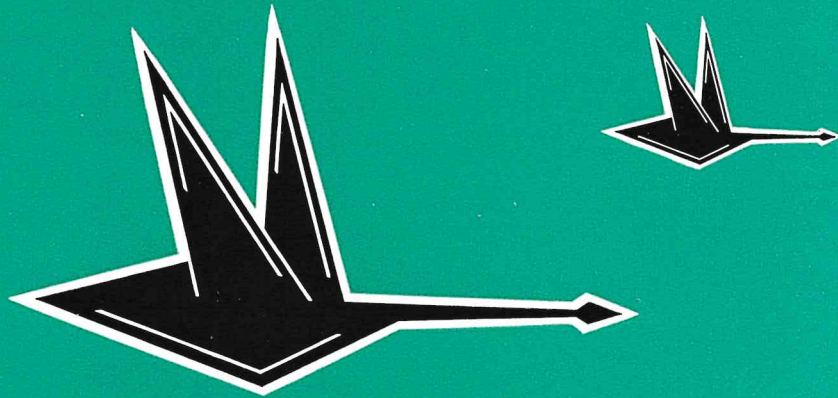


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WESTERN AUSTRALIA



S.W.A.N.S.

DUPLICATE

State
Wildlife
Advisory
News
Service

Vol. 3 No. 2
Autumn, 1972



S.W.A.N.S

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AUTUMN, 1972

Issued by direction of the Hon. R. Davies,
M.L.A., Minister for Fisheries and Fauna.

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

Chief Warden of Fauna: 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....

On the conservation scene extremists have been capturing the headlines recently. The media really cannot be blamed for catching on to the more sensational outbursts of these one-eyed individuals for, after all, emotive headlines do sell newspapers.

Here are a couple of typical comments:

"All kangaroo shooters ought to be shot".

"I will never rest until there isn't a 'roo left in the State."

And how about the efforts of an eastern states-based society who issued a leaflet showing a poor bewildered little joey looking at the body of its mother who had just been murdered by an evil 'roo shooter. This might have been effective publicity if the joey had not been a red, and its "mother" a male grey!

Perhaps a few may be deceived and rally to the flag, but generally such bigotted distortions of the truth tend to alienate the thinking public who, if presented with true facts and a logical argument, may find some merit at least in the cause.

If the demonstrators who picket shops which sell articles made from kangaroo skins were to wear only synthetic clothing, perhaps their appeal may seem more genuine. Man has been making use of the skins and meat of animals since prehistoric times, and while the massacre of endangered species such as leopards can in no way be condoned, the management and controlled harvesting of kangaroos is aimed at conserving them. In the long term, it will be far more effective than preserving every single animal for emotional reasons. Management of kangaroos by controlled harvesting falls within the broad spectrum of conservation—often stated as: "the wisest possible use, over the longest possible term, of all our natural resources."

If you are a preservationist who refuses to buy pet food containing kangaroo meat, will you be forgoing your joint of lamb this weekend on the same emotional grounds?

IN THIS ISSUE

Kimberley Islands	31
Australian Crocodiles	33
Emu Farming	36
Adèle Island	38
Reserve Management—Why and How	41
Grey Kangaroo Management Programme Explained	46
Our Diminishing Heritage—Tammam	50
Declaration and Amendment of Reserves	53

KIMBERLEY ISLANDS EXPEDITION



During May and June 1972 the Department organised an expedition to examine the flora and fauna of the islands off the North Kimberley Coast.

It is well known that some species of wildlife which formerly existed in the Australian mainland now survive only on islands. Some examples are the Boodie (*Bettongia lesueur*) which occurs on Barrow, Bernier and Dorre Islands and the Banded Hare Wallaby (*Lagostrophus fasciatus*) which occurs on Bernier and Dorre Islands. There are a large number of islands in the Kimberleys and almost nothing is known about the wildlife on them.

Efforts to increase knowledge of the area commenced last year when Departmental Research Officers and Museum staff were attached to a mapping team from the Royal Australian Survey Corps. At that time the Army was surveying the Kimberley coast and its associated islands so it was possible to visit about fifteen islands by helicopter.



Patrol vessel "Dampier" in inlet at Augustus Island

This year the survey was based on the Department's patrol vessel "Dampier". Two three-week trips were made using Koolan Island as a base. Biologists from the Department of Fisheries and Fauna, the W.A. Museum and the W.A. Herbarium took part. Some of the islands visited were Augustus, Champagne, Heywood, Bigge, Wollaston, Katers, the Coronations and the Osborne Group, as well as a number of smaller ones. (A report on the visit to Adèle Island can be found elsewhere in this issue).

Although most of the flora and fauna collected has still to be identified, the trip was a great success and a number of interesting observations were made. A number of mammals were collected including the Little Rock Wallaby, Northern Native Cats, an Antechinus, the Sugar Glider, the Golden Bandicoot, the Golden Back Tree Rat, at least one species of Rock Rat, a native mouse, a flying fox and a number of bats. The Little Rock Wallaby



Native rodent, yet to be positively identified (Augustus Island)

was found on no fewer than five islands and native cats on at least three islands. Interesting birds collected included the Torres Strait Pigeon and the Green Winged Pigeon, both of which are rare in Western Australia. A Jungle Fowl was also collected from one island.



West side of Augustus Island from air

The last extensive plant collections from this area were made by Allan Cunningham from 1819 to 1821, so that the collecting done during this trip was breaking almost new ground. Many species have still to be identified but already a number of the plants have been found to be new to the State.

As well as plants and animals, members of the expedition found a number of aboriginal rock arrangements and paintings. Information on these will be made available to the W.A. Museum.

While in the area, the opportunity was taken to enter the St. George Basin at the mouth of the Prince Regeant River. The Basin contains extensive mangroves swamps and is a well known haunt of the salt water crocodile.

When all the information has been collated a case will be prepared for some of the islands to be reserved for the Conservation of Fauna and Flora. Much work is still to be done and it is hoped to work in this area again next year.

The Department would like to thank all those who assisted with the expeditions, especially the Dampier Mining Company, Pearls Pty. Ltd., and the Royal Australian Survey Corps.



Camp on Augustus Island

FAUNA WARDENS APPOINTMENT

By notice in the *Government Gazette* on the 7th of April, 1972, the Hon. Minister for Fisheries and Fauna appointed Mr. William Michael Mahoney as a Warden of Fauna.

HONORARY FAUNA WARDENS— CANCELLATION

LITTLE, Raymond George, of Brady Street, Jarrahdale (Gazetted 5/5/72).

JOHANSSON, Erick, of The Copper Kettle Restaurant, Pinjarra (Gazetted 26/5/72).

PENALTIES INCREASED FOR RARE SPECIES

By notice in the *Government Gazette* on June 30, 1972 the Minister for Fisheries and Fauna has declared the following birds to be rare and likely to become extinct:

- Noisy Scrub Bird (*Atrichornis clamosus*)
- Bristle-Bird (*Dasyornis brachypterus*)
- Rufous Bristle-Bird (*Dasyornis broadbenti*)
- Black Grass Wren (*Amytornis housei*)
- Western Whipbird (*Psophodes nigrogularis*)
- Ground Parrot (*Pezoporus wallicus*)
- Night Parrot (*Geopsittacus occidentalis*)
- Naretha Blue Bonnet (*Psephotus haemato-gaster narethae*)
- Cape Barren Goose (*Cereopsis novae-hollandiae*)

By this notice the above birds become wholly protected throughout the State at all times. Anyone infringing this protection is liable to a penalty of one thousand dollars.

The Freckled Duck was placed in the same category in March this year. (See SWANS Vol. 3 No. 1 p. 54) The Western Australian Wildlife Authority is currently examining those species of reptiles and mammals which should be given this additional protection. It is certain that the Short-necked Tortoise will be added, but a decision on other reptiles and mammals has not yet been made.

OBITUARY

On the 2nd June, Mr. P. Crackel of Swanbourne, passed away after a short illness.

The late Mr. Crackel, known affectionately as "Percy" to his many friends, successfully ran a sporting goods store in Perth for many years. Through this medium, Percy imparted expert knowledge and advice on hunting and fishing; the phrase "Crackel for Tackle" was known by thousands of sportsmen throughout the State.

To those who were fortunate enough to know Percy, he was one of nature's gentlemen, a man with personal charm and understanding, a man who cared that future generations of Western Australians could enjoy the Australian outdoor way of life, and that the average citizen should have the opportunity to catch a fish or hunt a duck.

The late Mr. Crackel is survived by his widow, Mrs Mabel Crackel and two children, to whom we extend our deepest sympathy.

S. W. Bowler,
Supervising Warden.

AUSTRALIAN CROCODILES

In terms of conservation and public acceptance, Australian reptiles, and crocodiles in particular, tend to suffer in comparison with more appealing native fauna. Western Australia undoubtedly leads all other States in the conservation of reptiles in general, but the abysmal lack of informative literature written for lay consumption has done nothing to alleviate the misconceptions and lack of understanding of crocodiles. We are therefore pleased to be able to reproduce the following excellent article by Dr. H. Robert Bustard which appeared in "Australian Natural History" Vol. 17, No. 5. Dr. Bustard is a population ecologist working at the Research School of Biological Sciences of the Australian National University and is Australia's leading authority on crocodiles.

"Crocodiles are one of the most maligned animal groups. They are widely loathed, very little understood by most people and surrounded by a number of myths. In this article I hope to be able to convince the reader that crocodiles have a place in nature and are no more than a master predator in their environment, as is a lion in his habitat.

In Australia there are two species of crocodile, the Freshwater or Johnston's Crocodile (*Crocodylus johnstoni*) and the Saltwater or Estuarine Crocodile (*Crocodylus porosus*). These two species illustrate a number of points which have been central to evolution and distribution of the crocodile group. There has been a radiation or evolution in two main directions, namely, the development of long-snouted species with slender jaws and of short-snouted, broad-jawed species. The Australian freshwater species and the estuarine crocodile are representatives of these two groupings respectively. The distribution of freshwater crocodiles is usually closely circumscribed, since saltwater forms a barrier to their dispersal. Hence, adjacent areas of the world separated by even a narrow area of sea may have evolved quite distinct freshwater crocodiles. Such is the case in Australia and Papua-New Guinea. The Australian Freshwater Crocodile is found only in Australia. In Papua-New Guinea there is also a freshwater crocodile (*Crocodylus novaeguineae*), but even the novice could readily distinguish it from the Australian freshwater species.

The saltwater crocodiles on the other hand, like many seagoing animals, have been able to disperse and colonize other suitable habitats. Probably no crocodile has been as successful at this as the estuarine species (*C. porosus*). This crocodile is widely distributed in Asia from the Indian sub-continent eastwards, and extends southwards through the Malay peninsula and Indonesia to northern Australia. It often occurs on fairly small, remotely-placed Pacific islands having, for instance, been recorded at least once in the Fiji Islands, which are thousands of miles from any substantial land-mass.

Crocodiles "unpopular"

Crocodiles are reptiles, as are lizards, snakes, tortoises, turtles, and the remarkable New Zealand tuatara (*Sphenodon*). This may in large measure explain why they enjoy such low public esteem, as the general public tend to dislike reptiles, and, since they are ill-informed about them, credit them with many harmful or unpleasant habits. Hence a crocodile, which is master of its river system or swampland, is seen as a foul beast, whereas the lion is called "King of Beasts".

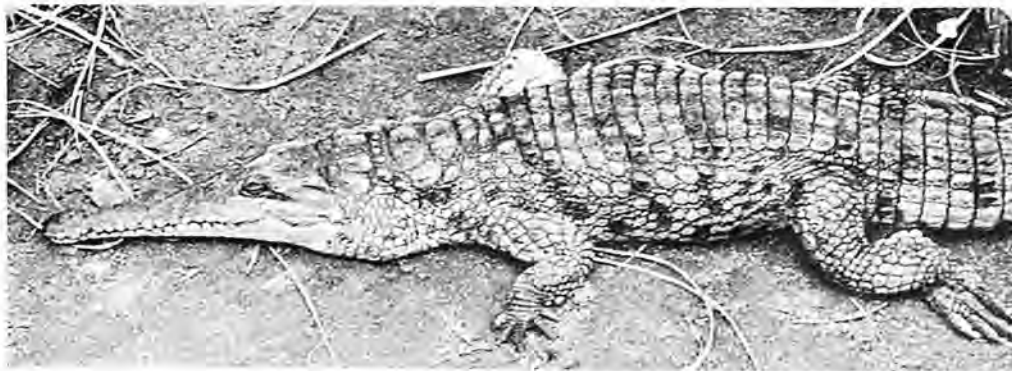
Like other members of the class Reptilia, crocodiles have a long and distinguished history. They are descended from prehistoric reptiles called archosaurs—ancestral also to the dinosaurs, and somewhat like them in living pattern. The crocodiles have continued to occupy the same life style for 170 million years. There is a temptation to think that in evolution the new is always replacing the old. This is far from always being the case, and the crocodile group provides an excellent example of a group of animals which in far-back antiquity evolved a way of life that made them supreme in their chosen habitat and allowed them to remain masters of their environment throughout 170 million years. It must be remembered that, until the advent of shooting with modern automatic weapons, crocodiles could be seen in almost unbelievable numbers throughout tropical swamplands and river systems.



Salt water crocodile (*Crocodylus porosus*)

Like most reptiles, crocodiles do not thrive under cool conditions. For this reason they are restricted to the tropics, in Australia being found only in the north, occurring in Western Australia, the Northern Territory, and Queensland. In Western Australia they are restricted to the Kimberley Division. They occupy a similar portion of the "top-end" of the Northern Territory, but in Queensland the estuarine species formerly ranged much further south along the coast, well into central Queensland. Human expansion and shooting have all but exterminated these more southerly populations.

Freshwater or Johnston's
crocodile (*Crocodylus
johnstoni*)



All crocodiles are semi-aquatic, and show adaptations to their way of life. The eyes and nostrils (see the accompanying photos) are placed well up on top of the head so that the crocodile can swim or float with only the eyes and nostrils exposed. There is a fleshy flap at the back of the mouth which cuts off the throat so that crocodiles can open their mouths under water without drowning. The rear feet are webbed and the tail, the main organ of propulsion, is flattened laterally to make a powerful paddle. When swimming, all four limbs are folded back along the body. Crocodiles' jaws are well equipped with sharp teeth to hold the prey. This is particularly important with slippery prey such as fish, which forms an important part of the diet of all species at least during part of their life.

Life cycle

The life-cycle of crocodiles follows the classical dinosaur pattern. They begin life as eggs which have hard calcareous shells like those of birds. Not unnaturally there is considerable difference in egg size among the various species, but they approximate the size of goose eggs, though somewhat more elongated. The mother crocodile has to place the eggs somewhere where they will not run the risk of being flooded by rising water. Some crocodiles nest during high water levels, either in or immediately after the wet. They solve this problem by laying their eggs in nests which they construct in floating grass islands that rise and fall with the water (as is done by the Estuarine Crocodile). Others, of which the Australian freshwater species is an example, nest during the dry season, laying their eggs in sandbanks. The young of the latter species must emerge before the water-levels rise at the start of the next wet season. Emergence is usually timed so that the rising flood-waters serve to disperse the recently-hatched young, which would be extremely vulnerable if they were all cooped up in small dry-season pools. When they hatch, baby crocodiles are quite tiny, a total length, including the tail, of around 9 inches being usual, although of course, there are species differences. They are extremely vulnerable to a whole host of predators, including many fish, birds, reptiles and mammals which larger crocodiles themselves eat.

Here again we see the dinosaur pattern. A life-history beginning with small eggs—even the largest crocodiles lay eggs which make an ostrich egg look enormous—and young which for some time are so small as to be virtually defenceless and must hide from their enemies, but which with growth eventually come to occupy a niche that no other species of animal can hope to challenge.

Parental care

Crocodiles have from time to time been stated to guard their eggs and even occasionally their young. For a long time this information was suspect and scientists thought that here was just another myth about crocodiles, especially since parental care is virtually unknown in reptiles. However, recent work, notably by H. B. Cott, a special adviser to the Governments of Uganda and Northern Rhodesia, has finally conclusively demonstrated that parental care does take place. The African crocodile *C. niloticus*, studied by Cott, not only guards the nest from egg-eating predators (as do many other species) but, according to Cott, plays a vital role in liberating the young from the nest and in guiding them to the nearest suitable water. When the young crocodiles are ready to leave the nest they call to the mother, who opens the nest. It appears that calling is also a key factor in synchronizing emergence by all the brood at the one time and in keeping them together with the mother. Cott has recently described "nurseries" in which the mother stays with the young, chasing away enemies until they are several months old.

Although juvenile crocodiles have many enemies, without man to disturb the balance crocodiles would always be numerous. This is because they are long-lived animals and require only a very low level of survival among their progeny to offset natural losses. Since they are master predators, losses will occur mainly from old age or fights with other crocodiles. It seems likely that crocodiles limit their numbers like other animal populations which have been studied and, indeed, as did man until he became a settled farmer. Crocodiles appear to do this by having "stations", or territories, each of which is occupied by an adult crocodile that will tend

to be an old individual. Since crocodiles, like other reptiles, grow throughout life, old is synonymous with large. Let us take an example from the Australian estuarine species. Although females very rarely exceed 14 feet, males certainly grow to at least 20 feet. Sexual maturity is reached between 8 and 9 feet. Just imagine the result of an encounter in which a hopeful young male of 9 feet and weighing several hundred pounds tries to dislodge an old male of twice his length, probably ten times his weight, and with perhaps a century's experience in the art of killing opponents!

Crocodile society is ultra-conservative and is an old crocodile's world. While it is true that until recently we lived in an old man's world, the difference is that the young crocodiles are killed off without having a chance to breed, breeding being a prerogative of "station"-owning crocodiles. In human society the younger men, although they may have to wait for power, are able to produce progeny throughout this period. With crocodiles, evolution is largely in the hands of crocodiles which have been successful for long periods of time. A conservative situation like this will tend to result in little change—which is reflected in the group remaining similar throughout a long period of geological time.

There are many aspects of crocodiles which deserve mention, but space precludes more than two. Crocodiles are carnivores and as they grow their diet changes from insects, tiny fish and frogs at birth, to larger fish, then other reptiles and birds, and in large individuals, mammals usually come to make up a large part of the diet. (This was beautifully illustrated by Cott in a publication in 1961). Crocodiles like fresh prey, and eat it at once. The idea that they keep food in underwater lairs until it is rotten is a myth. Crocodiles, incidentally, are not much interested in humans as food. This applies to large species well able to take a man. Even where contact is an everyday affair attacks are infrequent. Certainly the Estuarine Crocodile much prefers dogs or pigs to man. The Australian Freshwater Crocodile is a shy inoffensive little animal which will never attack humans unless attacked (wounded) first.

Conservation

I would like to finish this article with a plea for crocodile conservation. Those interested should read my 1969 article in *World Wildlife Year Book*. It would be tragic if such a fascinating group should be wiped out after such a long and proud history and before scientists have even had a chance to study them. Yet most species are threatened, and for some the only hope for the future lies in captive breeding studs. In Australia the situation is not yet so critical—due particularly to the foresight of Western Australia, which protects both species. However, since Queensland refuses to take any action, [see Crocodile Research in Queensland, S.W.A.N.S. Vol.

3 No. 1] poaching is rife as far away as Western Australia to sell skins in north Queensland. Incidentally, it would be quite possible to provide the commercial demand for crocodile leather from crocodile farms and leave the wild crocodiles to go their own way undisturbed as they have since Jurassic days.

By the time this article is in print Australia will have its first crocodile farms, run to benefit Aborigines, under my supervision, with financial backing from the Commonwealth Office of Aboriginal Affairs, apart from an attempt at Karumba which failed in the mid-1960's.

LEATHERY TURTLE AT BUSSELTON

Fauna Warden K. Morrison reports the capture of a rare Leathery Turtle at Busselton in January this year.

A local professional fisherman found the turtle entangled in the ropes of his shark net which he had set in 22 fathoms of water about 10 miles north of Cape Naturaliste. The turtle was handed over to the local Jaycees organisation, who run a large marine aquarium in Busselton, but due to its large size it threatened to damage the aquarium or harm itself, so on the following day it was released into the ocean, unharmed.

The turtle weighed approximately 500 lb., was about 5½ feet long and measured 8 feet across from flipper to flipper.



Leathery or Luth Turtle (Photograph by courtesy South West Times)

Leathery or Luth Turtles are only very occasional visitors to our coast, although they are the most widely distributed of all turtles. They are placed in a family of their own, for unlike all other marine turtles their carapace consists of many small plates embedded in a tough leathery skin and the backbone is not firmly attached to the carapace. The Leathery Turtle is second only in reptilian size to the Estuarine Crocodile, and grows to a length of more than 8 feet with a weight exceeding 1,500 lb. Seven prominent ridges extend along its back and five along its belly. The limbs are powerful clawless flippers, the front pair much longer than the rear. It is mainly a fish eating turtle, and the throat is lined with long spines to help hold its prey.

EMU FARMING

Emu farming has started in Western Australia on a property at North Kalannie where over one hundred emus form the basis of the breeding stock to support a scheme to produce over 5,000 skins a year.

In the past 25 years exotic leathers, such as crocodile, lizard and ostrich, have grown in importance on the world markets; ostrich leather for example fetches \$20-\$25 per square foot. In South Africa, in 1969, two far-sighted Swiss businessmen-cum-farmers, Messrs H. Kaegi and H. Wuthrich, made a study of the ostrich farming industry and recognised an untapped potential for emu farming in Australia.

Mr. Kaegi and Mr. Wuthrich arrived in Western Australia in January 1970 and set about sounding out the relevant Government Departments for assistance and guidance. Although the idea may have seemed a little outlandish at first hearing, it rapidly became apparent that the two gentlemen had researched the scheme thoroughly, and had sufficient financial backing to see it through.

Wild emus are unsuitable for producing top quality leather because the pelts are usually damaged on the back; so for emu farming to be successful the emus must be bred and reared in captivity. This meant that a 6 ft. high strong fence had to be built to enclose the breeding stock. The lower 18 inches consists of rabbit proof netting, the middle 3 ft. of chain mesh, and there are three plain wires which run along the top. This fence costs \$2,500 per mile.

The company formed by Mr. Kaegi and Mr. Wuthrich is called Emu Experimental and Research Farms Pty. Ltd. Other partners are a neighbouring farmer, Mr. J. MacNamara, and a Perth solicitor, Mr. A. Williams. The company has a four stage development programme.



Emus at Kalannie, note fence in background (Photograph by courtesy Sunday Independent)

1st stage

- Construction of 80 breeding pens.
- Purchase of incubators.
- Building up of a stock of 5,000 emus over a period of 5 years.
- Construction of rearing pens.

2nd stage

- Construction of further rearing pens.
- Increasing of the stock to 10,000 emus.
- Construction of an abattoir.

3rd stage

- Construction of a tannery.

4th stage

- Construction of a leather goods manufacturing plant.

Building up a stock of 5,000 emus is by no means an easy venture. It is not feasible to take adult emus in the wild as they cannot be domesticated and are therefore useless as breeding birds. Consequently emu chicks have to be raised on the farm. The initial breeding stock of about 100 birds, consists of chicks taken in the wild, pet emus given by local farmers, and birds from the C.S.I.R.O. research station. Calculating an average of 9 eggs a year, 110 breeding couples will provide the rising generation of 1000. The following year double the amount of birds will be kept for breeding purposes and in the third year again 110 birds in addition. This gives a yearly increase of 3,000 young birds from the fourth year onwards.

Mr. Kaegi points out that these figures are theoretical, based on the observations of the ostrich under farming conditions, and only experience will tell if the emu will behave in the same way.

The first tanning trials with emu skins were carried out by a tannery in Sydney. The results were absolutely disastrous. The tanned product was far from being a leather, let alone a high quality fine leather. However, with the assistance of a worldwide Swiss chemical concern and after many experiments, a high quality fine leather was produced. The leather, coming as it does from a unique bird, has a singular pattern with no similarity to other skins. Leather and fashion specialists have declared unanimously that this unique and attractive leather is suitable for the manufacture of clothing, handbags, shoes, travel goods etc. One of the largest exporters of skins in Australia and South East Asia has gone on record as saying "I think we should have no problems in disposing of your entire production without much trouble".



Mr. H. Kaegi with emu skin prior to tanning (Photograph by courtesy Sunday Independent)

Apart from the skin, other parts of the bird have a commercial value—feathers for feather dusters; flesh for pet meat; blood, waste meat and bones for fertiliser; and fat for soap. It is obvious that if the project succeeds it will benefit the State's economy. In addition to boosting export figures, the project will assist the local farming community, for Mr. Kaegi estimates 200,000 bushels of grain per year will be required to feed his total stock. Also, in the second stage of development, local farmers will be offered young birds to rear and sell back for slaughtering, and in the third and fourth stages of development the tannery and manufacturing plants will provide local employment for up to 300 people. It is a bold venture which deserves to succeed.

FOOTNOTE: Emus have been classed as vermin in W.A. for many years. In 1969/70 over 27,000 beaks were presented for the bounty payment of 40 cents each. In 1970/71 the figure dropped to 12,400, but this is due more to the decreased bounty of 20 cents than to any reduction in numbers of emus. The bounty has now been removed, because the Agriculture Protection Board feel that it was bounty hunters killing for profit rather than farmers protecting their property, who were taking most emus. Organised hunting causes the birds to damage vermin fences far more than if the birds are left alone.

COMPUTERS USED IN WATERFOWL RESEARCH

In May this year the Department's Senior Waterfowl Research Officer, Dr. T. L. Riggert, accompanied by Mr. N. Hall, the mathematician from the W.A. Marine Research Laboratories, visited the Arthur Ryalah Institute for Environmental Research in Melbourne.

The Institute has established computer programmes to process the mass of information gathered from waterfowl research carried out by the Victorian Fisheries and Wildlife Department. Ducks have been banded in vast numbers—over 100,000 to date; to collate this information without the aid of a computer would be a statistician's nightmare.

In W.A., the Waterfowl Research Branch is in the process of establishing a similar computer programme. The one week trip by Dr. Riggert and Mr. Hall will prove to be of great value; many of the problems encountered by the Institute will now be avoided when the W.A. programme is fully established. This type of co-operation between States is to be applauded; one often gets the impression that much time and money may be being wasted by duplication of effort in various States. By closely following the Victorian programme, the data from waterfowl research in both States can be compared and correlated and thereby provide much valuable information on waterfowl movements, breeding, habitat preference, longevity, etc.

The Department is very grateful to Mr. S. Cowling and Dr. I. Norman for their co-operation during Dr. Riggert's and Mr. Hall's visit. In November this year the 1972 National Conference of the Australian Committee on Waterbirds will be held on Rottnest Island. During their stay, members of the committee will be shown the work being done on waterfowl research in W.A. and this will provide an opportunity for this Department to return the hospitality which was extended to our officers.

NEW FAUNA CENTRES

Four new district fauna offices are to be set up, bringing the total to 13. The new centres are at Mount Magnet, Geraldton, Mandurah and Esperance.

Because of staff changes and accommodation difficulties, appointments to these centres have not yet been finalised, but the names of the officers and the full addresses will be published in S.W.A.N.S. as and when the appointees take up residence.

ADELE ISLAND REPORT

On June 18, 1972 a party of biologists from the Department of Fisheries and Fauna, the W.A. Museum and the W.A. Herbarium visited Adèle Island while taking part in a survey of the fauna and flora of islands off the Kimberley coast. The party was transported in the Department's patrol vessel "Dampier".

Adèle Island is situated about 50 miles north west of Cockatoo and Koolan Islands which are north of Derby. It is a low, flat, sandy island of about 500 acres, the highest point being only a few feet above high water mark. A lighthouse and radio beacon have been constructed to assist shipping and an automatic weather station has recently been built for the Bureau of Meteorology.



Brown Booby with chick

The vegetation is simple, only eleven species being collected. Most of the island is covered with the well known beach plant, *Spinifex longifolius*, up to two or three feet high with creepers and other plants scattered here and there. Parts of the island which are subject to occasional inundation by the sea are covered with salt water couch (*Sporobolus virginicus*). Other species collected were—

Amaranthus sp.
Boerhavia diffusa
Canavalia maritima
Cyperus conicus
Euphorbia chrysochaeta
Ipomoea biloba
Portulaca oligosperma
Salsola kali and
Sesuvium portulacastrum

Much of the island appeared to have been burned, possibly two or three years ago.

The outstanding feature of the wildlife is the sea bird breeding colonies. When the party visited the island three species were nesting; these were the Brown Booby, the Masked Booby and the Lesser Frigate Bird. "The Handbook of



Lesser Frigate Bird nesting colony. Vegetation is *Spinifex longifolius*

Australian Sea-Birds" by Serventy, Serventy and Warham also lists the Pied Cormorant and the Lesser Crested Tern as breeding on Adèle but no evidence of breeding was seen during this visit.

The most numerous of the breeding birds was the Lesser Frigate Bird, about 2,500 breeding pairs being present. This bird nests in dense colonies of up to three or four hundred nests only two or three feet apart. The nest is a platform a few inches off the ground built in and made of *Spinifex*. All stages from the single egg to birds almost capable of flying were present in the one colony.



Lesser Frigate Bird—female

The Brown Booby was nesting almost all over the island and it was estimated that 1,500 to 2,000 pairs were present. The nest is constructed on prostrate vegetation or even seaweed on the beaches and consists of a few twigs or stems from the *Spinifex*. Two eggs are laid although only one young bird is raised. Again, all stages from the eggs to sub-adults were present.

The Masked Booby was much less common than the other two species, only about 100 pairs being present. The nest of this species is a depression in the sand, most nests being on the beaches with a few in inland, open areas. The Masked Booby is a fairly rare bird in W.A. only one other island, Bedout Island near Port Hedland, is recorded as a breeding site.



Masked Booby

One interesting find on Adèle Island was the presence of a small land bird. This was the Tawny Grassbird (*Megalurus timoriensis*), an unusual find on an island so far from the mainland. Other birds seen on or near Adèle included the following: Kestrel, Pied Cormorant, Caspian Tern, Lesser Crested Tern, Common Noddy, Silver Gull, Reef Heron, Pied Oystercatcher, Red-capped Dotterel, and Pelican. A few frigate birds seen were completely dark underneath and were probably the Greater Frigate Bird.

No mammals were seen although tracks indicated that a small rodent exists there. This is probably the introduced House Mouse (*Mus musculus*) as this species was collected on Browse Island, 60 miles north-north-east of Adèle, which the party visited the previous day. No sign was seen of any reptile.

CHANGE OF ADDRESS

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

LITTER

Litter and its prevention is a major problem facing our State of Western Australia today.

While most Western Australians are aware of the beauty of their natural heritage, many tend to take it for granted. Because it has always been there, we assume it must always remain.

All too frequently this lapse of conscious and vital interest in our environment results in ruinous disfigurement. We awake too late to find what we prized has been lost.

Untidiness in all its forms—from rubbish dumping, to leaving the remnants of a picnic in a park or on the beach, to the simple act of dropping a bus or train ticket in the street—costs the nation millions of dollars each year in cleaning up. Thousands of people are injured or have their health impaired by thoughtless disposal of products designed for their pleasure and convenience while at the same time our State's natural beauty is impaired or destroyed.

It has been estimated that the population of Perth may treble in the next 30 years. If we are not to be drowned in litter by the year 2,000, we will have to be three times tidier than we are today!

THE KEEP AUSTRALIA BEAUTIFUL COUNCIL (WESTERN AUSTRALIA) INC. is a non-profit public service organisation which has been formed with the support of the Government of Western Australia and leading business, industry and community organisations.

Its aims are:—

To foster and encourage the appreciation of clean and well-kept cities and countryside.

To safeguard the character and beauty of the Australian landscape through the prevention of litter.

To preserve and improve the appearance of our environment in the schools, in factories, shops and offices, in parks, beaches and recreation places and along the roadside by the prevention of litter.

To promote litter-prevention through publicity of all kinds, provision of litter receptacles and encouragement of suitable legislation.

To maintain continuous and effective campaigns against the disfigurement of the landscape by litter and to encourage a responsible community attitude to cleanliness in all public places.

To co-operate, where considered desirable by the Council, with other organisations on questions relating to all forms of pollution and generally to work for a clean, healthy environment.

Through advertising and publicity campaigns, educational programmes through schools and continuous research into the latest litter prevention

techniques, the Keep Australia Beautiful Council will act as a clearing house to provide advice, materials and assistance to municipal and community groups and to business and industry to advance the cause of litter prevention and State beautification.

You can actively participate in litter prevention . . .

By joining the Keep Australia Beautiful Council (Western Australia) Incorporated.

1st Floor, Central Govt. Offices, Barrack St., Perth, 6000.

A State Government grant pays for administration but not for educational and publicity campaigns.

The cost of campaigns is paid for by subscriptions and donations from business, industry, associations, municipalities and individuals.

Membership Fees—individual members, small firms or non-profit organisations—\$10.00.

Large firms, associations or companies—\$50.00 min.

NATIVE CATS ABUNDANT

Fauna Warden A. R. Marshall reports that in May this year he discovered the bodies of four Western Native Cats (*Dasyurus geoffroii*), all killed by vehicles on the Brunswick Junction/Collie road.

The bodies were distributed over about four miles and all the animals had been recently killed. There were three males and one female.

Mr. Marshall comments that to see four native cats in such a short distance is indicative of the number that must be present. In fact, Collie is a known stronghold of the species, but further investigations show that in the past few months a large number of sightings have been made. Furthermore, many of these have been in or near the metropolitan area, notably at Armadale, Kalamunda, Quinn's Rock and in the John Forrest National Park. One specimen found at Wanneroo had only three legs which appeared to be a congenital deformity rather than the result of an accident.

There could be two reasons for the large numbers of sightings of native cats. One is that the species is making a comeback, or at least holding its own in the face of increased development of the bush. The other reason would be that the efforts of this Department's Extension Service are paying off and individuals are taking the trouble to report sightings and bring in specimens.

Readers are urged to report all sightings to this Department and specimens are always welcome at the W.A. Museum.

PRIVATE ZOOS AND FAUNA SANCTUARIES

In the past year about one dozen applications have been received requesting approval to establish private zoos. Whether or not the applicants are prompted by commercial interests or conservation motives is not always readily apparent, but few requests of this nature receive favourable consideration.

The Department feels that the functions of a zoo can only be achieved by those who have specialised knowledge and sufficient financial resources to meet the housing and aesthetic requirements demanded both by this Department and the public. Few people realise how much capital is required to establish a zoo, and even fewer people have worked out the economics. In most cases aspiring zoo-keepers who are alarmed at the rapid destruction of habitat and are interested in fauna conservation, could make a more positive personal contribution towards the preservation of the environment by joining a responsible conservation organisation.

Requests are also received from very well-meaning individuals who wish to establish their land as fauna sanctuaries—not for any pecuniary gain, but from genuine preservation motives. Any landowner may, of course, protect fauna or its habitat on his property, but some desire the prestige of owning a fauna sanctuary and wish the Department to erect official signs and carry out policing on their behalf. This is not possible; land may be donated as a fauna sanctuary, but must first be surrendered to the Crown, whereon it will be gazetted as a fauna and flora reserve and vested in the Western Australian Wild Life Authority, who will retain control and ensure correct management.

FRECKLED DUCKS

Honorary Warden Mr. Neville Beeck reports sighting 2 pairs of Freckled Ducks on Coyrecup Lake, east of Katanning, in March this year.

Mr. Beeck is sure of his identification and feels that there may have been more of the species present.

Information on the Freckled Duck is of great value to the Department's Waterfowl Research Branch and will be of assistance in preserving the species from extinction in W.A. All Honorary Wardens are urged to report positive sightings.

NOTE: The Freckled Duck has been declared a "rare and endangered species". The maximum penalty for illegally taking this bird is \$1,000.

RESERVE MANAGEMENT—WHY AND HOW



Tutanning Wildlife Sanctuary—showing cleared land around perimeter

If you are sufficiently interested in conservation to be reading this journal, you probably have some understanding of why man sets aside reserves for the conservation of fauna and flora. It certainly is not because governments must pander to preservation extremists, vocal though they may be; nor is it solely to provide academic stimulation for white-coated boffins in dusty halls of learning. It is, fortunately for mankind, because that new branch of science known as ecology has brought about an increased awareness of the close relationships that exist between man and his environment; and also because our native animals and wildflowers have an aesthetic appeal.

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

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

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



Nangeen Hill Wildlife Sanctuary (Rock Wallaby Reserve)

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

At present in Western Australia there are about 400 reserves for the conservation of fauna and flora, comprising 12½ million acres. Of these 235 (comprising about 11 million acres) are vested in the Western Australian Wild Life Authority. The responsibilities of the Authority and the Reserve Management Branch are to establish new reserves, ensure they are in the right place, are of the right size, and are properly managed.



Tutanning Wildlife Sanctuary—example of over-mature vegetation requiring burning. Note dying box poison in foreground at base of tree

Determining the size of a reserve is of paramount importance: a suitable size in one area will not be suitable in another. In the deserts a greater area is necessary than in a high rainfall area because of the lower density of plants and animals in dry country. In Western Australia, it is considered that 50,000 acres is the minimum size for a reserve which will continue to harbour a full range of plants and animals; reserves under this size need careful management if they are not to be altered drastically by external influences.

When the land around a reserve is cleared for farming, the character of a reserve begins to change. What was once a large area of unbroken bushland becomes an island surrounded by country which most of the animals are unable to inhabit. The reserve commences a change in character due to outside pressures such as the introduction of weeds like wild oats and introduced animals like rabbits, foxes, cats, dogs, rats



Firebreak construction at Tutanning

and mice. Fire also tends to become more frequent with consequential effects on the plants. A reserve affected by these external influences, if not managed, slowly and inevitably will change over a period of many years; plant associations will deteriorate and the animals they support will decrease in variety and numbers. Because the unfavourable pressures are exerted from the outside of a reserve, a smaller reserve will be affected more quickly than a larger one because the buffer zone which is created around the perimeter forms a greater percentage of the overall area, and the centre of the reserve is relatively close to the cleared land. This has already occurred in many smaller reserves in the south-west of the State.

This outside pressure is only one factor affecting the changing character of a reserve. In smaller reserves there is a much greater chance that a fire will burn out a whole area and destroy all the food and cover for a particular species. In larger reserves pockets of land will remain unburned and the animals there will repopulate the areas as they recover. Thus paradoxically, the



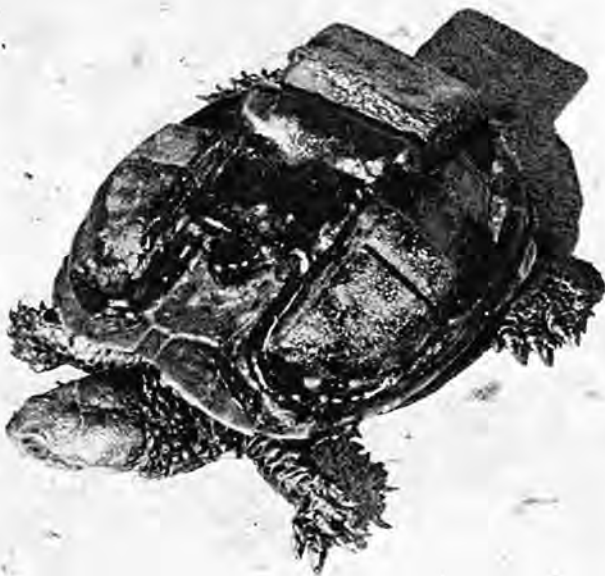
Dr. A. A. Burbidge with radio tracking equipment

larger the reserve the less management it requires. These larger reserves are usually in the more remote parts of the state and are known as Primitive Reserves. Examples are the Northern Nullabor Wildlife Sanctuary which consists of over 6 million acres and the Fitzgerald River Reserve of 604,000 acres.



Twin Swamps Wildlife Sanctuary showing pit traps used for catching tortoises

Rare Species Reserves are a different kettle of fish entirely. Almost as if by some diabolic pre-arranged plan Nature seems to have decreed that the rarer species of wildlife shall inhabit areas which are subjected to human usage or interference. The Short-necked Tortoise Reserves at Ellen Brook and Twin Swamps are typical in this respect. Situated only 20 to 25 miles north-east of Perth, they are surrounded by land which has been developed or is likely to be developed in the near future. They are also relatively small and therefore would be unable to withstand the threat of extensive alterations to the external environment.



Short-necked tortoise with radio transmitter attached

So delicate is the balance, that research officers visit these reserves on average about once a week during the winter, monitoring populations by recording movements, growth, age and numbers. This research has been continuous since 1963. Apart from this biological research, much of the work of Reserve Management Officers is taken up with fire control. Because of the tortoise's habit of burying itself under leaf-litter or fallen branches in summer, a fire through the reserves would be disastrous.

A word here about fire control in relation to the management of reserves. Most of our native flora is not only fire-resistant but actually requires regular burning. Fires have been going through this country for hundreds and thousands of years and the plants and animals have adapted to these. In the management of reserves it is necessary both to prevent fires and start them.



Prescribed burning at Tutanning

Firebreaks not only control fires which start accidentally, but also control those fires started by Reserve Management Officers when they are burning to rejuvenate the flora and to reduce leaf litter. This is known as prescribed burning; it is burning under a certain set of conditions so that the fire becomes a tool of management. The management officer controls the rate of spread of the fire, the height of the flames and the percentage of the area that will be burned.

Many animals can survive relatively "cool" fires; but where leaf litter accumulates the fire becomes hotter, giving us the paradox that if we protect our fauna from fire we may in fact be helping to destroy it. Furthermore, if an area remains unburned for a long time it can change in character and become unsuitable for the animals it supports.

The Short-necked Tortoise Reserves are examples of rare species reserves where the pressures are mainly external and human access and interference very limited. But the Two Peoples Bay Wildlife Sanctuary, the home of the Noisy Scrub Bird, has a history of considerable human usage. The scenery and excellent fishing make this area extremely attractive to tourists.

Management must therefore cater for tourist activity without allowing it to compromise the primary aim of the management plan which is to protect the habitat of the reserve for the Noisy Scrub Bird. In addition to fire control, the management plan involves creating roads through the reserve to permit access to attractive picnic and beach areas, but access is restricted in other areas where the bird is known to exist. This reserve is so important that a full-time ranger is housed actually on the reserve.



Fire out-of-control at the Two Peoples Bay Wildlife Sanctuary February 1970

It can be seen therefore that no two reserves are alike and each requires a different management plan. The most complex management plans are for smaller reserves housing a variety of fauna. Possibly the best example of this is the Tutanning Reserve. This is an area of only 5,000 acres but contains about one dozen varieties of marsupial. One problem for management is to provide varied habitat; not only a diversity of vegetation type but also vegetation of different ages. For example, when the she-oak is small it is a food source for the Tammar; after 5 to 7 years' growth it provides shelter for the Tammar; between 11 and 15 years' growth it shelters the Red-tailed Wambenger and when mature it becomes the habitat of the Ring-tail Possum. Since



Regenerating Casuarina at Tutanning

the area is isolated and the animal community virtually imprisoned by the clearing of the surrounding land, a fire through the reserve would be catastrophic. The vegetation at different stages of growth which provides prepared habitat for some of the fauna would be destroyed and certain species would be eliminated.

The diversity of the vegetation is not the only management problem. Population levels are important also, since different animals require varying living space. A single Woylie weighing only 2 lbs requires up to 100 acres, but the Tammar weighing about ten pounds requires only 4-5 acres.

The situation at Tutanning is therefore extremely complex. So complex, in fact, that a Research Station has been established in the reserve to facilitate further research.



Casuarina at Tutanning before regeneration

Our rapidly diminishing wetlands are another type of reserve which require management. The preservation of wetland refuges is the key to maintaining waterfowl populations in Western Australia; but on the Swan Coastal Plain alone over 150,000 acres of wetlands have been drained for industrialisation, urbanisation and agricultural projects. It is unfortunate that the prime agricultural lands are also those areas which have, for thousands of years, provided the habitat for much of our waterfowl.

The loss of coastal wetland refuges has a disastrous effect on our waterfowl populations because the birds are unable to survive our long summer on the limited permanent waters of the inland areas. In addition, many freshwater swamps are deteriorating through the inflow of brackish or saline water. This is borne out by the increasing proportion of Mountain Ducks in the waterfowl population (these birds have a preference for a salt-water habitat), and the decreasing proportions of Black Duck and Grey Teal, which are much more desirable as game birds.

Recommendations for the establishment and management of game reserves and sanctuaries

are based on data collected by the Department's Waterfowl Research Unit. Trapping and banding provides evidence of migration patterns, breeding habits and the type of habitat preferred by the various species; over 20,000 ducks have been banded to date.

Other practical work undertaken by the Waterfowl Research Unit is the establishment of artificial nest-boxes. In Western Australia nearly all ducks nest in the hollow branches of trees. In many wetland areas there are few suitable nesting sites and elsewhere much timber has been cleared for agriculture. In an attempt to remedy this, nearly 2,000 artificial nest boxes have been erected in the South-West.

This research work is not "management" in the strict sense of the word, but on the basis of the data obtained management decisions can be made. There are two types of waterfowl reserve; game reserves where shooting may take place during the annual waterfowl hunting season, and waterfowl sanctuaries and refuges where shooting is not permitted at any time. The sanctuaries are areas where it is necessary to conserve waterfowl, for example, where a rare species like the Freckled Duck is found (e.g. Bengier Swamp), or where large populations of ducks congregate (e.g. Mandurah). The refuges are reserves established in areas of considerable shooting pressure, so that birds may retreat to safety during the hunting season (e.g. Lake Muir).

The conservation of waterfowl is a complex problem, but it is not the game shooter who exerts the greatest pressure on our waterfowl populations. The effects of the game shooter can be and are controlled; if research shows that shooting in a particular area and at a particular time is not warranted, then the area is closed to shooting for that season. In 1969 drought conditions were so severe that there was no season proclaimed. Game shooters in general are aware that management measures such as this are vital if their sport is to have a future. It is the reduction of our wetlands that poses an almost insuperable problem. Since we cannot hope to stem the tide of urbanisation and industrialisation we must create artificial lakes such as those at Beverley. In this way we can prolong the existence of populations of waterfowl.

It must now be apparent that the work of fauna conservation and the Reserve Management Branch in particular is complex in the extreme. With only a very small staff to manage and police 400 reserves totalling 12½ million acres, the Department places great value on the importance of the role of Honorary Wardens. Quarterly reports detailing unusual sightings of fauna are of special interest to research officers. In addition, and particularly in more remote areas, reports on the unauthorized usage of reserves, fire hazards, increased predation on fauna etc., all help to lessen the burden of the district warden and the Reserve Management Branch.

LARGE SCALE BIRD SMUGGLING UNCOVERED

Readers will recall that in our editorial in SWANS Vol. 2, No. 2, Autumn 1971, the Department said that although it knew of illegal trafficking in birds, it was powerless to act without evidence.

Just how lucrative smuggling of this nature can be was highlighted by a recent case at Derby.

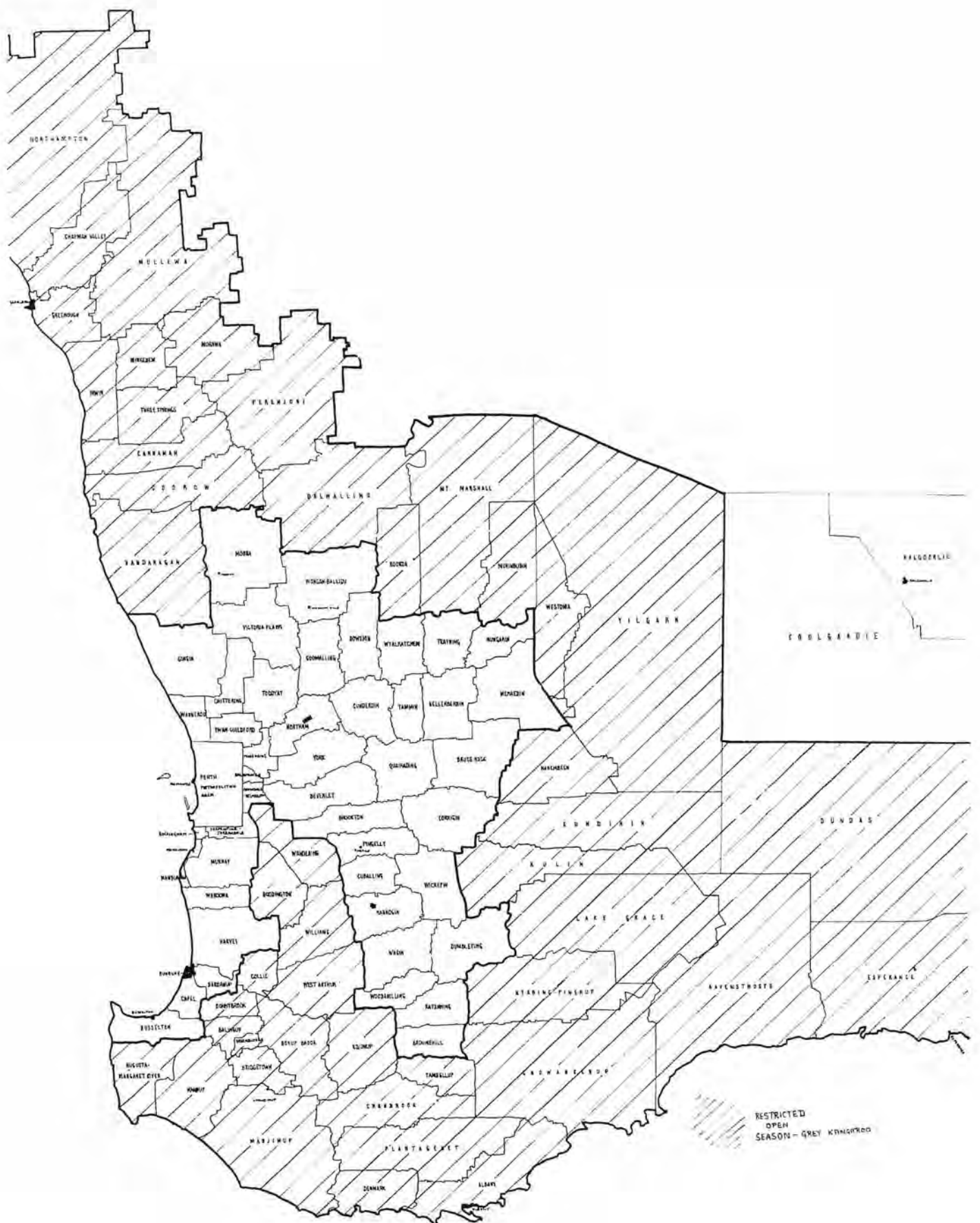
On April 22, 1972 Detective Sergeant Davis of the Derby C.I.B. reported sighting three men with a truckload of parrots. Fauna Warden G. Hanley was called in to investigate, apprehended the persons concerned, seized the birds, and found that they consisted of the following:

- 103 Mallee Ring-necks
- 4 Gang Gang Rosellas
- 42 Western Rosellas
- 19 Adelaide Rosellas
- 19 Superb Parrots
- 9 Eastern Rosellas
- 7 Regent Parrots
- 125 Mulga Parrots
- 6 Blue Bonnet Parrots
- 15 King Parrots
- 6 Stubble Quail
- 6 Spinifex Pigeons

An estimate of the value of these birds on overseas markets is up to \$200,000. Ill-treatment caused the death of some of the birds, but the remainder are being cared for at the South Perth Zoo.

On May 2, in the Derby Police Court, Robert William Turner of Flinders Park, South Australia, was fined a total of \$260 for breaches of the Fauna Conservation Act, Fauna Conservation Regulations and the Police Act. A private aeroplane and four vehicles used by the accused are being held, and charges under the Commonwealth Customs Act are yet to be heard. The maximum penalty for exporting prohibited exports is \$1,000 and forfeiture of any vehicles or other means of transport used in the smuggling.

Comparing the estimated value of the birds with the amount of the fines which can be imposed under the governing Acts, it is obvious that consideration needs to be given to provision for stiffer penalties.



GREY KANGAROO MANAGEMENT PROGRAMME EXPLAINED

The Grey Kangaroo Management Programme came into effect last year and is designed to ensure the long-term conservation of the grey kangaroo, while at the same time, recognising the right of the landholder to protect his primary production from damage.

Nearly one year has elapsed since the programme was implemented, and although there is no doubt of its overall success, an appraisal of the situation has shown that not all members of the rural community fully understand the provisions, and also that some amendments are necessary. The legislation covering the original programme was published in SWANS Vol. 2 No. 3 Winter 1971 (p. 70). It listed among other things, those shires where a limited open season on the grey kangaroo had been proclaimed; these are shires in which grey kangaroo populations are reasonably secure and where conflict with agriculture is likely to be continuous. The open season is referred to as "limited" because of the restrictive conditions placed upon it.

These restrictive conditions are:

- (1) Grey kangaroos may be taken only by the owner or occupier of the land on which they are taken, or by an agent appointed in writing by the owner or occupier. (This has now been amended to include employees, members of the owner's family, and also licensed part-time shooters.)
- (2) Where the land is virgin land or land held under pastoral lease, the owner or occupier or his agent (includes part-time shooters) shall not take any grey kangaroos unless he has first obtained a damage license.
- (3) The kangaroos shall be taken only on land which is being actively farmed and on which the kangaroos are causing damage.
- (4) The person taking the kangaroos shall notify the nearest warden of fauna as soon as practicable after he has commenced the taking of kangaroos.
- (5) The warden may, if after an inspection of the property he considers it necessary, prohibit the further taking of kangaroos on that property until the owner or occupier obtains a damage license.
- (6) Skins or carcasses may not be sold unless damage tags have been issued.

The introduction of licensed part-time shooters is the major amendment to the original programme. Many reports have been received indicating a build-up of grey kangaroo populations in the South-West, causing problems for farmers and creating road hazards. Licensed part-time shooters can now carry out cropping on behalf of farmers who have damage problems. Also, where grey kangaroos are found to be in excess numbers on uncleared land, part-time shooters will shoot under the authority and direction of this Department. It is thought that this should reduce both problems to reasonable proportions.

As a natural consequence of the introduction of part-time shooters there could be a need for chillers in rural areas. The Department will allow the licensing of these, but only in areas where they can be closely supervised.

The Shires where a limited (restricted) open season has been proclaimed are as follows:

Albany	Denmark	Mullewa
Augusta-	Dundas	Nannup
Margaret	Esperance	Narembeen
River	Gnowangerup	Northampton
Boddington	Greenough	Nyabing-
Boyup Brook	Irwin	Pingrup
Bridgetown-	Kojonup	Perenjori
Greenbushes	Kondinin	Plantagenet
Carnamah	Koorda	Ravensthorpe
Chapman Valley	Kulin	Tambellup
Coorow	Lake Grace	Three Springs
*Collie	Manjimup	Wandering
Cranbrook	Mingenew	West Arthur
Dandaragan	Morawa	Westonia
Dalwallinu	Mount Marshall	Williams
Donnybrook-	Mukinbudin	Yilgarn
Balingup		

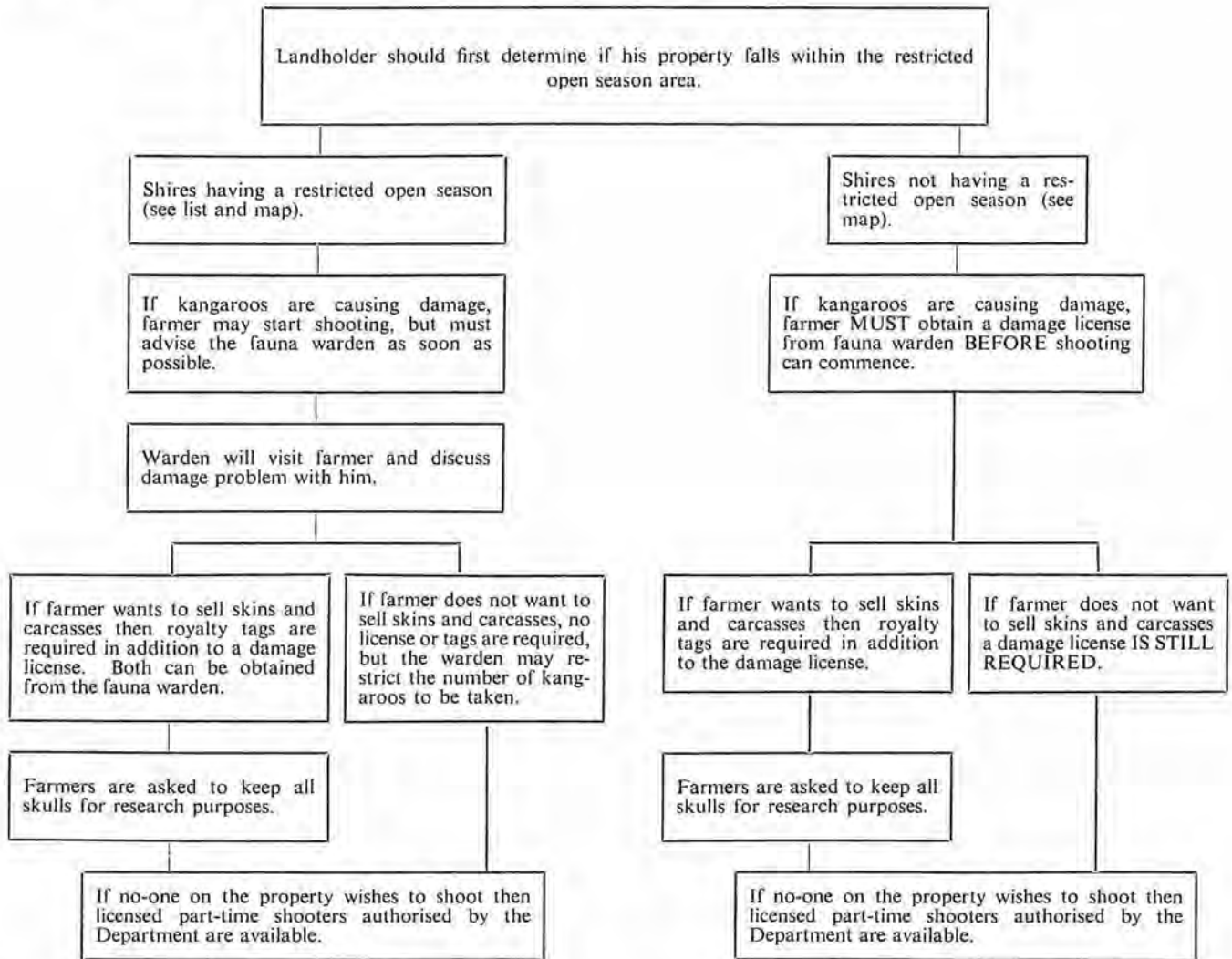
All that part of the Shire of Merredin east of the Vermin Proof Fence.

*Added to list June, 1972.

One of the points which has arisen after examination of the programme is that some individual farmers are not fully aware of the requirements of the regulations. The action a farmer should take if he is suffering damage is shown in the flow chart below, which it is hoped will be republished through other media and thus reach the maximum number of involved parties.

It should be pointed out that the programme and any amendments are the result of informed discussion (and subsequent agreement) between officers of this Department, members of the Agriculture Protection Board and the Western Australian Wildlife Authority. Four farmers represent

the interests of the rural community in these bodies. The programme is flexible in that amendments may be made in the light of subsequent information or should conditions alter to any great extent.



BLACK DUCKS CAUSE PROBLEMS AT ZOO

Large numbers of Black Ducks have been polluting the lakes at the Zoological Gardens, South Perth, and some captive, resident birds have died of algal poisoning as a result.

This infestation is an annual one with the birds arriving in January and leaving in April and May. Pollution is not the only problem; the "free-loaders" consume large quantities of food and their boldness drives away the smaller and more timid species from the food.

In an attempt to reduce the problem the Department's Waterfowl Research Branch trapped and banded over 450 birds and released them at Pinjarra. However, large numbers remained well into June until the first heavy rains of the year caused a noticeable reduction.

Ten years ago the zoo staff were overjoyed when half-a-dozen wild ducks came to the zoo for the first time. Numbers have increased steadily since then, and as one official put it, "It really has got beyond a joke now".

MORE CO-OPERATION NEEDED SAYS A.C.F.

The Australian Conservation Foundation has called for a greater Commonwealth Government role in wildlife conservation, and has stated that there is an opportunity for greater collaboration in the field between States and between Commonwealth and States.

These points were made by the A.C.F.'s Director, Mr. R. D. Piesse, during evidence he gave in Canberra on April 18 to the House of Representatives Select Committee on Wildlife Conservation. It was his third appearance before the Committee.

He told the Committee that the Foundation had "become aware of a very widespread feeling that the Commonwealth should give more leadership rather than continuing to remain relatively aloof from practical conservation problems of national significance".

Mr. Piesse said: "It would seem that the Commonwealth must come, at some time or other, to assist the States in dealing with the problems of conservation, especially wildlife conservation, just as it did in the field of education.

The parallel is very real and close—of a national problem which can only be handled satisfactorily with greater resources of money and manpower than the individual States possess".

The Director of the A.C.F. summarized the main ways in which he believed the Commonwealth could play an increasingly significant role in promoting Australia-wide activity in wildlife conservation.

These were:

- (1) Research—expansion of work by established bodies;
- (2) Information collection, pooling and co-ordination;
- (3) Financial grants, largely to the States;
- (4) Policy formulation;
- (5) Advice to Commonwealth on conservation effects of its public works spending and other resources policies;
- (6) Control of land, especially by agreement between States as to use of land; and
- (7) International agreements.

Mr. Piesse said that an obvious role for the Commonwealth was to concentrate at the national level in stepping up the collection of basic facts which were essential for sound decision-making.

The Commonwealth, he said, could also help in the publicity field.

The Assistant Director, Dr. J. G. Mosley, told the Committee that the States needed better-publicized and clearer policies on the extension of the National Park and Reserve systems. He said that there was also a need for more finance and effort to be put into surveys designed to find new parks and reserves.

He warned that the demands industrial development was making on the environment were such that the investigation work was urgent, and said that protection of existing reserves was not as good as it should be because of slow progress with preparation of National Park plans of management.

HONORARY FAUNA WARDENS— APPOINTMENTS

- PASSFIELD, Alfred James, of Cervantes (Gazetted 24/3/72).
- COULTAS, David, of 2 Robinson Street, Gingin (Gazetted 24/3/72).
- HAMDORF, Ray, of 25 Morriett Street, Attadale (Gazetted 24/3/72).
- HEALEY, Colyn, 71 Haig Road, Attadale (Gazetted 24/3/72).
- STYLES, Colin, of 31a Bricknell Road, Attadale (Gazetted 24/3/72).
- WHEATLEY, Eric, of 117 Stoneham Road, Attadale (Gazetted 24/3/72).
- TATOM, Miss Roberta, of 43 Bricknell Road, Attadale. (Gazetted 24/3/72).
- ROBINSON, Ross Graham, of 88 Belmont Avenue, Belmont (Gazetted 14/4/72).
- LAYTON, Harry, of Meekatharra (Gazetted 14/4/72).
- CHAPPELL, Brendon, of Mount Magnet (Gazetted 14/4/72).
- REYNOLDS, Frank Joseph, of Post Office Box 140, Busselton (Gazetted 14/4/72).
- McGARRY, Eric, of 151 Lockhart Street, Como (Gazetted 21/4/72).
- BUTSCHER, Father Joseph, of the Beagle Bay Mission, via Broome (Gazetted 5/5/72).
- SLATTERY, John Adrian, of 55 Stirling Street, Bunbury (Gazetted 26/5/72).
- PALMER, Neil John, of Janglin Farms, Beacon (Gazetted 26/5/72).
- TAYLOR, Ronald Francis, of Dandaragan (Gazetted 26/5/72).

Our Diminishing Heritage

The Tamar (*Macropus eugenii*) is a small wallaby weighing about 10 lbs and in general appearance resembles a small kangaroo. It was first recorded by Francisco Pelsaert in 1629 and thus has the distinction of being the first-known Australian marsupial. In those days tammars were found in southern South Australia; Western Australia from Geraldton to Esperance; and on a number of off-shore islands, but their range on the mainland, like that of so much of our native fauna, has been steadily reduced by the clearing of the mallee and scrub woodland which forms their ideal habitat.

In order to survive and reproduce, tammars require specific habitat conditions. The major requirement is cover, not only for protection from the elements but also because they rely on sight and sound for warnings of danger. Away from this cover tammars are extremely vulnerable to predation by any fast-moving terrestrial animals or by eagles. During daylight and when they are not feeding at night they restrict their movements almost completely to areas of suitable cover. This cover consists of low to medium-height closed canopy vegetation which provides shelter, is not readily or quietly penetrable, and thus provides an early warning system for the tamar. One such type dominated by a species of *Casuarina* is known colloquially as "Tamar scrub".



Tammars differ from most other small wallabies in that they are specialised for life under dry conditions. In their habitat fresh water is often unavailable for long periods, and during the summer droughts food plants shrivel and wither. Those tammars which live on islands may, therefore, have to supplement their water intake by

drinking sea-water. Research has shown that tammars from the Abrolhos Islands have the most effective kidneys of all those marsupials which, so far, have been the subject of extensive scientific study, and it has been discovered that these tammars can exist on sea-water for long periods, though not indefinitely.

A further interesting feature of the tamar concerns breeding. If a tamar mates just after giving birth then the resulting embryo lies dormant while the first young is suckled in the pouch. This is known as delayed implantation or embryonic diapause, and is a phenomenon known in other species (e.g. the Red Kangaroo), but in tammars the delay can be as long as 11 months—the longest recorded in any mammal.

The populations which survive on offshore islands, together with the remaining mainland pockets present a range of habitats which allows comparative studies to be undertaken. A great amount of valuable research has already been done, but much remains to be learnt about the tamar in order to assist the formulation of management plans for the conservation of the species.

Management of the tamar is vital because human interference with the habitat has isolated the mainland populations. Until recently all the island populations had been thought to be relatively secure, but the proposed development of Garden Island as a naval base has necessitated a close examination of all the proposals and the effects they may have on the tammars. Research to date suggests that the tamar habitat on Garden Island could be slightly reduced without causing the species to become extinct there. However, it is not possible to say exactly what area must be left to ensure continuance of the species on the island. It is thought that a reduction to about 1,000 acres would put the species on the knife-edge of survival, and that two or three hundred acres either way might mean the difference between survival and extinction. If the area is too small the tammars would probably die out sooner or later because a small population would have insufficient genetic resources to withstand disease and other harmful ecological factors.

It is known that each tamar requires approximately $4\frac{1}{2}$ acres of suitable territory in order to survive, and habitat must include sufficient plant cover of suitable height and density and sufficient food throughout the year. Tammars held in captivity have shown that the species will not breed unless some cover is provided, be it only a few trees and logs. Paradoxically, the clearing of

TAMMAR

Macropus eugenii



the tammar's natural habitat for roads and fire-breaks has some beneficial effect since the animals feed on the regenerated vegetation along the verges. But any excessive clearing and reduction of the habitat would be catastrophic.

More information is needed on the population dynamics and behaviour of tammars, but enough is known for it to be clear that constant monitoring of the habitat and the populations must form the basis of any management plan for the tammar on Garden Island.

DISTRIBUTION:

South-western Australia (including Houtman Abrolhos, Recherche Archipelago), S.A. (mainland, some offshore islands including Kangaroo Island).

LOOKS:

Resembles small kangaroo.
General colour dark brown.
Faint dorsal stripe descending no further than mid-back.
Upper lip—white.
Throat, chest and belly—white.

HEIGHT:

Male } about 2 ft.
Female }

WEIGHT:

Male: 5.85 k (about 13 lb; from Garden Island population sample.)
Female: 4.3 k (about 9½ lb; from Garden Island population sample.)

BREEDING:

Mating season (Garden Island) from middle of December to middle of February.
Development of young can be delayed in the uterus if a joey is being suckled in the pouch.
One joey per year is produced, unless delayed implantation takes place.

DIET:

Tammars are grazing and browsing animals eating mainly shrubs and perennial grasses.



Tammar habitat on Garden Island

IUCN VIEWPOINT ON THE CONSERVATION AND USE OF WILD ANIMALS

The International Union for Conservation of Nature and Natural Resources is concerned with the conservation of wild animal life, and has been involved since its establishment in promoting action for this purpose. A guiding principle has been the belief that sensible protection and conservation of wild animals and their habitats is consistent with the scientific, educational, social and economic goals all countries seek.

IUCN believes it is important to man's long-term well-being to maintain the full array of natural diversity in animal species throughout the world. Even the smallest or least-known species may play vital roles in the function of the life systems of the planet. Conservation of species necessarily requires conservation of their habitats—and of the ecosystems of which they form a part. Towards the goal IUCN, in cooperation with other organisations and with governments, has consistently promoted the establishment of a world-wide system of national parks and reserves.

IUCN has taken an active role in the preparation of several international conventions and has regularly provided the scientific background for national measures for wildlife protection. It strives to prevent wild animals from being seriously reduced in numbers, or the gene stocks lost by habitat destruction or over-exploitation. It believes that conservation of separate populations and subspecies is required in order to maintain the full variety of wild animals for future generations. IUCN supports scientific studies of wild animals and their habitats so that conservation programmes for individual species may be based on a knowledge of their biology and ecological requirements.

Many wild species, however, occur in reasonable abundance in widespread habitats. Subject to appropriate ethical standards, these may be hunted, fished or trapped for food, commerce or recreation. Such exploitation need always be kept in balance with the reproductive capacity of the species involved, and must not exceed the maximum yield sustainable by the populations concerned, or disrupt the ecosystems to which they belong. Because such exploitation creates a selective pressure on these species, the harvest must be controlled to prevent populations from being dangerously reduced, and needs to be accompanied by management to increase carrying capacity of habitats and the productivity of the species.

Management of wildlife usually involves both habitat protection and control of numbers. Wild animals sometimes come into conflict with other valuable uses of land, and may therefore be classified locally as "pest" or "harmful" animals. Reasonable reductions of the numbers of these species in the areas of conflict may be justifiable. Such reductions, however, must always be carried out with proper safeguards to protect other species and to allow the target species to survive in its full genetic variety and reproduce in its natural habitat. The survival of a species is considered by IUCN to be of the utmost importance.

In accordance with the foregoing statements, and in keeping with humane standards, IUCN recognizes that wild animals are commonly used for food, recreation and commercial purposes, and that with some species, reductions of over-abundant populations may be essential to habitat protection. It recognises that such use or reduction may enhance the long-term survival of the species in areas where economic returns are considered more important than aesthetic or recreational values or where wild animal life is considered of secondary importance to other uses of land or natural resources.

Where species or subspecies are seriously reduced in numbers IUCN urges the strictest protection against all exploitation. Where there is doubt, IUCN encourages the declaration of moratoria on harvest and use. It will undertake or cooperate in studies designed to provide a scientific basis for management and improvement of their habitats and increase in their numbers. IUCN is prepared to offer its full support to such protection and management.

WATER SAMPLING ON TORTOISE RESERVES

When the Short-necked Tortoise was the subject of the series "Our Diminishing Heritage" (S.W.A.N.S. Vol. 2 No. 4 pp 88-89), the need for constant monitoring of populations and habitat was stressed.

As part of the Management Programme the Department has arranged for water samples from the swamps at Ellen Brook and Twin Swamps to be analysed by the Government Chemical Laboratories. The need for this analysis was emphasised by the recent examination of the proposed siting of the Pacminex Alumina Refinery.

There are four sampling sites at Twin Swamps and one at Ellen Brook. Collected samples will be filtered and analysed to determine the presence and quantities of dissolved solids, sulphate, nitrogen, nitrate, phosphorus, fluoride, chloride and iron.

DECLARATION AND AMENDMENT OF RESERVES

NEW RESERVES

Name	Res. No.	Locality	Plan	Area	Previous Use	Purpose	Vesting	Gazettal
Shark Lake	A31197	7 miles north of Esperance	423/80 D.3	39a, 2r, 26p	....	Cons. of Flora and Fauna	W.A.W.A.	21/1/72
Mokine	31211	5 miles south-east of Clackline	2/80 C.1	715a, 0r, 10p	....	Cons. of Flora and Fauna	....	11/2/72
	31241	6 miles south-west of Gingin	28/80 B.1	832a, 3r, 15p	....	Cons. of Flora and Fauna	W.A.W.A.	17/3/72

VESTING OF RESERVES

Name	Res. No.	Locality	Plan	Area	Purpose	Previous Vesting	New Vesting	Gazettal
	28415	East Yuna	161/80 A.4	668a, 3r, 10p	Cons. of Flora and Fauna	....	W.A.W.A.	14/4/72
Bindoo Hill	30844	East Yuna	156/80 AB.1	About 1,200 acres	Cons. of Flora and Fauna	....	W.A.W.A.	14/4/72
	19613	East Yuna	160/80 F.4	22a, 0r, 31p	Cons. of Flora and Fauna	....	W.A.W.A.	14/4/72
Wingedyne	28471	12 miles west of Woodanilling	416/80	627a	Cons. of Flora and Fauna	....	W.A.W.A.	11/2/72

CHANGE OF PURPOSE

Name	Res. No.	Locality	Plan	Area	Previous Purpose	New Purpose	Vesting	Gazettal
	14510	10 miles south-east of Dowerin	33D/40 B.4	About 400a	Cons. of Flora	Cons. of Flora and Fauna	....	17/12/71
	13496	8 miles west-south-west of Three Springs	94/80 F.1	740a, 1r, 22p	Timber	Cons. of Flora and Fauna	....	18/1/72

CHANGE OF AREA

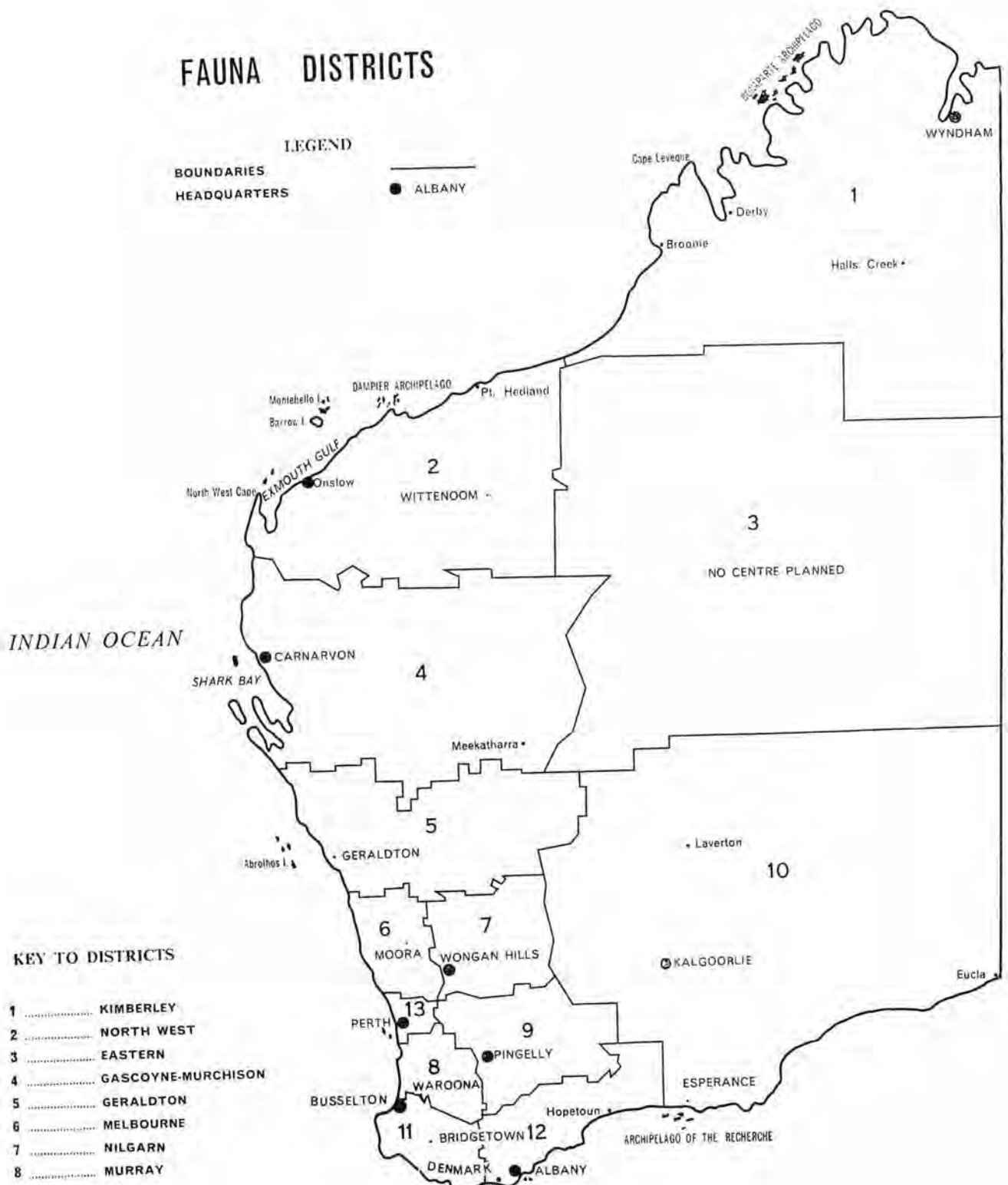
Name	Res. No.	Locality	Plan	Previous Area	New Area	Purpose	Vesting	Gazettal
Mullet Lake	A23825	....	423/80	About 4,718a	About 4,738a	Cons. of Flora and Fauna	W.A.W.A.	18/2/72
Jitarning	29988	North of Jitarning Townsite	377/80 D.E.4	44a, 2r, 13p	49a, 1r, 13p	Cons. of Fauna	W.A.W.A.	26/5/72
Sandy Island and Flat Island	A25027	Off Point d' Entrecasteaux	454/80	About 50a (Sandy Is.)	About 81a (Sandy Is. plus Flat Is.)	Cons. of Flora and Fauna	W.A.W.A.	18/2/72

CANCELLATION OF RESERVE

Name	Res. No.	Locality	Plan	Area	Previous Use	Current Status	Vesting	Gazettal
	17296	18 miles south-east of Corrigin	344/80 F.4	5a	Flora and Fauna	Vacant Crown Land	....	30/3/72

FAUNA DISTRICTS

LEGEND
 BOUNDARIES ———
 HEADQUARTERS ● ALBANY



KEY TO DISTRICTS

- 1 KIMBERLEY
- 2 NORTH WEST
- 3 EASTERN
- 4 GASCOYNE-MURCHISON
- 5 GERALDTON
- 6 MELBOURNE
- 7 NILGARN
- 8 MURRAY
- 9 AVON
- 10 EUCLA
- 11 SOUTH WEST
- 12 GREAT SOUTHERN
- 13 METROPOLITAN