

SWANS

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*Director of Fisheries and Wildlife
B. K. Bowen. B.Sc.*

*The support of the public is an
essential component in any
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management
programme—but an informed,
educated public is needed to
ensure its continuing success.*

*This publication is designed as
a medium by which the various
organisations, individuals, and
wildlife management
personnel may be kept
informed of the work being
carried out by this department,
of departmental policies and
directions: and for promoting
a better understanding and
appreciation of Western
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role it plays in maintaining a
suitable environment in which
man can live.*

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**Editor:
Malcolm Taylor
B.Sc.(Hons.) Dip.M.S.
Assistant Editor:
Kevin Carhart**

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COVER PHOTO: by G. R. Barron

The Western Grey Kangaroo (*Macropus fuliginosus*) is so similar to the Eastern Grey Kangaroo that they were only separated with certainty as a result of studies on breeding biology and blood characteristics in 1966. The animal has a distinctly grey fur, although occasionally showing browner tones, and normally dwells in eucalypt woodland and sclerophyll forest. (see page 20 for details of the Grey Kangaroo management programme).

Abandoned breeding colony of Banded Stilt discovered in W.A. Goldfields

by Clifford Young



Although the Banded Stilt or Rottnest Snipe (*Cladorhynchus leucocephala*) is a relatively common bird found on salt lakes and brackish estuaries throughout the southern portion of Australia, until August, 1930 the bird provided one of Australia's most intriguing ornithological mysteries. Where did it nest, and what were its eggs like?

The Banded Stilt was first scientifically described in 1816 from a skin probably collected in southern Australia by the French expedition of *Le Geographe* and *Le Naturaliste* between 1800-1804. Then from about 1880 onwards the species became more and more often reported until the absence of nesting records for a species not found outside the Australian continent began to draw comment from many quarters. Except for false or mistaken claims of eggs found belonging to the bird which, in almost all instances turned out to belong to another species of stilt—the White-Headed Stilt, and an unsubstantiated report from Norseman in 1904 of black and white birds with black and white eggs nesting in large numbers, it was not until 1930 that the mystery was solved. In that year the birds were found nesting in large numbers at Lake Grace in Western Australia's eastern wheatbelt. By a remarkable coincidence, another nesting colony

was located later the same year at Lake Callabonna in South Australia.

Since that time however, there has only been a handful of sightings of the bird nesting and ornithologists still have much to learn about its habits. It was therefore of great interest when Dr A. Burbidge and Mr P. J. Fuller from the Western Australian Wildlife Research Centre discovered a recently abandoned breeding colony of Banded Stilts at Lake Barlee while conducting a biological survey of the Eastern Goldfields in September last year.

The colony was the largest yet recorded, and was estimated to contain 179 000 nests and more than 255 000 addled eggs and dead chicks.

Mr Fuller, who visited the abandoned colony said "it appeared to have been abandoned at least 3-4 weeks before his visit". Many nest scrapes were empty but in some places up to 30-50 addled eggs were clumped against shrubs or in

depressions, presumably having been blown there by the wind, and dead chicks, varying in age from newly hatched to half-grown, were scattered throughout the colony. The only sign of life was 12 three-quarter grown chicks which ran away across the now dry lake bed.

Dr Burbidge said the expedition found the colony after seeing flightless Banded Stilt chicks walking through the bush near Mt Elvire Station, about 5-10 kilometres from the shores of Lake Barlee. This led the men to search the shorelines of the Lake to the west, south-west and south-east of the Mt Elvire homestead. The middle arm of the lake, west of the homestead, contained extensive sheets of shallow salt water with depths within 300-400 metres of the shore not exceeding 10 cms. In an area 8 km south west of the homestead about 25 live half-grown chicks were seen together with about 100 flying birds and along the shore of the lake were more than 100 dead chicks varying in age from 1-2 days to full-grown. The eastern arm of the lake was also inspected but although this also contained extensive sheets of shallow water, no Banded Stilts were seen.



▲ The expedition found many clumps of eggs at the base of vegetation. They had been blown there by the wind. Photo by P. J. Fuller.

▼ Abandoned eggs were scattered over three small islands on Lake Barlee which can be seen almost dried up in the background. Photo by P. J. Fuller.



▼ Banded Stilt Photo—Copyright A. G. Wells



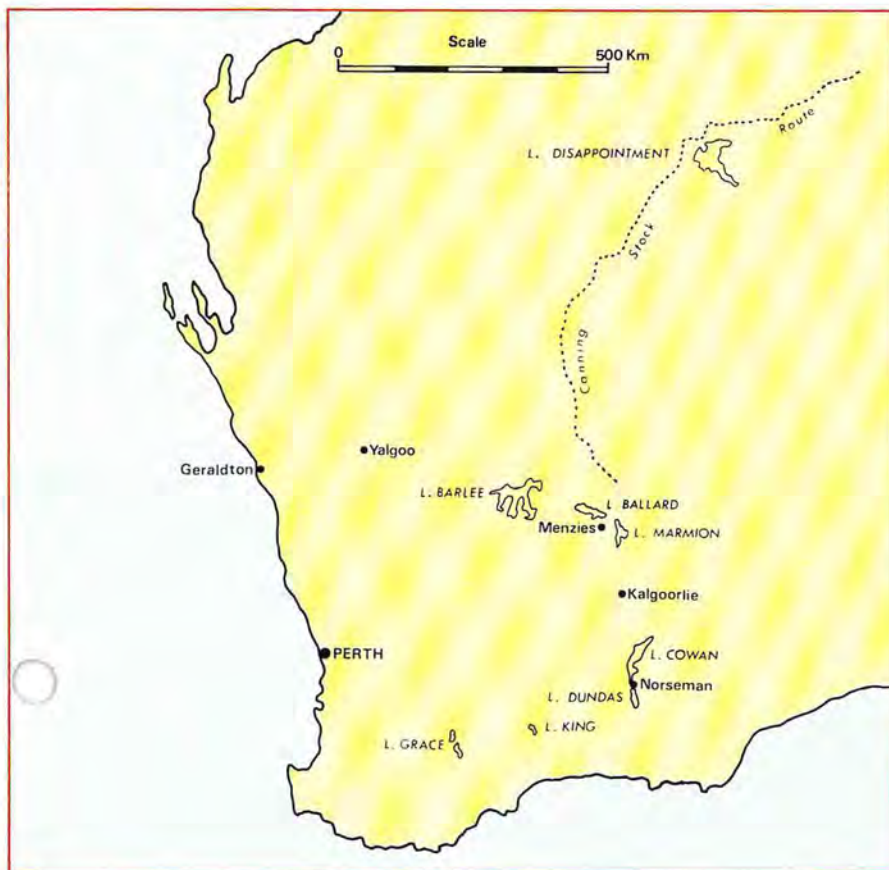
It was not until an aerial inspection of the lake was undertaken that the large nesting area on three islands in the central arm of the lake was found, and this observation was followed up by a ground inspection on 2 October.

The area of each island was calculated and the number of nests on each island was estimated by counting nests in ten plots, each of one square metre, selected by throwing an egg over the shoulder and using the point of impact as the centre point of the plot. The results showed the three islands held about 179 000 nests and about 255 000 added eggs and dead chicks.

However, as the clutch size is usually three or four, 179 000 nests would have contained over 500 000 eggs. This suggests that about 250 000 young survived long enough to leave the island. Even considering that many of these chicks would have died before being able to fly, the colony's breeding success must have been significant.

The density of nests on the islands was extremely high, up to 18 nests per square metre being recorded. Nests at this density could not have all been occupied by incubating birds at the same time so it would appear that breeding may have been continuous at this site for some time.

Heavy rain fell in the Lake Barlee area in May and June, 1980, with follow-up rains in July and breeding probably started soon after the lake was filled. The birds may then have continued breeding as long as the environmental conditions remained suitable. The abandonment of the colony was probably triggered by a fall in the level of the lake which would have disrupted their food supplies. The Banded Stilt feeds mainly on small crustacea such as the Brine Shrimp (*Artemia salina*) and the related *Parartemia*. Both these crustacea are found in water high in salt content and their eggs are capable of surviving long periods of drought. They develop rapidly after heavy rains fill the lakes where they are found and crowd their lifetime into the brief time available in the shallow short-lived pools.



Dr Burbidge and Mr Fuller suggested that the high density of nests at Lake Barlee could only be explained by the same birds laying more than one clutch, each in a new nest, or successive waves of birds laying within the one colony. Available data also suggest that the parents do not feed the young for long but leave them to fend for themselves. Such behaviour has high survival value in the environment in which the Banded Stilt breeds—a place where there is abundant food, but for a very short time. Rains heavy enough to fill the inland salt lakes of Western Australia only occur, on average, every 5 years or so, and under these circumstances the Banded Stilt has, Dr Burbidge believes, developed a reproductive strategy based on high fecundity and minimal care of the young. The large egg it lays and the large well developed young are adaptations to this strategy.

Brief Nesting History of The Banded Stilt in W.A.

Australia is the only continent which does not have flamingoes—that flamboyantly colourful wading bird. Interestingly enough, however, fossil flamingoes have been found in Central Australia but apparently these died out millions of years ago. Recent research by scientists in the U.S.A. has shown that the Australian Banded Stilt is the closest living relative of the flamingoes.

The Banded Stilt (*Cladorhynchus leucocephala*) is a striking black and white bird and is often found in its thousands feeding in shallow inland salt lakes. In contrast, the birds' nesting habits, type of eggs and young remained a well guarded secret until 1930 when a colony was found nesting at Lake Grace on the edge of Western Australia's eastern wheatbelt. However, in the light of that discovery and a subsequent accurate description of the bird's unusual egg—a large, lustreless egg varying in colour between deep fawn and pure-white with black or deep brown markings forming twisting and turning lines over the surface—it would appear the Banded Stilt had been observed nesting earlier but not recognised at the time: A West Australian ornithologist, Mr F. Lawson-Whitlock wrote—"In the year 1904 I was in the Norseman district. The winter was

exceptionally wet and Lakes Dundas and Cowan presented vast sheets of water. I saw Banded Stilts on Lake Dundas...Later in the year I met a young fellow who had been prospecting farther north on Lake Cowan. He told me he had come across a large colony of long-legged, long-beaked, black and white birds nesting on a sandy beach. He described the eggs as white with black markings. I was greatly puzzled as I held the view that the Banded Stilt probably migrated to a distant country to breed and I dismissed the probability that these birds were of that species. In the light of recent discoveries I now think that this was a colony of these remarkable birds."

In addition to its unusual egg (which is unlike the egg of any other wader and, according to Dr D. L. Serventy and H. M. Whittell in "*Birds of Western Australia*" approaches the pattern of eggs of the oyster catchers or Crested Tern), the Banded Stilt's young, when first hatched, are covered with pure-white down—the only such instance in the order of wading birds.

In the same year that the birds were first "officially" discovered nesting at Lake Grace, there was an unconfirmed report of Banded

Stilts nesting in the Menzies area, north of Kalgoorlie, by Mr T. Smith of Kalgoorlie. Mr Smith said there was a huge migration of young birds from a large lake in the Menzies area—"almost as soon as they were hatched they started to walk toward the coast. I doubt if any reached there. I would be quite safe in saying they must have died by the hundred-thousand, for a strip of country about 30 miles wide was literally white with the dead birds."

Since the report of the original discovery at Lake Grace, further evidence was gathered that the birds had also nested at the same time at Lake King, 80 kilometres to the east.

No further nesting was reported until 1945 when an attempt was made again at Lake Grace followed by another attempt in 1946—both failed due to flooding. In November, 1960, preparations for nesting were found at Wagga Wagga Lake in the Yalgoo District, but this also failed—this time due to the lake drying up. Adult birds with young were encountered along the Canning Stock Route in 1971 and it was presumed nesting had taken place that year at Lake Disappointment. In 1973 and again in 1975, nesting was observed at Lake Ballard, north-west of Menzies. Also in 1975, 50 000 nesting pairs were seen at Lake Marmion, 35 kilometres east of Menzies.

Studies on Middle Island in the Recherche Archipelago

by A.J.M. Hopkins

Islands have long held a special and romantic appeal for people, being imagined as places of untouched beauty with secluded white beaches fringed with palm trees, populated only by shipwrecked sailors and native fauna. But for biologists they represent more than that. At least since the time of A. R. Wallace and Charles Darwin, whose studies in the Malay Archipelago and the Galapagos provided the embryo for the rebirth of biology as a science, the evolutionary significance of island biotas has been recognised.

Western Australia's offshore islands provide a number of unique opportunities for research biologists. In addition to the evolutionary studies many islands are the last repositories of plants and animals now extinct on the mainland. They provide landing/roosting and breeding sites for seabirds and seals and sealions, and breeding sites for marine turtles. Many Western Australian islands have been surveyed to provide the basis for island biogeographical studies, the results of which have been applied in assessing optimum size for conservation reserves. Some have also been studied as simplified natural laboratories, of which the prime example is Rottnest Island. Together these studies have provided valuable insights into natural ecosystem processes which have been used to better reserve and manage the biological resources of the mainland.

Recent studies on Middle Island provide a good example of how the integration of information from a number of concurrent studies of the ecosystem have contributed to a clear understanding of the processes of that biological system. These studies began in 1973 after a severe summer wildfire burnt about half the island. Members of the W.A. Wildlife Authority expressed concern about the impact of this fire, and staff from the W.A. Herbarium, the W.A. Wildlife Research Centre and several other institutions collaborated to study the effects of the fire on the island's flora and fauna.

Middle Island (34° 06'S, 123° 11'E) with an area of

approximately 11 square kilometres is the largest island in the Recherche Archipelago Nature Reserve and has a more varied geology, topography and coastline than any other island in the group. The island lies 9km to the S.S.E. of Cape Arid and is about 130 km by sea to the east of Esperance. At the western end of the island, granite rocks form an elongate hill, Flinders Peak (174m). Limestone, which overlies the granite in the central part of the island, forms 50m high cliffs around the southern bays. These bays, and those on the north coast with their white sandy beaches, are a prominent feature of the island. So too is Lake Hillier, a pink brine lake on the north-eastern part of Middle Island and separated from the sea by a steep narrow sand-dune.

As a result of the recent biological work, the list of vascular plant species recorded on the island now exceeds 230 and 20 plant associations have been recognised and mapped. The fauna includes 12 species of reptiles and amphibians, 37 bird species (17 resident, 18 migratory) and one terrestrial mammal, the Tammar (*Macropus eugenii*). A skull of the Southern Bush-Rat (*Rattus fuscipes*) has also been found. Seals and sea-lions probably utilized Middle Island before the place became a sealers camp but only sea-lions have since been seen in nearby waters.

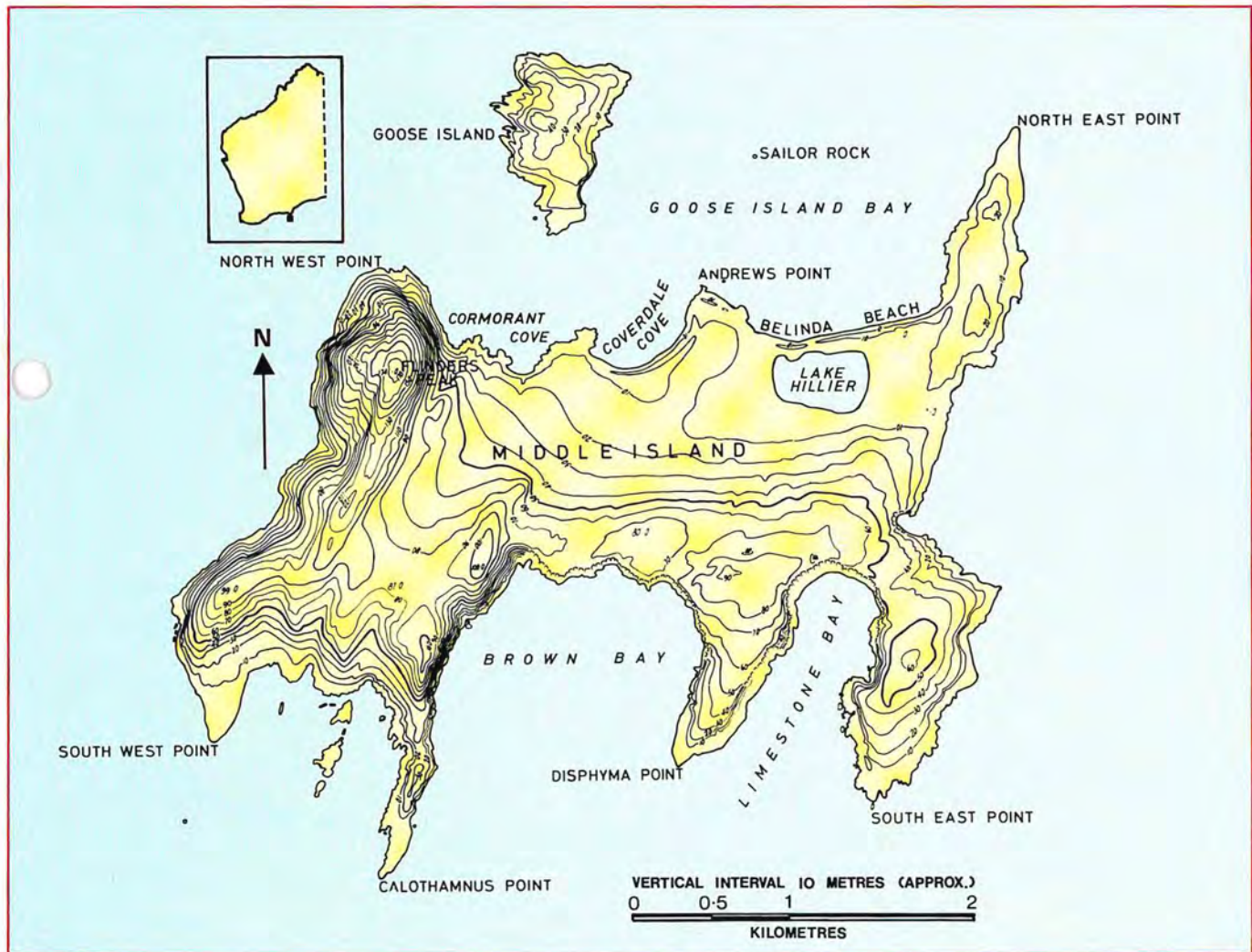
The first recorded visit to Middle Island was made by Mathew Flinders in the *Investigator* in January, 1802 while he was en route

▼ Breeding colony of Blackfaced Cormorants *Phalacrocorax fuscescens* at the base of Flinders Peak (Cormorant Cove).





▲ Flowers of *Alogyne hakeifolia* overlooking Middle Island's pink lake.



from England to Sydney. He was accompanied by the noted botanist Robert Brown who explored the island and made collections over a period of 2½ days. Flinders revisited the island in May, 1803 during his circumnavigation of Australia, for the purposes of "cutting wood, boiling down seal oil and killing geese". He also buried his boatswain, Charles Douglas, and seaman, William Hillier, and abandoned two anchors which have only recently been found and retrieved. A subsequent important plant collection was made by Allan Cunningham in 1818 while he was travelling with P.P. King and J.S. Roe aboard the *Mermaid*.

The island was apparently not visited again until the 1820s when sealers and whalers began operating throughout the archipelago. One of the first boats to sail from Sydney was the brig *Belinda* which was wrecked on Middle Island in July, 1824, and her 26 surviving crew spent 5 months there before being rescued.

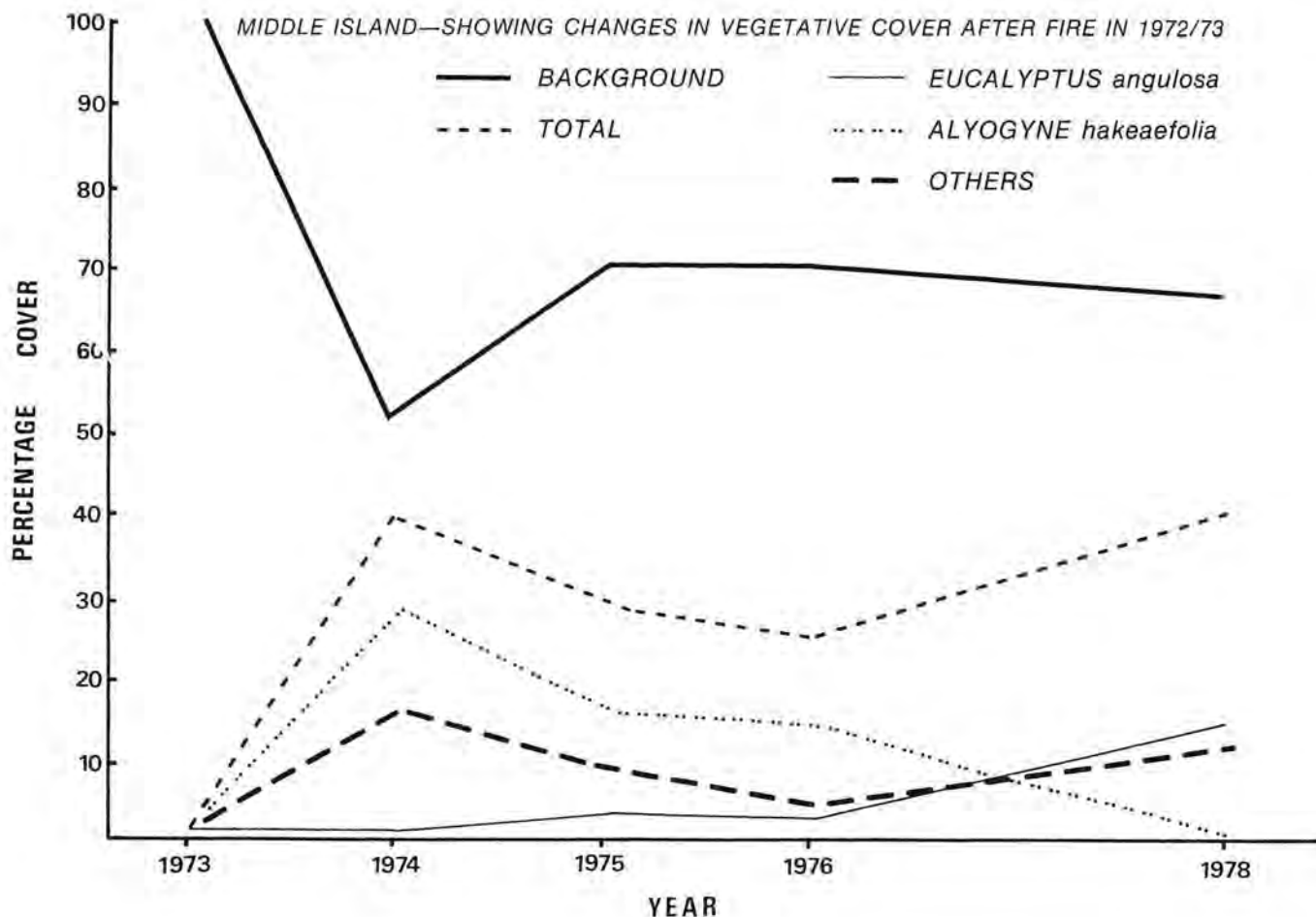
The island later became the centre of sealing and whaling operations in the archipelago. Cruise built stone houses and gardens and the island became widely known as the "Right Whale station of the bight".

The industry declined and occupation of the island is thought to have ceased by the 1850's. Between 1899 and 1905 the pink lake was mined for salt and a number of pastoral and agricultural ventures were also proposed but there is no evidence that these came to fruition. The crew of the Fisheries Research Vessel *Penguin* which was blown ashore in 1920, and later, the salvage team, stayed for short periods but otherwise the island has remained relatively undisturbed until the present. The pastoral lease was cancelled in 1958 and Middle Island was included in the Recherche Archipelago Nature Reserve later that year.

A comprehensive biological survey of 20 islands of the archipelago

including Middle Island was made by an Australian Geographical Society expedition team in 1950. This party included J. H. Willis (botanist) and V. N. Serventy (zoologist). Willis made a particular point of searching for the species first collected by Robert Brown but he failed to locate them all. Among those he failed to find were *Alyogyne hakeifolia*, *Gyrostemon sheathii*, *Hibiscus huegeli*, *Scaevola aemula*, *Solanum simile* and *Villarsia parnassifolia*. **YET ALL SIX OF THESE SPECIES HAVE BECOME PROMINENT COMPONENTS OF THE FLORA ON MIDDLE ISLAND IN THE PAST 10 YEARS. WHY WERE THEY MISSED?**

The answer which has come from the recent studies is that these species are fire ephemerals, species with very durable seeds which persist in the soil and germinate in great numbers after a fire. The species are mostly short-lived herbaceous perennials, growing to 2m tall in 2-4 years.



flowering profusely and then dying off. The evidence suggests that Middle Island had been burnt 2-3 years before Brown's first visit and not again until the summer of 1972-73.

The importance of Middle Island as a study site was thus recognised—an island site having an insular but reasonably well documented biota covering a recently burnt area and a long unburnt area. The scope of the studies was broadened to include an examination of the unburnt vegetation and the relationship of the macropods to the two ages of vegetation.

Five vascular plant species collected by Brown or by Willis (in 1950) were not recorded again and presumed to be extinct, but at the same time some thirteen immigrants were recorded. These rates of



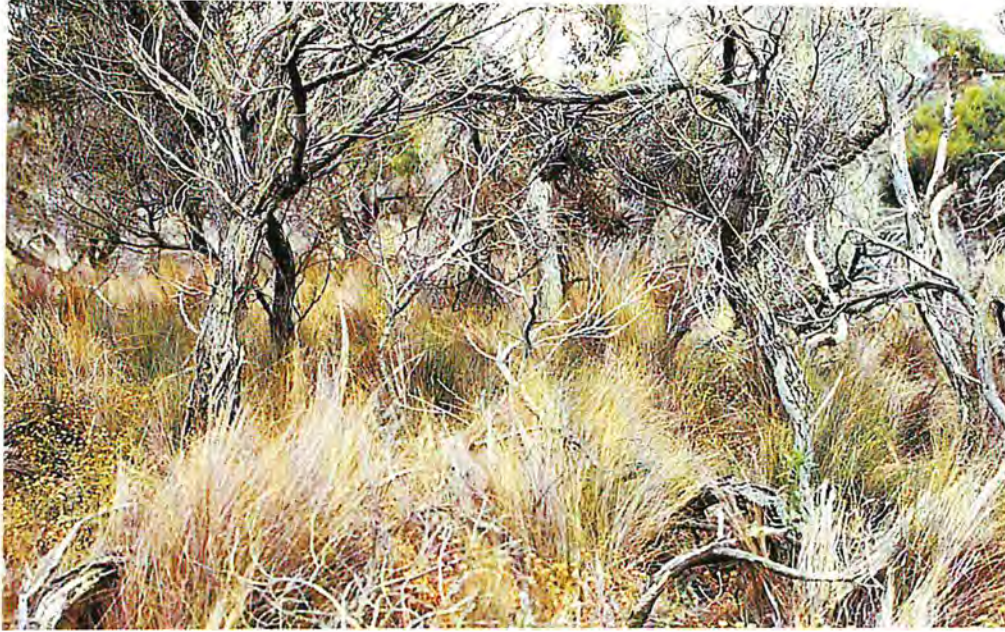
▶ A long unburnt example of *Eucalyptus angulosa* open forest 14m high with a mid-storey of *Melaleuca lanceolata*, and abundant *Poa* tussocks on the ground.

▼ *Hakea suaveolens* which is common on the islands of the Recherche Archipelago.



▼ *Kunzea baxteri*.





▲ Unburnt *Acacia rostellifera* open scrub with shrubs of *Pimelea* spp present and *Poa* tussocks on the ground. The *Acacias* were found to be dying and regenerating in patches. The effect of the 1977 fire on Middle Island on this vegetation type is shown below. ▼



▼ Two years after the 1977 fire, regeneration is slowly taking place.



immigration and extinction are consistent with those calculated for the island using island biogeographic theory. Extinctions in the flora were not excessive in the absence of fire for *ca.* 170 years. The six herbaceous perennial species listed above had apparently persisted for that period as seeds in the soil while the remaining extant species had persisted either through longevity of the established individuals or by regenerating in the absence of fire.

Of the twenty plant associations recognised on Middle Island, some have not been recorded for the mainland. In particular the vegetation on the island is taller (eg. *Eucalyptus angulosa* forest to 18m) with a more open, grassy understorey. This reflects a gradual thinning of the woody perennials and shrubs with a concurrent increase in abundance of grass (*Poa* spp.) over time since last disturbance. The absence of these tall vegetation associations with open understoreys on the adjacent mainland probably reflects the relatively high evidence of fire there over the past 150 years.

The vegetation is regenerating vigorously after the 1972 fire although the boundaries of some of the plant associations appear to be altered by the fire, particularly by the elimination of physiognomic dominants by burning.

The terrestrial fauna does not seem to have been adversely affected by either the absence of fire for 170 years or the fire of 1972. No extinctions have been recorded and the tammar wallabies (*Macropus eugenii*) did not appear to utilize the thick regenerating vegetation significantly more than the open unburnt areas for shelter although some of the early succession plant species were heavily grazed.

These studies are continuing despite the fact that a second fire in February, 1977 burnt much of the remaining area of long unburnt vegetation. Whilst studies of aged vegetation are no longer possible, the vegetation after fire will be monitored for at least the next 10 years.

Russian-banded bird recaptured in W.A.

A tiny wading bird, banded in Eastern Siberia in June, 1979 by Russian scientists, has been recaptured in Alfred Cove near Perth, Western Australia.

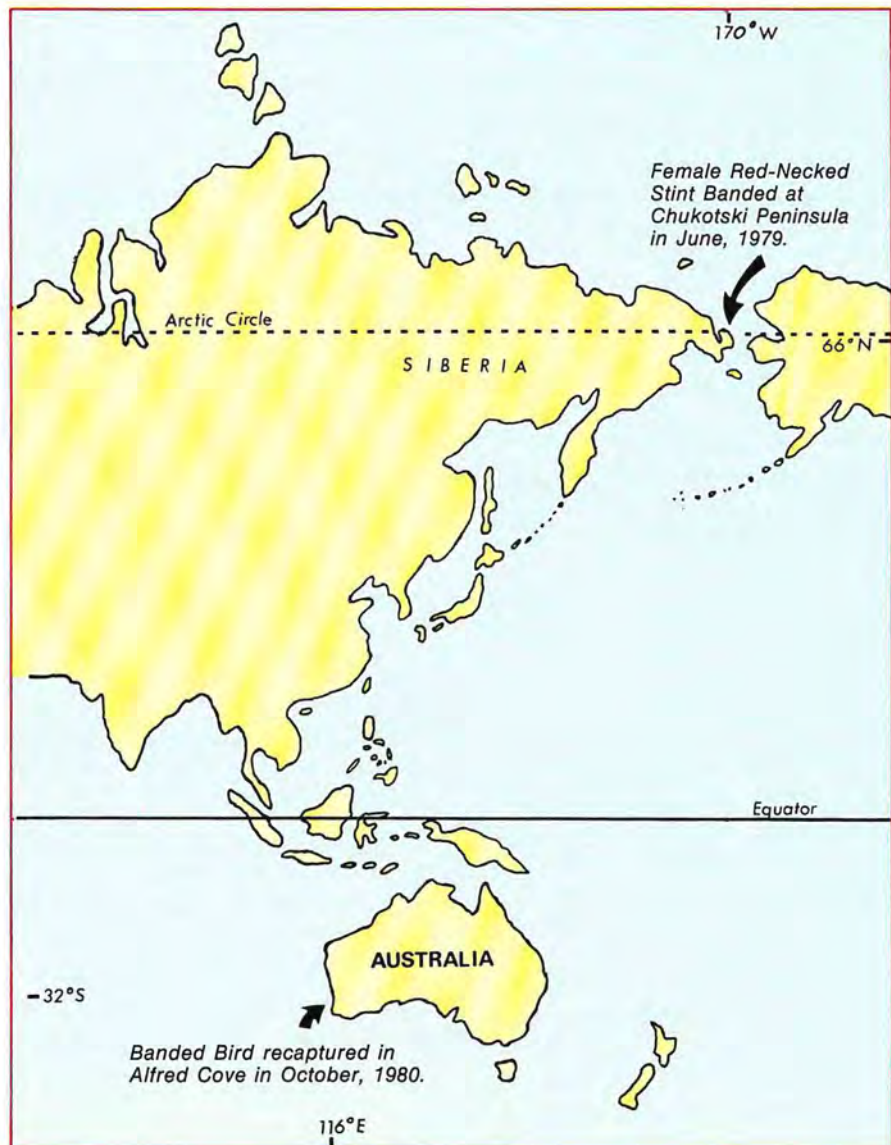
Although the bird, a Red-necked Stint (*Calidris ruficollis*) is commonly found in Western Australia, the species only breeds in Eastern Siberia and parts of Western Alaska—a distance from Perth of more than 12 500 kilometres via South-East Asia and Japan. However, no bird of this species previously ringed in its breeding area had been recaptured in Western Australia before now. In addition, the capture was the first recorded of any wader species being recaptured in W.A. after being ringed overseas.

A research officer with the Western Australian Wildlife Research Centre, Mr Jim Lane, who helped capture the Stint, said it was caught with a cannon-net while he was demonstrating the netting technique to members of the W.A. Wader Study Group. The Group was formed several years ago and is composed solely of amateur ornithologists with a special interest in migrating waders visiting W.A. One of the main activities of the Group is capturing various waders and banding them, noting information such as the time and place of their capture. The birds are then released and, if recaptured at a later date, the bands can provide valuable information as to the bird's travels.

Mr Lane pointed out that the capture of the Russian-banded Stint was also interesting in that it was the first time any waders had been caught with a cannon-net in Western Australia. Previously, the W.A. Wader Study Group had used mist nets to trap birds, a technique



▲ A Red-necked Stint, one of many which annually visit W.A. from their breeding grounds in Eastern Siberia and Western Alaska. Photo—Copyright A. G. Wells.





◀ An example of the cannon-netting technique being used in the Swan River to capture pelicans.

which requires patience and a degree of luck. A cannon-net, unlike a mist net is not set up and left. It is usually positioned close to where birds congregate and fired over the birds with shotgun cartridges when they are within reach. The technique has been used to trap waders overseas but, until now, it has only been used

in W.A. to capture larger species such as Pelicans.

On the group's first try with the cannon-net, 151 waders were caught of which the banded Red-necked Stint was one.

Enquiries to the U.S.S.R.'s Moscow Ringing Centre for

Wildfowl revealed the bird was one of 267 Red-Necked Stints banded near Uelen on the Chukotski Peninsula between 1978-79 during a three-year study of the birds' breeding biology. The recaptured bird, a female, (ring number S-925.103) was marked at its nest on the peninsula on June 17, 1979. However, at the end of June researchers found her nest destroyed and she wasn't seen again that season nor during the 1980 breeding season.

(The Red-necked Stint (*Calidris ruficollis*) is the smallest member of the Sandpiper family, rarely attaining a length greater than 162 mm and a weight of 28.3 grams. The majority of birds visiting W.A. start arriving in mid-September and leave about April.)

More rare flora illustrated

The last issue of SWANS ie Vol. 11 No. 1 provided details of a newly released Department of Fisheries and Wildlife report (No. 42) entitled *A Guide to the Gazetted Rare Flora of Western Australia* which is available on request from the Extension and Publicity office, Department of Fisheries and Wildlife, 108 Adelaide Terrace, Perth.

The report presents descriptions, illustrations and an introductory discussion of the first 100 Western Australian plants to have been gazetted as rare, likely to become extinct or in need of special protection under the Wildlife Conservation Act 1950-1979. It aims to assist interested persons in identifying these rare plants and to encourage further research on their distribution and reproductive biology.

Some of the photographs from the report were included in SWANS Vol. 11 No. 1 and the remaining photographs are shown on the following eight pages to enable the gazetted rare plants to be easily recognised.

Most of the plants that have been gazetted as rare are restricted to the South-West of Western Australia and more than one third occur in the Albany Wildlife district.

A new series of more detailed leaflets is also expected to be published shortly, with each leaflet depicting a single species from the list of gazetted W.A. rare flora.

Further details of leaflets in this series will be published in SWANS as stocks become available.

Nature Reserves-Why and how

Although Western Australia has set aside more than 1 000 reserves for the conservation of flora and fauna, the total area they cover (about 9.1 million hectares) is relatively tiny in comparison to the size of the State. Consequently the siting of these reserves and their subsequent management is crucial in preserving Western Australia's often unique plants and animals.

Most people have some understanding of why man sets aside reserves for the conservation of flora and fauna but there are still some who think it is only because of pressure from preservation extremists or to provide academic stimulation for white-coated boffins in dusty halls of learning. Instead, it is because that branch of science known as ecology has brought about an increased awareness of the close relationships that exist between man and his environment; and also because our native animals and wildflowers have an aesthetic appeal.

Most ecologists would be the first to admit that the depth of man's knowledge of the role of each organism in the biosphere, and his understanding of the interaction between these organisms, is still very, very limited. Nevertheless, man has blundered along making sometimes irreversible decisions at the expense of future generations. But one thing he has learnt is that if, by destroying its habitat, he causes a species to become extinct, there can be no recall later if he discovers the animal had a vital role to play in the environment.

Once a species is extinct the position is final. No further research can be done, no more learnt from it or from its relationships with other species, including man. For we can learn a lot from other animals, and not just behaviour patterns; it has already been shown that research on the quokka may aid medical science, particularly in the study of muscular dystrophy. There are many other links between man and other

animals, and surely thousands are yet to be discovered.

This reason alone is sufficient justification for creating reserves and conserving wildlife populations and their habitat; but what of the inalienable right of every animal—the right to live? This is the cry of the sentimentalists; it is a plea for preservation rather than conservation, and overlooks the natural high mortality of animals which is a part of nature. It is as amoral to cause the depletion of a species by overprotecting it, as it is to destroy its habitat or shoot it out. What we must do to ensure an animal's "right to live" is establish reserves and manage them so that the habitat does not deteriorate through the introduction of outside influences, e.g. man, weeds, and unnatural predators. The term "unnatural" predators is used because the prey/predator relationship plays an important role in the balance of Nature and introduced predators, e.g. foxes, upset this ecological balance.

Reserve Management

The Reserve Management Unit of the Department of Fisheries and Wildlife was created in 1968. Its initial problems were manifold; little work had been done on the problem of reserve management either in Australia or overseas, and the unique nature of Western Australian fauna and flora meant that there was little information available and even fewer established techniques or guidelines. The management of a piece of natural bush is much more complex than farm management, because instead of managing for a few species of plants and animals, one must maintain complexity where there are large numbers of plant and animal species.

Number of Reserves

At present (June 1980) in Western Australia there are about 1 036 reserves for the conservation of fauna and flora, comprising 9.1 million hectares. Of these, 555 (comprising about 8.8 million hectares) are vested in the Western Australian Wildlife Authority. The responsibilities of the Authority and the Reserve Management Unit are to establish new reserves, ensure they are in the right place, are of the right size, and are properly managed.

Determining the size of a reserve is of paramount importance; a suitable size in one area will not be suitable in another. In the deserts a greater area is necessary than in a high rainfall area because of the lower density of plants and animals in dry country. In Western Australia, it is considered that 20 000 ha is the minimum size for a reserve which will continue to harbour a full range of plants and animals; reserves under this size need careful management if they are not to be altered drastically by external influences.

When the land around a reserve is cleared for farming, the character of the reserve begins to change. What was once a portion of a large area of unbroken bushland becomes an island surrounded by country which most of the animals are unable to inhabit. The reserve commences a change in character due to outside pressures such as the introduction of weeds like wild oats and introduced animals like rabbits, foxes, cats, dogs, rats and mice. Fire also tends to become more frequent with consequential effects on the plants. A reserve affected by these external influences, slowly and inevitably will change over a period of many years; plant associations will deteriorate and the animals they support will decrease in variety and numbers. Because the unfavourable pressures are exerted from the outside of a reserve, a smaller reserve will be affected more quickly than a larger one since the buffer zone which is

created around the perimeter forms a greater percentage of the overall area, and the centre of the reserve is relatively close to the cleared land. This has already occurred in many smaller reserves in the south-west of the State.

Importance of Fire

This outside pressure is only one factor affecting the changing character of a reserve. In smaller

reserves there is a much greater chance that a fire will burn out a whole area and destroy all the food and cover for a particular species. A word here about fire control in relation to the management of reserves. Fires have been going through this country for hundreds and thousands of years. Some plants e.g. some species of wattles (*Acacia*) actually require a certain intensity of heat from a fire in order for their seeds to commence germination, but if fires occur too frequently the young plants will be

unable to reach maturity and set seed to establish future generations.

Hence both the intensity and frequency of fires are factors of great importance to the survival of many species of Western Australian plants.

Over time, leaf litter tends to build up on the ground surface with increasing fire risk, eventually leading to infrequent hot fires and this was probably the situation over most of Western Australia before the arrival of Europeans. Nowadays, to reduce the danger of fires going out of control many areas within Western Australia, outside of Nature Reserves, are subject to frequent cool burns before leaf litter has time to build up and this in effect is a major environmental change that will tend to favour some plant species at the expense of others.

In larger reserves pockets of land will remain unburned and the animals there will repopulate the areas as they recover. Thus paradoxically, the larger the reserve the less management it requires. These larger reserves are usually in the more remote parts of the State and are known as Primitive Areas.

One such reserve is Lake Magenta in the Shire of Kent.

Management Plans

At present, the Department's Reserves Management Unit is preparing a detailed plan of management for the Lake Magenta Reserve which, once it is approved, will be in force for the next ten years. The draft plans were open for public comment for several months earlier this year and among those who contributed their ideas on the proposed management of this reserve were adjoining landholders, naturalists, shire officials, conservationists, scientists and fire control officers. It is only through the participation of the community in their management that Nature Reserves can best serve the interest of the people for whom they were set aside.



▲ Certain species of *Acacias* require a critical intensity of heat from a fire in order for their seeds to germinate.

▼ Controlled fuel reduction burning of one of the blocks of the strategic fire buffer at Two Peoples Bay Nature Reserve in September, 1980.



Lake Magenta Management Plan



Lake Magenta Nature Reserve covers an area of 94 170 hectares and lies for the greater part in the Shire of Kent with its western boundary situated about 30 kilometres east of Pingrup. Farming land, used mainly for cereal production, surrounds the reserve on three sides with Lake Magenta forming the fourth side. Most of the reserve is low lying and of gently undulating terrain, being part of an area notable for its lack of rivers and for the presence of salt lakes. The reserve includes all of the southern portion of Lake Magenta, a large saltpan lake, and part of a chain of salt and ephemeral freshwater lakes to the south of Lake Magenta. Several small soaks complete the meagre sources of freshwater on the reserve.

Despite its relative lack of freshwater, Lake Magenta Reserve is one of the most important nature reserves in the south-west. This is partly because of its large size but also because the vegetation comprises the greater part of a naturally isolated belt of eucalypt woodlands and mallees. Even before

the surrounding land was transformed for agriculture, the reserve area was surrounded by sandplain heathlands and scrub to the north, west and south, and Lake Magenta to the east.

Although the vegetation on the reserve appears at first glance to be a nearly uniform expanse of mainly mallee, on closer inspection it becomes a rich mosaic of widely and more subtly differing associations of a surprising diversity of species.

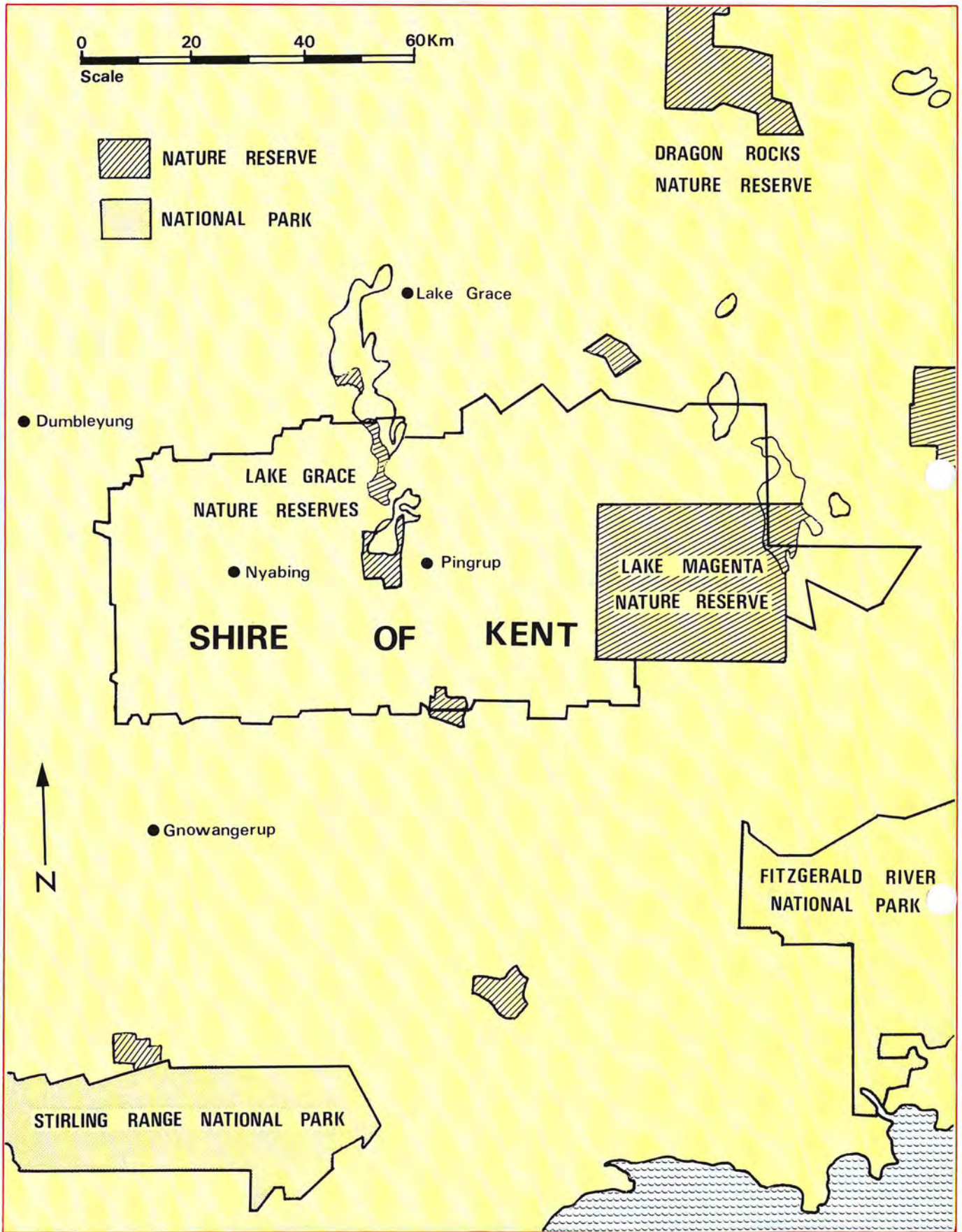
Two Museum expeditions to the northern part of the reserve in 1971 and 1972 described 16 vegetation formations: 4 of open mallees, 3 of closed mallees, 3 of closed forest, 2 open forests or woodlands, 3 heath and scrublands, and one herbland or samphire formation.

Because of its size and compact shape many of the immediate effects of development of surrounding land that tend to degrade the values of smaller wheatbelt Nature Reserves such as the spread of grasses and other pasture plants and the drift of fertilizers, seeds, chemicals and soil,

can be confined to a buffer zone around the perimeter of the reserve which takes up only a small portion of its total area. The remainder and greater part becomes a "core" area subject to minimum influence or disturbance from outside the reserve. The vegetation and flora of this area consequently stand a good chance of being able to continue their natural evolution and succession with a minimum of interference.

In addition, because of the naturally isolated nature of Lake Magenta, the surrounding reserve and its vegetation and sedentary wildlife have not been subjected to the same degree of environmental change due to the encroachment of farmland as have many other smaller reserves which are remnants of a previously continuous expanse of similar habitats.

For the more mobile fauna, particularly the birds, Lake Magenta lies at the hub of a series of major Nature Reserves and National Parks which provide complimentary and alternative summer and winter range habitats. These include the Lake



Grace Nature Reserves (35km west), Dragon Rocks Nature Reserve (70km north), the Fitzgerald National Park (30-40km south) and the Stirling Range National Park (85km south-west).

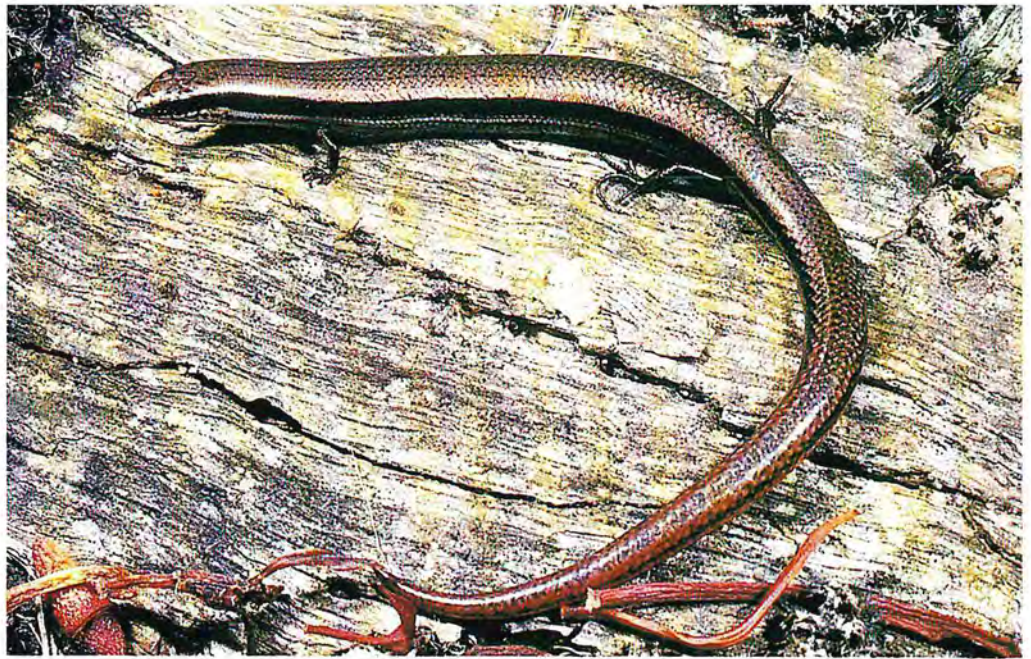
History of the Reserve

Initial attempts to establish a large Nature Reserve in the mallee country of the eastern wheatbelt began in the early 1950s. Although support for the establishment of such a reserve was widespread among scientists and Government agencies at the time, the initiative which turned the idea into reality was taken by Dr D.L. Serventy, then Senior Research Scientist of the Wildlife Survey Section of the C.S.I.R.O., and Mr R. Aitken, a teacher at the Government school at Nyabing.

In a letter to the Under-Secretary for Lands, Mr H. E. Smith, in December 1952, Dr Serventy proposed that a reserve be established in the vicinity of Nyabing. Land in this area was already committed to development however, and the Under-Secretary encouraged Dr Serventy to look eastwards, towards Lake Magenta. Dr Serventy moved quickly, surveying the area in company with a party of scientists from the Western Australian Museum, which included Dr G. M. Storr, and reporting back to the Under-Secretary by mid-February.

Our party traversed the area along the old road from Pingrup to Lake Magenta and sampled the country at various points along the road. We saw Mallee Fowl in the area and observed two fresh mounds from our vehicle close to the road...

...The area appears to be a stronghold of several other characteristic Mallee bird species whose habitat is being diminished in other parts of the State owing to progressive clearing and other disturbances by closer settlement. In our rapid survey, we compiled a list of 51 bird species of which special mention may be made of the following:



▲ *Lerista distinguenda*. Photo by P. Griffin.

▼ *Limnodynastes dorsalis*. Photo by P. Griffin.



▼ *Rhamphotyphlops australis*. Photo by P. Griffin.



Southern Scrub-Robin (*Drymodes brunneopygia*) almost confined to Mallee areas.

Shy Ground-Wren (*Hylacola cauta*)—also confined to Mallee areas and now very rarely seen in its previous haunts in the wheatbelt.

Blue-breasted Wren (*Malurus pulcherrimus*)—characteristic of the Mallee and, in former times, regarded as one of the rarest of the Blue Wrens; we encountered it several times in the area.

Rufous Tree-Creeper (*Climacteris rufa*)—a eucalypt woodland species once common but which is now disappearing from a large portion of the south-west.

In the case of marsupials, we were shown a small collection made by Mr Ray Aitken of the Government School Nyabing, and collected recently in the neighbourhood. This collection included two very rare and disappearing species in the south-west. The Honey Mouse (*Tarsipes spencerae*) and the Red-tailed Wambenger (*Phascogale calura*). The area, if preserved from despoilation, would serve as a permanent haven for these and undoubtedly other rare marsupials.

The advantages of the eucalypt belt in this area comprising Salmon Gum, Mort (*sic*) and Mallee (*Mallee forms Eucalyptus*

spathulata, *E. oleosa*, *E. cylindriflora* and *E. astringens*) are that it is almost isolated by a ring of sand plain in the north, west and south, and by Lake Magenta in the east. Thus the fauna inhabiting this woodland is confined, as it were, by a natural fence which it will not normally cross. There is no settlement nearby and human interference will be at a minimum.

(Dr D. L. Serventy in litt. to the Under Secretary for Lands, 18 February 1953.)

The proposal gained support from a number of prominent scientists including Professor A.R. Main (then lecturer in zoology at the University of Western Australia) and Mr C. A. Gardner, Government Botanist. It was also supported by several Government Departments and Agencies including the Soil Conservation Commission and the Forests Department.

However, the proposal was not favourably received by local interests. The Kent Vermin Board considered the reserve should not be created in the interests of proper vermin control. Dingoes, particularly, were a continuing problem in the eastern wheatbelt area at the time and such a large reserve was seen as an area in which pest animals would breed. The proximity of the proposed reserve to agricultural land and the suitability of much of it for farm development were also sources of long-lasting opposition.

Several alternative areas were inspected during 1956 but all were found to be less than suitable. In view of this, Dr Serventy's original proposal was revived and the reserve was established and vested in the Fauna Protection Advisory Committee in November, 1958.

The acquisition of the reserve was summed up for the Minister for Fisheries at the time by officers of his Department:

The area sets aside a representative selection of mallee habitat most of which has been undisturbed and is still in its original state. In recent years the

▼ Yate (*Eucalyptus occidentalis*) woodland. Photo by I. Crook.



reservation of such primitive areas has been accepted as an essential form of land use. Reserves of considerable extent are needed for a variety of purposes, and have considerable scientific, aesthetic and recreational value. They form outdoor laboratories for the benefit of all the biological sciences. They allow the study of soil structures and soil successions which, I understand, is essential in any programme of soil conservation or land management. Botanically, they make possible the study of plant climaxes and normal successions and afford scientists an opportunity to study and to understand the evolution of the environment. Studies such as these make it possible for a proper adjustment of human management of the land to its natural limitations. Eventually, therefore, primitive reserves must be of immense value to agriculture. They have, too, a day-to-day economic value to apiculture and provide recreational areas for outdoor pastimes such as bird-watching, bush-walking, photography and nature studies generally. The present reserve includes, I believe, a wide range of soil types of mallee associations. Moreover, it is contiguous with the halophytic formation of Lake Magenta, which adds greatly to its importance.



▲ *Delma fraseri*. Photo by P. Griffin.

Several attempts to have the reserve cancelled, moved or substantially reduced in size were defeated and the final word in the debate for the continued existence of the Lake Magenta Reserve was



▲ Dwarf Bearded Dragon Lizard
Amphibolurus minor. Photo by P. Griffin.

made by the then Premier, the Hon. D. Brand, in April, 1964:

These decisions to retain the Reserve at its present size and location were reached because the ecosystems in those parts of the Reserve which might otherwise have been alienated were not duplicated in any of the available Crown land north or east of the present Reserve. It was considered essential that this Reserve retain all sections of the various mallee habitats of the region, each of which had to be of sufficient extent to be self-perpetuating. It was also considered that if the Reserve was left as a compact unit, various problems such as fire and vermin control, fencing and invasions of exotics would be kept to a minimum. It was further considered that clearing of substantial parts of the Reserve would cause an increase in the salinity in and have a detrimental effect upon, the present agricultural land and the lakes of the drainage area.

In addition to its value as a flora reserve, Lake Magenta is also home for a wide selection of birds, mammals, reptiles and amphibians. Mr J. Dell of the W.A. Museum recorded 98 species of birds in the reserve—the combined results of observations during four field trips made in 1953, 1963, 1971 and 1972. This is the largest number of bird species recorded from any wheatbelt Nature Reserve in Western Australia.

Seven frogs and 31 reptiles (27 lizards and 4 snakes) have also been

collected from the Lake Magenta Nature Reserve, mainly during expeditions by the Western Australian Museum. Like those for the mammals (11 species recorded) and birds, this list is almost certainly not a complete one, but the number of lizards alone is greater than that found on any other wheatbelt reserve with the exception of the East Yuna Reserves which are north of Geraldton and total 1 717 hectares in area.

The Department of Fisheries and Wildlife's Reserve Management Unit is currently finalising a management plan for the Lake Magenta Nature Reserve which will include measures necessary for the protection of surrounding property from fire, weeds and pests, and outlining the anticipated use of the reserve. However, paramount among the objectives of management for the reserve is the protection of its values as a large and little-disturbed, naturally discrete area of mallee and woodland ecosystems characteristic of this low rainfall region of the south-west of Western Australia.



▲ *Diplodactylus spinigerus*.
Photo by P. Griffin.

Adapted for SWANS by Clifford Young from Draft Management Plan No. 4 by I. G. Crook and A. A. Burbidge.

Grey Kangaroo Management Plan

A Grey Kangaroo Management Programme was introduced in Western Australia in 1971. A recent review has demonstrated that the programme has provided security to the grey kangaroo population and it is now possible to allow landholders greater flexibility in the management of grey kangaroos which are causing damage to property.

Following discussions with farmers' representatives, a revised programme has been prepared by the Department of Fisheries and Wildlife and the Agriculture Protection Board. This programme has been jointly approved by the Minister for Fisheries and Wildlife and the Minister for Agriculture. The provisions of the programme are outlined below.

OPEN SEASON AREAS

An open season for grey kangaroos has been declared in those areas shown on the map opposite. In these areas it is considered that grey

kangaroos populations are secure and damage to agriculture is likely to be a continuous problem.

CONDITIONS APPLYING TO THE OPEN SEASON AREAS

1. The open season in the areas listed applies only on private land—this term covers freehold land, conditional purchase leasehold land or any other leasehold land which is granted for the purpose of agricultural production under the Land Act.
2. Grey kangaroos may only be shot by the owner or occupier of the land on which they are causing damage. However, if the landholder does not wish to carry out the shooting himself, he may nominate an agent or a licensed kangaroo shooter to shoot on his behalf.
3. Skins or carcasses of kangaroos taken may only be sold if a Damage License and royalty tags

have been obtained from the District Wildlife Officer.

4. Following inspection of a property, a Wildlife Officer may, if necessary, prohibit the shooting of kangaroos on that property until the landholder has obtained a Damage License.

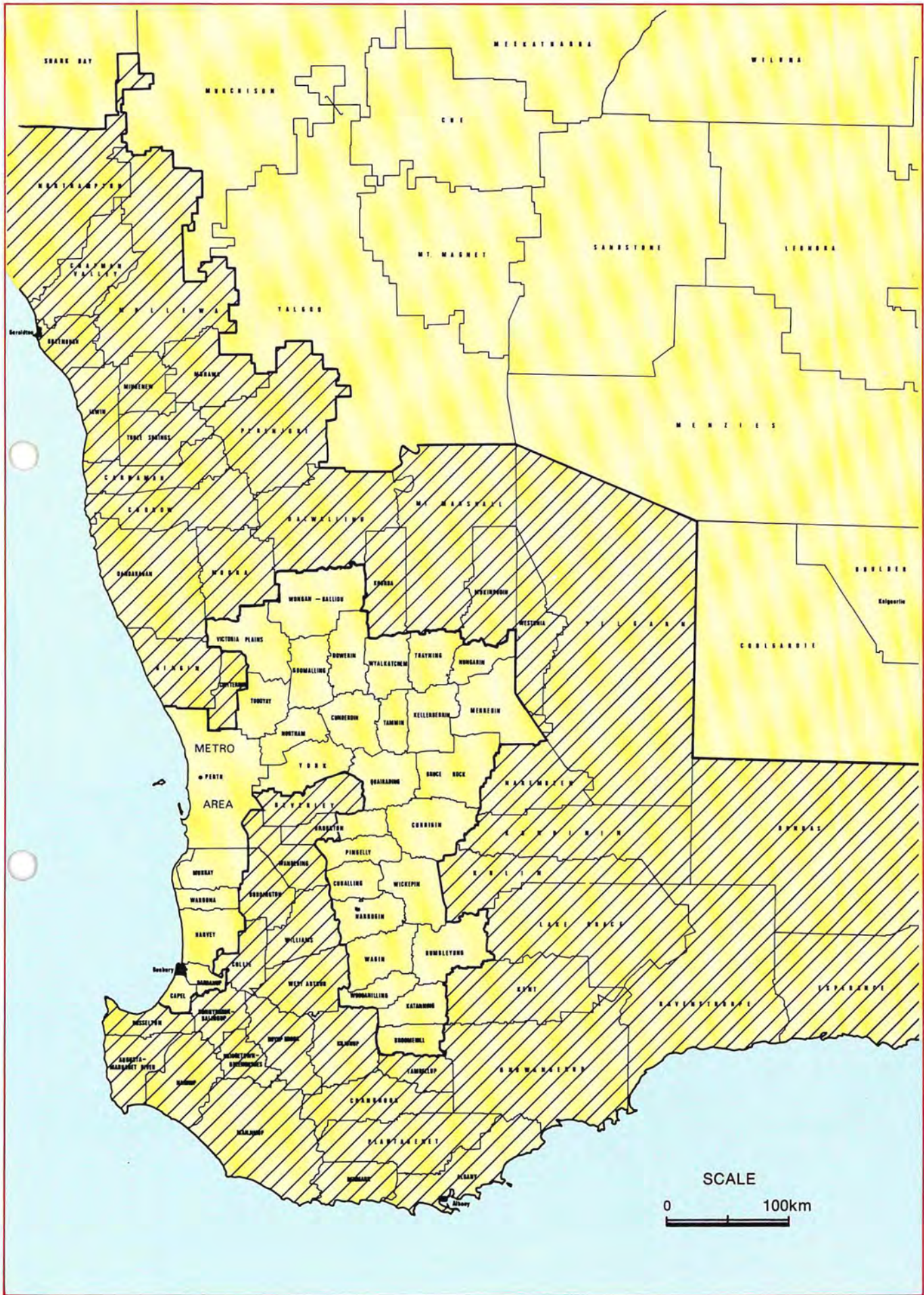
AREAS WITHOUT AN OPEN SEASON

In areas other than those shown, grey kangaroos are protected and may not be taken unless the landholder has first obtained a Damage License from the District Wildlife Officer. Conditions 2 and 3 relating to open season areas will apply once a Damage License is issued.

NON-PRIVATE LAND

Where grey kangaroos are found to be in excess numbers on areas other than private land (as defined previously), culling may be authorised, if necessary, subject to the approval of the authority controlling the land concerned.



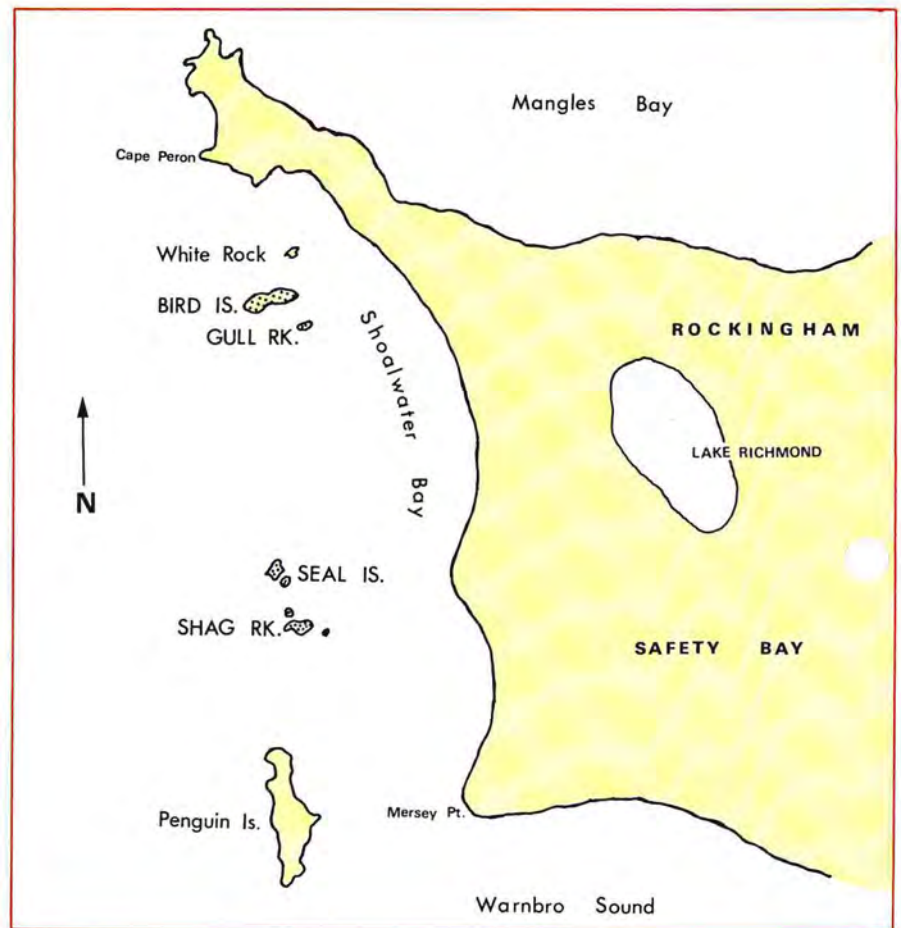


Feral Cat scare in Shoalwater Bay

An inspection of island reserves in Shoalwater Bay, south of Rockingham, recently failed to find any evidence of a feral cat, signs of which were reportedly sighted on one of the islands by a member of the public.

Although the report had suggested the cat was on Bird Island, Wildlife Officers from the Department of Fisheries and Wildlife also checked nearby Gull Rock, and Seal Island and Shag Rock which lie further south.

The presence of a feral cat on one of the islands could have proved disastrous for the birdlife as the islands are important breeding grounds for several species including Little Penguins (*Eudyptula minor*), Bridled Terns (*Sterna anaethetus*), Caspian Terns (*Sterna caspia*), White-faced Storm Petrels (*Oceanites marina*), Silver Gulls (*Larus novaehollandiae*), Pied Cormorants (*Phalacrocorax varius*), Welcome Swallows (*Hirundo neoxena*) and Willy Wagtails (*Rhipidura leucophrys*).



▼ An Australian Sea Lion (*Neophoca cinerea*) on Seal Island. Photo D. Coughran.





▲ Access to many of the islands is difficult and care must be taken not to disturb nesting birds or Sea Lions which also visit the islands.
Photo D. Coughran.

The islands lack fresh water but, if released on one of the islands, a feral cat would probably survive on the moisture from its victims. It is likely it would live as long as it had a continual food supply.

Most of these islands are small, Bird Island is the largest of the group covering an area of only 3.2 hectares, but are close to the mainland in sheltered water and are well visited

by the public during summer months. It is now thought that the sighting reported was not of a cat but someone's pet dog, taken to the island and left to roam while its owners explored the beach.

As the islands are Nature Reserves, dogs are forbidden on them but many people ignore signs on the islands unaware of the destruction their pets cause to

nesting birds and the habitat. Consequently patrols to the islands are being stepped up and anyone found contravening the regulations will be liable to prosecution.

Anyone visiting the islands is also requested not to leave the beach area because of the danger of disturbing nesting birds. Most nesting on the islands takes place between May and February.

Departmental Fisheries & Wildlife Offices

Head Office: 108 Adelaide Terrace, Perth, W.A. 6000. Tel. 325 5988

District Offices:

Albany: Stirling Terrace, Albany, W.A. 6330. Tel. 41 4811.

Broome: Hamersley Street, Broome, W.A. 6725. Tel. 92 1121.

Bunbury: Stirling Street, Bunbury, W.A. 6230. Tel. 21 2598.

Busselton: 12 Queen Street, Busselton, W.A. 6280. Tel. 52 2152.

Carnarvon: Carnarvon Marina, P.O. Box 774, Carnarvon, W.A. 6701. Tel. 41 1185.

Denham: Knight Terrace, Denham, W.A. 6537. Tel. Shark Bay 48 1210.

Dongara: Lot 322, Carnarvon Street, Port Denison, Dongara, W.A. 6525. Tel. 27 1187.

Esperance: Wallaceway Centre, Esperance, W.A. 6450. Tel. 71 1839.

Fremantle: Cnr Collie St and Marine Tce, Fremantle, W.A. 6160. Tel. 335 6369 and 335 3405.

Geraldton: Fisherman's Wharf, Geraldton, W.A. 6530. Tel. 21 1956 (Fisheries), 21 3510 (Wildlife).

Jurien Bay: Padbury Street, Jurien Bay, W.A. 6516. Tel. 48 1166.

Kalgoorlie: Maritana House, cnr Cheetham and Boulder Roads, Kalgoorlie, W.A. 6430. Tel. 21 4148.

Karratha: Lot 750, Welcome Road, Karratha, W.A. 6714. Tel. Karratha 85 1427.

Lancelin: Gingin Road, Lancelin, W.A. 6508. Tel. 78 1111.

Ledge Point: Deburgh Street, Ledge Point, W.A. 6508. Tel. 78 1078.

Mandurah: 15 Leslie Street, Mandurah, W.A. 6210. Tel. 35 1240.

Manjimup: C/o Agric. Dept Manjimup, W.A. 6258. Tel. 71 1299.

Moora: Padbury Street, Moora, W.A. 6510. Tel. 41 1055.

Mt. Magnet: Hepburn Street, Mt. Magnet, W.A. 6638. Tel. 96.

Pingelly: Park Street, Pingelly, W.A. 6308. Tel. 273.

Waroona: Fouracre Street, Waroona, W.A. 6215. Tel. 33 1331.

Wongan Hills: Quinlan Street, W.A. 6603. Tel. 71 1395.

Wyndham: Lot 1215 Delamere Road, Wyndham, W.A. 6740. Tel. 61 1342.

WILDLIFE DISTRICTS IN WESTERN AUSTRALIA

