S.W.A.N.S.

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DEPARTMENT OF FISHERIES AND WILDLIFE, PERTH

S.W.A.N.S.

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Issued by direction of the Hon. Peter Jones, M.L.A., Minister for Fisheries and Wildlife.

Director of Fisheries and Wildlife: B. K. Bowen, B.Sc.

Conservator of Wildlife: H. B. Shugg, A.A.P.A., A.F.A.I.M.

The support of the public is an essential component in any conservation or reserve 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 Australian wildlife and the role it plays in maintaining a suitable environment in which man can live.

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SOMETHING TO THINK ABOUT

The following article is a copy of a letter written by the American Indian Chief Seattle, in 1854, in response to a proposal from the U.S. Government, under President Franklin Pierce, that reservations for Indian Tribes be set up in the North West Pacific Territories.

"The Great Chief in Washington sends word that he wishes to buy our land.

The Great Chief also sends us words of friendship and goodwill. That is kind of him, since we know he has little need of our friendship in return. But we will consider your offer. For we know that if we do not sell, the white man may come with guns and take our land.

What Chief Seattle says, the Great Chief in Washington can count on as truly as our white brothers can count on the return of the seasons. My words are like the stars—they do not set.

How can you buy or sell the sky, the warmth of the land? The idea is strange to us.

We do not own the freshness of the air or the sparkle of the water. How can you buy them from us?

Every part of this earth is sacred to my people. Every shining pine needle, every sand shore, every mist in the dark woods, every clearing and humming insect is holy in the memory and experience of my people . . .

The white man's dead forget the country of their birth when they go to walk among the stars, (but) we are part of the earth, and it is part of us. The perfumed flowers are our sisters; the deer, the horse, the great eagle, these are our brothers. The rocky crests, the juices in the meadows, the body heat of the pony and man—all belong to the same family.

So, when the Great Chief in Washington sends word that he wishes to buy our land, he asks much of us. The Great Chief sends word he will reserve us a place so that we can live comfortably to ourselves. He will be our father and we will be his children. So we will consider your offer to buy our land. But it will not be easy, for this land is sacred to us.

The shining water that moves in the streams and rivers is not just water, but the blood of our ancestors. If we sell you land, you must remember that it is sacred, and you must teach your children that it is sacred and that each ghostly reflection in the clear water of the lake tells of events and memories in the life of my people.

The water's murmur is the voice of my father's father. The rivers are our brothers, they quench our thirst. The rivers carry our canoes, and feed our children. If we sell you land, you must remember, and teach your children, that the rivers are our brothers, and yours, and you must henceforth give the rivers the kindness you would give any brother.

(continued on page 72.)

IN THIS ISSUE . . . .

NUYTSLAND NATURE RESERVE

By Dr. A. A. Burbidge

Reserve No. A27632 was gazetted on June 25th 1965 for the purpose of "Primitive Area for the Preservation and Study of Flora, Fauna, Geological and Anthropological Features". It was proclaimed "Class A" on November 7th, 1969, and vested in the Western Australian Wildlife Authority on the same date.

The reserve is officially named the "Nuytsland Nature Reserve" after the Dutch explorer Pieter Nuyts who sailed this coast in 1627. The Nuytsland Nature Reserve embraces a long coastal strip of land representative of both the high cliffs of the Great Australian Bight and the ocean beaches, sand dunes, and sand plains in the vicinity of Eyre and Israelite Bay. An area of the Reserve extends inland across the Eyre Highway in the vicinity of Cocklebiddy, enabling travellers to see country unaltered by man's impact. The reserve is important for a number of reasons.

1. Biological

The reserve, and particularly the Israelite Bay area, represents the southern boundary of the overlap zone between the floras and faunas of the moist south-west and the desert.

From a botanical point of view Israelite Bay is at the southern end of the boundary between the South-West Province and the Eremean Province. This overlap zone is noted for the high degree of speciation and endemism which occurs along it. This means that a comparatively large number of plant species along the line have a very restricted distribution. One example at Israelite Bay is *Eucalyptus augustissima*, a mallee.

It also means that a large number of plant groups common in the southwest have their easternmost distribution at Israelite Bay. An example is the genus *Banksia*. Other plants are totally restricted to the reserve; one well known species is the only Western Australian *Correa* or Bell, this group being more developed in the east. Another species restricted to the reserve is *Pimelea serpyllifolia* which grows only on the cliffs.

From a zoological viewpoint the Israelite Bay area is the southern end of the boundary between the south-west (or Bassian) fauna and the Eyrean (or desert) fauna. Many species have their easternmost W.A. distribution in the area. Examples are the Honey Possum (*Tarsipes spencerae*), the Southern Bush Rat (*Rattus fuscipes*), the Pigmy Possum (*Cercartetus concinnus*), the Dunnart (*Sminthopsis murina*) and the Ashy Mouse (*Pseudomys albocinereus*). Many birds, e.g. the New Holland Honeyeater, Western Spinebill, White-cheeked Honeyeater, Little Wattle Bird and White-tailed Black Cockatoo also have their easternmost records in the area, and the picture is similar in other animal groups such as reptiles.

It is of scientific value to preserve animals such as these at the extremes of their range because often they show many adaptations to the more harsh climatic conditions than occur over the major part of their range and this gives an understanding of the factors controlling species distribution and influencing evolution.

Little Penguins (*Eudyptula minor*) nest in rock falls at the base of the cliffs and this is the only place in Australia where this species nests on the mainland—all other sites are on islands.

2. Palaeontological

During the ice ages of the past one to two million years (the Pleistocene Age) rainfall in the southern half of Australia underwent a series of fluctuations and on a number of occasions a humid corridor was opened up along the southern coastline between the now isolated south-eastern and south-western corners of the continent. This allowed the movement of many animals and plants from east to west and, to a lesser extent, from west to east. These movements are evidenced by situations where a number of closely related species occur in the south-west, all of which are derived from a parent stock in the south-east. Documentations are available of this in a number of animals groups including birds, frogs and insects. These migrations are also evidenced by fossil deposits of bones and pollen in caves and in areas covered by dunes and this is one of the main reasons the reserve was extended so far along the Bight coastline. Scientific work in this area is in its infancy and it may not be possible to develop this documentation in the future if the area is disturbed, either by grazing of domestic stock or by mining.

3. Scenic

The Nuytsland Nature Reserve contains one of Australia's scenic wonders, the 200 km long, 100 metre high cliffs at the southern extremity of the Nullarbor Plain. These cliffs are believed to be the longest unbroken cliffs in the world, and in the future they may become an important tourist attraction.

West of Point Culver a shoreline of cliffs and beach.

62798—(2)

West of Twilight Cove, where vertical cliffs meet the foaming sea.

4. Historical

The reserve contains much of the country traversed by John Eyre during his famous journey from South Australia to Albany in 1841. The country in the reserve remains in the same condition as when Eyre walked it. The reserve also embraces some of the old overland telegraph line constructed in 1876 and similarly shows the type of country through which the line was constructed using the primitive equipment then available.

5. Techtites

Techtites are small disc-shaped objects believed to be of extra-terrestrial origin. Yellow Lake and other lakes in the vicinity of Israelite Bay have yielded interesting specimens of techtites which are now lodged in the W.A. Museum. These specimens have been in demand for loan overseas. Deposits of Quaternary marine mollusc fossils, probably of different ages are also exposed in the lakes and are currently under study at the Western Australian Museum.

MOULTING PENGUINS

Beginning in January each year, a number of moulting Rockhopper Penguins are found all along the coastline south of Bunbury.

These penguins usually moult in mid January and the moulting process lasts about 3–4 weeks.

The moulting penguins are not adults, but are juveniles in either their first year plumage or more commonly, their second year plumage.

The penguins, in a weakened state during the moulting cycle, seek out sheltered beaches along our South-West Coast but it is important that the penguins are not disturbed or interfered with in any way. During this period, well-meaning individuals, thinking the birds are ill or injured, actually do more harm than good by "rescuing" them and attempting to nurse them back to health.

If a bird is **obviously injured,** then after it has recovered it should be returned either to the same beach or a similar secluded beach away from the public.

Any enquiries should be referred to the Department's district offices at Bunbury, Busselton, Albany and Esperance.

NARETHA BLUE BONNET SEQUEL

Readers will recall that the Naretha Blue Bonnet was the subject of our "Diminishing Heritage" series in the last issue of S.W.A.N.S. (Vol. 6 No. 2).

Mrs Nan Ingleton of Parramatta, N.S.W., has for a long time received the journal and on a number of occasions has championed our cause in letters to us.

Her last letter and its accompanying poem would be a delight for any Editor to receive and I feel I must share them with all readers of S.W.A.N.S.

For those who read the previous feature on the Blue Bonnet no further explanation is necessary.

Editor, S.W.A.N.S.

Although the enclosed tribute to one of the most beautiful Australian bird "portraits" I have ever seen, is totally inadequate in theory . . . its essence stems from both the Blue Bonnet species' enchanting form and the shadows which now encompass such treasures of the wilderness.

I was moved deeply, by the Naretha background . . . the distant sanctuary already trespassed . . . the known threat which is continent-wide at this hour. May your Departmental officers and all property owners in this vicinity be successful in safeguarding both casuarina and its irreplaceable nestlings forever.

Thank you, for the tremendous interest which S.W.A.N.S. has already provided and especially, for this avian source of inspiration . . .

Very sincerely,
Nan Ingleton (Mrs)

The Poem:

NARETHA BLUE BONNETS
(Parrots in Jeopardy)

Winged jewels of the wild . . . their kindred dawn,
Feathers the east in ritual plumes of grey;
Rose-breasted morning lulls the restive plain . . .
Nullarbor's night-winds sleep . . . and it is day!
Sun-coaxed, from casuarinas of their dreams,
Reflecting all of heaven in their flight,
A royal banner breaks against the skies . . .
In aerial gusts of blue and gilded light.

Wings of the harsh horizon—wards, of time,
Through sand-drift pastures still, their rainbow runs,
Seeking the arid earth's own link with life,
Seed of their myall realm . . . where desert suns
Once walled these secret fortresses in fire,
The cradling she-oak holds her nestlings near;
Distance, dissolves . . . a vandal-shadow threads
Its chill of trespass—through the winds of fear.

Nan Ingleton,
Parramatta, N.S.W.

N.B. The late Ernestine Hill described the "galah" dawn-tints over Nullarbor and the screeching night winds there . . . N.I.

FERAL CAT REPORTS

Wildlife Officer R. Smith of the Karratha District has reported, since the last issue of S.W.A.N.S., the taking of a feral cat at Yanrey Station.

The animal's stomach contained the following:
3 Geckoes
2 Dragons
2 Large Centepedes
1 Stick Insect
2 Skinks
2 Blind Worms
3 Grasshoppers
1 Spinifex Hopping Mouse (*Notomys alexis*)

Positive identification of the Hopping Mouse was provided by the Western Australian Museum.

This report demonstrates the diverse diet of the feral cat, and the occurrence of the Hopping Mouse is further circumstantial evidence in support of the theory that cats are responsible for the disappearance of many of our native mammals in certain areas.

The Museum, prior to this report, has recorded thirty-two species of mammals, eaten by feral cats. These comprise:—

10 species of bat
9 species of rodent
10 species of dasyurid
Honey Possum
Pigmy Possum
Bandicoot, and
Rabbit.

In some cases, the examination of stomach contents has provided the only locality data for some species, and demonstrates the predatory efficiency of the lovable domestic pet when abandoned in the wild.

An Honorary Wildlife Officer has also reported the taking of a feral cat during a field trip to observe the rare and endangered Naretha Blue-bonnet parrot in its habitat on the edge of the Nullarbor Plain. The cat, which was the size of an average domestic dog, had found a means of capturing prey, by lying in wait under a sheep watering trough and then attacking the birds as they came to drink. His hunting skill could be determined by the large quantities of feathers of this rare bird around the trough.

Field officers put paid to the cat with appropriate action, but evidence of other cats in the bird's habitat is of concern to Departmental officers and ornithologists.

S.W.A.N.S. 1976

Only three issues of S.W.A.N.S. Vol. 6 were published in 1976—Nos. 1–3.

The next issue of S.W.A.N.S. will be Vol. 7, No. 1. 1977.

CHANGES IN THE TAXONOMY OF TINY MARSUPIALS

By Dr. A. A. Burbidge

Two recent papers by Dr Michael Archer have revised the taxonomy of some species of tiny marsupials or "Marsupial-mice". Dr Archer did most of the research for these publications while working under Dr W. D. L. Ride at the Western Australian Museum before taking up his present post of Curator of Mammals at the Queensland Museum.

Prior to Dr Archer's work there was considerable confusion in regard to which species of tiny marsupials occurred in Western Australia.

Australian marsupials fall into three main groups: the Phalangeroids, which include kangaroos, wallabies, possums, wombats and the koala; the Perameloids which include the bandicoots; and the Dasyuroids which include the mainly carnivorous species such as the Tasmanian Tiger, native cats, antechinuses, marsupial mice and the numbat. Dr Archer worked on a group of Dasyruoids known as the Pigmy Antechinuses or Planigales.

In Dr Ride's book "A Guide to the Native Mammals of Australia" four species of Pigmy Antechinuses are listed. Following Dr Archers' work it appears that there are at least six species in Australia, four of which are known to occur in Western Australia. These are:

1. *Ningaui timealeyi.* Ealey's Ningaui

   Dr Archer described a new genus of tiny marsupials for this and the following species. Ningaui is an aboriginal name given to tiny mythological beings that are hairy, have short feet and only come out at night to hunt for food all of which is eaten raw. The specific name *timealeyi* is in honour of Dr E. H. M. ("Tim") Ealey of Monash University who collected the first known specimen of this species while working for C.S.I.R.O. in the Pilbara.
   Ningaui timealeyi externally looks like *N. ridei* (see plate). It occurs in the Pilbara and probably on North West Cape. It apparently inhabits spinifex country.

2. *Ningaui ridei.* Ride's Ningaui (Plate 1)

   This, the other species of *Ningaui*, was named in honour of Dr W. D. L. Ride, for many years the Director of the Western Australian Museum. When Dr Archer wrote his description it was known from only two specimens, both collected about 40 km north-east of Laverton. Since then work by the Western Australian Wildlife Research Centre has shown that it is apparently widespread in W.A. deserts. Specimens are known from Queen Victoria Spring and Neale Junction in the Great Victoria Desert, the Gibson Desert south-west and north-west of Warburton and the Little Sandy Desert near the Carnarvon Range. It also inhabits spinifex country.

3. *Planigale maculata.* Pigmy Marsupial-Mouse
   Originally described by John Gould in 1851 this species occurs in the high rainfall parts of northern New South Wales, Queensland and the Northern Territory. It has only recently been discovered in Western Australia where specimens have been collected on the Drysdale River National Park in 1975 and on Barrow Island in 1973. It is a comparitively large species, does not have a flattened head and the tail is shorter than the head-body length.

4. *Planigale ingrami.* Ingram's Planigale (Plate 2)
   This species is smaller than *P. maculata* and can be distinguished by its flattened head and its tail which is longer than the head and body. In W.A. it is known from the Kununurra region and from near Derby. In W.A. this species was formerly known as *P. subtillissima.*

   There may be another species of Planigale in Western Australia since there is one specimen from Tambrey in the Pilbara which Dr Archer could not assign to any other species. Because the only specimen is

Plate 1, Ride's Ningaui.

[Plate 2, Ingram's Planigale.

damaged no name will be applied until better material is available.

For those who have a copy of "A Guide to the Native Mammals of Australia" by W. D. L. Ride the following amendment can be made to the list of species on p. 120.

PIGMY MARSUPIAL MOUSE, *Planigale maculata.* Northern coastal N.S.W., coastal Qld., northern N.T., Kimberley of W.A., Barrow Island. Rain and sclerophyll forest, woodland, marsh (spinifex on Barrow I).

Recognition: rather smaller than mouse; head rather cone shaped in side view; short grey fur.

INGRAM'S PLANIGALE, *Planigale ingrami.* Queensland, N.T. and Kimberley Division of W.A. Savannah woodland and grassland.

Recognition: much smaller than mouse, head flattened, tail shorter than head-body.

NARROW-NOSED PLANIGALE, *Planigale tenuirostis.* N.S.W. and Qld. Savannah woodland and grassland.

Recognition: similar to *P. ingrami* but muzzle rather narrow making head appear less triangular when seen from above.

GILES' PLANIGALE, *Planigale gilesi.* Qld, N.S.W. and S.A. Arid country west of the Dividing range.

Recognition: similar in external papearance to *P. ingrami.*

EALEY'S NINGAUI, *Ningaui timealeyi.* Northwest of W.A. Spinifex country.

Recognition: smaller than mouse, narrow hind feet.

RIDE'S NINGAUI, *Ningaui ridei.* W.A. arid interior. Spinifex country.

Recognition: similar to *N. timealeyi.*
Plate 35 on p. 121 of Dr Ride's book is actually an illustration of *Ningaui ridei.*

Species of *Planigale* and *Ningaui* are difficult to identify on external charactersitics alone. Very little is known of their distribution or biology. Increasing knowledge will depend largely on interested people who might come across specimens passing them onto the Wildlife Research Centre or the Museum.

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POSSUM PUZZLE

The W.A. Museum and the Department of Fisheries and Wildlife are puzzled over a possum which was picked up dead outside the Carnarvon Shire Council Office on November 3rd. The possum appears to have been struck by a car a short time before.

The W. A. Museum has identified it as a Northern Brush-tail Possum, the scientific name for this species being *Trichosurus arnhemensis* because it was first discovered in Arnhem Land. It is also known from the Kimberley Division and from Barrow Island off the north-west coast. The Carnarvon specimen has a coat colour similar to those from Barrow.

At present scientists do not think that this species occurs on the mainland south of the Kimberley but this Carnarvon specimen may throw new light on its distribution. They would like to know whether the Carnarvon possum is part of a population which lives in or near the town or whether it is an escaped pet.

Anyone having information is asked to get in touch with the Curator of Mammals at the Museum, with Wildlife Officer Geoff Hanley on Carnarvon 41 1135, or the Department of Fisheries and Wildlife, 108 Adelaide Terrace, Perth.

RABBITS ON MISTAKEN ISLAND RESERVE

Following an inspection of Mistaken Island, near Albany, District Wildlife Officer R. Grayson has reported an increase in the number of rabbits inhabiting the island.

Between February and April, the Department of Fisheries and Wildlife, in co-operation with the Agriculture Protection Board, will be baiting the island using carrots as bait and 1080 as the poison.

Readers can refer to S.W.A.N.S. Vol. 5 No. 1, 1975, for further information on the use of carrot baits.

FLORA CONSERVATION NOW INCORPORATED IN WILDLIFE CONSERVATION ACT

In December 1975 the Fauna Conservation Act was amended to retitle it as the Wildlife Conservation Act for the purpose of paving the way for the amalgamation of the laws relating to the protection and conservation of both flora and fauna.

An Act to incorporate flora conservation in the Wildlife Conservation Act was passed by Parliament in November 1976 and will be proclaimed soon to come in to operation.

The main purposes of the amendments are firstly to bring together the administration of flora and fauna conservation in the Department of Fisheries and Wildlife, and secondly, to better protect and conserve the wildflowers and other plants of Western Australia.

For detailed information on the unique flora of Western Australia the reader might well refer to the 1975 Western Australian Year Book and C. A. Gardner's "Wildflowers of Western Australia".

The Year Book explains that there are some 6 500 species of indigenous flowering plants of which a great many are restricted entirely to Western Australia. There are also many species which do not flower but are still important.

Of the flowering plants only a few are really rare and endangered but many more are threatened and require constant monitoring and special protection measures. Three hundred and twenty one species are known only from the original specimens collected.

The late C. A. Gardner, an authority on W.A. wildflowers said, "There are few places in the world which are so renowned . . . for a wealth of wildflowers as Western Australia . . . the splendours of colour and the diversity of tint and shade have made this flora world famous . . . The noteworthy divergencies in Australian flora have always excited the attention of botanists, but that interest has been most specifically centred on the plants of the South West, for this area is the oldest part of the Australian land mass, and in a broad sense, the cradle of Australian plant life".

This is the natural resource and asset which the amended Wildlife Conservation Act sets out to better protect and conserve. In accordance with the Government's previously stated policy, and practices accepted as essential in the other Australian States, the amendments to the Wildlife Conservation Act provide for:

- The preservation of rare species of flora wherever they occur;
- The protection of wildflowers and other plant species in designated regions throughout the State for the aesthetic appreciation and the enjoyment of residents and tourists as well as for scientific purposes;
- The conservation of those wild plant resources utilized by the nurseries and by the fresh cut flower and dry floral art trades, and in the chemical industry.

The provisions relating to the protection of rare species may seem to be somewhat drastic in the unlikely discovery of a rare species on private land. The Minister may, for any period up to 5 years, prevent the landholders from destroying the plants involved. However, there will be provision for the payment of compensation appropriate to each case and for the purchase of the land concerned if that is deemed necessary within the 5 year period.

For various reasons the Act provides for specified species to be declared as "protected" but this has been made as flexible as possible. For example, it is possible to declare as "protected"—

- All species in all or any specified reserves and national parks;
- Specified communities of plants of outstanding scientific value;
- Specified species throughout the State or in a part or parts of the State.

The Act provides also that any of these "protections" may be partly or wholly removed.

In drafting the amendments the following objects were kept in mind—

- Encouragement had to be given to the growing and propagation of all species of native plants, including (under supervision) some of the rare species;
- Landholders have previously had an untrammelled right to clear their land and also a general right to sell most of its product;
- The need for statistical data so that a better understanding can be maintained of the value and ramifications of the exploitation of plants from the wild; and
- To achieve the foregoing with the minimum interference to enterprise; but
- Nevertheless, to be able to take action where any unscrupulous exploitation occurs which might threaten either the resource itself or the future of those who are operating in a responsible way; and
- The Crown (Government Departments and instrumentalities) through its undertakings and works programmes to act as responsibly as it requires members of the public, and industry, to act.

The Act provides that license fees and any royalties collected from the exploitation of protected plants on Crown land are to be credited to the Wildlife Conservation Trust Fund. From the Fund money will then be available for the payment of any compensation which may be necessary or for the purchase of land should a landholder prefer to sell.

The following is a brief summary of the flora amendments which have been incorporated in the Wildlife Conservation Act.

Definitions:

"Flora" means any plant (including any wildflower, palm, shrub, tree, fern, creeper or vine) which is—

(a) native to the State, or

(b) declared to be flora pursuant to subsection (4) of this and includes any part of flora and all the seeds and spores thereof.

"Protected flora" means any flora for the time being declared to be protected flora for the purposes of this Act.

The Act binds the Crown in relation to all flora provisions.

The Minister may declare any class or description of flora as protected flora.

Moneys received from license fees and royalties for taking protected flora on Crown land, will be paid into the Wildlife Conservation Trust Fund.

Crown Land

The property of all protected flora on Crown land is vested in the Crown and may not be taken by any person except under license.

Licenses may be issued for:—

(i) Commercial Purposes, or

(ii) Scientific or Prescribed Purposes at the discretion of the Minister, with the conditions that royalties must be paid at specified rates and that flora taken under license, must be marked by the licensee. Other such licenses may be issued as are prescribed.

Private Land

The owners, occupants or persons authorised by them are permitted to take flora from their land, but may not sell it, unless they hold a Commercial Producers or Nurseryman's license or some other special license issued under this Act. Licenses are issued, upon application, at the Minister's discretion, and may be refused to, or revoked from persons convicted of any offence against the Act. Applications for licenses must specify the land in question and classes and description of flora to be exploited.

Selling Flora

Flora may only be sold by a person who is licensed to do so, or who has purchased flora from a lawfully entitled seller, and who maintains a legible record of:—

(i) the quantity and class or description;

(ii) date of purchase;

(iii) name and address of persons from whom flora was purchased.

This record must be retained for twelve months and be produced on the demand of a Wildlife Officer.

Rare or Endangered Flora

Where any flora requires special protection by virtue of its being rare or endangered it may be declared rare. Any person with a current license to obtain flora later declared rare would then require further consent from the Minister. No person may take rare flora from private land without the written approval of the Minister. Any person who takes rare flora is liable, on conviction, to a penalty not exceeding $1 000.

An owner or occupier of private land having been refused permission to remove rare flora may be granted compensation provided that the Minister is satisfied that the owner or occupier will suffer loss of use or enjoyment of the land. Compensation rates must be agreed upon between the owner or occupier, and the Treasurer, with an appointed valuer being consulted if required.

Where compensation has been paid for a period of five years, the Minister may not refuse a subsequent application, but the land in question may at any time be taken by the Governor, under the Public Works Act 1902, for the purposes of the Wildlife Conservation Act.

P.W.D. CONTRIBUTE TO WATERFOWL CONSERVATION

Throughout Australia, until recent years, consideration for the utilization of water by living organisms other than man received little consideration.

Fish and wildlife were left to exist against the natural elements as well as habitat interference by man. In the past the draining and damming of waterways for man's various industries often resulted in the loss of nests, eggs and young of waterbirds.

This year, drought conditions over wide areas of Western Australia have meant that waterfowl wetland habitat has been reduced in size and quality.

However, the 1976 breeding season would have been a disaster in the waterfowl rich districts of Benger and Busselton, had it not been for the co-operation and interest in waterfowl conservation by Public Works Department engineers and field staff.

Given the standards to work on by the Department of Fisheries and Wildlife, P.W.D. engineers have shown professional and personal interest in species and conditions on their assigned waterway—manipulation projects.

These officers are valuable allies to the conservation of wildlife as they are able to suggest possible solutions to wetland manipulation for the rest and reproduction of present and future waterbird populations.

With Australia second only to South America for the number of genera unique to a particular continent, the Public Works Department's co-operation can be seen as a vital step in the conservation of our valuable diverse, assemblage of waterbirds and their habitat.

STATUS CHANGE FOR BLACK GRASS WREN

The Black Grass Wren (*Amytornis housei*) is no longer considered to be a rare and endangered species.

Since the Prince Regent River Reserve Expedition in August 1974 revealed a greater number of birds in the North West Kimberley, the species is considered to be common in its known habitat.

After recommendation by the Western Australian Wildlife Authority, the Minister for Fisheries and Wildlife declared in the *Government Gazette* of August 11, 1976 that the Black Grass Wren be removed from the list of fauna which is rare and likely to become extinct.

Our Diminishing Heritage

The sea, which covers the majority of the Earth's surface, is virtually the "last frontier" in terms of the discovery of possibly many new forms of unknown creatures.

Whilst the fish and their more humble relatives dominate in numbers of species this domain of intrigue, three main orders of warm blooded mammals share the marine environment.

The seals and whales represent two of the forms of which many stories of legend and fact have been written depicting these denizens of the deep. The third order, the "Sea-cows" or *Sirenia*, leads us to an animal of which very little is known to man.

The word *Sirenia* was taken from the ancient belief in Sirens who, with their weird songs, lured unwary ancient mariners to their destruction in the surf. These beasts were often observed on the surface of the sea by early navigators, and reports of the sightings were often fantasised to those of beauteous blonde women of the sea or mermaids with flowing tresses and fish-like tails.

However, these beasts, like whales, have no definite voice, so that if the sirens' singing was based on that of the Sea-cow, it must have represented a highly imaginative conception of the whistling sigh of air rushing through the nostrils—although calves are said to have a bleating cry like a young lamb.

The Dugong (*Dugong dugon*), the species of Sea-cow in Australian waters, has two related species, the Manatee in the tropical Atlantic and the extinct Steller's Sea-cow (a huge animal of 35 ft in length) which inhabited the Bering Sea. Dugongs grow to around 10 ft (3 metres) in length and weigh between 1 000 and 1 200 lbs (450 kg and 550 kg), somewhat less than the related Manatee. Very little is yet known about the breeding biology of the Dugong and much vital data are still required about the time-scale of the life history. Nothing is known about the age of maturity, length of gestation, period of suckling or rate of growth.

In Western Australia Dugong are found in the waters of Shark Bay and Exmouth Gulf; along the North West coast, with concentrations having been recorded in the vicinity of Port Weld and the Dampier Archipelago and in the Kimberley. From there, the Australian extent of their range is around the north coast to within the Great Barrier Reef. The animal is the only species of herbivorous mammal that lives entirely in the sea and is in fact physically incapable of leaving the water.

They are essentially sociable creatures and may assemble in herds of 6 to 40 or more individuals, in which females are always more numerous than males. Shallow seas, bays and estuaries are frequented, where they browse not upon algae as first thought, but upon the marine grasses, existing in great abundance throughout the reef flats of the inner tropical coasts.

Dugongs are inoffensive, sluggish creatures except when alarmed and are apparently endowed with comparatively small intelligence.

Usually a single calf is born and is tended with fastidious care by the mother. The flippers, more flexible and of looser elbow action than in males, enable the sea-cow to hold her nursling partly clasped to her breast when rising with head and shoulders exposed to suckle it; also rising frequently to breathe, she is careful to see that the calf gulps in fresh air.

As in most mammals the head of the Dugong is small in comparison to the body. The nostrils, though having a valve-like flap, are situated at the extremity of the muzzle; the eye is small while the inconspicuous ear provides acute hearing.

The general term "Sea-cow" is derived purely from the bovine feeding habits of grazing on the sea-grasses. It has been scientifically determined, however, that the animals are directly related to the terrestial elephant.

The extraordinarily mobile and greatly enlarged upper lip is of considerable aid in feeding, as it is sufficiently prehensile to seize grass and thrust it back into the mouth, the action being aided by strong backwardly directed bristles on the lip.

The two teats of the dugong are situated on the breast beneath the flippers, thus emphasising again the relationship with elephants in which the single pair of teats is placed between the fore legs, in contrast to the addominal udder of cows. The ivory tusks found in dugong are also analogous to those of elephants in that both are front or incisor teeth, and not canines as are the tusks of wild boars or hippopotami.

In sea-cows and elephants there is a unique provision for the replacement of worn teeth by a progression forward of the rearmost molars. This steady progression forward of unlimited number of teeth compensates for the rapid wear and tear involved in eating aquatic plants with which a large amount of sand may be mixed.

The bones of Dugong are noted for their high density, especially the skull and ribs, the weight of which helps the ungainly animals to remain submerged while feeding.

The hide of the beast is a thickened leathery skin with fine hairs discernible over the body and covering a layer of oily blubber. The skin (usually scarred by contact with jagged coral and possibly the tusks of males) varies in colour from reddish-brown to bluish or greenish olive-grey with fleshy white under-parts.

Throughout the world (see distribution opposite page) Dugong have been hunted and killed for their tusks, hides, oil and very palatable high-protein flesh. Aphrodisacal and medicinal properties have also been attributed to Dugong oil and meat

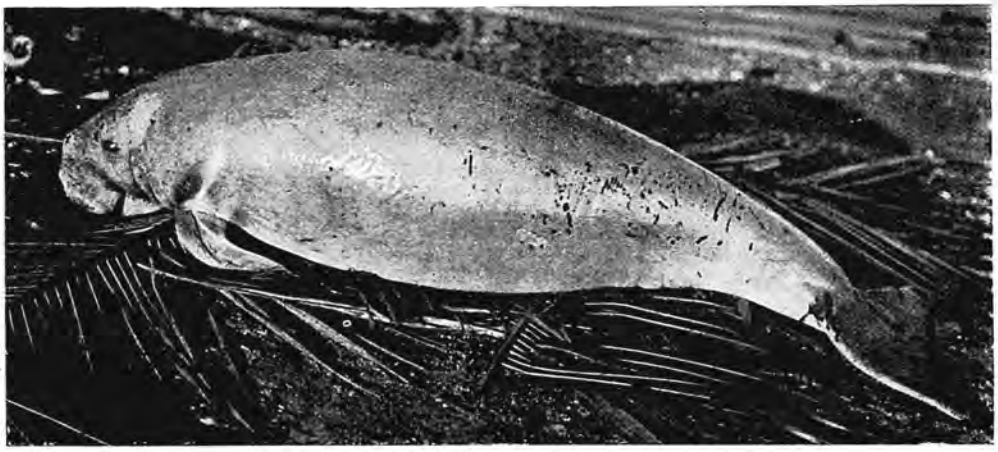
Although the Australian Aborigine is still allowed to hunt the Dugong for food, the beasts appear to have found a secure home, away from man's predations in Australian waters. The calculated stable numbers, remote breeding grounds and its classification of rare and likely to become extinct, give the animal a chance of survival in Western Australia.

DUGONG

DUGONG DUGON

Moves are afoot to commence further studies on the Dugong in Western Australia, which will further enhance the existence of these gentle vegetable feeders.

It cannot be over emphasised that their increasing scarceness, defencelessness, and their apparent slow rate of breeding render it essential that the protection at present afforded should be extended for all time and rigorously enforced.



DISTRIBUTION

Distribution of the Dugong is from Madagascar, following the coastline of Africa, Asia Minor and Asia, including India, the Malay Peninsula, Indonesia, Northern Australia, New Guinea, the Solomon and Marshall Islands, and as far north as Taiwan.

SIZE

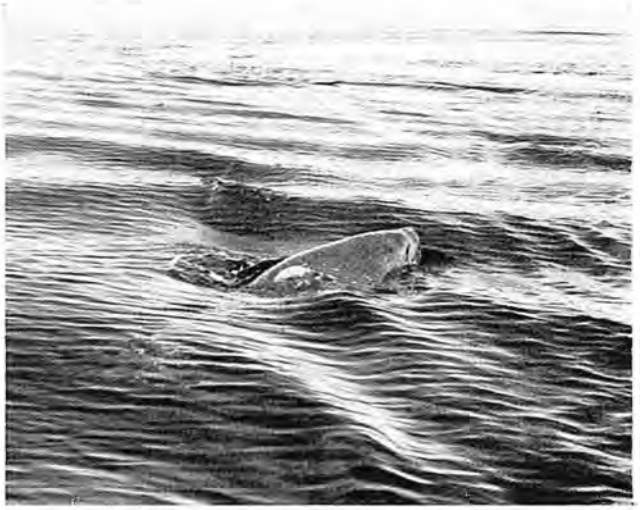
Adult (average) 3 metres
Weight (average) 450 kg–550 kg

FOOD

Sea Grasses particularly *Diplanthera* (*Halodule*), and *Cymodocea*—

COLOUR

Reddish-brown to bluish or greenish olive-grey, white under-parts. Older animals may be heavily scarred.



Dugong on the surface in Shark Bay, July, 1966. Photo by J. L. Bannister.

WARNING: THE SWAN COASTAL PLAIN— A POSSIBLE DESERT

A. Tingay

The growth of a city is naturally accompanied by increasing demands on natural resources required by the population such as land, water, timber, stone and clay etc. The provision of these resources also often becomes more expensive as supplies dwindle or have to be brought from more distant areas. Often these costs may include damage to or loss of significant, interesting and beautiful parts of our environment. This is well illustrated by the problems of supplying water to the rapidly increasing population of Perth.

In 1972 the demand for water in the Perth area was 223 million cubic metres and this is expected to increase to 729 million cubic metres by the year 2000. Demand for water in the past has been met by damming rivers within the Darling Plateau but these can no longer supply current demands and extraction of groundwater from shallow aquifers is now occurring in the Wanneroo and Jandakot areas of Perth. It is anticipated that, if Perth's population continues to grow at its present rate, this source will not be sufficient to meet demand by 1990 and then rivers running to the south coast such as the Warren will have to be dammed and pipelines laid to Perth. Many of these rivers are our finest beauty spots and offer tremendous tourist and recreational potential.

Damming

The damming of a river drastically alters its ecology. Reservoirs are typically large, deep bodies of water similar to true lakes and similarly are of low productivity. Moreover although the area of land drowned by a dam is relatively small, the impact is serious because of its selective nature which affects vegetative types largely restricted to valleys. The effects on fauna are probably a reduction of habitat for birds, particularly passerines that prefer dense vegetation (these include the rare Red-eared Firetail Finch), but possibly an extension of habitat for the marron, catfish, oblong turtle and the introduced trout. Effects on recreation are also considerable as most activities are prohibited in catchment areas.

Underground Supplies

The effect of extraction of water from the borefields north and south of Perth may well be a general lowering of the water table by 5 metres or more near each bore decreasing to 2 metres at 2 kilometres distance. The number of proposed bores means that a vast area of land will be affected from south of Wanneroo to the Moore River in the north.

As the lakes adjacent to the borefields are simply expressions of the water table the effects of extraction on lake levels and vegetation may be considerable. At its worst a number of lakes in the Wanneroo area may dry up and their vegetation may die. Moreover, all vegetation overlying the borefields may be seriously affected by the reduction in the availability of water.

Many trees near to operating bores are already dying in the Gnangara area.

The effect on fauna is likely to be more rapid and drastic as the lakes likely to be affected are permanent freshwater areas which are few on the Swan Coastal Plain and thus are critical summer drought refuges for waterfowl. Two of these lakes, Jandabup and Nowergup, are fauna reserves and it has been predicted that the former may in the future be dry for eleven months of the year.

It has been suggested that lake levels could be maintained by pumping some of the extracted groundwater back into them but the costs of such schemes have not been estimated and at present no guarantees that they will be installed have been given. Moreover, it is not known whether the groundwater will fulfil the same ecological role as the present water within the lakes and whether it will maintain the same levels of productivity. There is little information available on the flora and fauna of the area and their requirements on which management plans may be based but the Department of Fisheries and Wildlife, the Department of Conservation and Environment and the Metropolitan Water Supply, are now co-operatively planning for ecological studies and fauna surveys to be undertaken.

A possible solution to the problem is offered through an analysis of the uses of water in the Perth area.

Perth has the highest per capita consumption of water of any Australian capital city and a great deal of this is wasted principally by inefficient watering of gardens. Significant reductions in water demand are possible if householders were to use efficient sprinklers for minimum periods of time and during the night time when evaporation is low rather than during the day.

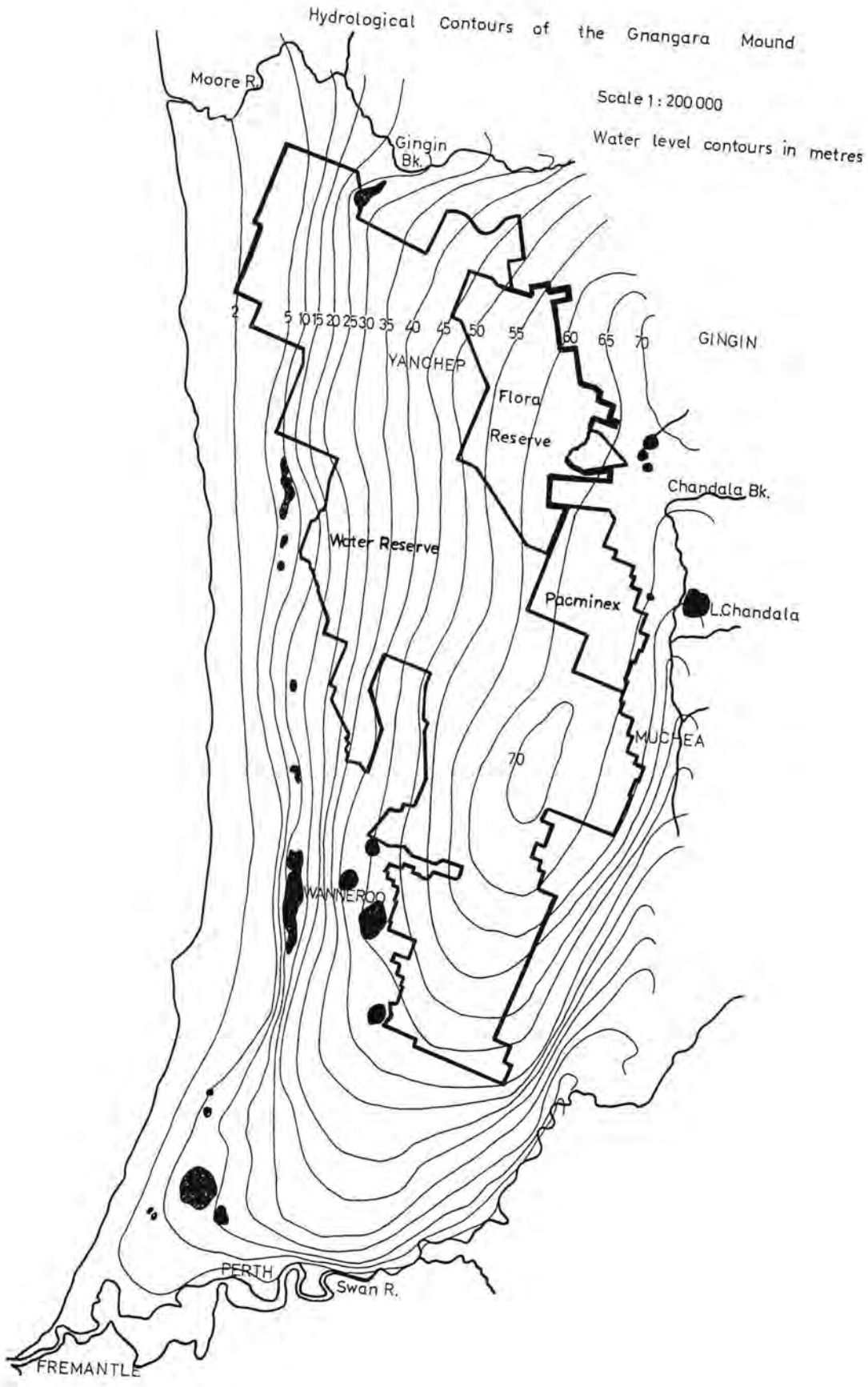
Native plants also require far less water than lawns and exotics and their planting could be encouraged.

Further gains could be made if rainwater tanks were generally installed to utilise the catchment provided by every roof and even by home owners fixing all leaking taps.

These changes could be brought about by publicity campaigns emphasising the problems and solutions and by pricing policies more in line with the supply of a scarce resource which water is in Western Australia. Both of these methods are environmentally long overdue.

If Perth's population were to become more environmentally conscious in its use of natural resources many of the problems illustrated above by the example of water would not arise. However, in time this alone will not be sufficient if the city's population growth continues unchecked; the undesirable consequences will only be postponed.

Those consequences are unacceptable and it is high time to seriously apply ourselves as a community to this the most fundamental of the world's problems, overpopulation.


Hydrological Contours of the Gnangara Mound
Scale 1 : 200 000
Water level contours in metres
Moore R.
Gingin Bk.
2
5
10
15
20
25
30
35
40
45
50
55
60
65
70
GINGIN
YANCHEP
Flora Reserve
Chandala Bk.
Water Reserve
Pacminex
L.Chandala
MUCHEA
70
WANNEROO
PERTH
Swan R.
FREMANTLE

LAKE CHANDALA— A PROPOSED NATURE RESERVE

A. Tingay

Negotiations have been completed in connection with the purchase of Lake Chandala by the Western Australian Wildlife Authority. The portion of Swan Location 1371, part lot 2, was offered for sale by Mr Alan Fewster of Muchea and the Authority took advantage of the opportunity to acquire one of the State's most important proposed nature reserves.

Formalities for the finalisation of the area as a nature reserve are now under way.

Lake Chandala, 50 km north of Perth, is a fauna sanctuary of great importance as the large old swamp paperbarks which grow in it support one of Western Australia's few remaining Straw-necked Ibis nesting colonies. This is a very attractive ibis with dark blue wings with a metallic sheen, white underparts and straw-like yellow feathers on its lower neck. It stands about 70 cm tall and has the long curved beak characteristic of all ibis which it uses to catch insects in long grass fringing swamps and in pasture lands.

All ibis nest in colonies which sometimes number thousands of pairs. Lake Chandala supports at least several hundred pairs during the breeding season and these present a magnificent natural spectacle.

In the early sixties this was also the site of bird banding activities by the C.S.I.R.O. when more than 2 000 nestlings were banded. Some of these have since been recovered in the Kimberleys, the Northern Territory, Queensland and even New South Wales, establishing the species as one of the most nomadic in Australia.

The lake also supports a large variety of waterbirds, many of which are nesting species.

Flock of Straw-necked Ibis over Lake Chandala.

Straw-necked Ibis nest.

In the past attempts have been made to drain the lake and to clear the vegetation but although they have modified the environment to a certain extent, these have been unsuccessful. Although the reserve will undoubtedly be one of the most important fauna sanctuaries in the State, it will still face management problems.

It is close to the proposed Pacminex Alumina refinery site so the threats of industrial pollution are great and increased human disturbance may result from subsequent associated urbanisation. There is also the serious threat of lowering of the water table in the area by groundwater extraction from private and government bores.

Lake Chandala therefore presents an ideal example of the planning that is necessary for the conservation of fauna and of some of the problems this involves. At the same time, if offers the opportunity for ornithologists to observe a spectacular congregation of birds at only a short distance from Perth.

CHANGE OF ADDRESS

After each issue, a number of copies are returned as 'unclaimed', 'insufficient address' 'no longer at this address' etc. These names are then removed from the mailing list.

To ensure that you receive your future copies of S.W.A.N.S. **any change of address should be notified.**

(Editor.)

EARLY 1976'77 DUCK SHOOTING SEASON

The 1976/77 duck shooting season opened at 6 p.m. on Saturday, December 18, 1976 and closed at 8 p.m. on Sunday, January 16, 1977.

The Bird Committee of the Western Australian Wildlife Authority had given careful consideration to the views of the W.A. Field and Game Association and the Department's research staff before recommending the limited season.

Aerial and ground surveys had been carried out late in 1976 by the Department of Fisheries and Wildlife and this had revealed that about one-third of the shooting area within the South West and Eucla Land Divisions was not available due to the dry seasonal conditions.

Reports indicated that breeding within the waterfowl population had been minimal this season and the reduction of the shooting season to one month plus a change in the daily bag limit from ten to six birds was to assist in moderating the shooting pressure.

Lake Towerrinning in the West Arthur Shire was closed to shooting to provide an additional refuge area. Also, the Avon River between the Northam Townsite and Dumbarton Bridge was closed so that the summer pools provided protection for birds moving to the area from further inland.

Game species for the season were:—

Whistling Tree-Duck *Dendrocygna arcuata*
Plumed Tree-Duck *Dendrocygna eytoni*
Mountain Duck *Tadorna tadornoides*
Black Duck *Anas superciliosa*
Chestnut Teal *Anas castanea*
Grey Teal *Anas gibberifrons*
Blue-winged Shoveler *Anas rhynchotis*
White-eyed Duck *Aythya australis*
Wood Duck (Maned Goose) *Chenonetta jubata*

A report on the results of the season will be given in a following issue of S.W.A.N.S.

OUR ATTITUDE TOWARDS NATIVE PLANTS

By R. Powell

(reprinted from W.A. Wildflower News, Vol. 13, No. 4, Nov. 1975)

Since colonization, Western Australians have grown exotic plants. A gardening tradition has evolved with certain clear characteristics. Admired most are:

- the showiest plants (with large, bright flowers; dense foliage; bright green or variegated leaves)
- plants which are neatly shaped.

Gardens are seen as collections of individual plants. The greater the number of showy plants in a garden, the more it is admired. It does not matter if those plants do not harmonize; in fact, they are often purposely planted so that they contrast with each other, to heighten the spectacle. Fundamental to the keeping of such a garden are certain gardening habits—

- pruning (to maintain a neat shape and to increase the mass of foliage and the abundance and density of flowers)
- spraying (to maintain a tidy, unblemished appearance)
- digging, fertilizing and watering (to encourage the plants to produce a lot of foliage and abundant flowers—and, indeed, to keep them alive in our climate).

Today, some people are growing native plants. But that is no real revolution: they admire them according to the same criteria and treat them in much the same manner as the exotics. Consequently, not many native plants have become popular. Only thirty to fifty native Western Australian genera contain a majority of showy species (such as *Banksia* and *Acacia*) and only fifty or so genera can even muster more than one or two showy species. Altogether that is less than one hundred of the State's seven hundred and forty-four native genera. Certainly, most native Western Australian plants are not showy; nor do many of them grow into a neat shape.

But should we judge native plants (things of nature) by the same criteria as exotics? Are we going to admire and cultivate only those comparatively few that are showy? I believe that every native plant is beautiful, and worth growing, it if is looked at in the right way

Many large trees, particularly Eucalypts, are admired for what is described as their grace, form or character. Why not admire other native plants in the same way? All native plants, large or small, grow according to a formula. The formula is different for each species and the plant is further modified by its environment; thus there are produced patterns of an endless variety. Each pattern is delicate, whether it be a fine pattern produced by, slender branches and dispersed foliage, or a bizarre one where branches twist or form sharp angles. The leaves themselves, which may be divided, toothed, wedge-shaped, etc., add to the pattern. (Many of the patterns are emphasized when the plant supports raindrops or the morning dew.) Exotic plants, which bear more foliage, or bigger leaves, often conceal their pattern of growth. Moreover, in cultivation the plant's structure is distorted either through selective breeding or simply because it is growing in an unfamiliar climate. And, of course, if the plant is pruned the pattern is destroyed.

Nothing is more harmonious than unspoiled bushland; the plants all belong together—they have evolved together. For the gardener who desires his garden to be harmonious and integrated, a collection of local native plants has an immediate advantage over one of exotics (from different countries and climates). But one can increase the harmony much further still by imitating the way plants occur in nature. For example, in the sand-dunes, where plants are of many different colours and textures, they diffuse through one another, which mutes and blends the colours; one can space such plants appropriately in the graden to produce a similar effect. Thus there is an opportunity to have a garden with a beauty of an altogether different kind—a kind seldom even hinted at by the exotic garden.

Watching the behaviour of native plants can also awaken our admiration. In particular, their seasonal behaviour—which enables them to thrive in our climate —is often quite dramatic. It is enchanting to observe the small plant *Opercularia vaginalis* in its transition

In gardening books we often see the phrase "ugly old wood"—but woody is the very nature of most of our perennial plants, which must survive harsh dry summers. If we find wood ugly we cannot enjoy the beauty of our native plants.

from its late summer condition—brown and all but leafless—to its condition in winter, when it is dense, leafy and bright green. Some native plants (e.g. *Acacia pulchella*) flower first during the wet season then grow, whereas others (e.g. *Pimelia floribunda*) grow first, then flower. Although many plants become dormant in summer, others (e.g. *Melaleuca acerosa*) are at their softest and greenest. Others flower at that season.

Natural flora attracts natural fauna. We can wonder at the diverse designs by which native plants lure their pollinators. We can also enjoy the company of the birds and other small creatures which the plants bring us.

There is much to admire in native plants. What is most important is that we cannot admire many of them if we require them to conform to rigid ideas. We must look at them with humility, with a mind open to the delight the plant can give us, each in its own way.

And should we treat native plants as we treat exotics? If we admire the plants' form we shall never prune them. As they become old and develop their character to the fullest, so we admire them more (just as with trees). If we admire native plants for the way they harmonize with each other we shall study the plant communities in nature and try to copy them in the garden. If we admire the way plants adapt to our climate we shall grow plants that occur in the same climate as that where we live. We shall not water plants (except when they are very young and vulnerable); we shan't want to interfere with the plant's seasonal behaviour.

We are very lucky to have native flora around us to see. At last we are cultivating some of our own plants. But if we are to go any further, I believe, our thinking must change, along with our gardens. We must realize that native plants are all worth cultivating. Obviously there are far too many of them for anyone to grow them all, but if each of us stuck to the plant communities of his own locality, then between us we could cultivate a substantial proportion. If we grow native plants we can learn about them; if we don't change our attitude we shall never get to know the great majority of our plants.

LITTLE FALCON PROTECTED

At last some of our antiquated laws are slowly emerging to become victims of modern day commonsense.

In the *Government Gazette* of May 28, 1976 the Minister for Fisheries and Wildlife declared a new list of unprotected fauna in Western Australia. This appeared in S.W.A.N.S. Vol. 6 No. 2.

The Western Australian Wildlife Authority had recommended that the Little Falcon (*Falco longipennis*) be deleted from the new list as it appeared that the bird was not causing the damage to stock and property as first suspected many years ago.

A situation had also arisen whereby the markings of the bird produced a likeness similar to that of a Peregrine Falcon. This led to the situation where the Little Falcon could be indiscriminately shot by gun happy vandals and the very similar Peregrine (a rare and endangered species) therefore placed in jeopardy and the warrant of a $1 000 fine.

The Agriculture Protection Board raised no objection to the reclassification providing there was a liberal policy regarding the issue of damage licenses to people whose pigeons or poultry were being attacked.

Commercial poultry growers have fully confined premises which prevents their exotic stocks from intermingling and competing with indigenous birds; a paradox exists however in the case of domestic pigeons (also exotics) which are regularly released for exercise and sporting purposes.

According to the Wildlife Conservation Act, pigeons are unprotected introduced fauna and whilst they are the hobby of some breeders, these birds at large are considered by many to be exotic intrusions to the State's indigenous fauna.

Birds of Prey have been persecuted by man since time immemorial; whether protected or unprotected, it is folly to believe that they can be wilfully exterminated in preference to exotics.

ANIMALS IN SANCTUARY

It can be said that "animal sanctuaries" whether they be private zoos or public parks have (if not for the benefit of the species, then for the education of children) a place in our society.

In W.A. there are a few licensed animal sanctuaries, and many park lakes and private properties where indigenous fauna is tame and allowed to roam free.

An article on "Progressive Animal Sanctuaries", recently written in an Eastern States journal and distributed throughout Australia raised the following comments from a senior research officer of this Department.

The article emphasised the necessity (for complete education) of hand feeding and touching wildlife.

While the concept of open animal parks or farms is quite a good one, there are problems associated with the level of contact between people and animals.

Last year at Tidbinbilla, a child was blinded in one eye by an inquisitive pet emu.

Each year people who take in sick and injured young kangaroos forget to release the animals back in the wild when they are fit and well. It is inevitable that one day, the mature buck kangaroo will virtually "beat up the children, attack the lady of the house and eat the washing off the line".

Other animals in open-close-contact situations can also present real hazards when they not only become used to being hand fed but actually start to demand food from visitors, etc. Even a determined mountain duck is quite capable of injuring a small child in this situation, and swans at suburban lakes can often be seen "extorting" food from visitors.

Under supervision, a child is protected while feeding a barrage of begging swans at Lake Monger.

Further, in overseas countries, the expectations developed by large animals in the wild when accustomed to regularly obtaining food from humans has lead to deaths and serious injuries, e.g. grizzly bears in the U.S., and baboons and elephants in Africa.

Animals are not extensions of the human ego, and to adopt the attitude of "feed and touch" is inherently dangerous, and no less degrading to the animals themselves than the sight of animals behaving abnormally in the "cells" of lower class zoos.

Determined swans harass a child to the point of panic—a dangerous situation near water.

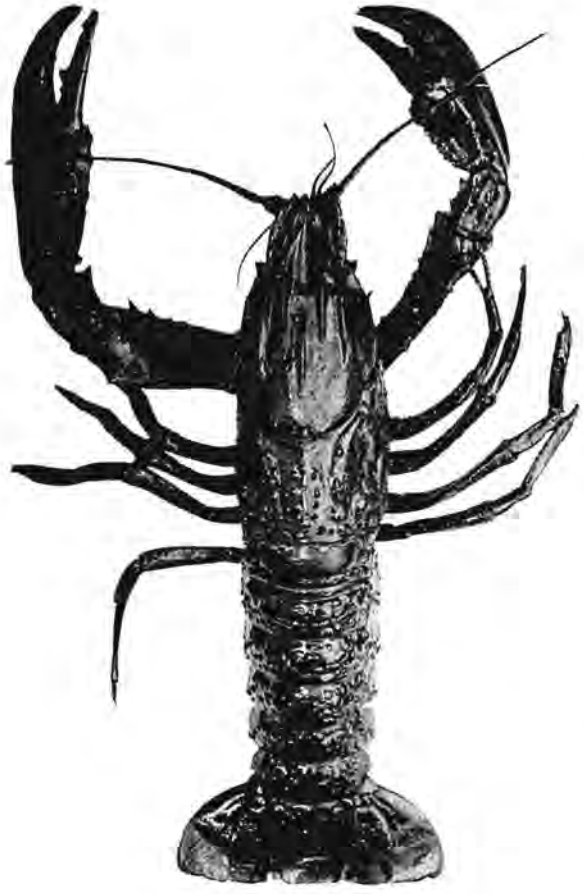
KEEPING MARRON IN SMALL BACKYARD POOLS

Marron, and other Western Australian freshwater crayfish may be successfully kept in small backyard pools, ranging in size from as small as 1½ m in dia. (plastic wading pools) to larger ponds of the conrcete fish pond type. Water depth need not be in excess of 15 cm. New concrete pools should be well-cured with lime before use and the bottom should be covered with coarse sand. If a normal tap supply is used, the water should be allowed to dechlorinate for a week, or so with aeration upon first filling of a pool. If bore water is used and contains iron in solution, the iron must be allowed to ozidixe and precipitate out of solution before the water is added to the pool. Complete changes of pond water are not required, unless the marron are frequently overfed.

The pool should be completely shaded from direct sunlight during the summer to prevent water temperatures exceeding 25°C or so. Aeration of small pools may be provided by several air stones running off a small aquarium type compressor. Aeration may only be necessary when water temperatures are high (usually late afternoon) or in the early morning if algae is present.

Algae may be in the form of long green strands or minute green cells giving the water a green soupy appearance. An algal "bloom" will result in an oxygen deficiency developing overnight.

The larger crayfish should be provided with individual shelters; short lengths of P.V.C. piping are suitable. If mating and spawning occurs in the early spring the young marron, resembling their parents, will be released from the swimmerets under the tail of the female in November in the Perth area. Bunches of rope fibre should be placed in the pond in anticipation of the release of young. When release occurs the young will seek out this shelter and remain in or close to it during early life. Rather than disturb the female to see how spawning is processing, examination of the weed in December will tell whether spawning has finished or not, for the young marron, if present, cling to the fibre bunches when it is pulled out of the water. For the very best results large adult non-spawning crayfish should be kept in a separate pond from the small young. It is possible to maintain a number of small ponds on schedule of growing, cropping and restocking. Females can breed at two years of age, but usually breed for the first time at three years of age.



Marron *Cherax tenuimanus*.

The worst practice in marron raising is any zealous tendency to overfeed. Excessive feeding will pollute the water, cause deoxygenation, and deaths. Lumps of meat are particularly bad in this respect.

Poultry pellets can be fed but require some weeks to break down to a rich bottom layer of detritus. Red manure, (compost worms) is better for a small pond and just a few marron since it can be eaten immediately and does not pollute the water. These worms can be cultured the year round in a wooden box, kept in a cool place, initially filled with a mixture of pre-soaked cow manure and garden peat moss (1:1). Soaked poultry pellets or kitchen vegetable scraps (non-acid) can be placed on the surface of the mixture occasionally to feed the worms. Larger worms with a "collar" are breeders.

In stocking the pond, male marron are distinguished by having two bluish penes at the base of the most posterior pair of the five pairs of legs. Females have an opening at the base of each of the middle pair of legs.

In the smallest size pool suggested at the beginning probably no more than half a dozen legal sized marron can be stocked. Even then some initial fighting may result in deaths particularly if no shelters are provided.

At times each marron will become inactive and tend to remain in its shelter or when moving about appear very sluggish and perhaps are covered in a furry coat of algae. This behaviour is normal and the marron should not be interfered with as it is preparing to cast off its shell, called ecdysis, the growth process in crayfish. The empty shell will be seen some time later while the marron will be, after a short period of "hardening" (when again it should not be handled) most active in its shiny new shell and eat more food per day than at any other time.

NATURE RESERVES

The Wildlife Conservation Act defines a nature reserve as "an area of land which is vested in the Crown and which the Governor, subject to such conditions and limitations as he thinks fit, reserves to Her Majesty or disposes of in the public interest pursuant to the provisions of paragraph (g) of subsection (1) of section twenty-nine of the Land Act, 1933, for the conservation of indigenous flora or fauna".

Prior to the Act being amended in 1975 nature reserves were known as wildlife sanctuaries and included reserves for the conservation of fauna only. With this change in definition the Wildlife Authority assumed responsibility for an additional 396 reserves.

This accounts for most of the large increase in the number of nature reserves during the past year.

A new system of reserve statistics is at present being set up at the Wanneroo Wildlife Research Centre. When information is available from this system it will follow on in the tradition of previous reserves information in S.W.A.N.S. It will be seen that future statistics will follow the figures hereunder which were recorded on June 30, 1976.

A. NATURE RESERVES IN WESTERN AUSTRALIA

Year	Total Number	Area (ha)	Vested in the W.A. Wildlife Authority No.	Vested in the W.A. Wildlife Authority Area (ha)
30 June 1969	278	2 342 966	127	818 442
30 June 1970	315	2 100 318	156	867 362
30 June 1971	359	4 955 893	213	4 415 595
30 June 1972	404	5 077 224	242	4 533 944
30 June 1973	440	5 013 287	265	4 607 266
30 June 1974	454	5 033 935	281	4 626 617
30 June 1975	491	5 103 037	320	4 713 482
30 June 1976	918	5 339 547	351	4 747 403

B. SUMMARY OF NATURE RESERVES—30 JUNE, 1976

As at June 30, 1975	491 Reserves	5 103 037·354 7 ha
New Reserves 1975/76	32 Reserves	20 458·055 7 ha
Amendments 1975/76	1 Reserve +	10 293·069 3 ha
Add Flora Reserves	396 Reserves about	206 159 ha
TOTAL	918 Reserves	5 339 947·479 7 ha

C. NATURE RESERVES VESTED IN W.A. WILDLIFE AUTHORITY

As at June 30, 1975	320 Reserves	4 713 742·153 3 ha
New Reserves 1975/76	23 Reserves	16 421·682 1 ha
Amendments 1975/76	...	10 185·291 3 ha
Existing Reserves vested 1975/76	8 Reserves	7 053·888 3 ha
TOTAL	351 Reserves	4 747 403·015 0 ha

D. NEW RESERVES (Fauna or Fauna and Flora only)

No.	Name	Vesting	Area (ha)	Gazetted
A 33466		W.A.W.A.	5 131·000 0	11/7/75
33455		W.A.W.A.	270·484 3	11/7/75
33475		W.A.W.A.	1 735·000 0	11/7/75
33501		...	203·406 5	11/7/75
33530	Wongan Hills	W.A.W.A.	417·494 2	15/8/75
20095		...	99·588 1	5/9/75
23602	Gunyidi	W.A.W.A.	121·405 7	17/10/75
33697		W.A.W.A.	212·945 9	31/10/75
8830	Bulgin Rock	W.A.W.A.	23·911 7	14/11/75
33713		...	116·777 1	14/11/75
33749	Boodalan Island	Shire of Murray and W.A.W.A.	1·5602	28/11/75
8946	Malcolm Dam	Min. for Water	400·638 8	12/12/75
33811	Bedout Island	W.A.W.A.	30·711 6	31/12/75
33803	Kwinana Freeway	W.A.W.A.	4·422 4	31/12/75
33828	Charlies Island	W.A.W.A.	Unknown	23/1/76
33829	Friday Island	W.A.W.A.	0·819 5	23/1/76
33830	Fortescue Island	W.A.W.A.	45·419 3	23/1/76
33832	Low Rocks	W.A.W.A.	4·032 3	23/1/76
33834	Serrurier Island	W.A.W.A.	350·967 0	23/1/76
27354	Neridup	W.A.W.A.	215·558 4	23/1/76
33842	Quarram	W.A.W.A.	3 825·412 3	6/2/76
33854		W.A.W.A.	19·508 4	6/2/76
A 21253	Lake Gounter	W.A.W.A.	3 330·442 3	13/2/76
33901	Koks Island	W.A.W.A.	2·580 6	5/3/76
33902	Lowendal Islands	W.A.W.A.	245·161 9	5/3/76
33903	North-East Regnard Island	W.A.W.A.	42·322 5	5/3/76
A 13145		...	133·610 5	12/3/76
10129		Min. for Water	2 480·318 3	12/3/76
9219		Min. for Water	168·349 2	19/3/76

(*continued from page* 71.)

No.	Name	Vesting	Area (ha)	Gazetted
14522	....	Min. for Water	338·721 9	19/3/76
20046	....	W.A.W.A.	390·521 6	14/5/76
34000	Wogerlin Hill....	Min. for Water	94·936 2	14/5/76
	Total	32 reserves	20 458·055 7 ha	
	Total vested in W.A.W.A.	23 reserves	16 421·682 1 ha	

(*continued from page* 54.)

The red man has always retreated before the advancing white man, as the mist of the mountain runs before the morning sun. But the ashes of our fathers are sacred. Their graves are holy ground, and so are these hills, these trees. This portion of the earth is consecrated to us.

We know that the white man does not understand our ways. One portion of the land is the same to him as the next, for he is a stranger who comes in the night and takes from the land what he needs. The earth is not his brother, but his enemy, and when he has conquered it, he moves on. He leaves his father's grave behind and he does not care . . . His father's grave and his children's birthright are forgotten.

He treats his mother, the earth, and his brother, the sky, as things to be bought, plundered, sold like sheep or bright beads. His appetite will devour the earth and leave behind only a desert.

I do not know. Our ways are different from your ways. The sight of your cities pains the eyes of the red man. But perhaps that is because the red man is a savage and does not understand.

There is no quiet place in the white man's cities. No place to hear the unfurling of leaves in spring, or the rustle of insects' wings. But perhaps it is because I am a savage and do not understand. The matter only seems to insult the ears. And what is there to life if a man cannot hear the lonely cry of the whip-poor-will or the arguments of the frogs around a pond at night?

I am a red man and do not understand. The Indian prefers the soft sound of the wind darting over the face of a pond and the smell of the wind itself, cleansed by the midday rain, or scented by the pation pine . . .

So we will consider your offer to buy our land. If we decide to accept, I will make one condition. The white man must treat the beasts of this land as his brothers.

I am a savage and I do not understand any other way. I have seen a thousand rotting buffaloes on the prairie, left by the white man who shot them from a passing train. I am a savage and I do not understand how the smoking iron horse can be more important than the buffalo that we kill only to stay alive . . .

If all the beasts were gone, men would die from a great loneliness of spirit. For whatever happens to the beasts soon happens to man. All things are connected . . .

Teach your children what we have taught our children, that the earth is our mother. Whatever befalls the earth befalls the sons of the earth. If men spit upon the ground, they spit upon themselves.

This we know: the earth does not belong to man, man belongs to the earth. This we know; all things are connected like the blood which unites one family.

Man did not weave the web of life; he is merely a strand in it. Whatever he does to the web, he does to himself.

But we will consider your offer to go to the reservation you have for my people . . . It matters little where we spend the rest of our days.

Our children have seen their fathers humbled in defeat. Our warriors have felt shame. And after defeat they turn their days to idleness and contaminate their bodies with sweet food and strong drink. It matters little where we pass the rest of our days—they are not many . . .

But why should I mourn the passing of my people? Tribes are made of men, nothing more. Men come and go like the waves of the sea. Even the white man, whose God walks and talks with him as friend to friend, cannot be exempt from the common destiny. We may be brothers after all; we shall see.

One thing we know which the white man may one day discover. Our God is the same God. You may think now that you own Him as you wish to own our land. But you cannot. He is the God of man. And His compassion is equal for the red man and the white. This earth is precious to Him. And to harm the earth is to heap contempt on its Creator. The whites, too, shall pass—perhaps sooner than other tribes . . .

But in your perishing you will shine brightly, fired by the strength of the God who brought you to this land, and for some special purpose gave you dominion over this land and over the red man. That destiny is a mystery to us, for we do not understand what will be when the buffalo are all slaughtered, the wild horses are tamed, the secret corners of the forest are heavy with the scent of many men, and the view of the ripe hills is blotted by talking wires. Where is the thicket? Gone. Where is the eagle? Gone.

And what is it to say goodbye to the swift pony and the hunt? The end of living and the beginning of survival.

We might understand if we knew what it was that the white man dreams, what hopes he describes to his children on long winter nights, what vision he burns into their minds, so that they will wish for tomorrow.

But we are savages. The white man's dreams are hidden from us . . .

When the last red man has vanished from the earth and his memory is only the shadow of a cloud moving across the prairies, these shores and forests will still hold the spirits of my people. For they love this earth as the newborn loves its mother's heartbeat.

So if we sell you our land, love it as we have loved it. Care for it as we have cared for it. Hold in your mind the memory of the land as it is when you take it.

And with all your strength, with all your might, and with all your heart, preserve it for your children, and love it as God loves us all.

One thing we know, our God is the same God. The earth is precious to him . . .

We may be brothers after all. We shall see."

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