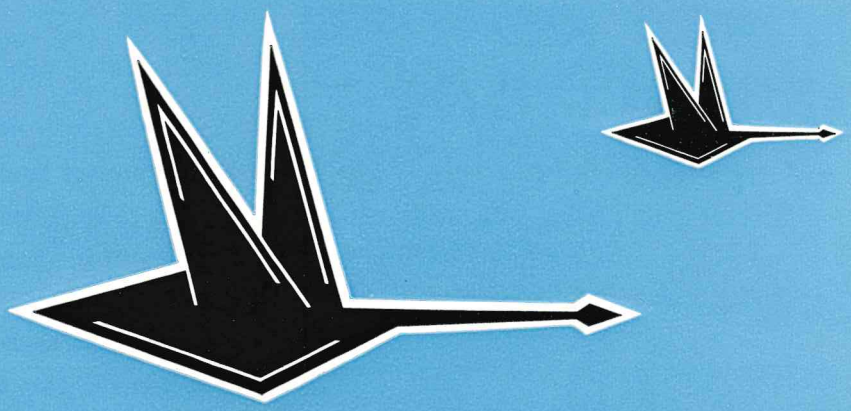
WESTERN AUSTRALIA



S.W.A.N.S.

State
Wildlife
Advisory
News
Service

Vol. 4 No. 2
Autumn, 1973

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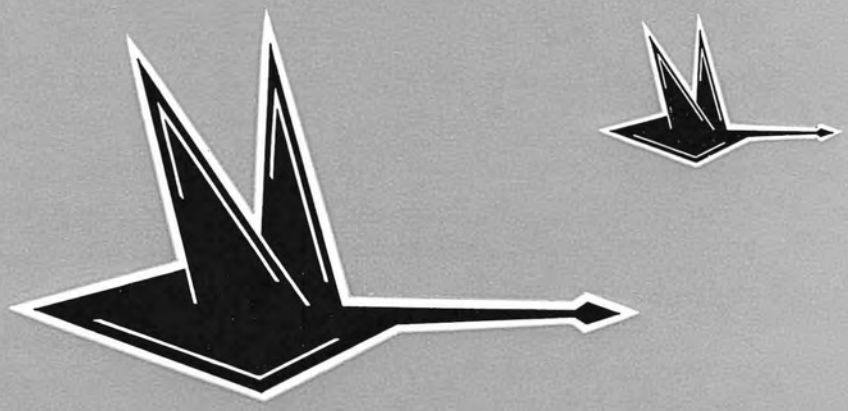

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Issued by direction of the Hon. A. W. Bickerton, M.L.A., Minister for Fisheries and Fauna.

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.

S.W.A.N.S. is published quarterly at the conclusion of each season by:

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Something to think about....

Most persons think that a state in order to be happy ought to be large; but even if they are right, they have no idea of what is a large and what a small state . . . To the size of states there is a limit, as there is to other things, plants, animals, implements; for none of these retain their natural power when they are too large or too small, but they either wholly lose their nature, or are spoiled.

ARISTOTLE, 322 B.C.

IN THIS ISSUE....

ADDITIONAL PROTECTION FOR RARE FAUNA

Thirty-four mammals and three reptiles have been declared " rare and likely to become extinct " and anyone interfering in any way with any of these animals is now liable to a penalty of $1,000.

Similar protection has already been given to 16 species of bird and these have been detailed in SWANS Vol. 3, No. 1 ; Vol. 3, No. 2 and Vol. 4, No. 1.

The 53 species of fauna now afforded this protection provide an authoritative statement of where the major problems of wildlife conservation lie so far as Western Australia is concerned.

The most recent list contains species which fall into five categories.

1. Species which are probably already extinct in Western Australia, e.g. Nos. 10, 11, 13, 15, 28 and 29.

2. Species which have always been rare, e.g., Nos. 1, 7 and 35.

3. Species which were once widespread but whose range has been reduced drastically since European settlement, e.g., Nos. 2, 6, 8, 9, 12 and 14.

4. Species which have been collected very rarely. In fact some of these species may be common but accurate information is lacking. On the other hand some may be extinct, e.g., Nos. 16–27 and 30–33.

5. Species which are still relatively common but which are subject to hunting pressures which may cause them to become very rare, e.g., Nos. 34, 36 and 37.

MAMMALS

1. **Barrow Island Euro** *Macropus robustus isabellinus*. This subspecies is found only on Barrow Island. Research there by the Department has shown that numbers are quite low and a close watch is being kept on the species.

2. **Crescent Nail-tailed Wallaby** *Onychogalea lunata*. Once found throughout the south west, east of the Darling Range. Shortridge between 1904 and 1907 collected it near Pingelly and Wagin. Now extinct in the south west but apparently still found in low numbers in the arid interior. The last specimen collected was a dead animal found near Warburton Mission by W. H. Butler in 1964.

3. **Spectacled Hare Wallaby** *Lagorchestes conspicillatus*. Once found throughout the Pilbara and southern Kimberley in spinifex country. Its range is now much reduced but it still occurs on Barrow Island and in pockets on the mainland. Also occurs in the Northern Territory. Extinct on Hermite Island in the Monte Bellos.

4. **Western Hare Wallaby** *Lagorchestes hirsutus*. Was fairly plentiful in the south west and centre of Western Australia until the turn of the century. In the south west last collected near Kojonup in 1896, and the last specimens on the mainland were collected near the Canning Stock Route in 1931.

Still occurs on Bernier and Dorre Islands in Shark Bay.

Western Hare Wallaby (*Lagorchestes hirsutus*)

5. **Banded Hare Wallaby** *Lagostrophus fasciatus*. First described by William Dampier in 1699 on Dirk Hartog Island. It was once fairly widespread through the southern half of the State, still being plentiful near Pingelly and Wagin in 1904–06 but disappearing shortly afterwards. Now restricted to Bernier and Dorre Islands in Shark Bay.

Juvenile Banded Hare Wallaby (*Lagostrophus fasciatus*)

6. **Brush-tailed Rock Wallaby** *Petrogale penicillata*. Although previously occurring in a number of suitable areas in the south west it is now known only from a few areas in the Quairading-Kellerberrin-Bruce Rock area. Also occurs on islands in the Recherche Archipelago, in Kalbarri National Park, in the Hamersley Ranges and the Kimberley. Also on Barrow Island and Depuch Island.

7. **Rothschild's Rock Wallaby** *Petrogale rothschildi*. Known only from the Western Hamersley Ranges and three islands in the Dampier Archipelago.

8. **Woilie** *Bettongia penicillata.* Once occurred over much of southern Australia but now known from only four localities in the south west, near Brookton, near Pingelly, at Dryandra and east of Manjimup.

9. **Boodie** *Bettongia lesueur.* Was quite common in the south west up to the 1930's but now believed to be extinct on the mainland. Occurs only on Bernier, Dorre and Barrow Islands and a small unnamed island south of Barrow.

10. **Broad-faced Potoroo** *Potorous platyops.* This species was first collected in 1842–3 near Albany and Goomalling. It was last collected in 1875. It is probably extinct.

11. **Gilbert's Potoroo** *Potorous tridactylus gilberti.* This animal was collected along the south coast during the last century but has not been seen since. Another sub-species still occurs in the eastern states.

12. **Little Barred Bandicoot (Marl)** *Perameles bougainville.* Originally occurred in the south west and as far north as Shark Bay and Onslow. It still occurred in the south west in 1905 but is now presumed to be extinct on the mainland. Only occurs on Bernier and Dorre Islands in Shark Bay.

13. **Pig-footed Bandicoot** *Chaeropus ecaudatus.* This animal is probably extinct, and only one specimen has ever been collected in Western Australia (In 1843, near Northam).

14. **Dalgyte** (Rabbit-eared Bandicoot) *Macrotis lagotis.* Formerly very common in the agricultural areas of the south west but disappearing from there in the 1930's. Now known from a few scattered localities in the north and centre.

Dalgyte (*Macrotis lagotis*)

15. **Rusty Numbat** *Myrmecobius fasciatus rufus.* This subspecies formerly occurred in Central Australia and has been recorded only once in Western Australia. This was in the Warburton Ranges in 1950. The Numbat *Myrmecobius f. fasciatus* is still quite plentiful in Wandoo forests in the southwest.

16. **Dibbler** *Antechinus apicalis.* Originally collected in the last century at widely separate localities in the south west. Three specimens were captured at Cheynes Beach in 1967. Not collected since.

Dibbler (*Antechinus apicalis*)

17. **Little Red Antechinus** *Antechinus rosamondae.* Occurs in the Pilbara in spinifex country. Very rarely collected.

18. **Long-tailed Dunnart** *Sminthopsis longicaudata.* This species has only been collected four times, three being in the Pilbara.

19. **White-tailed Dunnart** *Sminthopsis granulipes.* Occurs in the drier parts of the south west. Very rarely collected.

20. **Troughton's Dunnart** *Sminthopsis murina ooldea.* Known only from a restricted area of the Nullarbor Plain.

21. **Narrow-nosed Planigale** *Planigale tenuirostris.* In Western Australia collected only at Abydos Station in the Pilbara. Occurs rarely in the east.

22. **Kimberley Planigale** *Planigale subtilissima.* Known from a few specimens taken in the Kimberley. Recently collected during the "Ord Noah" rescue operations.

23. **Rock-haunting Ringtail** *Petropseudes dahli.* Only two specimens known from Western Australia, these being collected in the King Leopold Ranges in 1965. A few specimens have been collected in the Northern Territory.

24. **Scaly-tailed Possum** *Wyulda squamicaudata.* Known only from the Kimberley where it has been rarely collected, but in scattered localities from Broome to Kalumburu and Turkey Creek.

25. **Big-eared Hopping Mouse** *Notomys megalotis.* One specimen was collected near New Norcia in 1843. It has not been seen since.

26. **Long-tailed Hopping Mouse** *Notomys longicaudatus.* Also collected at New Norcia in 1843 and has not been seen since in Western Australia. Collected in central Australia around the turn of the century.

27. **Dusky Hopping Mouse** *Notomys fuscus.* Rarely collected in Western Australia. Known only from the Nullarbor Plain area.

28. **Stick-nest Rat** *Leporillus conditor.* Possibly occured in Western Australia as old nests have been found at various localities. Collected on the eastern Nullarbor Plain in the 1920's. Now known only on Franklin Island in the Nuyts Archipelago, South Australia.

29. **White-tipped Stick-nest Rat** *Leporillus apicalis.* Originally known from the arid interior and from the Murray and Darling Rivers in the east. This animal is probably extinct and it is not known for sure whether it ever occurred in Western Australia.

30. **Western Mouse** *Pseudomys occidentalis.* This mouse was first collected in 1930 near Tambellup. Up until recently only two other specimens had been collected but in the last two years it has been found on a number of wildlife sanctuaries in the south eastern wheatbelt.

31. **Shark Bay Mouse** *Pseudomys praeconis.* First collected on Peron Peninsula, Shark Bay in 1858 but since it has only been found on Bernier Island.

32. **Gould's Native Mouse** *Pseudomys gouldii.* In Western Australia this mouse has only been collected at Rawlinna.

33. **Shortridge's Native Mouse** *Pseudomys shortridgei.* Known from the south west (e.g., east of Pingelly and near Hyden) but has not been collected for some time. Still occurs in Victoria.

34. **Dugong** *Dugong dugon.* In Western Australian waters occurs from Geraldton northwards. It is still fairly common in Shark Bay, near Dampier Archipelago and in the Kimberley, but is very susceptible to hunting by man.

Dugong (*Dugong dugon*)

REPTILES

35. **Western Swamp (Shortnecked) Tortoise** *Pseudemydura umbrina.* This species is now almost totally restricted to two small wildlife sanctuaries in the Upper Swan-Bullsbrook area. Studies have shown that there are probably less than 100 remaining and that numbers are declining due to poor winters.

Salt-water Crocodile (*Crocodylus porosus*)

36. **Salt-water Crocodile** *Crocodylus porosus.* Once plentiful along the Kimberley coastline but now quite rare due to hunting pressure.

37. **Fresh-water Crocodile** *Crocodylus johnstoni.* Still found in reasonable numbers in some river systems in the Kimberley but numbers have been reduced by poaching.

NATIONAL PHOTOGRAPHIC INDEX OF BIRDS

The aim of the National Photographic Index of Australian Birds is to establish a comprehensive reference collection of 5,000 colour photographs recording all of Australia's 700 plus species and their plumage variations, together with illustrations of their behaviour. By this means, the Index hopes to contribute to the knowledge of, and interest in Australian birds and their preservation.

The Bank of New South Wales is now sponsoring a Grants Scheme in support of the Index. This support is to the extent of $5,000 per year for four years. The prime object of this scheme is to obtain photographs of species not yet represented in the Index—especially those which are rare. Grants are made to assist the photographers with field expenses, film and equipment. Applications are considered by an Advisory Panel comprising Dr. D. L. Serventy, Mr. E. L. Carthew, Mr. H. D. Millen, Mr. E. C. Slater and Mr. R. W. Turner.

Grants totalling $2,920 in cash and provision of Kodak film and processing worth over $1,000 plus substantial loans of cameras and equipment were awarded to 23 recipients following recommendations of the Advisory Panel at its meeting on 6th April, 1973. Applications far exceeded the money allocated for the year and every effort was made to distribute the grants as fairly as possible, with paramount consideration given to potential benefit to the Index.

A Selection Panel examines all photographs submitted for inclusion in the Index. On the 2-5 April, 1973, this panel comprising Mr. H. J. de S. Disney, Mr. A. Robinson, Mr. E. C. Slater, Mr. A. G. Gray, Mr. H. D. Millen, Mr. K. Muller and Mrs. Judy Clarke, considered a total of 2,408 transparencies received from 102 photographers. Of these, 567 were accepted for the Index and 243 for the transparencies section. A total of 60 new species were added to the Index with a further 34 new species included in the transparencies section. This gives a grand total of 7,633 photographs submitted for consideration, of which 471 have been accepted for the transparencies section and 1,985 for the Index itself. A total of 538 species is now represented in the Index.

All enquiries concerning the Index should be directed to—

The Executive Officer,
National Photographic Index of Australian Birds,
c/o The Australian Museum,
6-8 College Street,
SYDNEY, N.S.W. 2000.

19169—(2)

KANGAROO MANAGEMENT IN W.A.

EXPORT BAN AFFECTS CONSERVATION PROGRAMME

When the House of Representatives Select Committee on Wildlife Conservation visited Western Australia twice during 1971 they publicly announced that Western Australia was well ahead in conserving kangaroos and that they had seen more kangaroos here than in any other State.

For over two years a well-planned and co-ordinated management programme has been operating in W.A. to control kangaroo numbers in accordance with good rangeland management and multiple use principles. A quota has been established of 200,000 kangaroos per year and a limited number of shooters have been licensed and given an individual annual quota. No kangaroo carcass can be commercialised unless a self-locking royalty tag has been affixed and this tag must remain with the carcass up to the final stages of processing; after that it must stay with the skin. The most important feature of the management regulations are the returns which have to be forwarded to the Department. The information on these returns enables research officers to assess kangaroo populations, age and sex ratios, etc.

The management programme had been accepted by farmers, and the information from the shooters' and dealers' returns was becoming meaningful and valuable, when, in January this year the United States of America announced that it was proposing to place a number of species of Australian fauna, including the Red and Western Grey Kangaroo, on their Appendix "A" of endangered species. If this proposal had come about it would have meant that the import of kangaroo products into America would have been prohibited. As it transpires, the proposed ban has not come into effect because Australia, in an attempt "to put its house in order" has not renewed the waivure of the ban on the export of kangaroo products which has been in force since the 1920's. This has had the same effect as the proposed U.S.A. ban and has placed in jeopardy the whole kangaroo management programme operating in Western Australia. Without the export sale of skins the industry will be endangered and, if it fails, with it would go the flow of data from which the management and control programmes are determined. The alternatives to controlled shooting are shooting by Government officers or poisoning; the first is impracticable and the second unacceptable because poisoning is non-selective; it can be over-efficient and non-target species can be affected.

Western Australia has made the strongest possible protest to the Commonwealth Government at Ministerial and Departmental levels. The Minister for Fisheries and Fauna has been to Canberra to meet and request the Commonwealth Ministers concerned to lift the ban, and we understand that a strong argument on behalf of the rangeland management programme has been made also by the Minister for Agriculture. Western Australia has also participated in no less than five meetings of State and Commonwealth representatives in the last four months devoted almost entirely to reviewing existing State programmes and trying to develop a basic and united approach.

There is now hope that Western Australia's existing programme will be accepted with little amendment. Meanwhile the ban continues. The Commonwealth Minister for Customs, Senator L. Murphy has given little or no indication that he appreciates the effective controls operating in Western Australia or that he will exempt this State from the ban. Replying to a question by Senator Durack (W.A.) in the Commonwealth Parliament on June 7, Senator Murphy said:—

> "I indicated earlier this year that the policy of law, namely that the export of kangaroo skins should not be permitted, would be enforced and that the provision for consent to export would not be invoked by me unless I was satisfied that it was in the interests of conservation to do so. A regulation was introduced to deal also with the products of kangaroo and that has come into operation . . ."
>
> ". . . As far as I am concerned the conservation of kangaroos will be a first consideration. The suggestion that there has been proper control and proper conservation has been proved to be a lot of nonsense. It is time that Australians woke up the fact that all around the world there is abhorrence at what has been happening in regard to the virtually uncontrolled slaughter of kangaroos. I agree that the State from which the Honourable Senator comes, Western Australia, has endeavoured to institute some form of quota and regulation. The report which I have mentioned indicates that the conference considered these measures to be absolutely essential for the preservation of the kangaroo. Yet, those same measures are not operating in the State where most of the kangaroos are taken."

We must take issue with Senator Murphy's statement that Western Australia "has ENDEAVOURED to institute SOME form of quota and regulation". The quota has been established and the regulations have been operating successfully for two years.

It is difficult to understand why, if the measures that have been taken in this State are "absolutely essential for the preservation of the kangaroo", we should be penalised because Senator Murphy is dissatisfied with the policies of other States.

Until all States have produced management programmes which are acceptable to Senator Murphy, the situation in Western Australia can only deteriorate. If the industry winds down or collapses, the management data supplied by the industry will no longer be a valuable means of assessing populations. In addition, kangaroo numbers will build up and the balance of the biomass will be upset. All grazing animals must be held within that level which avoids degradation and allows restoration of the rangeland. Unless accurate checks can be made on population levels of grazing animals then good rangeland management is impossible. We believe that, in the Western Australian situation, the necessary data can only be obtained at anything like reasonable cost under the present management programme.

The suggestion that excess kangaroos should be poisoned is even more abhorrent to the public than shooting. Recently the Hon. Premier, Mr. J. T. Tonkin, received a petition (with a thousand or so signatures) from the students of Perth Modern School expressing concern that the poisoning of water sources could be used for exterminating kangaroos. In his reply, Mr. Tonkin summed up the situation as follows:—

"Dear Mr. Stokes,

"I acknowledge the petition submitted on behalf of the students of Perth Modern School. I found it impressive, not only in respect of the number of signatories, but also for the degree of concern obviously felt by the rising generation for the well-being of kangaroos and other wildlife.

"I feel that my Government need make no apology for the management programmes it applies to grey kangaroos, euros or red kangaroos.

"The House of Representatives Select Committee on Wildlife Conservation investigated both programmes very thoroughly and generally accepted them as adequate. I think this is obvious from any reading of the Committee's Interim Report and from its recommendation 3, which reads:—

3. That the Commonwealth Government recommend to the State Governments that, where not already in effect:
   - (i) limits to the numbers of kangaroos to be taken be established, having regard to seasonal conditions.
   - (ii) a policy of declaring from time to time areas to be spelled from harvesting of kangaroos be adopted.
   - (iii) a tagging system be adopted to control trading in kangaroo meat and skins.
   - (iv) kangaroo shooters be issued licenses on an annual quota basis for both full-time and part-time shooters.
   - (v) a royalty be paid on each kangaroo shot for commercial use, and that such royalties be applied by the States to the conservation of wildlife.
   - (vi) permits be issued to graziers to allow the culling of excess kangaroo populations and that they be permitted to sell the meat and skins. Where these are sold, royalties should be paid.
   - (vii) pet food manufacturers using kangaroo meat in their products be obliged by regulation to indicate this on their packages.

"All these proposals have been part of our management programme for the past two years.

"In addition, there were three conclusions reached by that Committee which are particularly relevant.

These were:—

(1) That none of the large species of macropod is at present under threat of extinction, whether from destruction of habitat, drought, or commercial factors. An exception is the Forester Kangaroo, a Tasmanian sub-species of the eastern grey, which is threatened due to habitat loss. However, the Committee accepts the view of CSIRO Division of Wildlife Research that the position needs to be continually monitored and that continuous research with regard to larger kangaroo species is necessary.

(13) That although repugnant to some sections of the community, spotlight shooting with rifles equipped with telescopic sights is the most effective and humane method of killing kangaroos.

(21) That whether or not there is commercial harvesting, kangaroo numbers will need to be controlled. There is thus a need to determine the best way of culling any surplus populations.

"The kangaroo industry is used in this State as a tool of management by which kangaroo populations are kept within reasonable bounds.

"You have referred to the students' alarm that the ecological balance in the area could be seriously affected. I believe the position is that the true ecological balance in the area, in fact, has been upset by the development of the area by pastoralists with the introduction of a permanent water supply. As a result, not only have additional grazing animals been introduced but the kangaroo has been protected from the devastating effects of drought and prolonged dry periods. This has permitted substantial increases in population. We are now faced with the need both for proper control of sheep numbers and kangaroo numbers in order to avoid destruction of the vegetation with consequent severe erosion and permanent denudation of the area.

"Conservation cannot be centred around only one species or around the fauna, but must take into account the total ecological balance. The Kangaroo Management programme has been developed in this context. In the event of the kangaroo industry collapsing as a result of failure to lift the export ban on kangaroo products, consideration must be given to other means of controlling excess kangaroo numbers. For this reason the classification of red kangaroos as vermin under the Vermin Act can only be considered when it is evident that an effective management system is operating.

Yours sincerely,
J. T. Tonkin
PREMIER"

One further point needs to be made in regard to the poisoning of kangaroos. Sub regulation 10 (a) of the Fauna Conservation Act Regulation 54 provides:—

> "Except as may otherwise be authorised in writing by the Chief Warden of Fauna, a person shall not use any explosive, poisonous, noxious or narcotizing substance in the taking of any fauna."

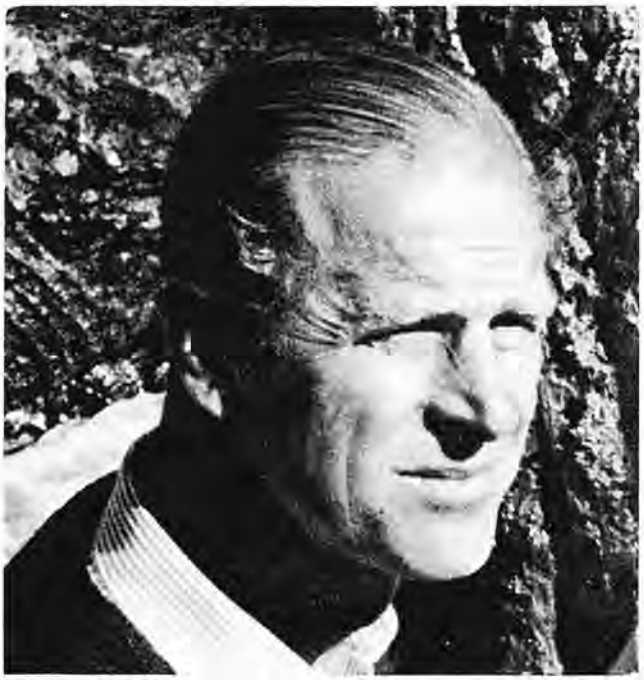
From all the foregoing it should be obvious that Western Australia has already put its house in order.

In the previous issue of S.W.A.N.S. we said that Australia had only itself to blame for its poor image overseas in the sphere of conservation. Justifiably or not Western Australia is now reaping the harvest of that image.

THE PRINCE AND THE NOISY SCRUB BIRD

Although the Noisy Scrub Bird is well known to most Western Australians and to keen aviculturists overseas, perhaps many people are not aware of the personal role that H.R.H. Prince Philip, Duke of Edinburgh played in ensuring the survival of this rare species.

We were very pleased therefore, to receive the text of a speech made by Mr. Alfred George, Chairman of the City of Westminster Chamber of Commerce, when introducing Prince Philip as the guest speaker at London's Dorchester Hotel on 9th April, 1973, before an audience of 800.



"Your Royal Highness, my Lord Mayor, Mr. Minister, my Lords, Ladies and Gentlemen,

"We in the Westminster Chamber of Commerce are indeed honoured that you should come to talk to us on one aspect of conservation. Some of us here today may not realise how deeply and how long you have been personally and actively involved in the many conservation problems that face mankind. When in 1961 the World Wildlife Fund was formed, you took an active part in its formation and have been President of the British National Appeal ever since. Not, Sir, as a figurehead, but as an extremely active and effective supporter both of the British Appeal, which raised over one half million pounds last year, and of the World Wildlife Fund International Fund, of which you are a Trustee.

"During National Nature Week in May 1963 when you attended the Wildlife Exhibition you initiated the five year movement called 'The Countryside in 1970'. Three conferences were held in 1965, 1967 and 1970. You were President of all three. Your active participation helped to get the message of the conference across to the Press and, probably more than any other single factor, changed the public attitude towards the environment.

"We all know you have written books and produced wildlife films. The list is endless; but I want to finish with the story that illustrates your deep personal identification with the cause of conservation. I think the title of my story should be 'The Prince and the Noisy Scrub Bird'. Near Albany, in Western Australia there was rediscovered in 1961 a little thrush-sized bird with one of the loudest voices in Australia—it has the delightful name of the Noisy Scrub Bird. For the previous 70 years it had been recorded as extinct. Ornithologists in Australia and indeed the world over, and especially Doctor Serventy, Australia's leading ornithologist, were pleased and excited; but they were alarmed because the area of the discovery was already scheduled as the site of a new town to be called Casuarina.

"In 1962 Prince Philip visiting Perth for the Empire / Commonwealth Games heard about this case. He personally expressed to Mr. W. S. Bovell, the Minister for Lands, the hope that the bird would be protected. For the next three years he publicly maintained this interest even to the extent of, through Rear Admiral Bonham-Carter, a member of his staff, rebutting in the Perth *Daily News* articles in favour of building the town and risking the ultimate destruction of the species. On 22nd April, 1966, the Western Australian Government magnanimously, and in spite of the need for industrial development, announced that the project for the new town had been abandoned and the area was declared a nature reserve. The species was saved for all time and in asking our guest to address us, I finish with the sentence from a report made for me by Dr. Serventy, he says and I quote: . . . had it not been for the action of the Prince by personal representation made in November 1962 and later correspondence, the Government would certainly have gone on with the scheme.

"So you have to address you today, a man who has personally saved a species from extinction."

This speech indicates the vital role played by Prince Philip in instigating the conservation of the Noisy Scrub Bird. But the story did not end with the establishment of the Two Peoples Bay Wildlife Sanctuary. As conservationists in W.A. will be aware, the Sanctuary now has a full time ranger, and is the subject of a planned management programme (see S.W.A.N.S. Vol. 2, No. 3). Continuing research is being carried out on the ecology of the Noisy Scrub Bird and methods of management to ensure its persistence.

IUCN VIEWPOINT ON WETLAND CONSERVATION

Our wetlands are shrinking through drainage and reclamation projects and a vital resource is being destroyed. These important areas—comparable in value to forests and farmlands—are now so scarce that every effort must be made to preserve what still remains.

By wetlands we mean wet terrestrial and littoral ecosystems—marshes, bogs, fens and all stretches of water, whether fresh or salt, static or flowing, temporary or permanent. Important categories include estuaries and marine shallows (up to 6 metres deep), brackish and saline lagoons, natural and artificial lakes, small ponds or pot-holes, reservoirs, flooded gravel pits, rivers, streams, flood-meadows and swamps. These wetland habitats support a vast range of plant and animal life and serve a variety of important functions, the full values of which are even now only beginning to be recognised.

The major functions of wetlands can be summarised in the following listing :—

Water regime regulation
Flood control
Erosion control
Nursery areas for food fishes, crustacea, etc.
Fish production
Waterfowl production and maintenance
Recreational uses
Educational uses
Plant production
Scientific research
Aesthetic enjoyment
Wildlife habitat
Landscape diversity

Despite the values represented by wetlands, these ecosystems have steadily been diminished in area through drainage, filling, stream " straightening" and scores of other usually unjustifiable attacks in the name of "land improvement".

The drainage of shallow lakes and marshes has long been regarded by many decision-makers as a step towards national prosperity, a view upheld by the yields of grain or the number of animals pastured, which provide visible proofs of success. Were this the full reckoning the case for drainage might be supportable, at least from the economic viewpoint; as it is there are many reasons to suggest that conversion to agriculture is neither the wisest nor most economical means or utilising the wetland resource.

If food production is the sole aim, then almost certainly there are other, better ways than schemes of this nature.

Drainage schemes designed to benefit agriculture must not only be "worthwhile", they must be more worthwhile than any other project with the same end in view. They must take into account the natural wetland assets which are going to be destroyed, and more especially the long-term effects of tampering with the water-table. This particular aspect is important, because the changes are often gradual, and the full effects may not be felt for 20 or 30 years. That is why so many projects fail to maintain their early promise.

Plentiful fresh water is one of the most valuable assets a nation can possess—but at the same time settled communities demand that water shall be kept safely in its place. This second requirement has been regarded as all-important, and drainage authorities have had an almost unlimited mandate for flood control works. Now the emphasis is beginning to change, and the primary problem is no longer the rapid disposal of water, but its conservation to meet the huge and growing demands of industrial, agricultural and domestic users. This new task is not made easier by the effects of long years of drainage and "land improvement", but at least we can learn from experience.

One essential lesson is that all drainage schemes are followed inevitably by repercussions farther downstream, the effects being felt eventually by a whole range of apparently unconnected interests.

Examples of the unforeseen results of drainage are found in almost every river system of Europe, and in many cases the ill-effects are still accumulating, since the cure to one problem is often the cause of several more. Usually the trouble begins with, or is aggrevated by, the drainage of marginal land on the upland gathering grounds, where the rainfall is heaviest, and the soil remains wet for most of the year. These boggy areas can often be "improved" without much difficulty to provide good summer grazing, and possibly some arable land, but by doing so the run off of rain and melting snow is greatly hastened. In their natural state such areas serve as regulators, absorbing water during wet periods and releasing it slowly in times of drought; drainage destroys this function and results in a much wider variation in river level along the middle and lower reaches. Sudden spates become more frequent, the volume of floodwater increases, and the farms and townships of the valley are faced with new threats of flooding. To correct this the river is embanked, and the channel may be straightened to help the water away. This in turn causes flooding downstream, and eventually the river is "corrected" along the greater part of its length. The riverside communities have thus had forced upon them a stereo-typed landscape, with fewer amenities and a greater poverty of plant and animal life. The embarkment of the river also prevents the low-lying fields from draining naturally, and so a new system of ditches and sluices is needed to keep them clear of water.

With the risk of flooding removed, it is tempting to improve the drainage still further, and to use as much of the low-land as possible for arable farming. This in itself is reasonable but, due to the sharper drainage, the loss of topsoil through erosion is proportionately greater. Erosion also results from drainage improvements along the sides of the valley, and, since the run-off is led to the river as quickly as possible, the particles of soil are never allowed to settle. Formerly, a good deal of this silt was dropped on the low-lying fields, where it formed a valuable fertilizer; now it is rushed to the sea and thrown down the banks and bars around the estuary, encumbering the channel and comprising a hazard to navigation. The loss of humus is especially serious because, unless great trouble is taken to replace it, the fertility of the fields will be reduced.

The rapid disposal of the surface water results also in a marked lowering of the river level during times of drought. This leads to higher concentrations of industrial and domestic waste, high enough in many cases to comprise a serious threat to fisheries and public health. The disposal of this nuisance entails either a complete

revision of the sewage system, or the building of balancing reservoirs to maintain the flow. Both solutions are costly, and the latter may involve considerable loss of farmland. The low level of the river may also make it difficult to maintain a constant supply of pure water to all those who require it. In some districts this problem is met by building still more reservoirs; in others, much greater reliance is being placed on boreholes and artesian wells. However, in certain areas these subsoil resources are fast being depleted. Subsoil water depends partly on the presence of surface water in swamps and lakes, the water being forced downwards and outwards under its own pressure into places not otherwise reached. If the surface water is removed by drainage, the effect is obvious. Subsoil water is also replenished by the infiltration of rain through the top-soil, but if the fields are honeycombed with land drains (or worse still covered with houses and roads) the water can no longer permeate.

The reclamation of coastal and estuarine marshes has further undesirable effects. Estuaries are among the most naturally fertile areas of the world, even more productive, acre for acre, than a field of wheat. The wheatfield, of course, produces more food for human consumption, because at present only a small part of the estuarine production reaches human mouths. The potential is nevertheless there, and, by interfering, we are throwing away the opportunity of exploiting new sources of food. On land, a crop is grown and harvested in the same field; in tidal estuaries there is constant movement and, although the harvest may be gathered in the deeper water, the primary source of productivity is centred in the marshes and mudflats. Estuaries must therefore be regarded as single units, comprising not only the mud and sand flats, but the marshes, the creeks, the open channels and the seaward approaches. If some of these components are cut off and reclaimed for agriculture, we must accept a loss of the basic energy on which much of our coastal fisheries may depend.

These chain reactions, set in motion by ill-considered drainage, are the strongest possible argument for reappraising the present policy of "land improvement". Farming has made great advances during the past century—advances which have made possible expanded population and higher standards of living, but paradoxically it is these same advances which threaten what we have gained. Water and food are both essential to us and the one cannot be considered except in context with the other; if more food now implies less water in the years to come, we can look forward not to better harvests, but to drought and failure. Mankind has already ruined the fertility of large areas of the northern hemisphere through wrongful husbandry, and the deserts and dust-bowls of his making continue to encroach. Only by placing the long-term productivity of the soil above all other issues can we hope to avoid the same mistake, and in this wetlands have a natural and vital role.

HONORARY WARDENS—APPOINTMENTS

Colin John Carruthers, of 25 Weldon Way, City Beach.
Norton Lewis Tassell, of 18 May Street, Gosnells.
Bernard Stanley, of Box 87, Brunswick Junction.
James Walter Robinson, of Camballin.
Gerald Graham Cluning, of Keirnan Street, Mundijong.
Edward Herron McLarty, of "Edevale", Pinjarra.
Frederick Patrick Taylor, of 41 Bussell Highway, Busselton.
John Robert Budge, of 96 Arnott Street, Trigg.
Donald Hugh Ardross MacKenzie, of 70 The Esplanade, Esperance.
Michael Barrett, of 37 Fisher Street, Rockingham.
Charles Ronald Smith, of Quangellup Road, Mt. Barker.
John Dudley Adams, of Porongurup Road, Mt. Barker.
Donald Roderick Bellair, of Red Bluff Caravan Park, Kalbarri.
Kenneth Raymond Newby, of Post Office, Ongerup.
John Merrick Aitken, of Post Office, Donnybrook.
Trevor Parker, of Post Office, Onslow.
William James Lapham, of Selwyn Street, Yalgoo.
Barrie Midford Vaughan, of Anaconda Mining Camp, via Widgiemooltha.
Robert Harman Dixon, of 92 Lenori Road, Gooseberry Hill.
James Walter Robinson, of P.W.D., Camballin, via Derby.
Kenneth Roy Champion, of Smith Street, Galway Bay, via Busselton.
Warwick Wilde, of Berry Road, Gidgegannup.
Trevor James Taylor, of P.O. Box 50, Wongan Hills.
David Dalgleish MacDonald, of 15 Lefroy Street, Exmouth.
Peter Toms, of Mogumber.
James Frank Gill, of Lot 4, Stoneville Road, Mundaring.
Ernest Albert McHugh, of Lot 52, Helena Valley Road, Helena Valley.
Eric George Godfrey, of 11A Scroop Way, Spearwood.
Stanley Birdwood Bennett, of 94 McKenzie Street, Wembley.
Eric David Baile, of Balle Road, Canning Vale.
Raymond Lance Stubbs, of Leopold Downs Station, via Derby.
Thomas Henry Lawrence, of 7 Great Eastern Highway, Northam.
Edwin James Burrows, of Windy Harbour, via Northcliffe.
Ronald Gordon Chandler, of 53 Churchill Avenue, Maylands.
Mikael Howard Capelle, of Flat 10, 82 Broadway, Nedlands.

NEW OFFICER TO POLICE BIRD IMPORTS

Mr. J. Richardson has been appointed by the Agriculture Protection Board to the position of Vermin Control Officer (Imports).

Mr. Richardson's duties will be to ensure that no prohibited birds enter Western Australia from other States. He has authority under the Vermin Act and has been appointed a Fauna Warden under the Fauna Conservation Act. Half of his salary is paid by the A.P.B. and the other half by this Department.

Mr. Richardson was chosen from 57 applicants because of his knowledge of bird identification. A major problem in the past has been the import of prohibited birds under the label of permitted species.

YELLOW-BILLED SPOONBILLS AT WOODANILLING

Following on the report in the last issue of the sighting of yellow-billed and royal spoonbills at "Rushy Swamp", Woodanilling, we received the following report from Honorary Warden Ray Garstone.

"Yellow-billed Spoonbills are by no means rare in this area, and odd groups may be seen at some time during most summer months. Rushy Swamp (Woodanilling) and Coyrecup Lake (Katanning) are perhaps their favourite haunts.

Yellow-billed Spoonbill (*Platalea flavipes*) (Photo : R. Garstone)

"In 1965 I found a nest well out in Toolibin Lake. It was quite large and well-built, not unlike the nest of a Goshawk, and contained four eggs. The nest was watched carefully and, after the young were hatched, a steel tower was set up in the water and photographs were taken. The birds were extremely friendly and all the young were reared to maturity. Many hours were spent in the hide and it was interesting to note the difference between the nesting spoonbills and the egrets who were also nesting in the vicinity.

"In 1966, 3 pairs nested in a loose colony and in 1972 a pair nested at Lake Coyrecup.

"The recent dry seasons and the fact that the lakes have not contained sufficient water and food seem to be the reason why I have no records recently. I feel that they will nest again here in suitable years when the lakes are full.

"In March, 1973 a flock of 32 Yellow-billed Spoonbills arrived at Rushy Swamp, but soon moved off again". (These were the birds sighted by members of the Western Australian Wildlife Authority during their tour—Ed.).

It would seem that ornithologists will have to re-write their records regarding the southerly range of the Yellow-billed Spoonbill. Serventy and Whittell give the general southerly limit as Moora, although occasional sightings have been made at Cannington (1954) and Bunbury (1958).

SEA-EAGLE AT ROTTNEST

Honorary Warden W. A. Farmer of Rottnest Island has sent us the following interesting report:—

"The din and commotion among the lesser predators as a sea-eagle flew over Rottnest from east to west has probably never been exceeded on the island. The settlement's several hundred ravens were the first to spot the stranger. Shrieking their warning call they took off *en masse* and, near the main lighthouse in the centre of the island, Rottnest's ten resident ospreys joined the attack. But the great eagle soared effortlessly in vast circles which always had the attackers flying in the wrong direction.

"No matter how vigorously they flapped their wings the ravens could not exceed above 1,500 ft., and, above them whistling madly, the ospreys reached an altitude limit of some 2,000 ft., still 1,000 ft. below the sea eagle.

"Over Vlaming Point (West End) the eagle changed the direction of its reconnaissance flight towards Garden Island and only then did Rottnest's avian defence force break off the pursuit and return wearily to their foraging grounds.

"The island's ravens have had only one previous experience of high altitude flying when, many years ago, the Perth Gun Club members were invited to thin out the ravens. Local residents expected the birds to leave the settlement after the first shotgun blasts, but instead they went straight upwards until they 'ran out of gas' and finally flopped back, not into the trees, but to the actual earth; they were completely exhausted."

(This eagle would be a White-breasted Sea Eagle. These are more commonly seen along the coast further north but are found around the whole coastline—Editor.)

CORRIGENDA—VOL 4 No. 1

Page 15—Yellow-tailed black cockatoos should read red-tailed black cockatoos. (The birds sighted were probably immature red-tailed black cockatoos—Ed.)

Page 18—Night kestrels should read night herons.

KNOW YOUR DISTRICT FAUNA WARDEN

William Michael (Mike) Mahoney was born in Subiaco on 3rd February, 1945, of American/Australian parentage. His mother's family can be traced back to early pioneer days and his grandfather was a Kalgoorlie gold miner, howbeit an unsuccessful one.

Mike was educated at Tuart Hill High School; when he left in 1960 his first job was as a telegram messenger and postal clerk with the P.M.G. Department. After two years his wanderlust got the better of him and he had many jobs, eleven he thinks, until he settled down for two years as a deckhand on a cray boat. It was from from this job in December 1964 that he left to become a fisheries inspector, much to the consternation of the "kakka-runners" in the industry.

He didn't "dob them in" though, and remained with the Department for over two years until he resigned to become a driving instructor. However, Western Australian drivers proved too much of a strain on his nerves; in 1969 the prodigal son returned to the Department as a Cadet Inspector and gained further experience at Albany, Seabird and with the Mobile Patrol.

In July 1971 Mike was appointed as a Fauna Warden and has since commenced duties as the first warden of the Mt. Magnet district. Most of his time is taken up by the kangaroo management programme and what time is left is used for general patrol work and office work. He has already earned the respect of the honorary wardens and farmers of the area for his conscientious work in the conservation field. Mike married his wife Pat in 1965 and they have four sons.

Mike tells one particularly good story about his days with the mobile patrol. During a night patrol near the Waroona Dam he and another inspector saw the lights of a vehicle parked near the dam. Thinking it more likely to contain marroners operating out-of-season than

a courting couple they backed up the vehicle and set up a road block. After some time waiting in the pouring rain for the "offenders" to appear, they returned to the dam. The lights were still there so back they went and up went the road block again. When they were were both thoroughly soaked and frozen they decided to investigate. Shining their powerful torches towards the twinkling lights, they were amazed to see not two lights now, but four. Their own torch beams and their own car lights reflecting back at them from the windows of the control tower.

SULPHUR-CRESTED COCKATOOS AT PINJARRA

In July 1972 Fauna Warden Bob Marshall made a positive identification of 24 mature Sulphur-crested Cockatoos (*Cacatua galerita*) at Pinjarra. This sighting was subsequently confirmed by Fauna Wardens Les Moss and Dave Mell although all can be excused for doubting the evidence of their own eyes.

The distribution of sulphur-crested cockatoos is described by Neville Cayley in "What Bird is That" as . . . "Australia (EXCEPT WESTERN AUSTRALIA, SOUTH OF THE FITZROY RIVER and western areas of South Australia)".

The most likely conclusion is that the birds had been liberated in the area, possibly as a single pair some years ago, and had built up to the present number. This is borne out by the statement of one local resident—" . . . the birds have been here for years. Originally there was one pair. I can remember a cousin having a pet one but I don't know what happened to it." Another resident can remember seeing a pair in 1956, one of which could talk, and has counted up to 32 in the present flock.

Other sightings have been made in the south-west—at Kalamunda (1963, three birds) and West Swan (1964 several). A number were also recorded at Lake Claremont, and Lake Monger, but have now disappeared from those areas.

Even further back in time, Wildlife Authority member, Mr. Angus Robinson recorded the birds at Mandurah in 1935 and learnt that they had been released by "a man who came from the north". However, an elderly resident of Coolup states that the birds were once present in large numbers as far north as Armadale and other antediluvian residents report the previous existence of flocks at Harvey.

An identification "in the hand" would be necessary to determine whether the birds are of Kimberley or Eastern States origin, but the former does seem likely on the evidence so far acquired.

Sulphur-crested Cockatoos are fully protected and may not be kept in captivity except under license. They may not be trapped, shot or poisoned or interfered with in any way. The maximum penalty for breaching this section of the Fauna Conservation Regulations is $200.

ROYAL HONOUR FOR WILD-LIFE AUTHORITY MEMBER

On 3rd May this year Dr. Dominic L. Serventy was decorated by Prince Bernhard of the Netherlands with the Order of the Golden Ark.

The decoration was instituted by Prince Bernhard in his capacity as President of the World Wildlife Fund and is awarded by him personally to leading people all over the world who have taken a prominent part in saving wildlife. Dr. Serventy was made a Ridder (Knight) of the Order.

Dr. Serventy was born in Perth in 1904 and educated at Perth Boys' School, Perth Modern School, the University of W.A. and Gonville and Caius College, Cambridge. He joined the Fisheries Division of the C.S.I.R.O. in 1937 and in 1953 transferred to the Wildlife Survey Section. This section later became the Division of Wildlife Research and when Dr. Serventy retired in 1969 he held the post of Senior Principal Research Scientist. He is a foundation member of the Fauna Advisory Committee (formed in 1943 and now known as the W.A. Wildlife Authority) and is currently serving on the Bird Committee and Game Management Committee of the Authority.

Dr. Serventy has been a member of the Permanent Executive Committee of the International Ornithological Congress since 1966, and has represented Australia on the Standing Committee on Pacific Conservation (Pacific Science Association) since 1949.

Conservationists throughout the world will know of Dr. Serventy through the large volume of scientific papers he has written and he is renowned for his work on Tasmanian Mutton Birds. On the local scene he is best known for his books-"Birds of Western Australia" (Serventy and Whittell) and "A Handbook of Australian Seabirds" (Serventy, Serventy and Warham).

Dr. Serventy (*right*) receives his decoration from Prince Bernhard at Soestdijk Palace

Altogether 23 awards have been made this year and the Department was pleased to note that Lt. Col. C. L. Boyle has been made a Ridder of the Order also. Colonel Boyle has worked hard and long in the interests of conservation and protection of fauna and is internationally acclaimed for his efforts in drawing world attention to the problems of oil pollution and for his work towards international controls over the trading of birds and other wild animals. In Western Australia Colonel Boyle is best remembered for his support as editor of "Oryx" in the efforts to save the Short-necked Tortoise and the Noisy Scrub Bird.

SUGGESTED READING

ECOLOGY

The Limits to Growth—Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrans III. London. Earth Island Limited. 1972.

In July 1970 an international research team at the Massachusetts Institute of Technology began a study of the effects and limits of continued worldwide growth—a study commissioned by The Club of Rome as part of their Project on the Predicament of Mankind. This non-technical report of their findings is a calm and masterfully coherent survey of mankind's problems and options.

The MIT team carefully studies the fundamental limits to growth in global population, agriculture, resource-use, industry, and pollution, and shows how these factors interact with each other. They conclude that even under the most optimistic assumptions about advances in technology, the world cannot support present rates of economic and population growth for more than a few decades from now. By simulating the behaviour of the world in a large scale computer model, the MIT researchers also show that only by a concerted attack on all the major problems at once can man achieve the state of equilibrium necessary to his survival.

WHITE SWANS ARE PROTECTED FAUNA

Honorary Wardens and holders of scientific collectors' licenses are asked to note that White Swans (Mute Swans) are protected under the Fauna Conservation Act.

The meaning of fauna is defined in the Fauna Conservation Act, which, among other things, rules that all vertebrate animals that are wild by nature and are living in Western Australia either in the wild or in captivity are fauna within the meaning of the Act. This includes vertebrates which migrate into the State or have been introduced by man. White Swans are fauna and, as they have not been declared to be "not protected" under the Fauna Conservation Act, they are protected under that legislation.

The Minister for Fisheries and Fauna, Mr. A. W. Bickerton has ruled that no person can take white swans from the colony at Northam without his permission. On 16th May this year, the ruling was imposed as a condition on all collectors' licenses that "No White Swans (*Cygnus olor*) shall be taken".

W.A. UNIVERSITY'S MARSUPIAL BREEDING STATION

Oblique aerial photograph of part of northern boundary of marsupial reserve. Russell Road runs obliquely across upper left hand corner. To the left (North) of Russell Road is southern edge of Thompson's Lake Reserve. Tracks shown are firebreaks and access roads. The warden's cottage, laboratories and machinery sheds can be seen in the centre of the photograph.

In Western Australia, studies of marsupials by University students have been continuing since 1948 and have been based mainly at Rottnest and Garden Islands, the Pilbara, the Wallabi Islands, Houtman's Abrolhos and the Tutanning Fauna Reserve.

Many of the field studies have been supported by laboratory experiments using wild-bred field-caught animals and, as knowledge of their biology expanded, marsupials have become extremely important for such disciplines as medical research (muscular dystrophy and immunology), physiology and ecology. The increased demand for animals rapidly exceeded the productivity of other holding centres and led to the establishment of the Jandakot Breeding Station in 1970.

The Marsupial Breeding Station consists of approximately 700 acres of bushland situated about six miles south-west of Jandakot Airport and three miles from the coast at Coogee. This land was previously part of Flora and Fauna Reserve No. 15556, which included Thompson's Lake.

The station has been surrounded by a high wire fence to enclose the animals and keep out dogs; a warden's cottage, a laboratory and an operating theatre have all been built close to the entrance on Russell Road and a large trapping pen has been constructed. To date more than $80,000 has been spent on the reserve.

At the time the reserve was fenced the fauna included a number of grey kangaroos and brush wallabies, short-nosed bandicoots, and brush-tail possums. The exotic species included house mice, black rats, rabbits, domestic cats, and foxes. No native rodents have been observed on the station, even though the habitat appears to be suitable. Many bird species have been observed in the area, but the lake does not appear to be as suitable for water birds as the neighbouring Thompson Lake. This is probably because it is overgrown and is comparatively lacking in crustacean and insect fauna needed for food.

PROJECTED STUDIES ON THE RESERVE

During the next few years it is hoped that the station will serve as a focal point for a number of studies on marsupial biology. Behavioural investigations will be initiated, especially during the critical period when animals are first being introduced to the area. Very little is known of how wallabies and kangaroos establish territories, develop complex hierarchical social systems, etc., and this will be a unique opportunity to observe these processes in action.

The marsupial station can also be treated as an experimental flora and fauna reserve. There is too little information available on the minimum acreage necessary for the long-term survival of the many different

species of marsupials now living in flora and fauna reserves, and Jandakot will furnish a practical solution to this problem. It should prove possible to increase stocking rates of selected species until signs of overgrazing of sensitive species of plants are evident, giving a rough figure for the minimum area required per animal below which irreparable damage would be inflicted upon the vegetation.

Jandakot will also prove instrumental in the testing of the many theories advanced in the last few years to explain the decline in the number of the quokkas on Rottnest Island. During the summer months there is a considerable fall-off in the condition of animals on the island due primarily, it is thought, to the unavailability of high quality vegetation replete in both protein and carbohydrates. With the availability of supplementary food for the quokkas at the Jandakot station it should prove possible to show that the seasonal mortality of animals at Rottnest in summer is due to the poor quality of the available vegetation and not due to other factors such as disease, senescence, etc.

The fact that such studies will be in progress does not mean that animals cannot be removed from the population. One of the main aims of the reserve is to "farm" marsupials, that is, to produce an annual crop of animals which can be removed and in fact, which must be removed if the area is not to become overpopulated. These animals will be used for a variety of research projects which centre on the quokka and include work on muscular dystrophy, cancer research, immunology, etc. In this way it is expected that successive generations of animals inhabiting the reserve—which will be selected for high productivity, i.e. rapid rate of growth and high fertility—will gradually change in nature until they are perhaps quite unlike quokkas living on Rottnest Island where selection is always in favour of capacities conducive to survival rather than high productivity.

Finally, the station at Jandakot will function as an invaluable teaching aid for the University. With the provision of a laboratory including living accommodation, this means that groups of students will be able to work and live on the station for short periods of time. Unparalleled facilities will thus be available for the teaching of disciplines such as fresh-water ecology, entomology, animal behaviour, population dynamics, etc. Students should gain first-hand experience in the observation and collection of animals in a near-natural situation as well as training in the development of management programmes for large tracts of land which will prove to be of great importance in the development of flora and fauna reserves in Western Australia in the future.

MANAGEMENT OF THE STATION

Grazing Pressure

As mentioned above, at the time the land was fenced the grey kangaroo, brush wallaby, short-nosed bandicoot and brushtailed possum occurred naturally in the area. These species will not be removed from the area of the reserve. When the station is fully stocked the quokka will be the predominant animal present, but some tammars will also be introduced. The reason for this is given below.

Each of the herbivorous animals has a characteristic grazing pattern and, if only one species were stocked (e.g. the quokka), grazing would be on those low herbaceous or nutritious shrubs within the reach of the quokka. With continued grazing by small animals the taller vegetation will gradually overshadow and eventually eliminate the preferred food of the quokka. Accordingly, it is proposed to exploit the different grazing patterns of the tammar, brush wallaby and grey kangaroo to graze the whole range of shrubs up to and within the reach of brush and grey kangaroo. In this manner it is hoped to facilitate the management of the vegetation for maintenance of the principal quokka population.

In order that the grazing patterns can be studied in detail, and particularly the response of the vegetation to browsing, two things have been done. Firstly, the vegetation has been surveyed by the W.A. Herbarium and the species present listed. Secondly, so that the changes induced by grazing can be documented, certain areas have been fenced as exclosures. These areas will be inaccessible to the grazing marsupials and so will show, by comparison, what grazing is doing to the areas outside the fenced areas.

It is to be expected that some plants may be so heavily grazed that they will be eliminated and, in order to document this aspect of grazing pressure. "line transects" have been set out. Along these line transects the plant species present have been documented for presence and size, and it will be possible in the future to go back to these line transects and measure the changes induced by grazing.

Part of the trapping enclosure which has been built to facilitate recapture of wallabies. The area inside has been planted with forage grasses and the animals are able to move in and out through swinging trapdoors. When animals are to be captured the access ways can be fixed and animals inside the enclosure captured by hand-held nets

Fire Control

In recent years, fire has probably burnt through the area at more frequent intervals than would normally be desired, but nevertheless it is considered necessary to burn parts of the area from time to time as a management procedure, not only to maintain the habitat, but also to reduce the risk of a bushfire burning the whole area. To facilitate these measures firebreaks and tracks have been made to divide the area into a number of

discrete sections, and the "cladium" reeds are being cleared from around the edge of the lake, as these constitute a particularly dangerous fire hazard.

Disease Control

A systematic survey has been carried out in conjunction with the Department of Public Health, to ascertain the nature and distribution of pathogenic bacteria in surface waters on the marsupial station. Water sampling of the surrounding lakes by the Department over the past two years has shown many of them to be polluted with bacteria derived from human and agricultural sources. Fortunately, Banganup Lake which is the main source of water on the reserve has proved to be surprisingly free of other than what may be regarded as indigenous bacteria and there is no evidence of any strains characteristic of urban or agricultural activity. This means that the opportunity exists of introducing native animals into an area essentially free from man-stimulated pathogens, and every effort is being made to ensure that upon introduction animals are disease free. Kangaroos and wallabies destined for the reserve are first swabbed to ascertain the nature and extent of any diseases which they may be harbouring, and only those which show negative results are passed for transfer. When they are being swabbed other valuable information is also collected which will form the basis of a card-index system on each animal released in the reserve. Vital statistics are measured, blood samples taken and ear tags attached; these records will enable a check to be kept on the well-being of each arrival introduced into the reserve.

Stocking and Recapture

When animals are introduced into the marsupial station they will be in low density and, from experience elsewhere, one would expect females to mature earlier than they would at high densities—e.g. on Rottnest. If early breeding occurs as anticipated, there is likely to be a consequent rapid growth in the population. The animals are expected to disperse throughout the reserve wherever sufficient cover and food are available. Under these circumstances trapping in the native vegetation would be difficult. However, from knowledge of quokka behaviour on Rottnest and from the known behaviour of tammars and grey kangaroos adjacent to crops, it is anticipated that animals throughout the reserve would be attracted to a highly nutritious forage (as a supplement to their natural diet).

Accordingly, fenced areas have been built where nutritious food will be grown, and which may be used to trap animals. Initially animals will be captured solely as a method of censusing the population, particularly when the population nears the carrying capacity of the land. As soon as censuses establish that the population can be cropped, as indicated by numbers and age structure, the traps will be used to catch animals for experimental purposes.

EXPERTS CALL FOR BROAD PROGRAMME TO SAVE CROCODILES

A 5-point programme for conservation of the world's crocodilian reptiles has been recommended by the Crocodile Specialist Group of the Survival Service Commission. The Group met 20–27 March at Ndumu and St. Lucia Game Reserves, Zululand. The new programme is aimed principally at saving 9 species: Cuban crocodile, Orinoco crocodile, Morelet's crocodile, Siamese crocodile, Indian gavial, false gavial, Rio Apaporis caiman, broad-nosed caiman and Chaco broad-nosed caiman. All are classified in the endangered category, and will be so listed in the revised Red Data Book Vol. 3. A number of other crocodilians are in lesser categories of danger.

The action programme outlined by the Specialist Group includes the following elements:

- surveys of hide sources, their volume and flow worldwide;
- surveys of wild populations of crocodilians with emphasis on South East Asia, West Africa and South America;
- specific actions favouring the species currently on the verge of extinction;
- focusing worldwide attention on crocodilian ecology;
- promotion of the establishment of an adequate system of sanctuaries for all species.

The order Crocodylia as a whole is in serious trouble. Essentially they are inhabitants of restricted areas; they do not migrate and their conservation is a local and national problem.

The main cause of their rapid and dangerous decline in recent years has been the uncontrolled killing of these animals for the leather trade. Hitherto, rational management has been the exception rather that the rule and, in some countries, crocodiles are unfortunately still classed as "vermin". As a result, some 15 out of the 21 existing species are already considered by the SSC as seriously threatened.

The crocodilians represent a valuable national asset of many countries, both as a tourist attraction and as a source of high-grade leather available for exploitation on a strictly limited and rational basis. Like other predators and scavengers they also play an important part in maintaining the balance of nature in relation to fresh water ecology. Furthermore, the crocodilians are of immense scientific interest as the only surviving members of the archosaurian group of reptiles which dominated the earth for 100 million years.

The meeting was financed in large part by the New York Zoological Society. It was hosted by the Natal Parks/Game and Fish Preservation Board. The meeting was organised by IUCN and WWF.

DECLARATION AND AMENDMENT OF RESERVES

NEW RESERVES

Name	Res. No.	Locality	Plan	Area	Previous Use	Purpose	Vesting	Gazetted
....	31746	Abt 40m N.W. of Esperance	403/80 C4	354·7474 ha	....	Conservation of Flora & Fauna	....	2/2/73
Barbalin	31715	6 m west of Mukinbudin	55/80 E3	175·8052 ha	....	Conservation of Flora & Fauna	....	22/12/72
....	31743	Abt 40 m N.W. of Esperance	403/80 D4	95·6854 ha	....	Conservation of Flora & Fauna	....	2/2/73
....	31881	Abt. 18 m W. of Ravensthorpe	420/80 C1	179·5868 ha	....	Conservation of Flora & Fauna	....	23/3/73
....	31742	Abt. 40 m N.W. of Esperance	403/80 D3,4	1179·3830 ha	....	Conservation of Flora & Fauna	....	2/2/73
....	31744	Abt. 40 m N.W. of Esperance	403/80 CD4	288·3031 ha	....	Conservation of Flora & Fauna	....	2/2/73
....	31745	Abt. 40 m N.W. of Esperance	403/80 C4	87·4576 ha	....	Conservation of Flora & Fauna	....	2/2/73
Lancelin	31781	N. of Lancelin	30/80 & 59/80	4573·7571 ha	....	Conservation of Flora & Fauna	W.A.W.L.A.	23/2/73
Beverley Lakes	31837	20 m. S.E. of Beverley	343/80	about 681 ha	....	Recreation & Conservation of Flora & Fauna	W.A.W.L.A.	2/3/73
Shelter Island	31908	Torbay	457/80 B2	about 10 ha	....	Conservation of Flora & Fauna	W.A.W.L.A.	30/3/73
Glasse Island	31909	Bremer Bay	447/80 EF2	about 4 ha	....	Conservation of Flora & Fauna	W.A.W.L.A.	30/3/73
....	31754	35 m. E. of Ravens-thorpe	404/80 EF4 & 421/80 E1	about 6813 ha	....	Conservation of Flora & Fauna	....	2/2/73
Chatham Island	31904	15 m. W.S.W. of Walpole	455/80 C4	about 101 ha	....	Conservation of Flora & Fauna	W.A.W.L.A.	30/3/73
....	32046	8m. S.E. of Pingaring	376/80 F4 & 387/80 F1	584·3623 ha	....	Conservation of Flora & Fauna	W.A.W.L.A.	15/6/73
Muiron Islands	31775	Off N.W. Cape	95/300	988 ha	....	Recreation & Conservation of Flora & Fauna	Shire of Ex-mouth and W.A.W.L.A.	2/2/73
....	31967	Wyndham	142/300	23,945 ha	....	Conservation of Flora & Fauna	W.A.W.L.A.	4/5/73

VESTING OF RESERVES

Name	Res. No.	Locality	Plan	Area	Purpose	Previous Vesting	New Vesting	Gazetted
....	A20372	18 m. S.E. of Wubin	89/80 F4	about 781 ha	Conservation of Flora & Fauna	....	W.A.W.L.A.	23/3/73
Sugarloaf Rock	31634	2 m. S. of Cape Naturaliste	413/30	approx. 8094 sq metres	Conservation of Fauna	....	W.A.W.L.A.	19/1/73
Channel Lakes	28088	20 m. S.E. of Beverley	343/80	2424·4717 ha	Conservation of Flora & Fauna	....	W.A.W.L.A.	2/3/73

(continued overleaf)

CHANGE OF PURPOSE

Name	Res. No.	Locality	Plan	Area	Previous Purpose	New Purpose	Vesting	Gazetted
....	A20372	18 m. S.E. of Wubin	89/80 F4	about 781 ha	Protection of Native Flora	Conservation of Flora & Fauna	W.A.W.L.A.	23/3/73
Channel Lakes	28088	20 m. S.E. of Beverley	343/80	2424·4717 ha	Conservation of Flora	Conservation of Flora & Fauna	W.A.W.L.A.	2/3/73

CANCELLATION

Name	Res. No.	Locality	Plan	Area	Previous Purpose	New Purpose	Vesting	Gazetted
Lake Preston	A22057	Eastern Shore of Lake Preston	383/80	about 878 ha	Conservation of Flora & Fauna	National Park	National Parks Board	26/1/73

MORE DUNNARTS FOUND

In recent months officers from the W.A. Museum and from the Fauna Research Branch of the Department have captured a number of small mammals which have rarely been recorded in Western Australia.

There are many mammals in Western Australia which have been recorded as " rare " which probably should be more accurately categorised as " seldom collected ". As more and more fauna surveys are carried out these " rare " animals and especially the smaller marsupials, are turning up with increasing frequency. Although their range has undoubtedly decreased since the advent of the white man, indications are that many species have survived in pockets throughout the State and it is only their small size and the relative remoteness of their habitat which has led to their being classified as rare.

Two species of Dunnart have been collected this year. The first, the Hairy-footed Dunnart (*Sminthopsis hirtipes*) is classified by W. D. L. Ride in " Native Mammals of Australia " among " the rare ones ", and only eight specimens were known up to 1967. The second, the White-tailed Dunnart (*Sminthopsis granulipes*) is similarly classified by Ride, and between 1925 and 1965 only nine specimens had been collected.

Honorary Wardens and other readers certainly will have little knowledge of these two species and in the hope that further specimens will now be reported, we are publishing the following details which may assist in identification.

HAIRY-FOOTED DUNNART (*Sminthopsis hirtipes*)

Distribution :

Wide distribution in Western Australia from arid to coastal situations. Infrequently collected which may indicate rarity—but is more likely to indicate the lack of collecting in the areas it inhabits.

Hairy-footed Dunnart (*Sminthopsis hirtipes*)

Localities of Capture :

Elder Creek, Warburton Range Mission.
Canning Stock Route.
Djindirana Claypan, 53 miles north of Everard Junction.
Canning Stock Route, Well 29
Windularra 26°30'S, 126°6'E.
Neale Junction.
26 mile peg, Kalbarri road.

Measurements :

Total length—165 mm.
Tail length—92 mm.
Hind foot length—18 mm.
Ear length—19 mm.
Weight—19 g.

Tail is long and may be fat as in the Fat-tailed Dunnart (*Sminthopsis crassicudata*). White-cream fur underneath with brown fur on the back. The feet and tail are pale-cream colour. The pads of the feet are covered with furry bristles—which give the animal its name. Ears are very long.

Nothing is known concerning the natural history of this animal.

It appears likely that the Dunnart featured in S.W.A.N.S. Vol. 4, No. 1, p. 8 was in fact *S. hirtipes* and not *S. granulipes* as originally thought.

Hairy-footed Dunnart (*Sminthopsis hirtipes*)

WHITE-TAILED DUNNART (*Sminthopsis granulipes*)

Distribution

Confined to the inland periphery of the south west of Western Australia. Until this year there were only eight specimens collected. Recently, the survey activities of the Fisheries and Fauna Department and the W.A. Museum have obtained a further four.

White-tailed Dunnart (*Sminthopsis granulipes*)

Localities of Capture

Bendering
Lake Grace South
30 miles east of Ravensthorpe
Nungarin
Tenterden, 7 miles west of Stirling Ranges
Marvel Loch
Kulin
Kondinin
16 miles north west of Moora
15 miles west of Three Springs.

Measurements

Total length—142 mm
Tail length—57 mm
Hind foot length—15 mm
Ear length—16 mm
Weight—19 g.

The white-tailed Dunnart, like *S. hirtipes* and *S. crassicaudata* stores fat in its tail. It is one of the larger Dunnarts and is distinguished by numerous small granules on the pads of its feet. It has a light-grey fur over much of its body.

A.C.F. MEMBERSHIP EXCEEDS 7,500

Membership of the Australian Conservation Foundation has passed the 7,500 mark for the first time, stimulated, no doubt, by publicity resulting from the President's visit. At 30th April, total ACF Membership in all categories was 7,581, an increase of 225 since 30th November, 1972.

Totals of each category were 6,430 Ordinary Members, 786 Member Bodies, 207 Life Members, 81 National Sponsors, 46 Benefactors, 31 Library subscriptions and two single donations.

The ACF continues to seek new members. Readers interested in joining the ACF should contact Brigadier C. M. L. Elliott of 1 Mosman Terrace, Mosman Park—Telephone 31 3329. The annual membership fee is $5 for Ordinary Members.

MINKE WHALE STRANDED AT CERVANTES

On 16th May a Minke whale was stranded at Cervantes. Fisheries Inspector K. Marshall investigated and found the animal to be alive but very weak. It had been badly mauled over most of the body, possibly by sharks, and the tail and dorsal fins were also badly damaged.

The animal was a juvenile female and measured ten feet in length.

Efforts were made to save the whale by dragging it into deeper water but these were unsuccessful because the whale kept returning to the shore.

Because of the damage to the fluke the whale would not have been able to swim, and therefore was humanely destroyed by departmental officers.

Our Diminishing Heritage

Brush-tailed Rock Wallabies (*Petrogale penicillata*) were once found on steep rocky hills and cliffs over much of mainland Australia, but populations have decreased considerably in eastern Victoria, south-eastern New South Wales and south Western Australia. The species is apparently quite common however, in tropical northern Australia.

The taxonomy of rock wallabies is very confused and it is not clear just how many species there are. Some rock wallabies are very different, e.g. the Yellow-footed Rock Wallaby and the Little Rock Wallaby while others are very similar, e.g. the Purple-necked Rock Wallaby and Rothschild's Rock Wallaby. Dr. W. D. L. Ride in his book "A Guide to the Native Mammals of Australia," recognises seven species, four of which occur in Western Australia. These are the Little Rock Wallaby (*Peradorcas concinna*) and the Short-eared Rock Wallaby (*Petrogale brachyotis*) which are found in the Kimberleys, Rothschild's Rock Wallaby (*Petrogale rothschildi*) from the western Pilbara and Dampier Archipelago and the Brush-tailed Rock Wallaby.

The agility and sure-footedness of these wallabies is amazing and they can be observed leaping from rock to rock, negotiating precipitous cliffs and gullies with ridiculous ease. That they can be seen during daylight hours is unusual and, in fact, of Western Australia's marsupials, only the Numbat is more diurnal in its habits. Rock wallabies will "sun bathe" on rocky outcrops but they do seem to require fairly stable temperatures; it has been suggested that their wide range throughout the continent can be attributed to their rocky environment which maintains constant temperatures. Dr. E. Ealey of the Division of Wildlife Research, C.S.I.R.O., while studying habitat requirements in the Pilbara, found deep caves among the rocks where the air temperature did not fall below 27°C or rise above 32°C although the shade temperature outside varied between 18°C and 46°C.

Brush-tailed Rock Wallabies vary in appearance over much of their range, but all have a distinctive long, slender tail which is bushy or tufted at the tip; the tail is not used to support the weight of the body to the extent that it is in other wallabies, but is used rather to balance the body when jumping. The hind feet have thick "pimpled" pads which prevent slipping on the rocks.

Because the range of this animal has been much reduced in Western Australia, especially in the south-west, the species is fully protected and has been declared "rare and likely to become extinct". Several areas which have been set aside as fauna sanctuaries and reserves harbour Brush-tailed Rock Wallabies, viz.:—

1. Recherche Archipelago Wildlife Sanctuary (Reserve No. A22796).
2. Mt. Caroline Wildlife Sanctuary (Reserve No. 11047).
3. Mt. Stirling Wildlife Sanctiary (Reserve No. 11048).
4. Nangeen Hill Wildlife Sanctuary (Reserve No. 23187).
5. Tutakin Hill Water Reserve (Reserve No. 11039).
6. Kalbarri National Park (Reserve No. A27004).
7. Barlee Range Wildlife Sanctuary (Reserve No. A26808).
8. Barrow Island Wildlife Sanctuary (Reserve No. A11648).
9. Depuch Island (Reserve for Aborigines).

A small population is known also on private property near Bruce Rock.

With a few notable exceptions, e.g. Kalbarri National Park and Barlee Range Wildlife Sanctuary, the reserves for the conservation of the Brush-tailed Rock Wallaby are small (under 350 acres) and as was explained in S.W.A.N.S. Vol. 3, No. 2, p. 42, reserves of this size are subject to external influences such as predation by foxes, etc. That isolated pockets still occur in the south-west as islands in a sea of wheat is due to the indestructability of the animals' rocky habitat and the protection it affords. Unfortunately no research has been carried out on Brush-tailed Rock Wallabies, and it cannot be said with any certainty that these isolated populations will survive indefinitely. It is to be hoped that the reduction in the range in the south-west has been halted, but as the north of the State is opened up, the remaining habitat will be further reduced and reserves are needed in suitable areas.

The Department is most interested to receive information on areas where rock wallabies occur anywhere in the State.

The penalty of $1,000 which can be imposed for interfering with these animals is a sizeable deterrent to miscreants, but the real need is more research and more sanctuaries. There are good populations and ideal habitat in the Kimberleys which should be protected now, before short-sighted man has the opportunity to destroy another part of his own heritage.

BRUSH-TAILED ROCK WALLABY

Petrogale penicillata

Close up of head; the two colours of the ear are particularly clearly shown

This animal is one held by the W.A. University. It is a hybrid and is probably a cross between a male Recherche (Hackett's) Rock Wallaby and a female Rothschild's Rock Wallaby

DISTRIBUTION:

Throughout the state in suitable localities. Now very rare in the southern half of the State.
Also found on Westall (Coombe), Wilson, Salisbury and Mondrain Islands in the Recherche Archipelago, Barrow Island and Depuch Island in the Pilbara.

LOOKS:

A medium-sized wallaby with a very long tail. Colour very variable. General colour grey-brown; often with light facial stripe; black stripe under arm-pit with pale stripe behind it; tail black with outer half bushy; ears—bottom half pale, top half black.

LENGTH:

Head and body—480-530 mm approx.
Tail —440-480 mm approx.

WEIGHT:

4-5.5 kg approx.

BREEDING:

Like all the kangaroo family these wallabies produce only one young at a time. Little information is available on breeding seasons, growth, etc.

DIET:

Again little information is available. Incidental observations show that they are grazing animals. They probably do not drink water as most areas where they occur have no fresh water available.

CHANGE OF STATUS FOR LITTLE CORELLAS

In May this year the Minister for Fisheries and Fauna, Mr. A. W. Bickerton announced that Little Corellas had been removed from the schedule of unprotected fauna.

Previously these birds could be trapped, shot or poisoned regardless of whether or not they were causing conflict with primary producers in grain growing areas. As readers will be aware, the indiscriminate poisoning of any species of fauna endangers non-target species.

In order to allow **landholders** to protect grain crops, an open season on Little Corellas has been declared in the Kimberley Land Division and in the Shire of Coorow. Landholders may take these birds by the use of firearms but other methods such as trapping and poisoning can only be used if the landholder has obtained a damage license from the Department.

In other Shires, isolated cases of Little Corellas causing damage should be reported to the District Fauna Warden for investigation.

The penalty for taking these birds outside the open season area and for taking them in an unauthorised manner or without a license is $400.

THE W.A. NATURALISTS' CLUB

The Western Australian Naturalists' Club was founded in 1924, with the objects—"To encourage the study of natural history in all its branches and to endeavour to prevent the wanton destruction of native flora and fauna".

Meetings: The senior members of the Club meet on the first Friday of each month, at the Club's headquarters, the Naturalists' Hall, 63–65 Merriwa Street, Nedlands at 8 p.m.

Junior members meet at the Naturalists' Hall the day after the Senior meeting (Saturday) at 2.30 p.m. Junior membership is for ages 9 to 18, but most members attending this meeting are aged 9 to 14.

The Intermediate group (ages 14 to 18) meets every second month for a Saturday evening meeting in the city, followed later in the month by a weekend excursion, camping or youth hostelling.

Excursions: Separate senior and junior excursions are held each month. These range from a long weekend camp-out to a half-day excursion.

Newsletter: Is sent to all members each month at no extra charge.

Journal: "The W.A. Naturalist" is published periodically.

The Library: Is freely available to members.

For membership or handbooks, write to:

The Hon. Treasurer,
Western Australian Naturalists' Club
Naturalists' Hall
63–65 Merriwa Street, Nedlands 6009
Western Australia.

AUSTRALIA'S FIRST CROCODILE RESERVE

On 4th May a new fauna sanctuary was created near Wyndham to protect the habitat of saltwater crocodiles.

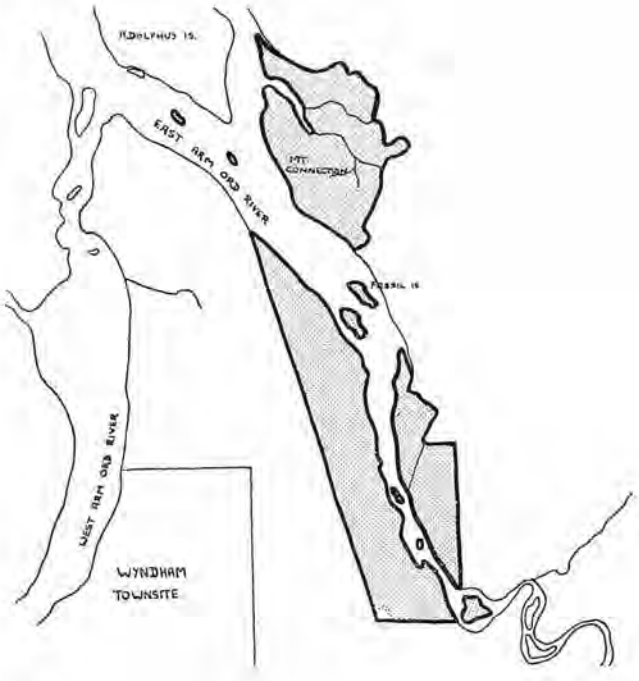
The new reserve of 23,945 hectares encompasses about 20 miles of both banks of the east arm of the Ord River north-east of Wyndham. This area was originally recommended as a crocodile sanctuary by Dr. H. Robert Bustard of the Australian National University during his survey and report on the status of crocodiles in W.A. in 1969. It was as a result of Dr. Bustard's report that the saltwater crocodile was declared protected in April, 1970; the freshwater crocodile had been given protection some years earlier.

This is the first reserve for crocodiles in the whole of Australia and one of very few throughout the world. The area is excellent saltwater crocodile habitat and will hold a sizeable population of crocodiles.

Interviewed recently Dr. Bustard said that he was absolutely delighted with the action of the State Government in setting an example by creating this reserve. He hopes to visit the area later this year and assess populations.

Dr. Bustard will be visiting Western Australia on several occasions during the year in connection with his planned turtle and crocodile farms at One Arm Point and Kalumburu respectively. The turtle farming project suffered some setbacks during the first year of experimental work but with the appointment of a project manager (Mr. Mikael Capelle) and new insulated buildings to hold the breeding tanks, Dr. Bustard is now confident of success. The crocodile farm project will start this year with the capture of small crocodiles to form the initial breeding stock. Saltwater crocodiles return to the same nests each year and Dr. Bustard and his assistant Dr. Eric Vaszolyi will be checking with local natives to find the location of these nests.

Full details of these experimental farms and periodic reports will be given in future issues of S.W.A.N.S.



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