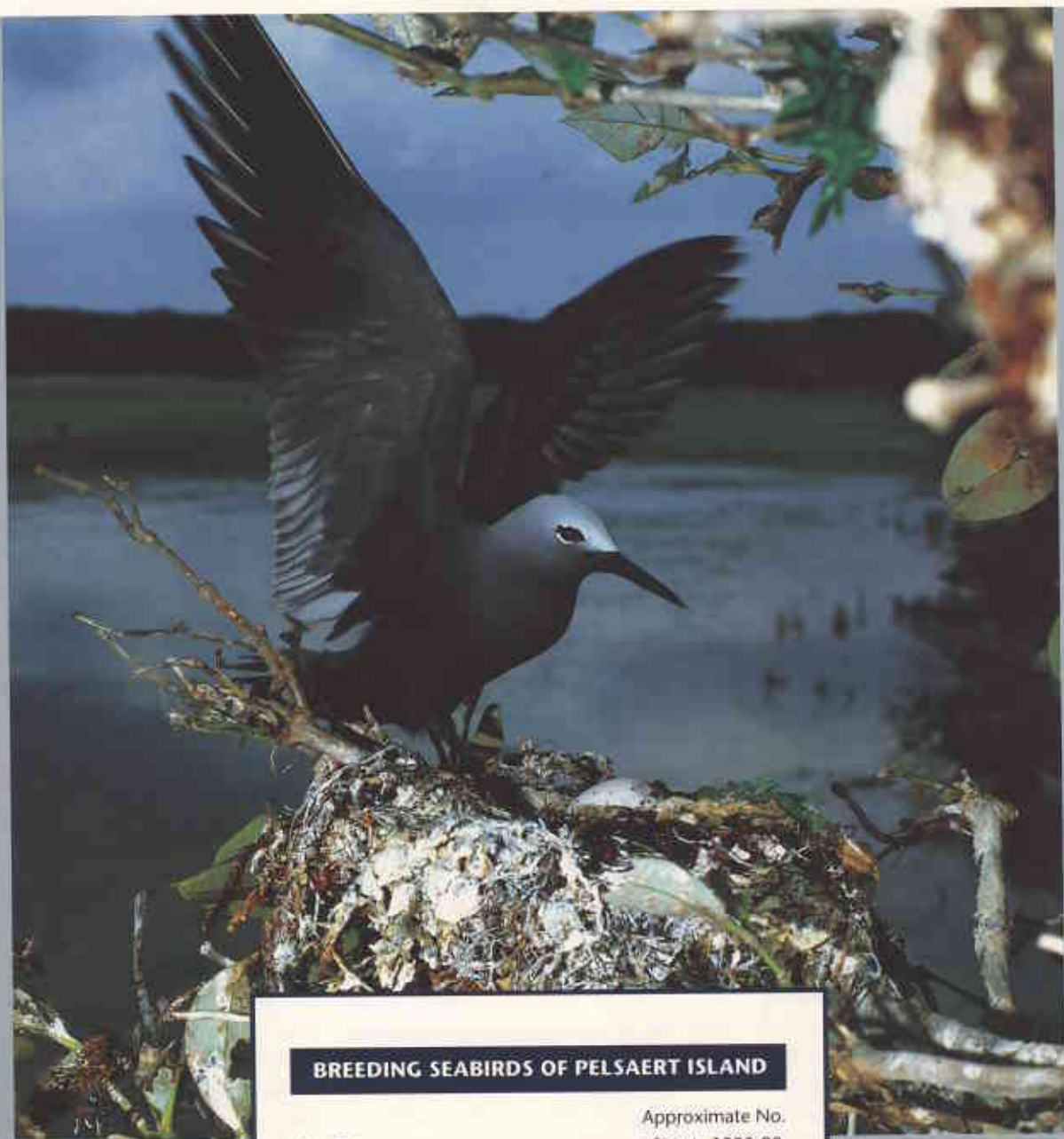
Photo - Jiri Lochman ▲ ▲

Sooty terns (below) are oceanic species not usually seen near the mainland.

Photo - Andrew Burbidge ▲

to contain more than a million birds. This colony had disappeared by the late 1930s, probably destroyed by a combination of guano mining, cats and rats.

The fourth abundant species is the lesser noddy. We estimated 30 000 occupied or recently used nests in December 1986, and in December 1989 another survey revealed about 54 000 nests. The nests, which are large for a seabird, are built from seaweed, copiously cemented with white excreta, and are located on the branches of white mangroves (*Avicennia marina*). Two large colonies were noted by Stokes in 1840 and by other visitors up to 1899. In 1907 C.G. Gibson found these to be abandoned, possibly because of disturbance by guano miners, with thriving colonies in place on Wooded and Morley Islands, in Easter Group, 35 km to the north of Pelsaert. The Pelsaert colonies were still abandoned in 1913. However, by 1936 lesser noddies had re-established on Pelsaert and were flourishing, and a similar situation was reported by later visitors up to 1954.



BREEDING SEABIRDS OF PELSEAERT ISLAND

Species	Approximate No. of nests 1988-90
wedge-tailed shearwater (<i>Puffinus pacificus</i>)	50 000
little shearwater (<i>Puffinus assimilis</i>)	35
white-faced storm-petrel (<i>Pelagodroma marina</i>)	250
red-tailed tropicbird (<i>Phaethon rubricauda</i>)	1
eastern reef egret (<i>Egretta sacra</i>)	5
osprey (<i>Pandion haliaetus</i>)	7
white-bellied sea-eagle (<i>Haliaeetus leucogaster</i>)	3
pieb oystercatcher (<i>Haematopus longirostris</i>)	10
silver gull (<i>Larus novaehollandiae</i>)	100
pacific gull (<i>Larus pacificus</i>)	15
caspian tern (<i>Hydroprogne caspia</i>)	15
roseate tern (<i>Sterna dougallii</i>)	700
sooty tern (<i>Sterna fuscata</i>)	223 000
bridled tern (<i>Sterna anaethetus</i>)	300
fairy tern (<i>Sterna nereis</i>)	200
crested tern (<i>Sterna bergii</i>)	400
common noddy (<i>Anous stolidus</i>)	115 000
lesser noddy (<i>Anous tenuirostris</i>)	54 000



Since then additional areas of mangroves have been colonised, some being abandoned again later.

The Wooded and Morley Islands colonies still exist. Numbers there, however, are now much lower than on Pelsaert; in August 1977 Ron Johnstone of the Western Australian Museum estimated about 8 700 nests on Wooded and 2 585 on Morley, while in December 1989 we estimated 6 875 on Wooded and 16 375 on Morley. Lesser noddies are found only in the Indian Ocean. Another sub-species breeds on several islands in the western Indian Ocean to the north of Madagascar.

Unlike the common noddy, the lesser noddy remains in the vicinity of the breeding colonies all year round and continues to roost in the mangroves at night. The lesser noddy is a vulnerable species in Australia. Its population fluctuates but may be under 100 000 birds, with only two breeding places 35 km apart (see *LANDSCOPE*, Autumn 1989).

THE FUTURE

Counts have shown that both noddy species have increased in number over the past few years. The reasons for this are unknown, and until regular censuses are conducted we will not be able to tell

Lesser noddies build massive nests of seaweed and perch them on mangrove branches.

Photo - Michael Morcombe ◀

A wedge-tailed shearwater at the entrance to its nest burrow.

Photo - Jiri Lochman ▲

atypical changes in abundance from those which happen normally. We plan to conduct regular censuses of lesser noddies and other Pelsaert seabirds to enable important baseline data to be accumulated.

Pelsaert Island is of enormous nature conservation value and needs continued protection and management. It is especially important that the small patches of mangroves, on which the lesser noddy depends for its nest sites, are not damaged. The introduction of predators such as cats, rats or even rabbits could be catastrophic. ☐

Andrew Burbidge, Director of Research, and Phillip Fuller, Senior Technical Officer, are both based at CALM's Wildlife Research Centre at Woodvale, telephone (09) 405 5100.

GUANO MINING

The early settlers found Australian soils to be deficient in nutrients, and fertiliser was in great demand. The guano (bird droppings) accumulations on the Abrolhos were discovered during the survey by HMS *Beagle* in 1840, and exploitation began in 1844 when the cutter *Waterwitch* brought a load of Pelsaert guano to Fremantle. Fishing schooners continued to bring small supplies for the local market, but it was not until after John Forrest made a survey of the guano resources of the Abrolhos in 1879 that steps were taken for regular production. This was begun in 1885 by the firm of Broadhurst and McNeil, then by J. & W. Bateman, and later by F.C. Broadhurst alone. He ceased operations in 1904 when the State prohibited the export of guano, but the lease was taken over by Fallowfield & Co., who continued production for the local market until 1915.

During this period 56 900 tonnes of guano was known to have been produced from the Abrolhos. Many islands were mined but the proportion that came from Pelsaert Island is not known. Some islands in the Abrolhos were greatly affected by mining, which removed all the soil and left them looking like a 'moonscape'. The destruction of the enormous seabird colonies on Rat Island in the Easter Group is thought to have been partially due to guano mining.

In 1943 the industry was revived on Pelsaert by the British Phosphate Commissioners because of urgent war needs, and 10 900 tonnes were taken up to 1945. Although some parts of Pelsaert were mined out to the bedrock, much of it was unsuited to mining and the damage was, fortunately, much less than on some other islands. The buildings left on Pelsaert by the miners were used as a tourist resort from 1946 to 1953, and when this enterprise collapsed the huts were removed to other islands by lobster fishermen.



Visitors from around Australia are discovering what those who live nearby already know - D'Entrecasteaux...C'est Magnifique. Turn to page 10.



Seabirds nest on Pelsaert Island in the Houtman Abrolhos by the million. See page 17.

LANDSCOPE

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There's more to invertebrates than slugs, maggots and spiders. Turn to page 28 to find out just why invertebrates are so important.



What has happened to Fitzgerald River National Park since the 1989 wildfire? See page 34.



Explore the Dampier Archipelago, a group of rocky islands with a violent past and a wealth of wildlife. Turn to page 48.

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C O V E R

Invertebrates play an important role in the ecosystem of WA's jarrah forest. Earthworms, termites and ants fragment leaf litter and mix organic matter. Some soil and litter invertebrates stimulate plant growth. Soil insects such as larval beetles feed on roots, stimulating the plants' growth rate. Our cover illustration is Philippa Nikulinsky's impression of this process at work in the jarrah forest.



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