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*The State Wildlife
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is

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Gordon Masters, M.L.C.
Minister for Fisheries
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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
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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COVER Honey Possum *Tarsipes spencerae*
PHOTO: feeding on *Eucalyptus angulosa* at Cheyne
Beach Western Australia. (See page 21 for story)
The honey possum is a zoological enigma, it has no obvious close relatives and it is only found in the South West of Western Australia. It is easily recognised as a mouse sized animal with a long pointed nose and three distinct longitudinal stripes along its back. (Photo — S. Hopper)

A Biological Survey of the Eastern Goldfields

by Dr. Andrew A. Burbidge, Chief Research Officer, W.A. Wildlife Research Centre and Chairman, Biological Surveys Committee.

Biological surveys provide the basic information about animal and plant distributions which is vital as a prerequisite for meaningful nature conservation programmes. Without data on the habitat requirements, distribution and abundance of animals and plants we would not know whether particular species were common or in danger of extinction, nor would we know if various species occurred in nature reserves or national parks.

In Western Australia several different organisations and many individuals have contributed such information over the years but with little planning or coordination. In 1975 and 1976 the Environmental Protection Authority released two "Red Books" titled "Conservation Reserves for Western Australia". As well as recommending that various areas of land be reserved for conservation the EPA also asked that a large number of biological surveys be conducted to see if certain areas were suitable for reservation and, if so, to lay down boundaries. This led the Department of Fisheries and Wildlife to suggest the creation of a co-ordinating committee for biological survey work. The Biological Surveys Committee first met in 1977. It comprises representatives of the National Parks Authority of W.A., the W.A. Museum, the W.A. Herbarium, and the W.A. Wildlife Research Centre.

The Committee decided to co-ordinate two types of biological survey:

1. inventory surveys of particular areas especially those recommended for survey by the EPA, and
2. regional surveys aimed at providing information on plant and animal distributions, population fluctuations, habitat requirements and the effects on the environment of man's activities. These surveys can also be used to evaluate the existing conservation reserves system.

Since 1977 inventory surveys have been carried out on eight of the fifteen areas listed by the EPA, as well as other reserves such as the Cooloomia Nature Reserve (SWANS Vol. 10, No. 2).

The Committee decided to base its regional surveys on the 12 "Systems" defined by the Conservation Through Reserves Committee in 1974. After considering each system in terms of existing knowledge and vulnerability to environmental change it decided there was an urgent need for a regional survey of CTCR System 11 — the Eastern Goldfields.

The Eastern Goldfields was chosen for two main reasons:

1. The great scientific interest in the "Coolgardie Botanical District" or "South West Interzone", which is an area to which many plant and some animal species are restricted, and to which the world-famous goldfields woodlands are largely restricted. No systematic collecting of plants or animals had been done previously but available data suggested that many species of

plants which occur there have very restricted distribution.

2. The pressure to have further land in the southern part of the region opened up for agriculture. There was little information available on which to base proposals for nature reserves should areas be released for farming. In addition the CTCR report made it clear that the existing large conservation reserves in the region may not be sited in the best locations.

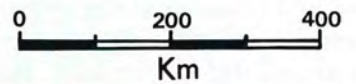
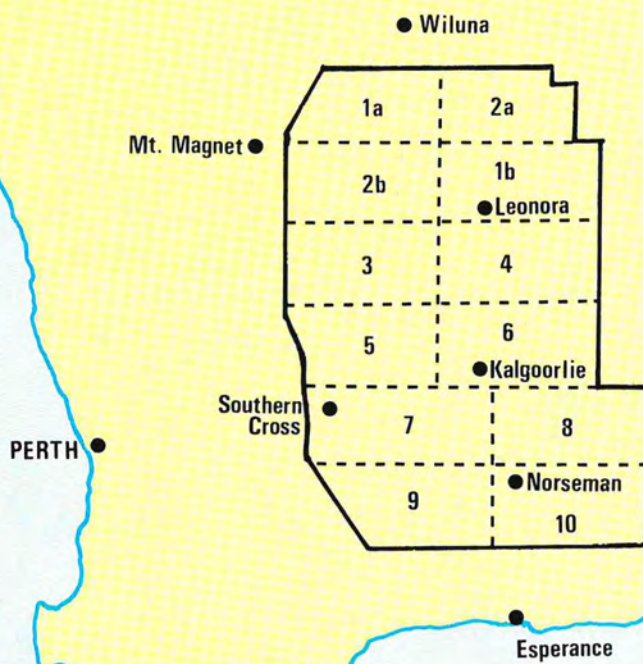
The area being surveyed closely follows that defined by CTCR but excludes a small area in the north around Wiluna. It is roughly rectangular and extends between 27°00'S and 33°00'S and 118°30'E and 123°45'E — an area roughly equal to that of the State of Victoria. Rainfall varies from 200 to 340mm. The Committee divided the area into 12 "cells" on the basis of the 1:250 000 map series. The two survey teams, one each from the W.A. Museum and the W.A. Wildlife Research Centre, each have responsibility for 6 cells, allocated so each team covers as wide a

▼ Desert Banded Snake *Rhynchoelaps b. bertholdi*. A small harmless burrowing snake from arid areas of Australia. (Photo — Copyright A.G. Wells)



BIOLOGICAL SURVEY AREA OF THE EASTERN GOLDFIELDS

WESTERN AUSTRALIA



latitudinal and longitudinal range as possible. Two consulting botanists work with the teams with support from the W.A. Herbarium. National Parks Authority staff input increases effort in cells 7 and 9, the most complex part of the region, by documenting the fauna of three National Parks — Boorabbin, Frank Hann and Peak Charles. The vegetation of the eastern goldfields is dominated by two groups of plants — *Eucalyptus* (gums) and *Acacia* (wattles) — and the committee was fortunate to be offered assistance by two botanists who are specialists in the taxonomy of these genera — Mr M.I.H. Brooker of the Forest Research Institute in Canberra and Mr B.R. Maslin of the W.A. Herbarium.

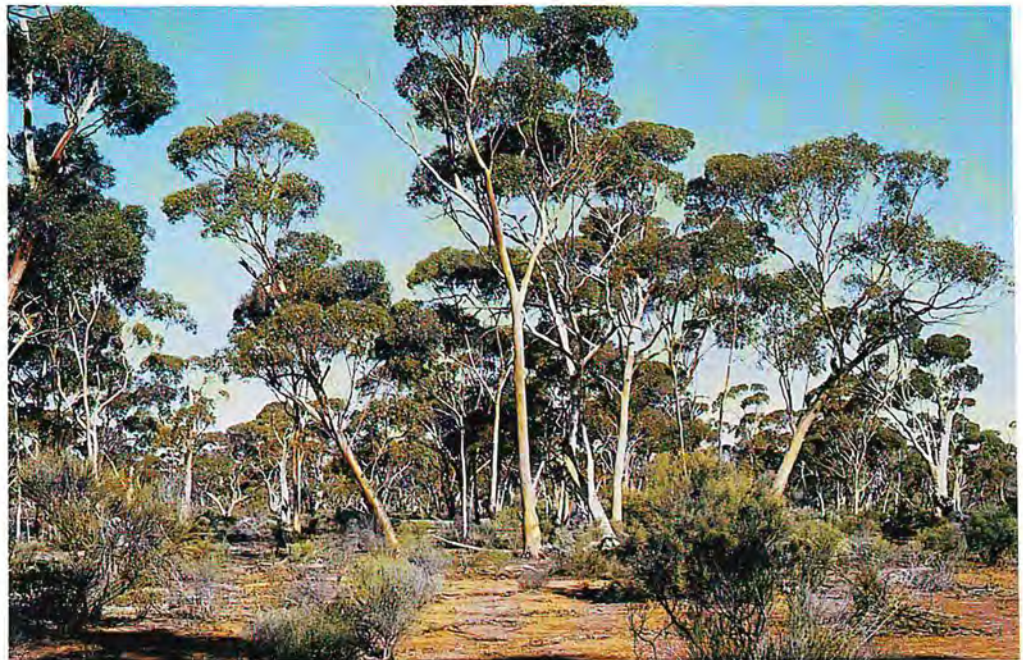
The Biological Survey of the Eastern Goldfields commenced in 1977 and 1978 with work by the Wildlife Research Centre on a proposed nature reserve in Cell 10 east of Lake Dundas. This survey provided the experience necessary to plan the main survey which commenced in the spring of 1978 and which will finish early in 1982. Effort in each cell varies with the complexity of the area. The northern-most 4 cells, numbered 1a, 1b, 2a, and 2b, are less diverse and only one study area was selected in each cell. Other cells have two study areas excepting cell 7 which has 3 and cell 9 which has 4. Each study area is visited three times in different seasons. The siting of study areas depended on accessibility but where practicable these were sited on areas of maximum environmental variability so that all the major vegetational systems of an area can be sampled and existing nature reserves and national parks can be documented.

Biological survey teams normally visit the Eastern Goldfields on field trips of about two weeks consisting of two successive camps in different parts of a cell. Specialists in the team study mammals, birds, reptiles and amphibians. As well as recording the presence of a species, information is also collected on habitat requirements, seasonal abundance and breeding. Various techniques are



▲ Peak Charles National Park. The granite hill is surrounded by mallee country typical of areas in the south-west of the study area. (Photo A. Burbidge)

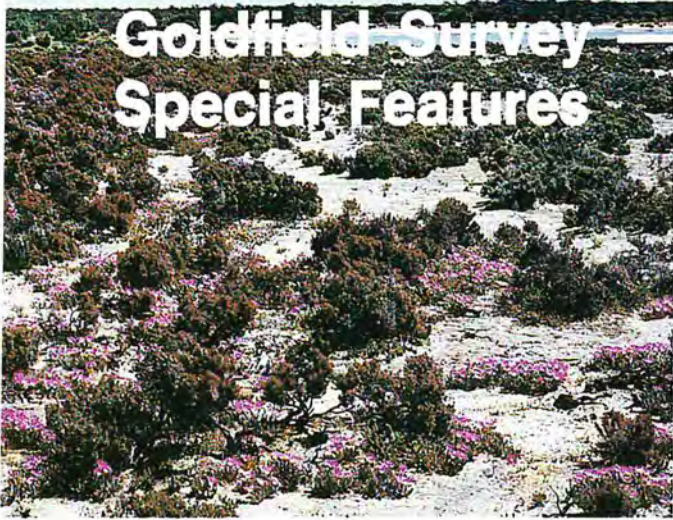
▼ Woodland on the Mt. Manning Range Nature Reserve. (Photo A. Burbidge)



▼ Species rich Kwongan (sand heath) vegetation in Frank Hann National Park. (Photo — A. Burbidge)



Goldfield Survey Special Features



▲ Salt lake margins have their own specialised flora and fauna. (Photo — A. Burbidge)



▲ Pied Honeyeater *Certhionyx variegatus*. A resident of the Northern arid zone migrating south into the Goldfields during winter and spring. (Photo — Copyright A.G. Wells)

▼ A Common Dunnart *Sminthopsis murina*. This animal differs from the dunnarts from the south-west of Western Australia, especially in having big ears, and may be a new species. (Photo — Copyright A.G. Wells)



▲ A survey member inspects a Tree Martin nesting hollow to see if eggs are present. (Photo — A. Burbidge)

▼ An undescribed subspecies of *Banksia sphaerocarpa* from near North Ironcap. This subspecies was discovered during the survey. (Photo — A. Burbidge)





▲ *Dryandra arborea* — the Yilgarn Dryandra, restricted to a few stony hills north of Koolyanobbing. (Photo — A. Burbidge)



▲ Hairy-footed Dunnart *Sminthopsis hirtipes*. A species from the sandy deserts also found in the Goldfields. (Photo — Copyright A.G. Wells)



▲ A species of *Grevillea* growing on red sandplains in the northern part of the Eastern Goldfield. (Photo — A. Burbidge)



▲ Common Scaly-foot *Pygopus lepidopodus*. A legless lizard with a wide distribution throughout Southern Australia. (Photo — Copyright A.G. Wells)

▼ Wanjarrri Nature Reserve. Red sandplain and dune country typical of the Great Victoria Desert. (Photo — A. Burbidge)



▼ Mitchell's hopping-mouse *Notomys mitchellii* is an animal that is found in the arid central areas of continental Australia. It is slightly larger than the common house mouse with a characteristic white or cream colour on its chest or throat. (Photo — Copyright A.G. Wells)



▲ Mulga Parrot *Platycercus varius*. Female feeding young in nest hole in *Eucalyptus*. (Photo — Copyright A.G. Wells)

employed for capturing and recording animals, including trapping, observation, digging out burrows, searching for nests, and so on.

The responsibility of the two botanists has been divided differently, one being assignment to the south-western cells (5, 7, 9 and 10) and the other to the more inland ones (1, 2, 3, 4, 6 and 8). They visit the region with the faunal survey teams and at other times when plants are in flower.

After completion of the field work the results will be prepared for publication. Publications will be at three levels:

1. Reports on the vegetation and vertebrate fauna of each cell. When a visit incorporates an existing large nature reserve or national park a report will be

prepared on that area, including a vegetation map.

2. Syntheses of the total data for plants and for each group of animals and a separate evaluation of the conservation reserve system.
3. A summary of results for publication in an international journal.

The biological survey is now about three quarters completed and much interesting information has already been collected. When completed it will be the first time in Western Australia that nature conservation will be able to proceed in the light of detailed information on a region. It will also allow future Western Australians to measure any changes which might result from development.

The Orange Chat Breeds in Captivity

The Orange Chat (*Ephthianura aurifrons*) is a spectacularly coloured insectivorous bird of the arid Australian interior, where it is most likely to be seen on samphire or saltbush flats around salt lakes.

Very little is known about the breeding habits of the species and so the following report from Police Sergeant A.V. Middleton of Wiluna Police Station provides useful information on the life cycle of these birds.

Sergeant Middleton had kept two pairs of Orange Chats in captivity for approximately three years during which they showed no sign of breeding.

After his transfer to Wiluna in June 1978, he constructed an aviary of pipe and wire 12' square and 6' high, and planted it with salt bush, cotton bush and various types of grass. The bushes were planted around the outer perimeter of the aviary to give the birds the maximum open ground to walk around.

During the 1978-79 breeding season in the Wiluna area very little rain was received and the chats continued to show no sign of

breeding, although wild birds were found breeding east of Wiluna during February 1979.

In January 1980, the drought broke in the form of two cyclones, Wiluna received heavy rain, which continued throughout the summer and well into the winter period, thereby increasing the insect activity in the area.

A light was rigged up over the aviary in the hope that the introduction of live food would trigger the birds into breeding condition.

This practice had to be stopped as not only did the moths and insects come to the light, but also Night-jars

which cause the Orange Chats to fly at night, this could have caused injury to them.

In May 1980, white ants were introduced to the birds as well as crushed boiled eggs and the diet they were used to.

One June 5, 1980, one of the cock birds was noticed feeding a hen, at regular intervals.

By June 20, the feeding cock bird had commenced to chase the other cock bird around the aviary, not allowing the other bird to feed or go anywhere near either hen and one pair of birds was removed from the aviary and confined to a small holding cage.

On June 28, the remaining cock bird was seen to sit in various positions in shrubs, calling the hen to him by soft *shu-shu-shu* type calls.

Mating took place on one occasion after which the cock bird chased the

▼ The brilliantly coloured male Orange Chat (*Ephthianura aurifrons*) (Photo — Copyright A.G. Wells)
(Insert) The female Orange Chat has a more subdued colouration. (Photo — Copyright A.G. Wells)





▲ Distribution of Orange Chat in Australia.

hen around the aviary.

Couch grass roots were supplied for nesting materials which the hen used successfully and on June 30, 1980 a partly constructed nest was observed in cotton bush (in the middle of a bush approximately six feet from the ground).

During nest building the cock bird sat near and in the nest site, but was not observed to help with nest building. The nest was not lined with any soft materials and was completed on July 3, 1980, and remained unoccupied until July 6, 1980 while the cock bird continued to feed the hen on white ants and diet.

On July 7, 1980, one egg was observed in the nest, but the birds did not start sitting on the egg until the following morning, when the hen bird was observed sitting on the nest, and a midday inspection revealed two eggs.

At this stage a wire netting fence was erected around the aviary, to prevent children from getting anywhere near the sitting birds and thus disturbing them.

Both birds shared nest duties, the hen bird appeared to sit at night, but during daylight, the cock and hen took turns.

A "hide" was constructed some two metres from the aviary and any spare time was spent observing the birds from this position.

The door of the aviary was wired up and food was fed to the birds through the wire mesh, because every time the aviary was approached the sitting bird would leave the nest and put on a "broken wing act", falling all over the floor of

the aviary calling loudly "shu-shu-shu", the non sitting bird would also behave in the same way.

A total of three eggs were laid, they were mainly white in colour with reddish lines, at the larger end.

On July 21, egg shell was found in the water container and another egg shell was found outside the aviary near the water container.

On July 22, the third egg shell was observed on the aviary floor; all the egg shells were examined and found to have blood veins in them.

The hen bird was observed to be hunting in all the shrubs in the aviary, from top to bottom. When she had no success she attended at the white ant tray and filled her beak with white ants (not workers) then flew straight up to the nest site. The cock bird left the nest on her arrival and then carried out the same behaviour pattern.

Large quantities of grasshoppers, meal worms, moths, grubs and crushed boiled eggs, were fed to the birds. The insects were thrown through wire netting into all the shrubs in the aviary because if they were placed in one spot the birds appeared to kill the insects and leave most of them and feed very few to their young.

Moths and grasshoppers were collected at night from every available street light in Wiluna and placed in a wooden box covered with fly wire (if they were left in a bottle the insects appeared to sweat and die overnight). One wing of each moth was removed and the hopping legs of grasshoppers were removed to stop escapees from the aviary. Plentiful supplies of white ants were found in old railway sleepers around Wiluna and meal worms were sent from Perth from various friends, via plane or road transport.

Trips to the nest by both parents were frequent. On one occasion ten trips were counted in twenty minutes, with either a beak full of white ants, a couple of meal worms or a grasshopper or moth.

Droppings were removed from the nest by feeding parents and carried to various areas of the aviary.

By July 26, 1980, the young birds were approximately one inch long and were nude except for white down on their heads and bodies, and they appeared to be transparent. Their gape was very yellow and pronounced.

The three young had pin feathers and were starting to move around the nest by July 28, 1980.

On August 5, the young left the nest, fully feathered with the exception of their pin feathers around their beak and forehead. The young birds were extremely pale in colour in comparison with wild-bred birds, probably due to the type of food fed to them.

When the young first left the nest they were unable to fly, they fluttered to the further perimeter of the aviary and sat separately under bushes.

On August 6, one young bird drowned in the water container.

The remaining two young birds commenced to fly around the aviary on August 9, and followed their parents (mainly the cock bird).

On August 10, diet food was taken by the young birds and they commenced to drink water and started to pick up white ants.

The parents would call the young birds from the tops of bushes when they had food with *shu-shu-shu* type calls, and the young would answer with soft similar calls.

Following this initial success Sergeant Middleton had one other successful breeding of Orange Chats later in the 1980 season resulting in five more young birds reaching maturity. He is now experimenting with adding canary colour food to their diet in an attempt to produce the brilliant colours found in the wild birds.

Editors Note

Police Sergeant Middleton is the holder of a special license issued by the Department of Fisheries and Wildlife permitting him to keep Orange Chats in an aviary. As Orange Chats require a continuous supply of live insect food (if they are to remain healthy and breed) they are NOT a suitable aviary species for

the inexperienced aviculturalist.

A free information booklet entitled "Licensing Requirements for Keeping Aviary Birds" is available

on request from the Extension and Publicity Office, Department of Fisheries and Wildlife, 108 Adelaide Terrace, Perth and provides a guide

to the licensing requirements and controls on bird keeping and trading in Western Australia.

New Research Officer to Carry Out Numbat Field Study



▲ Mr Tony Friend.

A Tasmanian biologist has been appointed to the Western Australian Wildlife Research Centre to carry out a field study on the Numbat, or Banded Anteater, to determine the cause of a recent decline in the numbers of the animal.

The Numbat (*Myrmecobius fasciatus*) was once found distributed throughout the southern half of Western Australia but has not been reported outside a small area of the South-West since the 1950s.

Even in this small area, sightings of the animal have steadily been decreasing and concern has been expressed about the Numbat's future.

However, before measures can be taken to conserve the animal, a great deal more information on its habits than is already known will have to be documented.

The Department of Fisheries and Wildlife has taken the first steps toward preserving the animal by appointing Dr Tony Friend, an animal ecologist, to find and study the Numbat in the field.

Dr Friend recently completed his PhD at the University of Tasmania in Hobart with a detailed study of Tasmanian terrestrial Amphipods, a small group of crustacea which are related to sandhoppers.

This included studying the relationships between different species of Amphipods and describing any new species in detail. Dr Friend said the latter aspect of his work, i.e. describing new species occupied a considerable portion of his time as he discovered 14 new species of terrestrial Amphipods during the course of his research.

Before coming to Western Australia, Dr Friend spent five months as a visiting Curator with the Australian Museum in Sydney.

Despite the distance between Tasmania and the forests of the South-West of Western Australia, Dr Friend said he did not expect many problems in acclimatising to the new area because much of the fauna was similar to that found in Tasmania.

Dr Friend said his main concern at present was finding enough Numbats to study.

A four-month long survey carried out in Wandoo woodlands in the South-West last year found only two Numbats. However, Dr Friend said he would probably extend the search into nearby Jarrah forest.

Although Numbats were not generally thought to live in Jarrah

forests, Dr Friend said the Jarrah forest's thicker understorey could have been responsible for the low number of Numbat sightings in the past compared to the more open woodlands associated with Wandoo.

Dr Friend also pointed out that last year's survey was carried out entirely by vehicle or by observers on foot, whereas he hoped to explore other means of population assessment.

Associated with the Numbat study will be an assessment of food availability for the animals. The Numbat's diet consists principally of termites and Dr Friend plans to conduct a survey to determine the abundance of termites in possible Numbat habitats, while relating it to other factors such as rainfall and vegetation.

A fox survey may also be carried out at the same time as many people have blamed this introduced predator as a major factor in the decline of the Numbat.

Dr Friend expects his research to span at least three years, at the end of which he hopes to be able to define possible areas suitable for gazettement as reserves to protect Numbats in this State.

▼ The Numbat or Banded Anteater is the State's fauna emblem but its numbers are declining in the wild. (Photo — Courtesy of Forests Dept W.A.)



Rare Flora Guide Published

Barbara L. Rye and Stephen D. Hopper, of the Western Australian Wildlife Research Centre, have prepared a 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.

Rare Flora Legislation

Any plants that the Minister for Fisheries and Wildlife considers to be in need of special protection to ensure their continued survival in the wild may be declared rare flora throughout the State of Western Australia. Plants may be added to or deleted from the list of rare flora at the Minister's discretion by notice published in the *Government Gazette*.

Once a taxon (genus, species, subspecies or variety) has been gazetted as rare flora, no person is permitted to take it from wild populations anywhere in Western Australia, either on Crown land or private land, unless he has the special written consent of the Minister. To take is defined in the Wildlife Conservation Act as to "gather, pluck, cut, pull up, destroy, dig up, remove or injure the flora or cause or permit the same to be done by any means". This provision applies equally to Government agencies (since the act binds the Crown) and to private citizens. A fine of up to \$1 000 may be imposed for a breach of the provision.

This should ensure that all proposed activities that may be detrimental to the persistence of rare

flora in the wild are kept under close scrutiny by the Department of Fisheries and Wildlife. It should not hinder legitimate scientific and horticultural studies of rare flora. On the contrary, these studies are to be encouraged where they are likely to provide information that will improve the conservation status of rare plants.

This provision relates only to *wild* populations of rare plants, not to cultivated or propagated specimens grown in domestication.

A final provision of the rare flora section of the Act allows for compensation to be paid to owners or occupiers of private land who are refused consent to take wild growing rare flora and who can satisfy the Minister for Fisheries and Wildlife that such a refusal will lead to loss of use or enjoyment of the land. If, at the end of five years, no action in purchasing or resuming the land for reserves has been taken, the Minister must lift his restrictions on the land owner or occupier.

This provision is necessary because some of the gazetted rare taxa are only known in the wild from small populations on private land. Some are threatened by land clearance for agriculture, gravel mining and many other activities destructive to natural vegetation. While this last provision imposes restrictions on private citizens as to what they may choose to do on their own land, Parliament has decided that these restrictions are not unreasonable to ensure the successful conservation of rare plants. Moreover, in almost all cases, only very small areas of land are occupied by rare flora.

Biological Data Required

Many of the rare plants listed in the report are not yet known to occur in nature reserves or national parks. The discovery of new populations may enable the acquisition of appropriate nature reserves, or at least allow officers of the Department of Fisheries and Wildlife to notify owners of Crown or private lands of the occurrence of rare plants on their properties.

Most of these rare taxa are restricted to the South-West Botanical Province and more than one-third occur in the Albany wildlife district.

Interested persons are therefore urged to contact staff at the Western Australian Wildlife Research Centre should they locate populations of these plants. Additionally, information on the reproductive biology of rare plants is sought to determine the best means of managing known populations on reserves and other lands.

In order to enable the gazetted rare plants to be easily recognised, photographs from the report will be published in SWANS. The first eight pages are as follows:-

SOME GAZETTED RARE WESTERN AUSTRALIAN PLANTS

The leafless blue-grey stems with their widely spreading forks identify this wattle, shown in full flower.

(Photo: B. R. Maslin)

Acacia aphylla Leafless Rock Wattle



Several *A. aphylla* plants growing in crevices on a granite rock in the Darling Range. This is an unusual, if not unique, habitat for a wattle species.

(Photo: B. R. Maslin)

Acacia aphylla Leafless Rock Wattle



Acacia argutifolia East Barrens Wattle

The spreading habit of an *A. argutifolia* shrub, growing in shallow sand on a rocky hillside in the Fitzgerald River National Park.

(Photo: B. R. Maslin)



Acacia depressa Echidna Wattle

The upright spines of this ground-hugging wattle are visible among the golden flower heads and divided leaves. It bears a closer resemblance to an echidna when it is not in flower.

(Photo: B. R. Maslin)



This photograph could have been taken in any season because the species flowers all year round. However, the peak flowering period is from August to November.
(Photo: A. S. George)

Adenanthos detmoldii Yellow Jugflower

Red flower cones among the clusters of feathery leaves. Fruiting cones derived from the previous year's growth occur below on the bare wood.
(Photo: G. J. Keighery)

Banksia brownii Feather-leaf Banksia



Banksia goodii Good's Banksia

A two-toned cone borne at ground level and closely surrounded by leaves. The red flower buds become brown as they open progressively from the base of the cone upwards.

(Photo: S. D. Hopper)



Banksia tricuspis Pine Banksia

Flowering cones with long yellow hooked styles and leaves resembling pine needles.
(Photo: G. J. Keighery)



Banksia tricuspis Pine Banksia

A very spreading shrub 3 m tall dominating dense low heath on gravelly soil in the Gairdner Range.
(Photo: S. D. Hopper)

Pale blue-grey stems bearing leaves, buds and fruits. This species is related to the whipstick mallees *E. pendens* and *E. sepulcralis*.
(Photo: S. D. Hopper)

Eucalyptus exilis Boyagin Mallee



Clusters of yellow flowers packed between the paired, more or less round leaves. This species is confined to granite rocks east of Kalgoorlie.
(Photo: A. S. George)

Eucalyptus kruseana Bookleaf Mallee



Pendent banches, leaves and buds. The glossy dark red appearance of the young branches is typical of the species.
(Photo: S. D. Hopper)

Eucalyptus pendens Badgingarra Mallee



Eucalyptus exilis Boyagin Mallee

A small mallee with erect slender silvery stems, growing in sand over laterite near Pingelly.
(Photo: S. D. Hopper)



Eucalyptus pendens Badgingarra Mallee

This photograph shows the remarkable spindly habit of *E. pendens*, emergent above a very low heath. From a distance, these whipstick mallees, are hard to see unless silhouetted against the sky because they blend into the background vegetation.
(Photo: S. D. Hopper)

The stalked red flowers of Rose Mallee are smaller than those of the related species, Mottlecah (*E. macrocarpa*), but are still spectacular. Their abundant nectar attracts several species of honeyeaters. (Photo: S. D. Hopper)

Eucalyptus rhodantha Rose Mallee



A mallee with white branches and silvery foliage, growing over low heath in sandy soil near Gunyidi. (Photo: S. D. Hopper)

Eucalyptus rhodantha Rose Mallee



Eucalyptus steedmanii Steedman's Gum

These trees of *E. steedmanii* were photographed in a morning mist soon after the rediscovery of the species in 1978 by officers of the Department of Agriculture. (Photo: S. D. Hopper)



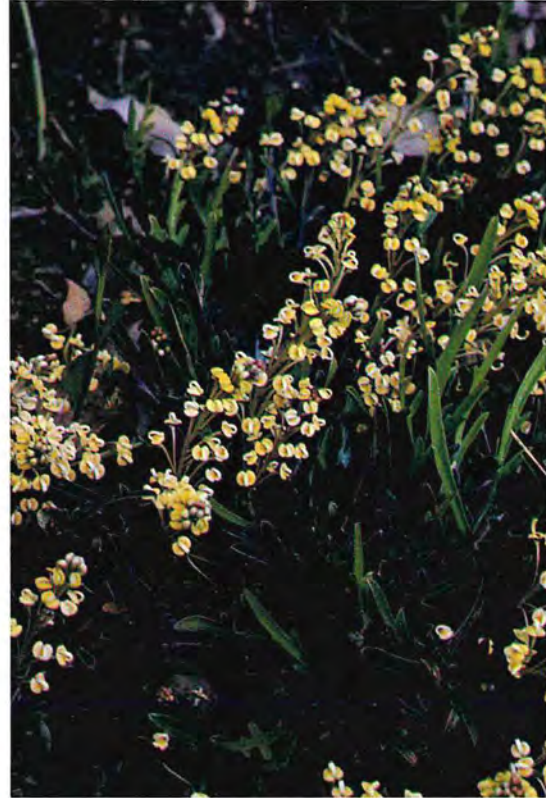
Eucalyptus steedmanii Steedman's Gum

The decorative buds and fruits are four-sided and distinctly winged. (Photo: J. Briggs)

Some of the notable variability in leaf shape of this species is evident in the plant pictured here in full bloom.

(Photo: E. Wittwer)

Grevillea cirsiifolia Varied-Leaf Grevillea



The petals of these elongated flowers are white on top, reddish underneath and usually widely spreading when mature. The species occurs between Bunbury and Nannup.

(Photo: A. S. George)

Franklandia triaristata Plumed Lanoline Bush



Gastrolobium appressum
Scale Leaf Poison

The leaves of this poison plant are in threes and are closely held against the stem. The species occurs on gravel in the Gunyidi area.

(Photo: T. E. H. Aplin)



Gastrolobium glaucum Wongan Poison

Known from only one location near Wongan Hills, this species has distinctive blue-green leaves arranged in threes.

(Photo: T. E. H. Aplin)



Grevillea baxteri Cape Arid Grevillea

Large divided leaves and a stalk with the flowers opening from the base upwards are illustrated. This species ranges from Mt Ragged to near Scadden.

(Photo: A. S. George)

A spreading shrub with quite bluish foliage growing in the Darling Range.
(Photo: G. J. Keighery)

Grevillea drummondii Drummond's Grevillea



Decorative clusters of yellow buds and flowers. The numerous long soft hairs in the undersurfaces of the leaves are highlighted in the sunshine.
(Photo: G. J. Keighery)

Grevillea drummondii
Drummond's Grevillea



Grevillea dryandroides Phalanx Grevillea

A trailing flower stalk with the flowers opening progressively towards the tip. The large red upright flowers should attract birds to feed on the ground and act as pollinators. The large divided leaves are normally held in a much more upright position than that pictured.
(Photo: A. S. George)

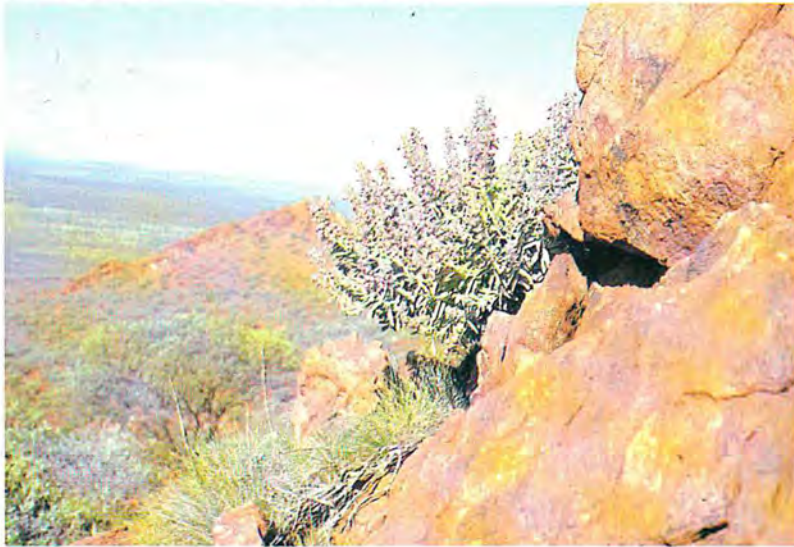


Grevillea dryandroides Phalanx Grevillea

Many of these plants are probably interconnected by underground stems. Vegetative reproduction by means of rhizomes is common at this site near Cadoux.
(Photo: B. L. Rye)

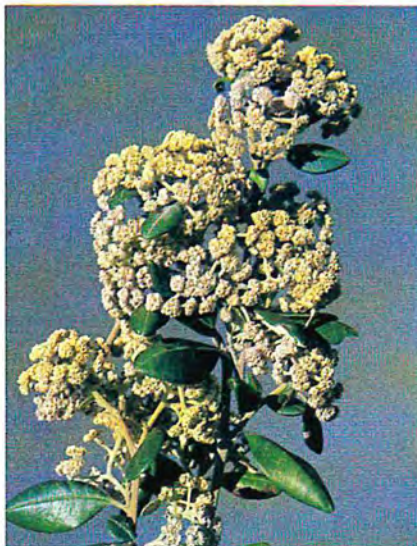
A plant in flower growing on the steep rocky slopes of Mt Augustus.
 (Photo: E. Wittwer)

Pityrodia augustensis Mt Augustus Foxglove



This species occurs in open woodlands of Powderbark Wandoo on lateritic ridges east of Pingelly.
 (Photo: A. S. George)

Pomaderris bilocularis
 Tutanning Pomaderris



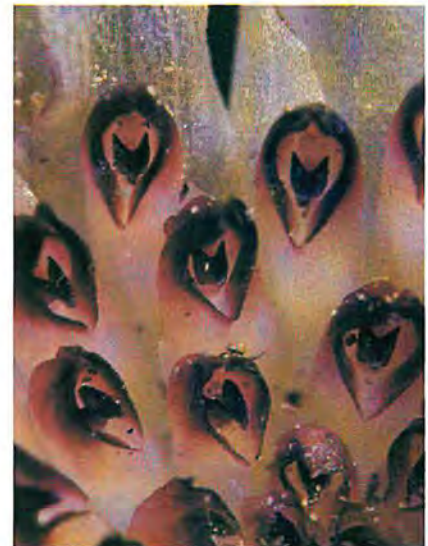
Pomaderris grandis Large Pomaderris

This has by far the largest leaves in the genus. Its clusters of tiny flowers are borne in groups on branching stalks, producing a massed display. It is confined to the Mount Manypeaks region.
 (Photo: F. W. Humphreys)



Rhizanthella gardneri
 Underground Orchid

A partially excavated plant. The bracts surrounding the flower head had raised and cracked the surface of the soil but were not protruding above the soil prior to the excavation.
 (Photo: S. D. Hopper)



Rhizanthella gardneri
 Underground Orchid

Although these colourful flowers are normally hidden below the ground, they attract, and are pollinated by insects which reach them through cracks in the soil.
 (Photo: H. Foote)

The unmistakable appearance of *Spirogardnera*, with its spirals of white flower clusters. The species occurs between Bindoon and Eneabba.

(Photo: G. J. Keighery)

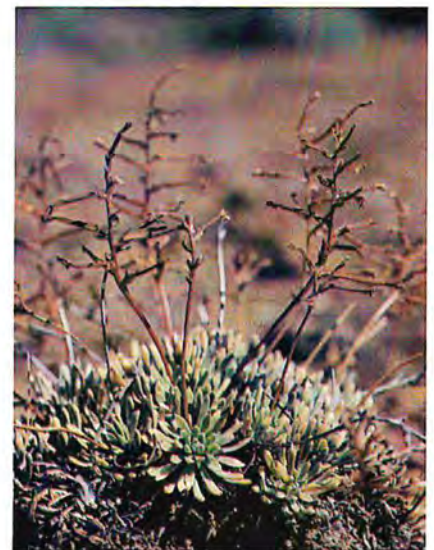
Spirogardnera rubescens Spiral bush



Despite its numerous fruits, this solitary plant failed to set seed, probably because it requires cross-pollination. Each fruiting stalk arises from a separate rosette of leaves.

(Photo: S. D. Hopper)

Stylidium coroniforme
Wongan Triggerplant



Stylidium coroniforme
Wongan Triggerplant

The last flower of the 1980 season borne on the only known surviving plant of the species. The petals are creamy yellow when they first open but soon become white. They are each about 6 mm long.

(Photo: K. F. Kenneally)



Tegicornia uniflora Mat Samphire

T. uniflora grows on the margins of salt lakes near South Stirling and Ongerup.

(Photo: A. S. George)



Verticordia staminosa Wongan Verticordia

The glossy red bracts on the buds and flowers are a distinctive feature of this feather flower. It is also unusual in having long protruding stamens in its winter flowering season.

(Photo: A. S. George)

Rabbit Eradication on Islands off the W.A. Coast

by Clifford Young

Mistaken Island

A rabbit eradication programme being carried out jointly by the Agriculture Protection Board and the Department of Fisheries and Wildlife on islands off the Western Australian coast is proving very successful.

Seven islands which previously had heavy infestations of rabbits have now been cleared of the pests with the result that the islands' natural vegetation and wildlife is regaining a foothold.

Many of Western Australia's offshore islands are important breeding sites for seabirds and marine mammals such as seals. In some cases the islands harbour species of animals which have been long extinct on mainland Australia. Much of the vegetation is also often unique and, as with the animals, exists in a delicate balance with the environment in its fight for survival.

The presence of rabbits on these islands endangers the existence of all other animals and the islands' vegetation. The rabbits burrow into the thin soil cover or take over existing burrows made by nesting seabirds. They denude large areas of vegetation leaving the islands open to wind and soil erosion. This also means less cover and feed for the islands' natural inhabitants.

Rabbits were originally introduced to some of the islands off the coast by fishermen and seafarers as a food source. The rabbits subsequently proliferated to the detriment of the native animal and birdlife.

Early attempts to control the rabbits using myxomatosis failed as the animals showed strong resistance to the disease, probably through the introduction of animals from the mainland which had already built up

an immunity from previous exposure to the virus.

Further attempts to eradicate the rabbits were carried out using bait mixed with 1080 poison (sodium monofluoroacetate).

To ensure its success, pre-baiting over a period of several days was generally carried out before adding the poison, and the programmes were carried out in late summer when natural food on the islands was low.

Before deciding on the use of 1080 poison to rid the islands of rabbits, extensive tests were carried out to ensure the bait used would not be eaten by other fauna. The tests showed that few if any other birds or animals found on the islands ate carrots except the rabbits and some introduced species of rats (*Rattus rattus*). Carrots, chopped into small pieces, were therefore used as the predominant bait.

To guard against secondary poisoning, field staff visited each island immediately following the poisoning programme to find and remove the rabbit carcasses. Any remaining carrots were also destroyed.

Among the islands on which the 1080 baiting programme has proved successful are the Green Islets located between Lancelin and Jurien Bay, Morley, Wooded and Leo islands in the Houtman Abrolhos Group, Carnac Island off Fremantle and Mistaken Island near Albany.

Carnac Island, which lies five nautical miles south-west of the Port of Fremantle and covers an area of 16 hectares, was the first island to be treated under the poisoning programme. Rabbits were originally introduced to Carnac Island by early American and/or French whalers some time before 1827 as a source of food. Their presence on the island was noted by Charles Frazer, a colonial botanist, who visited Carnac in 1827 and reported "an abundance



▲ A rabbit warren on South Island of the Green Islets Group showing area around it completely cleared of vegetation through browsing.



▲ Aerial photograph of Carnac Island in April 1969, shortly after poisoning programme against island's rabbits. Note large areas of bare earth where vegetation has been devastated by rabbits, particularly along beachline. (Photo courtesy Agriculture Protection Board)

▼ Aerial photograph of Carnac island in May 1971, two years after the island's rabbits were eradicated. Compared with earlier photograph, much of the island's vegetation has regrown and is thicker over the whole area. (Photo courtesy Agriculture Protection Board)





▲ Wooded Island in the Houtman Abrolhos is an important nesting site for many seabirds which are largely dependant on the island's vegetation. This island was treated against rabbits in 1973. Vegetation on Wooded Island is now lush and among the birds found, there is the Lesser Noddy (below right) and the Bridled Tern (insert) (Photos — C. Young)

of hares, seals and mutton birds" on the island.

Far from being considered a pest by the early colonists, the rabbits were viewed as a valuable asset as shown by the publication of a warning in the *Perth Gazette* of 1842 which stated rabbits were not to be shot or removed from the island without the permission of the Fremantle Harbour Master.

However, rabbit numbers on Carnac declined between the turn of the century and the 1950s and it was not until 1965 that serious attempts at controlling their numbers were undertaken. In July of that year, trials to determine the bait preference of Carnac's rabbits and to select a bait material which would not affect the island's native fauna were begun.

In 1969 the erosion problem caused by partial denudation of the island by rabbit grazing had reached serious proportions and a programme of complete eradication rather than control was decided

upon. In May 1969 pre-baiting was carried out which involved laying large quantities of unpoisoned carrots over the island on three separate days to ensure all the island's rabbits were feeding on the material.

Poisoned carrots were then laid and the island inspected the following day. More than 60 carcasses were picked up and a further inspection of the island in June the same year failed to show any evidence of live rabbits.

By the end of 1969, low-level aerial photographs of the island showed much of its vegetation had begun to recover.

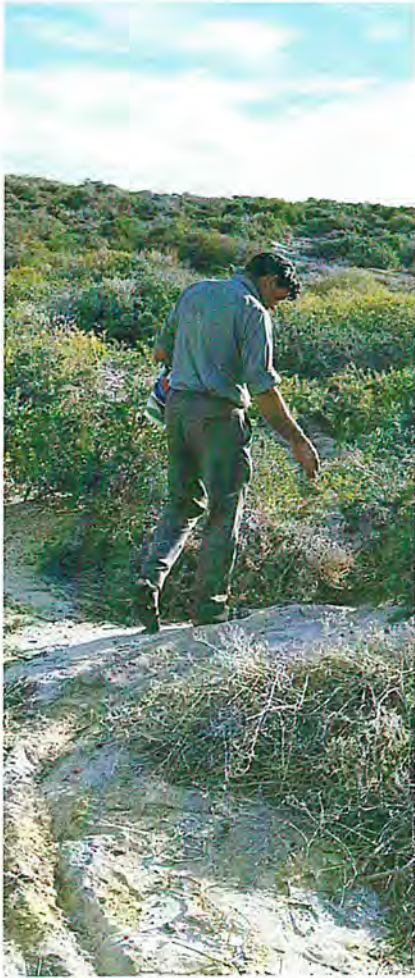
The news was welcomed by naturalists as Carnac Island is an important seabird refuge and nesting site. Thirty-three species of birds have been recorded on the island of which at least eight species breed there. The island is also noteworthy as the only area of overlap between the breeding ranges of the Little Penguin (*Eudyptula minor*) and the

Wedge-tailed Shearwater (*Puffinus pacificus*).

Carnac also contains the greatest concentration of Tiger snakes (*Notechis ater occidentalis*) in Western Australia, and is internationally important as a source of venom for scientific research.

▼ Lesser Noddys on Wooded Island.





▲ A field officer laying a pre-feed bait trail on South Island, Green Islets Group.



▲ Mistaken Island's rabbit population resisted several attempts to eradicate them using poisoned carrots but the last rabbit was finally killed in March last year. (Photo courtesy Agriculture Protection Board)

Following the successful elimination of rabbits from Carnac Island, similar procedures were used on Morley and Wooded Islands in the Houtman Abrolhos Group in February 1973, North and South Islands of the Green Islets Group in May 1974, Leo Island, also in the Abrolhos Group, in May 1976, and Mistaken Island off Albany in March last year.

Although the combined efforts of the Departments of Fisheries and Wildlife and the Agriculture Protection Board have eliminated the rabbits from those islands, it hasn't always been easy.

The last island to be treated, Mistaken Island, resisted three attempts to poison all its rabbits before success was eventually achieved early last year. The first major attempt to kill the rabbits was carried out in May 1977 when poisoned carrots were laid over the island. Although many rabbits were found dead after the programme, along with several of the introduced species of rat (*Rattus rattus*), an inspection of the island later that year showed numerous signs of

rabbits still in occupation.

In March 1978 the island's rabbit population was estimated at more than 200 and a second poisoning programme using 20 kilograms of chopped carrot pieces mixed with 1080 was carried out. Many rabbits were killed but again enough survived to repopulate the island.

A third attempt the following year was equally unsuccessful.

A fourth and final programme was launched against the rabbits in February 1980. This included pre-feeding a total of 300 kilograms of unpoisoned carrot pieces over five nights before a further 180 kilograms of poisoned carrots were laid over the island on the first of March.

An inspection the next day showed 60 percent of the bait had been eaten and numerous rabbits were found dead. Another inspection one month later could find no signs of rabbits living on the island and it was reported that there had been a dramatic change in the vegetation. Areas of moss which were formerly devastated were now growing untouched and no new ring-barking of trees was observed.

However, the full success of the February programme was not evident until December last year when a further inspection of the island was carried out. The island's vegetation was well on the way to full recovery, many previously bare patches of sand were covered with new growth and there were no fresh signs of rabbits.

Although during the inspection the only seabirds seen on the island were Little Penguins (*Eudyptula minor*), it is hoped that other species previously recorded breeding on the island, including Fleshy-footed Shearwaters (*Puffinus carneipes*), Great-winged Petrels (*Pterodroma macroptera*) and White-faced Storm Petrels (*Oceanites marinus*) will return to the island as the environment continues to recover.

The Department of Fisheries and Wildlife is now investigating other offshore islands to determine if any further rabbit problems exist in which case similar eradication measures may be considered.

Dragon Tree Soak — An Oasis in the Great Sandy Desert

by Clifford Young

“A howling wilderness of spinifex and sand” was how one early explorer saw the Great Sandy Desert, a region covering more than 20 000 square kilometres in the north of Western Australia.

Although the region has scattered vegetation consisting mainly of spinifex, hummock grass, patches of mulga and some desert oak, water holes are scarce and far apart and are generally indistinguishable from the surrounding terrain.

However, a biological survey into the Great Sandy Desert in late 1977 discovered a lush soak with open pools of water, surrounded by tall trees and rushes, and teeming with wildlife.

Situated between two sand-dunes in the north-western corner of the desert, the oasis was first seen from a helicopter chartered by the Bureau of Mineral Resources which was conducting a geological survey of the area. The information was passed on to a biological team from the Department of Fisheries and Wildlife which was at that time only 25 kilometres away investigating the wildlife and vegetation of a relatively barren group of rock outcrops, the McLarty Hills.

Only a short stay at the soak was needed to convince the biological party that the area was unique in Western Australia and worthy of preservation. An application to the Government to have the soak and the surrounding area declared an A-Class Reserve was officially approved in March, 1979.

Dragon Tree Soak, as it came to be known, only covers an area of about 0.5 hectares although the total area of the surrounding reserve is more than 14 000 hectares. It was named after the predominance of Dragon Flower Trees (*Sesbania formosa*) which surround the soak in contrast to the more usual paperbarks (*Melaleuca*) found in wet or damp situations throughout the State.

The biological team which first surveyed the soak comprised a biologist, Mr N.L. McKenzie of

the W.A. Wildlife Research Centre, and Mr A.S. George, a botanist from the Western Australian Herbarium.

Mr McKenzie described how they found the soak. “A Departmental survey had been carried out the previous year in the Edgar Ranges, about 100 kilometres north of the McLarty Hills. We had also spent considerable time in the Kimberleys, and the logical extension of that work was to continue south into the Great Sandy Desert.

“We also had a requirement at that time to select possible sites for reserves in the Great Sandy Desert which would cover habitats which were particularly unique to the area in terms of vegetation and animal life.

“As a bonus, a geological party from the Bureau of Mineral Resources was conducting a mapping exercise in the north-

western portion of the desert and offered to take us to the McLarty Hills by helicopter for a brief visit. The geological party was camped on the Anketell Ridge which lies to the south-east of the McLarty Hills and we drove there together with two assistants who would explore the immediate area around the ridge during our absence.

“Before we left for the Hills, a member of the geological party mentioned to us that he had seen a swamp in the area which was unlike anything else he had seen in the surrounding desert. As it was close to where we were going, we arranged that the helicopter would take us there after we had explored the McLarty Hills.

“The McLarty Hills turned out to be a very barren piece of landscape and after spending four days there, during which time we only caught one small marsupial mouse, we were glad to leave and were looking forward to our first glimpse of the soak.





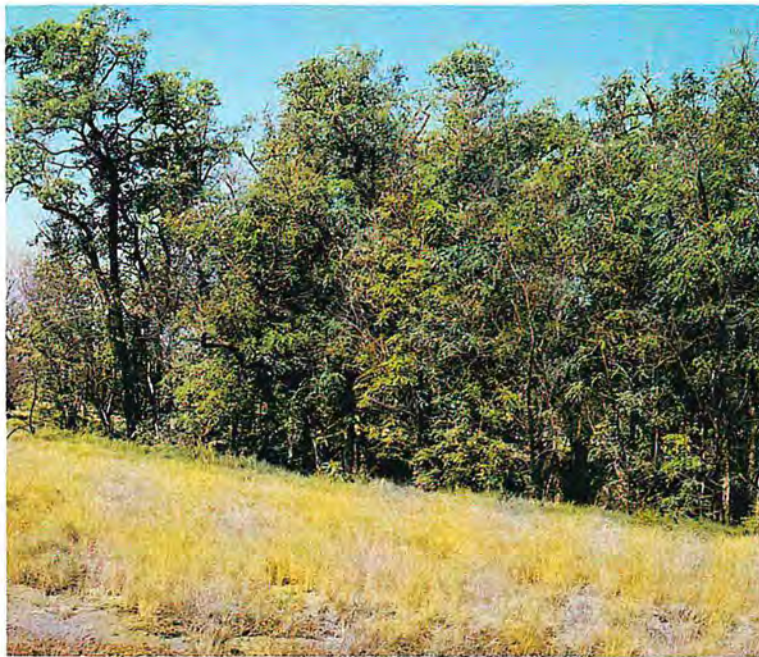
Small open pools of water, tall *Sesbania formosa* trees, and thick rushes provided a haven for birdlife at the soak. (Photo N. McKenzie)



▲ The surrounding sand dunes and spinifex also support a rich fauna collection including geckos. (Photo N. McKenzie)



▲ McLarty Hills (Photo N. McKenzie)



▲ Dragon Trees (*Sesbania formosa*) on the northern side of Dragon Tree Soak showing the remarkable contrast between the richly vegetated soak and the surrounding arid land. (Photo N. McKenzie)

▼ McLarty Hills (Photo N. McKenzie)



▼ The McLarty Hills, only 25 kilometres north-east of Dragon Tree Soak provides a stark contrast to the soak's lush vegetation and wildlife. (Photo N. McKenzie)





▲ A heavy mist hangs over the sand dunes the morning after the biologists arrived at Dragon Tree Soak. The vegetation found close to the soak is denser and supports more tall shrubs and trees than the surrounding desert. (Photo N. McKenzie)

“During the flight to the soak we could see a gradual change in the nature of the terrain below us. From a barren dry landscape covered with scattered shrubs and hummock grass, we began to see claypans and samphire patches with thicker stands of desert walnuts. the colour of the sand dunes was also changing to a richer red.

“We landed beside a green grassy sward only metres away from the edge of the swamp which was ringed with trees up to 14 metres high. However, what impressed us the most was the noise . . . there were birds calling from everywhere.”

As their time at the soak was limited, the two hastily set up camp and advanced into the swamp to record species of plants and animals and to collect samples. In particular, Norm McKenzie thought the conditions were ideal to provide a refuge for a night-parrot, one of Australia’s rarest birds.

However, his plans to capture one with a mist net set up near the edge of the soak were thwarted within minutes of setting the net up by a bronzewing pigeon which blundered into the net, knocking it to the ground and creating enough noise in the process to scare away any night

parrots which may have been in the area.

The following morning Norm spent more than three hours quietly observing birds coming in to drink at one of the open pools within the swamp. During that time he recorded more than 20 different species including Zebra Finches, Pied Butcher Birds, White-plumed Honeyeaters, Cockatiels, Rainbow Bee-eaters, Rufous Whistlers and Mistletoe Birds.

Several species of raptors, including an Australian Goshawk, a Spotted Harrier and Nankeen Kestrels, were also sighted flying over and around the swamp.

However, one of the most interesting finds was a group of Clamorous Reed Warblers (*Acrocephalus stentoreus*), a bird which, although common in other parts of Australia, particularly in swamps and marshes, was not expected to be seen in the middle of the Great Sandy Desert.

Mammals trapped at the soak also turned out to be surprising . . . almost every single one was a common house mouse (*Mus musculus*). These animals seemed to find conditions around the swamp ideal compared to the barren country

surrounding them.

The dunes and interdune area immediately around the soak were also explored with some interesting results. On the western side of the soak was a small cleared area with a number of empty fuel drums indicating it was an old helicopter pad which had probably been used during mineral exploration in the area.

Alongside one of the drums Norm McKenzie found some weathered dingo scat which he collected. Later analysis showed the scat contained the jawbones of at least two marsupial moles (*Notoryctes typhlops*), an animal about which little is known as it has only rarely been seen.

Mr McKenzie said he believed the scat was no older than two or three years and the marsupial moles would probably have been found and eaten within about 20 kilometres of Dragon Tree Soak.

This made the reserve particularly important as there is no recent evidence that any other reserves within Western Australia harbour this species of animal.

On their return to the geologist’s camp on the Anketell Ridge, they found their assistants, Mr Ken Youngson and Mr Jim Rolfe, had also been busy collecting specimens from around the area, one of which was a mummified bat. On close inspection the bat proved to be a White-striped Bat (*Tadarida australis*) which, although previously found in the Little Sandy Desert and the Gibson Desert, had not been found as far north as the Great Sandy Desert.

It has since been seen frequently patrolling the dunes and is now regarded as common in the area.

Following the success of this brief excursion into the Great Sandy Desert, a major biological survey was undertaken in 1979, the results of which are currently being compiled for publication. Full details of the expedition to Dragon Tree Soak are expected to be included in the publication.

Honey Possums

By Dr S.D. Hopper, Research Officer,
W.A. Wildlife, Research Centre



▲ Honey Possum feeding on *Banksia grandis* on Millbrook Nature Reserve showing the characteristic three dark longitudinal stripes down the back of the animal. (Photo S. Hopper)

Honey possums are among the most remarkable animals found in Australia because of their adaptations to a diet of nectar and pollen. They are small agile marsupials, weighing 7-20g when mature (females are usually a few grams heavier than males), and have three distinctive stripes along the back. An elongated snout, highly reduced dentition and brush tongue enable the animal to probe deeply into the stiff wiry flowers of banksias and other native plants for nectar. The tail is prehensile and up to 11 cm long, while the body is up to 10 cm. The combination of these and other features make the honey possum so unusual among marsupials that it is classified in its own superfamily separate from all other possums.

Honey possums are confined to south-western Australia, favouring heath, scrub and open low woodlands on light sandy soils where plants such as banksias, dryandras and eucalypts flower in profusion.

Recently, a good deal has been learnt about the ecology and reproductive biology of the species by research teams at Murdoch University, the Western Australian Institute of Technology and at the Western Australian Wildlife Research Centre.

Life History

The Murdoch team monitored a

large population near Manypeaks over a period of three years. They found that most animals lived out their lives within less than one hectare of land. This finding was unexpected because previous authors has presumed that honey possums were nomadic. Females with young were especially confined in their movements, 80% of them being captured over several months in areas less than 50 m in diameter.

The Murdoch team established that, on average, a honey possum lives for 12 months from birth — 3 months to weaning, 3 months as a weaned juvenile, and 6 months as an adult. Breeding occurs all year round but peaks in autumn, winter and spring when banksia flowers are most abundant. Usually 2 or 3 young are in each litter. Like kangaroos, the females are able to delay development of young embryos while they carry pouch young.

Studies recently initiated at the Western Australian Institute of Technology are aimed at investigating the honey possum's energy requirements under varying conditions of temperature and food availability. So far, it has been established that the animal goes into a state of torpor either when it's cold or when food is in short supply.

▼ Honey Possum feeding on *Dryandra formosa* at Cheyne Beach W.A. (Photo S. Hopper)





▲ Honey Possum on *Banksia nutans* at Two Peoples Bay Nature Reserve. (Photo S. Hopper)

▼ Honey Possum on *Beaufortia heterophylla* at Cheyne Beach Nature Reserve (Photo S. Hopper)



Pollinators

The Wildlife Research Centre team has focused on the role of honey possums as pollinators of native plants. The accompanying photographs illustrate the wide range of plants from which honey possums obtain pollen and nectar. Banksias are particularly important as food plants. Species of Jug flowers, *Adenanthos*, One-sided Bottle-brushes, *Calothamnus*, and Kangaroo Paws, *Anigozanthos*, regarded in the past as being pollinated only by birds, are also food plants of honey possums.

Although honey possums feed predominantly at night, it was found that they also feed in daylight during cool or overcast conditions at Cheyne Beach, east of Albany. This allowed the team to compare honey possums and honeyeaters feeding on banksia and eucalypt flowers. Honey possums were much slower at extracting nectar and they preened their fur of pollen more often than honeyeaters preened their feathers. As a result, captured honey possums were found to carry far less pollen than honeyeaters, and were not as important as pollinators of the plants under study (*Banksia grandis* and *Eucalyptus angulosa*). However, recent work at Millbrook Nature Reserve north of Albany suggests that honey possums may be the main pollinators of *Banksia goodii*, a very rare species that produces flowers at ground level over summer.

Conservation

Western Australian Museum records indicate that honey possums range widely throughout south-western Australia. They have been collected as far north as Kalbarri, as far east as Cape Le Grand National Park, and as far inland as Dragon Rocks and Lake Magenta.

They appear to be most abundant in south coastal areas. For example, pit trap surveys of the Department of Fisheries and Wildlife, the Western Australian Museum and Murdoch University indicate that honey possums are trapped 5-45 times more often near Albany and Esperance than they are in wheatbelt nature reserves such as at Tarin Rock,

Yornaning and Marchagee. The animals are 370 times more frequently captured near Albany than they are in banksia woodland at Jandakot south of Perth. In excess of 200 honey possums per hectare have been recorded near Manypeaks by Murdoch University staff in one of the areas where the species is abundant.

Habitats favoured by honey possums are typically heath, scrub or low woodlands that provide a year-round nectar and pollen supply. The vegetation is usually rich in species of the Proteaceae (e.g.

Banksia, *Adenanthos*, *Dryandra*, *Grevillea* or *Lambertia* spp.) and the Myrtaceae (*Eucalyptus*, *Calothamnus*, *Beaufortia*, *Melaleuca* spp.). Sandy soils poorly suited to cereal agriculture prevail in these habitats. This has been fortunate for honey possums because many areas of these light soils have been set aside for flora and fauna conservation in nature reserves and national parks.

Honey possums are known to occur in at least 12 such reserves, including several given class A status (e.g. Millbrook and Two Peoples Bay Nature Reserves, and Fitzgerald

River, Stirling Range, Cape Le Grand and Kalbarri National Parks). While the species as a whole appears in no danger, the extinction of local populations is accelerating with the encroachment of agricultural development into the northern and southern heathland areas of the south-west. Farmers can clearly make a significant contribution to the conservation of honey possums by leaving even small areas (a few hectares) of banksia scrub on poor sandy soils uncleared on their properties.

New Venomous Snake Found

A new species of venomous snake which was first found in Western Australia in late 1979 has been named *Brachyaspis atriceps* by staff from the Western Australian Museum.

The snake was collected in October 1979 by P. Griffin and G. Barron of the Museum while exploring open eucalypt woodland on sandy soil at Lake Cronin, about 90 kilometres east of Hyden.

Only one other specimen has since been collected and that was from the same area.

The snake is relatively small, the captured specimen measuring less than 0.5m. The top and sides of its head are matt black, and its upper lips narrowly edged with white. The rest of the upper and lateral surfaces are moderately dark brown with the exception of a small section behind the black of its neck which is brownish-white. Underneath, the snake is mostly pale reddish-brown.



▲ *Brachyaspis atriceps*. (Photo R.E. Johnstone W.A. Museum)

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- Wongan Hills: Quinlan Street, W.A. 6603. Tel. 71 1395.
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WILDLIFE DISTRICTS IN WESTERN AUSTRALIA

