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WILDLIFE CONSERVATION

REPORT FROM THE HOUSE OF REPRESENTATIVES SELECT COMMITTEE

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Recommendations

The Committee recommends:

The need for a survey of wildlife populations

1. (a) That a biological survey be established by the Commonwealth Government to undertake on a continuing basis surveys of birds, mammals and reptiles and their ecology and to establish a national collection of wildlife species;

   (b) That the *Australian Institute of Anatomy Act* 1924-1933, under which the Commonwealth was to take over the Sir Colin MacKenzie collections and establish a National Museum of Zoology, be implemented;

   (c) That the specimen collection held by the CSIRO Division of Wildlife Research be incorporated in the proposed national collection;

   (d) That the Australian national insect collection, maintained by the CSIRO Division of Entomology, be incorporated in the proposed national collection. (Para. 51)

The adequacy of the national park and reserve systems

2. (a) That a national policy be initiated aimed as acquiring such portion of the total land area of each State and Territory in the form of secure national parks and reserves as will ensure that all habitat types will be preserved;

   (b) That the Commonwealth Government take immediate steps to acquire such portion of the land under its direct control in the Northern Territory and Australian Capital Territory in the form of secure national parks and reserves as will ensure that all habitat types will be preserved;

   (c) That grants be provided to the States under Section 96 of the Constitution to enable them to acquire areas of wildlife habitat which are of national significance. The Commonwealth wildlife authority (*vide* recommendation 30) should be the body responsible for assessing requests from the States for financial assistance for the acquisition of such land. (Para. 180)

3. (a) That the Commonwealth establish land use authorities in the Australian Capital Territory and the Northern Territory;

   (b) That consideration be given by the States to the establishment of land use authorities where they are not already in existence. (Para. 67)

4. That the tourist potential of areas be considered when national parks and reserves are being established and that economic impact studies be made on surrounding communities. (Para. 92)

5. That when water reclamation and conservation schemes are being planned their effects on waterfowl and waterfowl breeding grounds be considered. (Para. 105)

6. That immediate steps be taken to set aside as national parks and reserves representative examples of remaining areas of rainforest, particularly the tropical rainforest of Cape York Peninsula. (Para. 116)

7. That before further coastal areas are subjected to sand mining and land development environmental surveys be carried out to ascertain the impact of such development on conservation. (Para. 128)

8. (a) That existing programmes of biological research related to the Great Barrier Reef be provided with funds by the Commonwealth Government appropriate to the urgency of the study;

(b) That a programme of conservation for the Great Barrier Reef be established, based on information so far available, but capable of adaptation as further research is completed. (Para. 136)

9. (a) That the Great Barrier Reef be set aside as a marine national park and made secure against mineral exploration or exploitation;

(b) That the development of tourist facilities within the proposed Great Barrier Reef marine national park be permitted only on a restricted basis;

(c) That the development of tourist facilities within the proposed Great Barrier Reef marine national park be regulated to ensure that they are compatible with the natural surroundings;

(d) That immediate attention be given to the present problems arising from waste disposal in the Great Barrier Reef area and appropriate planning commenced to deal with future problems of such waste disposal. (Para. 137)

10. (a) That serious consideration be given to converting suitable uneconomic previously forested farmland to coniferous forest rather than clearing additional native forest for this purpose;

(b) That before further native forest is cleared for the establishment of coniferous forest surveys be carried out to assess the value of such areas for wildlife conservation. (Para. 156)

11. That before further native forest is set aside for woodchip purposes surveys be carried out to assess the value of such areas for wildlife conservation. (Para. 160)

12. That before further areas of Crown land are released for agricultural development surveys be carried out to assess the value of such areas for wildlife conservation and their viability for agricultural production. (Para. 169)

13. (a) That consideration be given to amending Section 75 (1.) (*b*) of the *Income Tax Assessment Act* 1936-1972, so that only areas designated by land use authorities (*vide* recommendation 3) in the States and Territories shall qualify for taxation concessions for the purpose of land clearing;

(b) That the feasibility of concessions for the preservation of habitat be investigated together with concessions for land donated for conservation purposes. (Para. 177)

The effects of pesticides and pollution on wildlife

14. That research be undertaken to obtain information on the effects of pesticides on non-target organisms, the extent of pesticide residues in wildlife, and the effects of these residues through toxicological and biological studies on wildlife. Urgent consultation should take place between Federal and State authorities to determine the most appropriate means of achieving this recommendation. (Para. 189)

15. (a) That authorities responsible for the control and registration of the use of pesticides be charged with the phasing out of all non-specific and persistent pesticides as soon as suitable alternatives become available;

(b) That limitations be placed on the use of DDT similar to those imposed in the United States of America;

(c) That stricter controls governing the aerial applications of pesticides, including 1080, be introduced. (Para. 201)

16. (a) That the Pesticides Branch of the Department of Primary Industry sponsor original research into pesticides with an emphasis on the effects of pesticides on Australian wildlife;

(b) That the Technical Committees on Agriculture and Veterinary Drugs have their responsibilities expanded to allow them to investigate the effects on wildlife of pesticides already in use as well as new ones. (Para. 219)

17. That representatives of the Australian Veterinary Chemicals Association and the Department of Primary Industry make submissions to the Commonwealth Statistician indicating their statistical needs and that the Commonwealth Statistician establish series to meet these needs. (Para. 222)

18. That a national programme be established to educate pesticide users of their responsibility to the environment generally and wildlife in particular. (Para. 224)

19. That regulations governing packaging of pesticides for use in home gardens be reviewed with the aim of minimising the dangers caused by over use. (Para. 226)

Commercial exploitation of fauna

(The recommendations relating to kangaroos are those previously made in the Committee's Interim Report presented in November 1971. The Committee has received no evidence which would lead it to amend the recommendations made at that time.)

20. (a) That controls over the harvesting of kangaroos must at all times rest with governments.

(b) That the Commonwealth Government should approach the State Governments with a view to obtaining greater uniformity of laws relating to the taking of kangaroos.

(c) 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 licences 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.

(d) That Customs regulations relating to the export of live fauna should be liberalised to allow kangaroos to be collected and reared by Australian zoos for export to approved overseas zoos.

(e) That regulations controlling the export of kangaroo skins should be administered to ensure that local requirements by Australian manufacturers are adequately met.

(f) That the Commonwealth Government offer financial assistance to the States for:

(i) the acquisition of land for the creation of national parks and wildlife reserves for kangaroos and other native fauna.

(ii) research into the biology and ecology of kangaroo species.

(iii) the provision of increased staff for management, inspection and control of kangaroo and other wildlife populations.

(g) That recommendations concerning action suggested to State Governments be referred to the Fauna Authorities Conference.

(h) That recommendations made to State Governments be implemented by the Commonwealth Government in its own Territories. (Para. 233)

21. That the Commonwealth convene a meeting of the Fauna Authorities Conference with the aim of introducing more uniform controls on the killing of and trade in the Saltwater crocodile in the States and Territory involved. (Para. 244)

22. (a) That the Commonwealth Government convene a meeting of the Fauna Authorities Conference with the aim of having trade in Freshwater crocodile skins or products prohibited for the time being;

(b) That Customs regulations be amended to prohibit the export of the skin or any product made from the Freshwater crocodile. (Para. 247)

23. (a) That Customs regulations be amended to allow for the export of the more common aviary birds;

(b) That the Commonwealth and States enact uniform legislation to prohibit the keeping of rare and endangered bird species, whether aviary bred or not;

(c) That the Commonwealth seek international agreements for the protection of proclaimed rare and endangered bird species by a prohibition of their being held in captivity except in approved zoological gardens. (Para. 257)

Conservation of migratory animals

24. That Australia seek unilateral agreements with the Governments of Papua New Guinea, New Zealand and Japan to conventions for the protection of all bird species which, in the course of their migration, traverse parts of these countries and Australia. (Para. 276)

25. That Australia enact legislation to prevent the importation of endangered species of mammals, birds and reptiles or any products made from them, and that, for the present, the list of endangered species adopted by the United States serve as a basis for legislation by Australia. (Para. 282)

The effect on wildlife of domestic animals gone wild

26. (a) That CSIRO co-operate with the States in a research programme into the biology of feral cats;

(b) That cats living in the wild be regarded in all areas as vermin. (Para. 292)

27. (a) That large game reserves for buffaloes be established for the benefit of hunters and tourists;

(b) That outside the proposed game reserves a policy of control and domestication of buffaloes be pursued. (Para. 299)

28. That CSIRO co-operate with the States in research into the biology of feral goats. (Para. 306)

29. That an intensive research programme be undertaken into the threat presented to wildlife by the large numbers of domestic animals gone wild. (Para. 311)

The need for a Commonwealth wildlife conservation authority

(The Committee recognises the authority vested in the States in relation to wildlife and its conservation.)

30. (a) That the Commonwealth establish a wildlife conservation authority and that the CSIRO Division of Wildlife Research be incorporated within the authority. The authority should also incorporate a biological survey (*vide* recommendation 1);

(b) That the role of the proposed Commonwealth wildlife conservation authority include:

(i) responsibility for national parks and for wildlife conservation policy in Commonwealth Territories;

(ii) administration of international agreements on migratory and endangered species;

(c) That the role of the proposed Commonwealth wildlife conservation authority in co-operation with the States include:

(i) initiating and sponsoring national and regional surveys of national park requirements and wildlife populations;

(ii) undertaking research into major problems of conservation beyond State resources;

(iii) establishing guidelines for a co-ordinated approach to conservation, bearing in mind the impact resulting from the usage of natural resources;

(iv) developing uniform policies towards the commercial exploitation of wildlife;

(v) fostering education on conservation matters, including the establishment of field study centres, through grants to the States for these purposes;

(vi) establishing and financing a national institution, for and on behalf of the States and the Commonwealth, to train rangers, wardens and park managers, in the management of parks and reserves;

(vii) monitoring the status of endangered species;

(viii) collating financial requirements of the Commonwealth and the States, and making recommendations to the Commonwealth Government on the optimum levels of financial allocations for conservation. (Para. 327)

Miscellaneous issues

31. That the Commonwealth levy an excise on firearms and ammunition. All such moneys raised should be specifically devoted to wildlife conservation, and a formula devised for its equitable allocation between the Commonwealth and the States. (Para. 336)

32. That consideration be given by the Commonwealth Government to the introduction of a system of special subscription bonds to finance conservation projects. (Para. 338)

33. That the proposed Commonwealth wildlife conservation authority (*vide* recommendation 30) prepare detailed proposals for Commonwealth involvement in a scheme for field study centres. (Para. 349)

34. That the controls placed on the export of fauna be liberalised by permitting the export to approved overseas zoos of species which are designated as unprotected, pests or vermin by a State fauna authority. (Para. 356)

General observations

35. That a Standing Committee of the House of Representatives be established in the new Parliament with powers to inquire into matters of environmental and conservation concern referred to it by the House. (Para. 412)

I. Introduction

GENERAL

1. Between March 1968 and 12 May 1970, 84 petitions expressing concern at commercial exploitation of kangaroos were presented by Members on both sides of the House. On 12 May 1970, Mr E. M. C. Fox, M.P., presented a petition from certain residents of Victoria praying that the export of all kangaroo products be banned immediately. Mr Fox informed the House that he proposed to take action in connection with the petition and moved for its printing. On 14 May 1970, on the motion of Mr Fox, the House of Representatives resolved:

(1) That a Select Committee be appointed to inquire into and report upon—

(*a*) The need for an urgent and comprehensive survey of wildlife populations including birds, mammals of the land and water, and reptiles, and their ecology to enable conservation measures to be effectively applied to threatened species;

(*b*) The adequacy of the several systems of National Parks, Reserves, etc., of the States and Territories to ensure that at least minimum areas of the major animal habitats and the wildlife of the continent are preserved, held securely, and are properly managed in the national interest;

(*c*) The effects of pollution and the widespread use of pesticides on wildlife population;

(*d*) The effect on the population of kangaroos of the trade in meat and hides and the effect of other industrial exploitation on wildlife;

(*e*) The need for international and interstate agreements for the effective conservation of migratory animals;

(*f*) The threat presented to wildlife by the large numbers of domestic animals gone wild, particularly in Northern Australia, and

(*g*) The need for a Commonwealth wildlife conservation authority.

(2) That the committee recognise the control in these matters exercised by the States and seek their co-operation in all relevant aspects.

(3) That the committee consist of seven members, four to be appointed by the Prime Minister and three to be appointed by the Leader of the Opposition.

(4) That every appointment of a member of the committee be forthwith notified in writing to the Speaker.

(5) That the Chairman be appointed by the Prime Minister.

(6) That the Chairman have a deliberative vote and, in the event of an equality of votes, also have a casting vote.

(7) That the Chairman of the committee may from time to time appoint another member of the committee to be Deputy Chairman, and that the member so appointed act as Chairman of the committee at any time when the Chairman is not present at a meeting of the committee.

(8) That the Deputy Chairman, when acting as Chairman, have a deliberative vote and, in the event of an equality of votes, also have a casting vote.

(9) That the committee have power to send for persons, papers and records, and to move from place to place.

(10) That the committee report to the House as soon as possible.

(11) That the foregoing provisions of this resolution, so far as they are inconsistent with the standing orders, have effect notwithstanding anything contained in the standing orders.

2. On 4 June 1970, the Speaker informed the House that Mr R. N. Bonnett, Mr S. E. Calder, Mr E. M. C. Fox and Mr M. J. R. MacKellar had been appointed as members of the Committee by the Prime Minister, and that Mr F. W. Collard, Dr H. A. Jenkins and Mr R. H. Sherry had been appointed by the Leader of the Opposition. The Prime Minister appointed Mr E. M. C. Fox as Chairman and Dr H. A. Jenkins was appointed Deputy Chairman by Mr Fox.

ASSISTANCE FROM STATE PREMIERS

3. The Committee, required by its resolution of appointment to recognise control by the States in wildlife conservation matters, advised each of the State Premiers of its establishment and terms of reference and sought their assistance in the Inquiry. All Premiers offered to assist the Committee and nominated officers for this purpose. The Committee subsequently received evidence and guidance from officers of various Departments in each State and records its appreciation of their invaluable assistance.

ASSISTANCE FROM COMMONWEALTH DEPARTMENTS, PRIVATE ORGANISATIONS AND PRIVATE CITIZENS

4. The Committee invited Commonwealth Departments and instrumentalities, known private conservation organisations and individual conservationists with interests within the terms of reference of the Inquiry, to present submissions, comments or advice. In addition, the Committee advertised widely in the daily press and specialist publications inviting submissions from interested organisations and persons.

SUBMISSIONS

5. The Committee received some 600 replies to its request for submissions. These varied in nature from extensive, well-documented submissions covering all terms of reference to letters from private citizens supporting the aims and objectives of the Inquiry.

TECHNICAL ASSISTANCE

6. The Australian Conservation Foundation agreed to its Assistant Director, Dr J. G. Mosley, providing technical assistance in relation to the national parks aspect of the Inquiry.

7. The late Dr F. N. Ratcliffe, OBE, a former Chief of the Commonwealth Scientific and Industrial Research Organisation (CSIRO), Division of Wildlife Research, was appointed as Technical Adviser on wildlife matters. Dr Ratcliffe's untimely death in December 1970 was a great loss, not only to the Committee in its Inquiry, but also to wildlife conservation in Australia.

MEETINGS AND INSPECTIONS

8. An extensive series of public hearings and field inspections have been held covering all States, the Northern Territory, Norfolk Island and Papua New Guinea. In addition to 7,000 pages of evidence taken at formal public hearings, the Committee collected about 3,000 pages of unsworn information at informal meetings and while on field trips. In addition, 95 exhibits have been included in the Committee's records.

THE COMMITTEE'S INTERIM REPORT

9. In November 1971, as a result of the widespread public interest and concern shown in matters relating to the commercial exploitation of kangaroos and the widely held belief that urgent measures of control were required to prevent the extinction of the larger kangaroo species, the Committee presented a report on this aspect of its Inquiry.[1] The main findings of the Interim Report are embodied in this report.

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[1] Australia, Parliament, *Conservation and Commercial Exploitation of Kangaroos: Interim Report from the House of Representatives Select Committee on Wildlife Conservation* (Chairman: E. M. C. Fox), Parliamentary Paper No. 219, 1971 (Canberra, 1971).

II. The Nature of the Inquiry

GENERAL

10. Throughout its Inquiry, the Committee was advised by many expert witnesses that wildlife problems cannot be looked at in isolation and that most wildlife conservation problems are, in essence, land use problems related to the allocation of land for competing purposes. The use ultimately decided upon imposes its own particular limitations on other forms of use.

11. It was commonly suggested that specific recommendations related to the Committee's terms of reference may well be ineffective. The view was expressed that the environment should be looked at in its overall context and the wider issues of economic and population growth, allocation of resources and national aims considered.

12. Related to this issue is the concept of animals ultimately depending on plant communities and occupying characteristic habitats and, within the habitats, particular niches. This is referred to as the ecology of a particular species. Ecology is the science of the intricate web of relationships between living organisms and their living and non-living surroundings. Concern was often expressed that in the popular mind, conservation tends to relate to particular species, commonly the larger and more conspicuous ones. The Committee was advised that effective conservation cannot take place by looking at species in isolation and that the ecological framework of plant communities, vegetation, soil, climate, mammals, insects, birds and other components should be considered.

INTERPRETATION OF THE TERMS OF REFERENCE

13. The Committee, despite persuasive argument for fish and invertebrates to be considered, has taken the view that it was appointed with specific terms of reference and that it was not open to it to canvas more widely than the terms of reference allowed. It did, however, recognise that habitat preservation was a pre-requisite to conservation and for that reason the terms of reference are wider than may at first appear. The Committee also recognised that wildlife conservation was merely a part of a much wider question of conservation and the environment generally.

14. Broadly, the Committee's function has been to make recommendations to the Government which, if implemented, will ensure the long-term conservation of the nation's fauna resources. All conclusions reached by the Committee have been based on the evidence given and on its own observations.

THE COMMONWEALTH'S POWERS AND RESPONSIBILITIES IN WILDLIFE CONSERVATION

15. The Commonwealth's direct control of fauna conservation is restricted to the Australian Capital Territory and the Northern Territory and to its constitutional powers to control the export and import of fauna both alive and dead.

THE NATURE OF EVIDENCE

16. The Committee, at the commencement of its Inquiry, determined that representatives of all areas of interest in the terms of reference should be invited to appear at public hearings in order to make their views known. The Committee,

as a result, has been confronted with a great deal of contradictory evidence, much of it subjective.

17. It quickly became clear that definitions and nomenclature had very different meanings when used by different people. The Committee therefore, when responding to its terms of reference, has made clear its definition of these references.

18. Perhaps the most significant fact to emerge from the Inquiry was the general lack of knowledge about wildlife distribution and ecology. This was instanced by the 're-discovery' of species thought to be extinct or extremely rare such as the New Holland mouse (*Pseudomys novaehollandiae*) as recently as 1968, the Leadbeater's possum (*Gymnobelideus leadbeateri*) in 1939, the Mountain pigmy possum (*Burramys parvus*) in 1966, and the Noisy scrub bird (*Atrichornis clamosus*) in 1961.

AUSTRALIAN WILDLIFE—THE PRESENT SITUATION

19. The great area, range of climates and relative isolation of the Australian continent has led to the development of a unique fauna. The advent of European settlement has had a marked effect on this fauna.

20. Australian fauna is a typically island one lacking several basic animal types but including many endemic forms.

21. The indigenous fauna includes about 400 species of reptiles, 227 species of mammals and 700 species of birds. Marsupials, the fauna for which Australia is best known, are more prominent here than elsewhere. They are not restricted to this continent, there being many species in South America.

22. In addition to the native fauna, there are now at least 25 species of introduced birds and 17 species of introduced mammals in Australia.

23. The major impact on wildlife has resulted from European settlement and the pastoral activities that followed. This led to a decline in most wildlife populations as forests were cleared and grasslands established and as domestic animals were introduced.

Threatened Fauna

24. The status of an animal species refers to its numerical and geographical distribution. Considerable disagreement exists as to the most appropriate term to apply to species whose status is changing. It need not follow that because a species is threatened it is rare. The reverse also applies. There are several characteristics of Australian wildlife that lead to confusion:

(a) The abundance of animals, characteristic of some other countries, is not a feature of Australian wildlife distribution. It is considered that this sparse distribution of animals, especially mammals, has always been a feature of this country.

(b) Australian mammals are largely nocturnal. This was illustrated to the Committee on a number of occasions, but most forcibly on a visit to Tuttaning Reserve in Western Australia, a research reserve of some 4,000 acres. During an afternoon tour of the reserve the Committee saw no wildlife at all. At night, aided by spotlights operated by staff of the Western Australian Department of Fisheries and Fauna, more than 200 sightings covering 10 different species were made.

(c) Many birds and mammals in Australia are subject to extreme fluctuations in numbers over a period of years. The cause of these fluctuations is not yet known but it is apparently unrelated to man's activities.

(d) In the case of many mammals there is no general agreement on the taxonomic[1] limits of the species. Consequently, many mammals now regarded as distinct species are merely sub-species. Rarity may apply to only a particular sub-species, not the species as a whole.

(e) Many species are restricted to remote country areas and are known only from a limited number of specimens. Their status is indeterminate.

(f) Most small animals are hard to find even in their natural habitat and are thinly dispersed.

25. Since European colonisation a few native animals, notably the larger kangaroo species, have increased in habitat range and number. However, there is no doubt that most species have declined and some are extinct.

26. The term 'rare fauna' is not easily defined and a more useful concept suggested by Dr H. J. Frith, Chief of the Wildlife Division, CSIRO, is that of 'threatened' species. Dr Frith believes four classes should be included in this concept. These categories are:

(a) Those species whose extreme rarity is beyond question such as the Thylacine (*Thylacinus cynocephalus*), Bridled nail-tail wallaby (*Onychogalea fraenata*), and Night parrot (*Geopsittacus occidentalis*).

(b) Those animals that are known from only a few specimens and which live in remote uninhabitated country so that their status is unknown. Examples are the Scaly-tailed possum (*Wyulda squamicaudata*), and Long-tailed marsupial-mouse (*Sminthopsis longicaudata*).

(c) Those species that are well known but whose total numbers are not high, are restricted geographically or have special habitat needs. Examples are the Cape Barren goose (*Cereopsis novaehollandiae*), Freckled duck (*Stictonetta naevosa*), Noisy scrub-bird (*Atrichornis clamosus*), Western swamp tortoise (*Pseudemydura umbrina*), Leadbeater's possum (*Gymnobelideus leadbeateri*) and Mountain pigmy possum (*Burramys parvus*).

(d) Those species which may be abundant in places but whose distribution has shrunk greatly. This is particularly so if the remaining habitats are threatened by agriculture and there are inadequate reserves. This group includes the Quokka (*Setonix brachyurus*), and many birds of the rainforest areas.

Applying this concept the Committee examined the status of reptiles, mammals and birds.

Reptiles

27. A definitive statement on the status of reptiles is difficult and the distribution of many forms is not established. The salt and fresh water crocodile and the green turtle have been seriously depleted by commercial exploitation. Evidence

[1] Taxonomy is that department of science which consists in or relates to classification.

was given that many species of lizards have declined in numbers, but insufficient knowledge exists to make an accurate assessment. A reptile species which appears to be seriously threatened is the Western swamp tortoise.

Mammals

28. The decline in a number of marsupial and rodent species is regarded as being serious. It has been estimated that of the 119 known species of marsupials, 5 are probably extinct and a further 22 endangered. Native rats and mice have also been seriously depleted but lack of detailed study prevents an accurate assessment of the decline. Several, however, are extinct—many are endangered.

Mammals believed to be extinct:

Marsupials	
Broad-faced rat kangaroo	*Potorous platyops*
Brown hare-wallaby	*Lagorchestes leporides*
Toolache wallaby	*Wallabia greyi*
Gillespie's wombat	*Lasiorhinus gillespiei*

Giamard's rat-kangaroo, the mainland race (*Bettongia G. gaimardi*) is almost certainly extinct although the Tasmanian race (*B. g. cuniculus*) is still fairly widespread.

Rodents	
Large desert hopping-mouse	*Notomys amplus*
Darling Downs hopping-mouse	*N. mordax*
Long-tailed hopping-mouse	*N. longicaudatus*
White-footed tree-rat	*Conilurus albipes*
White-tailed house-building rat	*Leporillus apicalis*

Animals that are threatened:

Marsupials	
Southern planigale	*Planigale tenuirostris*
Little planigale	*P. subtilissima*
Red-tailed phascogale	*Phascogale calura*
Long-tailed marsupial-mouse	*Sminthopsis longicaudata*
Large desert marsupial-mouse	*S. psammophila*
Eastern jerboa-marsupial	*Antechinomys laniger*
Tasmanian tiger	*Thylacinus cynocephalus*
Barred bandicoot	*Perameles bougainville* (includes *P. fasciata*)
Desert bandicoot	*P. eremiana*
Cape York bandicoot	*Echimypera rufescens*
Rabbit-bandicoot	*Macrotis lagotis*
Lesser rabbit-bandicoot	*M. leucura*
Pig-footed bandicoot	*Chaeropus ecaudatus*
Mountain pigmy possum	*Burramys parvus*

Leadbeater's possum	*Gymnobelideus leadbeateri*
Scaly-tailed possum	*Wyulda squamicaudata*
Barnard's wombat	*Lasiorhinus barnardi*
Brush-tailed rat-kangaroo	*Bettongia penicillata*
Queensland rat-kangaroo	*B. tropica*
Lesueur's rat-kangaroo	*B. lesueur*
Plains rat-kangaroo	*Caloprymnus campestris*
Banded hare-wallaby	*Lagostrophus fasciatus*
Western hare-wallaby	*Lagorchestes hirsutus*
Central Australian hare-wallaby	*L. asomatus*
Bridled nail-tailed wallaby	*Onychogalea fraenata*
Western nail-tailed wallaby	*O. lunata*
Parma wallaby	*Wallabia parma*

Rodents

False water rat	*Xeromys myoides*
Shark Bay mouse	*Pseudomys praeconis*
Shortridge's native mouse	*P. shortridgei*
New Holland mouse	*P. novaehollandiae*
Smoky mouse	*P. fumeus*
Western native mouse	*P. occidentalis*
Field's native mouse	*P. fieldi*
Large eastern mouse	*P. oralis*
Broad-toothed rat	*Mastacomys fuscus*
Northern hopping-mouse	*Notomys aquilo*
House-building rat	*Leporillus conditor*
Thick-tailed rat	*Zyzomys pedunculatus*

Birds

29. Birds have fared better than mammals. The only species known to be extinct are the Tasmanian sub-species of the emu and the emu of Kangaroo Island and King Island. This probably applies also to sub-species of the mainland bird.

Birds believed to be extinct:

Night parrot	*Geopsittacus occidentalis*
Paradise parrot	*Psephotus pulcherrimus*

Birds considered threatened:

Freckled duck	*Stictonetta naevosa*
Golden-shouldered parrot (includes the Hooded parrot)	*Psephotus chrysopterygius* (*P. c. dissimilis*)
Orange-bellied parrot	*Neophema chrysogaster*
Turquoise parrot	*N. pulchella*
Scarlet-chested parrot	*N. splendida*

Ground parrot	*Pezoporus wallicus*
Noisy scrub-bird	*Atrichornis clamosus*
Western whipbird	*Psophodes nigrogularis*
Eyrean grass wren	*Amytornis goyderi*
Helmeted honeyeater	*Meliphaga cassidix*

30. The Committee was told on a number of occasions that when assessing the status of fauna it must be remembered that the situation is not static and that over a long period species disappear as a result of long-term environmental changes. It is probable that some of the extinct or endangered animals and birds referred to were or are declining from natural changes not related to European settlement.

31. Deliberate destruction of animals by man is not regarded as the major factor causing the decline in status of threatened species. The major cause of decline is undoubtedly the change in the habitat of the species concerned, brought about principally by land clearing and changes caused by grazing.

III. Term of Reference *(a)*

'(*a*) The need for an urgent and comprehensive survey of wildlife populations including birds, mammals of the land and water, and reptiles, and their ecology to enable conservation measures to be effectively applied to threatened species.'

GENERAL

32. There is a considerable range of approaches and attitudes towards the need for a wildlife population survey and what may be involved in carrying out or establishing such a survey.

33. Some witnesses expressed the view that if wildlife conservation measures awaited a comprehensive survey some species could become extinct before completion of such a survey. Others suggested that an effective survey was essential to the development of sound conservation measures.

34. While detailed information does exist on particular species, little information exists about the status of many indigenous birds, mammals and reptiles. There was no complete agreement between witnesses on the taxonomic limit of many species or indeed on what species do exist.

35. Surveys have been carried out and data acquired by State museums, State and Commonwealth fauna authorities, CSIRO, the universities and other bodies. However, no standard practices apply and frequently the information which does exist is not widely disseminated.

36. The Committee agrees with the view that thorough knowledge of the nature, distribution and ecology of plants and animals is the ideal basis for effective conservation. Knowledge of the diversity and distribution of animal and plant species is inadequate in Australia and there is consequent need for detailed research into the ecological factors affecting most of the threatened species.

37. The Committee accepts the view that in almost every plant and animal group the conservation of some species will require the maintenance of a very special set of conditions which only research of an ecological nature can establish. However, it agrees that most species can probably be conserved without such research if adequate samples of all major habitats are reserved for conservation purposes and managed in such a way as to prevent significant alteration. Taken together, such samples, if selected carefully, could be expected to include all the common and widespread species as well as most of the more popularly recognised species living in restricted habitats.

THE PRESENT SITUATION

38. Fauna and flora constitute two of the interacting components of a single biological system. Australia's unique mammals and the flora which support them have never been comprehensively studied. Wildlife habitat has been undergoing rapid and extensive changes due to economic development.

39. In all the technologically advanced countries of the world except Australia there exist national institutions responsible for the study of fauna. Despite the fact that Australian fauna and flora is unique, no nationally owned and administered institution exists which is charged solely with studying fauna and flora.

40. There are many animals and reptiles which have not yet been adequately described by scientists. Knowledge of some species which have been extensively studied, such as the larger marsupials, is both fragmentary and inadequately collated.

41. Changes in land use patterns, particularly land clearing for agricultural development and the introduction of stock, have altered the ecological character of vast areas. The habitat range of many species of Australian fauna has become much more restricted. This restriction has led to a decline in the status of many species.

42. A biological survey of Australia would do much to accelerate the rate at which knowledge of the diversity, distribution and ecology of animals and their habitat can be accumulated.

43. The Committee sees a need for an intensification of zoological and botanical collecting and for its preservation and detailed study by experts. Apart from the intrinsic interest of Australia's unique fauna, this taxonomic work is basic to an understanding of the ecological relationship of fauna and plants.

44. The Committee found that the museums support the concept of a biological survey to be carried out by a Commonwealth body.

45. For both scientific and prestige reasons, the Committee believes that Australia should establish a national biological survey. State museums have extensive though incomplete collections. While together they represent a taxonomic group of great value, their work is restricted by lack of funds.

46. A national biological survey would also provide opportunities for further taxonomic training. This would benefit the activities of existing State museums and wildlife departments.

NATURE OF POSSIBLE BIOLOGICAL SURVEY

47. Biological surveys have two major facets: systematic collection, and study and description by taxonomists. Because of the rapid changes taking place in the Australian environment collections should be undertaken as rapidly as possible. The results of such a survey would be an indicator of areas rich in species which should be conserved.

48. The survey should direct its activities particularly to wildlife which is not well known or is in danger of extinction. It should collaborate closely with State museums and all material acquired should be made freely available to them and to other interested groups.

49. It was emphasised to the Committee that one of the major problems with existing survey work was its fragmentation. Additionally no one group was aware of or had access to all available material.

50. The establishment of data storage and retrieval facilities to bring together all existing information would be of great value.

51. The Committee recommends:

(a) that a biological survey be established by the Commonwealth Government to undertake on a continuing basis surveys of birds, mammals and reptiles and their ecology and to establish a national collection of wildlife species;

(b) **that the *Australian Institute of Anatomy Act* 1924-1933,[1] under which the Commonwealth was to take over the Sir Colin MacKenzie collections and establish a National Museum of Zoology, be implemented;**

(c) **that the specimen collection held by the CSIRO Division of Wildlife Research be incorporated in the proposed national collection;**

(d) **that the Australian national insect collection, maintained by the CSIRO Division of Entomology, be incorporated in the proposed national collection.**

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[1] A copy of the Act is included at Appendix III.

IV. Term of Reference *(b)*

'(*b*) The adequacy of the several systems of National Parks, Reserves, etc., of the States and Territories to ensure that at least minimum areas of the major animal habitats and the wildlife of the continent are preserved, held securely, and are properly managed in the national interest.'

GENERAL

52. Great variations exist in the definition, objectives, nomenclature, and the security of tenure of existing national parks and reserves in the States and Territories.

53. National parks can be defined as extensive areas where, although wildlife conservation is a primary purpose, provision made for public use is a significant part of the management programme. Wildlife reserves and similar terms normally refer to areas where the preservation of wildlife is both the primary objective and the dominant feature of management.

54. The term 'national park' is sometimes regarded as being a misnomer in that, apart from Commonwealth Territories, national parks are, in fact, administered by the States.

55. The Committee has taken the view that if a park is of sufficient importance to rate as a national asset rather than a local or regional one, the term is reasonable and perfectly acceptable.

56. An assessment of adequacy assumes that an ideal method of selection of a proportion of total land exists. In fact, such judgments must necessarily be largely subjective.

OBJECTIVES OF NATIONAL PARK AND RESERVE SYSTEMS

57. Many conservationists have advocated the need for setting aside a minimum proportion of the land area of each State as secure national parks and reserves. This has led to widespread acceptance of a suggestion by the International Union for the Conservation of Nature and Natural Resources that 5 per cent is a desirable minimum. The Governments of Victoria and New South Wales have accepted this standard as their official policy. The Committee sees little value in this standard since it does not ensure that the major ecosystems and fauna habitats will be preserved.

58. The Committee considers that the main land use objectives relevant to the selection of land for parks and reserves are, first, the conservation of unique, uncommon or threatened species of plants and animals or outstanding natural scenery; second, the conservation of areas representative of different plant and animal communities and soil and water conditions; and third, the maintenance of opportunities for various kinds of recreation involving natural environment.

59. The objectives of national park and reserve systems have for the most part been poorly defined. This applies not only to the parks and reserves as a whole but also to the various classes of reserves and to zones within reserves. This means that not only does the public usually have a poor understanding of the aims of park and reserve systems, but these aims are often unclear to the park

manager. Many national parks include areas with facilities for public access as well as areas more strictly protected. Unless the objectives and priorities are clearly defined, the developed areas are likely to be extended gradually into the protected areas. This will impair the value of the park for wildlife conservation and public enjoyment of the natural environment.

60. In several statutes the primary aim of management of national parks is defined as preservation of natural conditions. Since most ecosystems are dynamic in nature, preservation of natural conditions requires that minimal manipulation of the environment takes place. Since natural conditions are desirable for science and recreation it is important that this should be the recognised objective over part of the park and reserve estate, even though its achievement may be difficult. Natural conditions may lead to a natural change in the existing vegetation and animal life. The chief problem of retaining natural conditions is that many reserves are too small to be naturally viable. A legitimate objective for other parts of parks and reserves is the perpetuation of a particular type of ecosystem, either for its own sake, or for its associated animal species. This may involve active manipulation of the environment by grazing or burning-off in order to maintain a desired stage in the natural or man-made vegetation succession.

61. The Committee believes it is important that each State and the Commonwealth should define the objectives of parks and reserves so that areas can be selected and managed with these aims in mind. The distinctive values of parks and reserves and the purposes for which they are set aside should be communicated more effectively to the general public.

62. Large reserves are less affected by natural catastrophes such as major fires and therefore offer a more secure habitat for wildlife than do smaller reserves. They also enable visitors to observe wildlife in a more natural situation. The Committee believes that if very large reserves are established and if there is duplication of particular habitat types, it is more likely that future human and wildlife needs will be met.

63. The Committee believes the task of obtaining adequate systems of national parks and reserves would be assisted if each State and the Commonwealth had a policy of expanding its park and reserve system according to specific criteria. Ideally the task of selecting land for national parks and reserves involves the application of expertise relating to several disciplines including biology, geology, geography and anthropology. There is need of specialised research investigation sections within the departments responsible for national parks and reserves. The work of such sections can be complemented by that of interested citizens and scientific and conservation societies.

64. One of the most notable features of the last few years has been conflict over land use. Members of the public and conservation groups have protested about proposals to mine, clear or otherwise alter important natural areas. During the course of its travels the Committee heard much evidence of these conflicts and opinions from both sides. The Committee sees these conflicts as a result of two factors: first, the demand for the productive use of resources is now so widespread that it is affecting some of the last natural areas, and, second, that as these areas are threatened with alteration the public is placing a higher value on them.

65. The Committee believes that even during its own short life there has been a significant increase in public appreciation of wildlife conservation. Conflicts have developed because there has been a time lag in the introduction of changes in government policy and administration to give effect to these changes. The maintenance of natural areas for wildlife conservation has been handicapped by the preference given in existing legislation to competing forms of land use such as mining over conservation; the relative weakness in terms of staff and finance of the park and wildlife agencies, and the absence of land use authorities to study and advise on the best use of public land. The Committee believes that the provision of adequate systems of national parks and reserves would be assisted if each State had an overall land use advisory authority. Such an authority could be charged with objectively considering the potential of land for reservation and conservation and other purposes. This would permit a more objective assessment of the alternative uses of land.

66. Currently no State has comprehensive machinery in the fields of both reserve selection and land use planning:

Queensland has a policy of acquiring new parks to achieve a sampling of all the State's natural environments but there is no new area investigation section or land use authority.

New South Wales has a policy of acquiring representative samples of all natural environments. An interdisciplinary scientific committee which recommends areas for preservation exists as does a new area investigation section in the National Parks and Wildlife Service. No land use authority exists.

In **Victoria** the National Parks Service does not have a statutory brief for new area investigation. A land use advisory authority exists.

Tasmania, as yet, has no definite policy on park and reserve expansion.

In **South Australia** the fauna and national parks authorities have been merged recently and an area investigation group is likely to be incorporated in the new body.

Western Australia does not have facilities for considering new areas and there is no land use authority. The Environmental Protection Authority has an advisory role on some land use matters.

In the **Commonwealth Territories** there is no definite policy on park and reserve expansion or a land use authority. The Commonwealth Government announced in October 1971 that it would appoint a land use advisory council for its Territories.

67. The Committee recommends:

(a) that the Commonwealth establish land use authorities in the Australian Capital Territory and the Northern Territory;

(b) that consideration be given by the States to the establishment of land use authorities where they are not already in existence.

MANAGEMENT OF PARKS AND RESERVES

68. In Australia there is a lack of information to assist the management in the administration of national parks and reserves. The differing form and strengths

of the various State park and reserve authorities leads to very different situations in different States.

69. Reference has already been made to the need for the clear-cut definition of the purposes of parks and reserves. Effective management techniques to bring about these desired objectives is an equally important need. It appears to the Committee that there is a need for an overall master plan for each of the State park and reserve systems and for individual plans of management for each unit. Parks should be planned as part of a system not as isolated and unrelated units.

70. While procedures now exist in New South Wales, Tasmania and South Australia for national park management plans and for consultation on these plans with the public, and Queensland has provision for specialised management of its national parks by zoning, none of the States has produced management plans for more than a small proportion of areas under its control.

71. The control of fire in a way compatible with the management objectives of parks and reserves is one of the main problems for wildlife agencies in Australia. Where the aim is to leave nature in an undisturbed condition the use of controlled burning techniques is questionable, even where these may be thought to be able to simulate the natural fire factor for the site.

72. An aspect of national park and reserve management which was of particular concern to the Committee was the practice still permitted in some areas of mining in national parks. The Committee believes that prospecting or mining should not be permitted in any areas set aside specifically for conservation purposes. This would include those reserves in the Committee's classification 'A' at Table I. The Committee recognises that under some circumstances mining may be desirable, but believes that this should only be with the specific approval of the Parliament of the State concerned.

73. Properly selected and managed, reserves are useful and, for many species, essential to survival. It cannot be assumed, however, that the whole problem can be solved by these means. Many animals require living conditions on land already used for other purposes. Some need the deliberate management of catchments, forests and coastlines.

THE EXISTING NATIONAL PARK AND RESERVE SITUATION

74. A difficulty in studying the adequacy of the national parks and reserves of Australia is the complexity of the present day reserve position. All States, and the Commonwealth Territories, have made different arrangements for the setting aside and administration of parks and reserves. Different terminology is used. The situation is made more complex by the fact that there are in each State a number of different types of reserve. These vary in terms of the extent of the commitment to wildlife conservation, the ownership of the land, the controlling body, and the security of reserve tenure.

75. A group convened by Professor R. Specht of the University of Queensland, as part of the International Biological Programme, has made an inventory of the natural vegetation occurring in all existing national parks and secure equivalent reserves. When these results are collated, they should show the extent to which areas representative of the major plant communities are already included in

reservations, and what further acquisitions are needed. If all the surviving plant communities are adequately reserved then it is reasonable to expect that most animal species will be protected.

76. In the meantime the only way of obtaining a broad quantitative picture of relative progress in the establishment of parks and reserves is to list the areas in similar classifications. This has been done in the table included at Appendix IV.

77. Each State and Territory has a system of premier public reserves which are dedicated to the primary purpose of wildlife conservation. These can be alienated only with the consent of Parliament and are under the sole control of a central professional conservation organisation. Nearly all the national parks are in this first group. The following table indicates the area and percentage of each State and Territory set aside in this category:

TABLE I

NATIONAL PARKS AND RESERVES

(as at 30 June 1972)

State or Territory	Area (acres)	Percentage of State/Territory
New South Wales	3,415,552	1.7
Victoria	507,248	0.9
Queensland	2,563,225	0.6
Western Australia	12,863,795	2.0
South Australia	8,808,283	3.6
Tasmania	1,050,442	6.2
Northern Territory	10,316,200	3.1
Australian Capital Territory	Nil	Nil
Total	39,524,745	2.1

A second group contains other reserves with similar purposes and control, but with a lesser degree of security against revocation or change of purpose. A third large group comprises reserves which are under the control of more than one authority and which are not devoted to the sole purpose of wildlife conservation. A final group comprises the very large number of proclaimed reserves or sanctuaries on private land. Although the reserves have been placed in this order they are meant to be complementary in their function and value for wildlife conservation.

78. In New South Wales, Tasmania and South Australia, administration of parks and reserves is by a single National Parks and Wildlife Service. Elsewhere there are separate organisations for the administration of national parks and fauna reserves. In Victoria, these responsibilities are carried out by the National Parks Service and the Fisheries and Wildlife Department respectively. In Queensland, the Forestry Department has administered national parks for many years and the Department of Primary Industries is responsible for fauna sanctuaries. In Western Australia, part-time authorities, the Western Australia Wildlife Authority and the National Parks Board of Western Australia—are responsible for fauna

reserves and national parks respectively. In the case of fauna reserves, the Department of Fisheries and Fauna has responsibility for the day to day management. The Northern Territory Reserves Board controls the national parks in the Territory, but some wildlife sanctuaries are administered by the Chief Inspector of Wildlife (Northern Territory Administration) and others by the Director of Social Welfare.

79. Australia has only just begun to reserve marine areas. At 30 June 1972 only Queensland, South Australia and New South Wales had established reserves of this kind.

80. The main trends in national park and reserve administration in Australia in the last five years have been:

(a) the transfer of responsibility for control from part-time to full-time agencies;

(b) the amalgamation of the bodies controlling national parks and fauna reserves;

(c) the upgrading of habitat protection objectives in fauna reserves;

(d) the reappraisal of ineffective fauna sanctuaries;

(e) the establishment of marine reserves;

(f) the establishment of native forest reserves (under the control of State forestry departments);

(g) the introduction of more park and reserve management plans.

TOURISM AND NATIONAL PARKS

81. Because of its uniqueness, Australia's wildlife has featured prominently in much of the tourist promotion of Australia.

82. The Australian Tourist Commission, in its marketing, stresses the attraction of areas away from major centres. Details of animal sanctuaries, parks and reserves are supplied to travel agents throughout the world. Overseas travel agents and publicists are encouraged to visit Australia and their itineraries invariably include contact with Australia's wildlife.

83. Surveys conducted by the Australian Tourist Commission indicate that Australia should exploit its unique flora and fauna and that overseas visitors are not going to be satisfied with viewing fauna under zoological garden type conditions.

84. The Commission told the Committee that tourist revenue is expected to grow from about $120 million in 1969 to about $300 million in 1975. As experience in the United States, Canada and South Africa demonstrates a great and growing usage of national parks by both domestic and overseas tourists, it is reasonable to expect that the demand to view wildlife is going to increase accordingly in Australia.

85. In the United States over the twenty years to 1970 there was a 230 per cent increase in the number of visits to national parks (in 1950 there were about 14 million visits, and in 1970 about 46 million). While no comprehensive figures are obtainable on the number of visits made to Australian national parks, the New South Wales National Parks and Wildlife Service says that for parks in close

proximity to capital cities an average rate of increase in visitations of about 11 per cent a year has been observed. Some parks have experienced higher growth rates, for example, visits to the Lamington National Park in Queensland have increased at about 24 per cent a year over the last three years and to the Blue Mountains National Park by 16 per cent a year over the last four years.

86. In 1965 the Australian National Travel Association (now the Australian Tourist Commission) with the co-operation of Federal and State Governments commissioned a study into the assessment and establishment of guidelines for the development of tourism. The report stated that it was of paramount importance that action be taken to ensure the preservation of carefully chosen parts of Australia's vast natural areas by the establishment of additional parks and reserves.

87. The report went on to state that Australia's fauna and flora, particularly its fauna, were one of the prime visitor attractions. Reference was made to the larger kangaroos, koalas, platypuses, echidnas, emus, wombats and buffaloes and a number of birds, including the fairy penguins at Phillip Island.

88. The Committee believes that to attract increasing numbers of visitors to Australia, the effective conservation of native fauna in natural areas is of high priority.

89. The Committee recognises that in relation to tourism the fact that Australian fauna is largely noctural presents problems. This factor should be taken into account when formulating national park management plans to ensure that tourists have a reasonable opportunity of viewing fauna in natural surrounds.

90. Evidence was given that the development of national parks and reserves could have an important financial impact on adjacent towns. Mr C. G. Fredine, Chief of the Division of International Affairs, United States National Parks Service, advised the Committee that in the United States economic impact studies are made of the economic effects of national parks on adjacent communities as an integral part of planned park management.

91. The Committee believes that national park management and development is an important aspect of tourism and, as such, deserving of Commonwealth financial assistance.

92. The Committee recommends:

that the tourist potential of areas be considered when national parks and reserves are being established and that economic impact studies be made on surrounding communities.

AREAS INADEQUATELY REPRESENTED IN EXISTING NATIONAL PARKS AND RESERVES

93. The Committee, while recognising that increased provision of examples of all kinds of ecosystems and habitat types is desirable, believes that a number are in particular need of reservation:

(a) Wetlands and swamps
(b) Rainforests
(c) Coastal areas subjected to sand mining and land development
(d) Marine areas (notably the Great Barrier Reef)

WETLANDS AND SWAMPS

94. Apart from fish, waterfowl constitutes the major game species in Australia.

95. Hunting game species can, in the Committee's view, be regarded as a legitimate use of some species of wildlife, provided that the hunter is prepared to contribute towards the cost of conservation. All hunting organisations appearing before the Committee indicated that they were prepared to contribute—in the form of licence fees. The Committee believes that the sport should be properly controlled. Species taken should be from populations which are correctly managed to produce a continuous surplus. Numbers should be regularly monitored so that the effects of hunting can be evaluated.

96. It is generally agreed that waterfowl are declining in numbers as a result of the encroachment of agriculture and the resultant drainage of swamp land, the damming of rivers, flood mitigation programmes and the trampling by stock and feral animals of nesting cover on the edge of lagoons. The flow of most rivers has been reduced by water conservation and flood mitigation schemes. Many of the most productive (in wildlife terms) swamps have been drained.

97. The value of waterfowl has rarely, if ever, been given consideration when water reclamation and conservation schemes have been implemented.

98. Australia is the poorest continent in relation to the number of species and the size of the populations of waterfowl that it supports.

99. There are nineteen species which differ widely in habitat and ecology. Three broad groups are recognisable:

(a) **Northern:** this includes the Magpie goose, 'Whistling' duck, Burdekin duck and Pigmy goose. These birds are generally restricted to the coastal tropics and sub-tropics.

(b) **Southern:** this includes the Cape Barren goose, Black swan, Mountain duck, Chestnut teal, Freckled duck, Shovelar, Musk duck and Blue billed duck. The main distribution of these species is south of latitude 27° S.

(c) **Continental:** this includes the Grey teal, Pink-eared duck, Black duck, Hardhead and Wood duck which are found throughout the continent. The species use different regions as breeding and refuge areas at different times according to rainfall conditions.

100. In the inland areas, many of the common game ducks have breeding seasons which are directly related to water level changes in the swamps and billabongs. Although some breeding occurs each year, extensive breeding takes place only when lagoons and billabongs are replenished or when water spreads across the plain. The whole trend of water conservation on the inland river system is to diminish or prevent this flooding. This restricts waterfowl breeding.

101. Methods should be developed to maintain coastal refuges and replenish adequate inland swamps and billabongs. This would go far towards ensuring the survival of all waterfowl.

102. Many wildlife conservationists regard protection as the main obligation to native fauna and cannot accept the idea of conserving for hunting.

103. The Committee believes that waterfowl conservation is justified by its value as a game species and as a natural resource, and because of aesthetic values.

104. The Committee recognises that habitat destruction is by far the most important threat to wildlife populations and believes effective waterfowl conservation depends on a recognition of the threat to these populations and an appreciation of their value as a natural resource.

105. The Committee recommends:

that when water reclamation and conservation schemes are being planned their effects on waterfowl and waterfowl breeding grounds be considered.

RAINFORESTS

106. The need for rainforest preservation, particularly the tropical rainforests of north Queensland, was an issue forcibly brought to the attention of the Committee. For a number of reasons the Committee believes that special measures are needed to preserve remaining rainforest areas.

107. The rainforest areas in Australia consist of tropical types in north-east Queensland, sub-tropical types in Queensland and New South Wales, and temperate rainforest in areas of Tasmania.

108. Rainforests generally develop in areas with high rainfall and fertile soil. As a result, a large proportion of rainforest has already been cleared for various agricultural uses and, except in cases where terrain is unsatisfactory, has proved quite successful for pasture and crop production.

109. Tropical rainforest is the richest and most complex plant community in existence. This is illustrated by CSIRO studies in north Queensland in which 18 quarter-acre areas were shown to contain 818 different species of trees. Rainforests provide habitat for a great number and a wide range of native wildlife.

110. Rainforests are very much an isolated entity cut off effectively from surrounding vegetation types. The relative isolation and seclusion of tropical rainforest has led to the development of what Dr J. Kikkawa of the University of Queensland has described as a degree of seclusion not dissimilar to a zoo.

111. Wildlife found in rainforests includes many ground birds such as Ship birds, Scrub wrens, Brush turkeys, Pittas and Cassowaries; and mammals such as Pademelons and Musky rat kangaroos. In the trees Rifle birds, King parrots, Cat birds, Rainforest possums and Tree kangaroos exist.

112. The further north in the continent the greater is the variety of species. For example, in southern Queensland rainforest there are about 100 species of birds and in northern Queensland there are more than 200. Many rainforest species are very restricted in distribution, the Cus cus and the Palm cockatoo, for example, are confined to the forest of Cape York Peninsula.

113. The habitat of most of the animals living in rainforests is very specialised and alteration or destruction of the remaining tropical rainforest would almost certainly lead to the extinction of some species.

114. It is generally believed that the more complex an ecosystem, the more resistant it is to alteration. Australian rainforests, particularly its tropical rainforest, are unique and complex.

115. If remaining rainforests are retained, it is likely that the existing plant communities and animals will remain as they are. Clearing of these areas, and in some cases the clearing of adjacent areas, means the irreversible removal of what remains of Australian rainforests.

116. The Committee recommends:

that immediate steps be taken to set aside as national parks and reserves representative examples of remaining areas of rainforest, particularly the tropical rainforest of Cape York Peninsula.

COASTAL AREAS SUBJECTED TO SAND MINING AND LAND DEVELOPMENT

117. Considerable public concern has been expressed at the effects of the sand mining industry which operates in Queensland, New South Wales and Western Australia.

118. The mineral sands industry produced rutile, zircon and ilmenite to a total value of about $54 million in 1970. The procedures for prospecting, mining and restoring areas mined for mineral sands usually involve the removal of all existing vegetation on the site, the stockpiling of topsoil, the extraction of the mineral by dredging, the back filling of the excavation with tailings, the spreading of stockpiled topsoil on the mined area, the laying of brush on that area to prevent drift of sand, and finally re-vegetation.

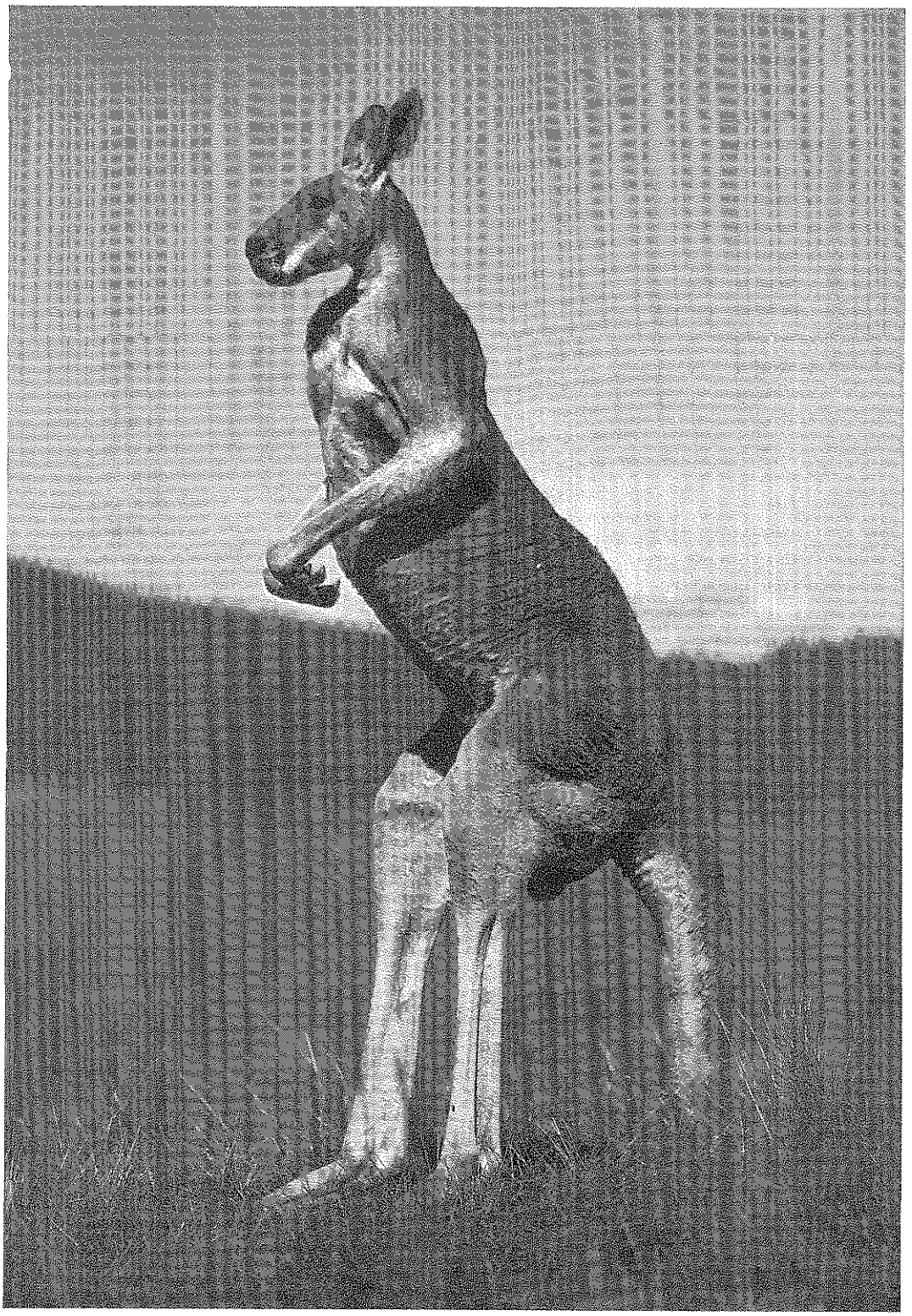
119. The opposition to sand mining has been widespread and largely concentrated on its adverse effects on vegetation and landform rather than on fauna as such. The principal issues raised have been:

(a) that mining irrevocably destroys naturally evolved vegetation and landforms, often over large areas and that in this regard it tends to eliminate completely particular types of formations and plant communities, most commonly dune formations and their vegetation.

(b) that mining operations may, by indirect means, significantly affect the natural conditions of nearby unmined areas. These effects may be brought about by the construction of roads, power lines and plant, through erosion by surface water movement and destruction of features controlling the water table, through the introduction of salt water during mining operations, through the removal or lowering of sheltering dunes, and through the destabilisation of sand surfaces.

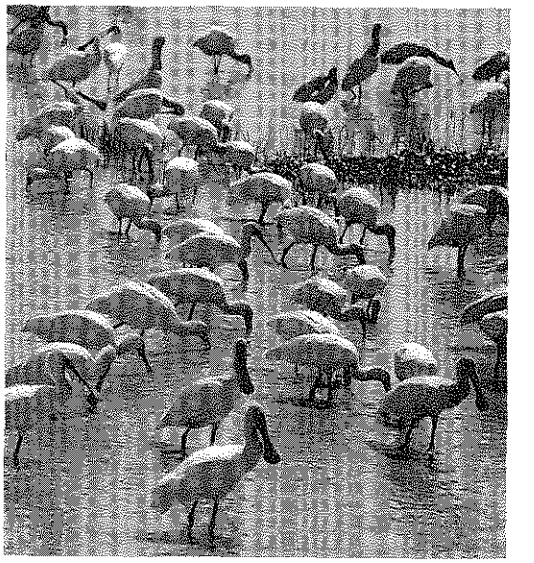
(c) that by removing natural vegetation cover, mining promotes unstable sand movement. A less frequent claim is that mining, by removing the heavy mineral content of beaches, promotes erosion and foreshore instability.

(d) that mining deleteriously affects marine life in foreshore zones and damages breeding and hatchery grounds of fish.

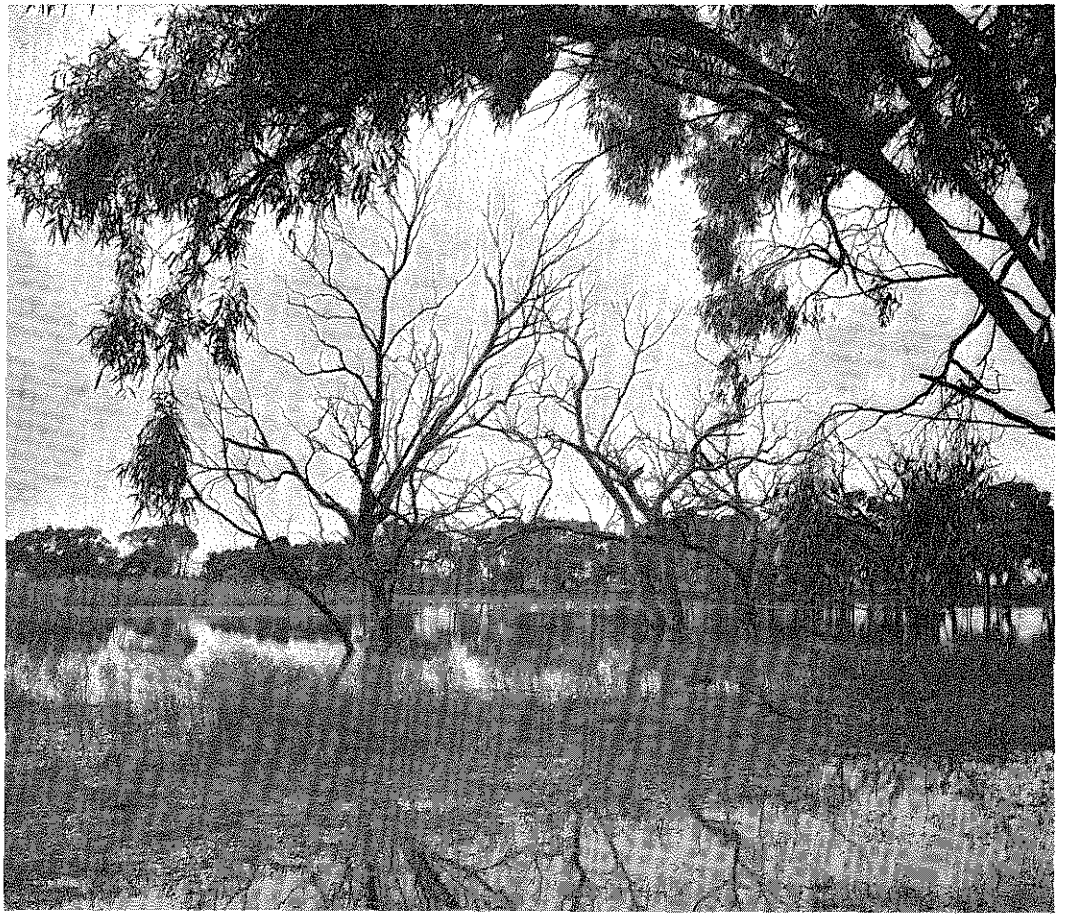


Male Red kangaroo—most of the concern about commercial harvesting of kangaroos has centred around this species

Black ducks

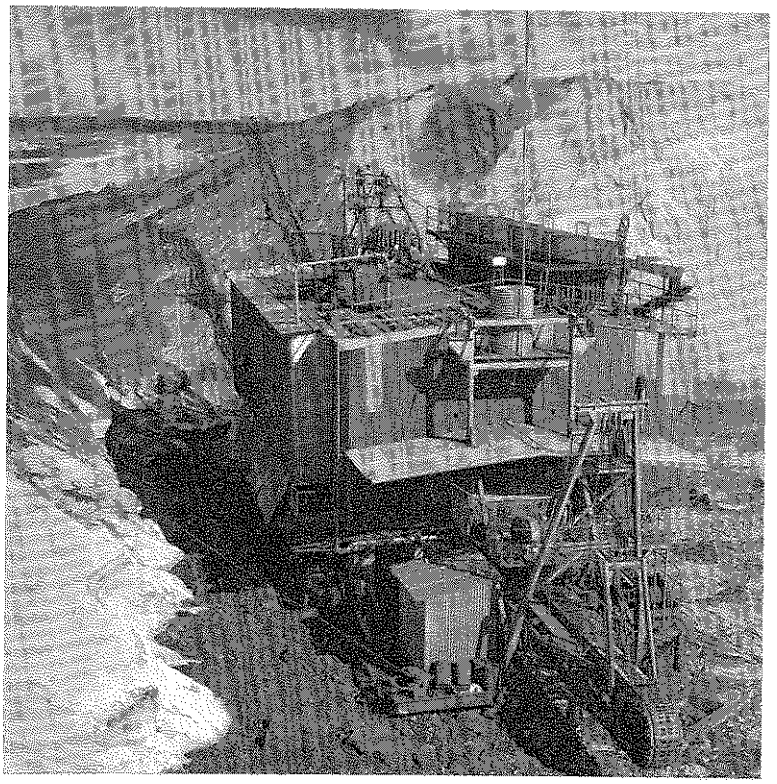


Royal spoonbills

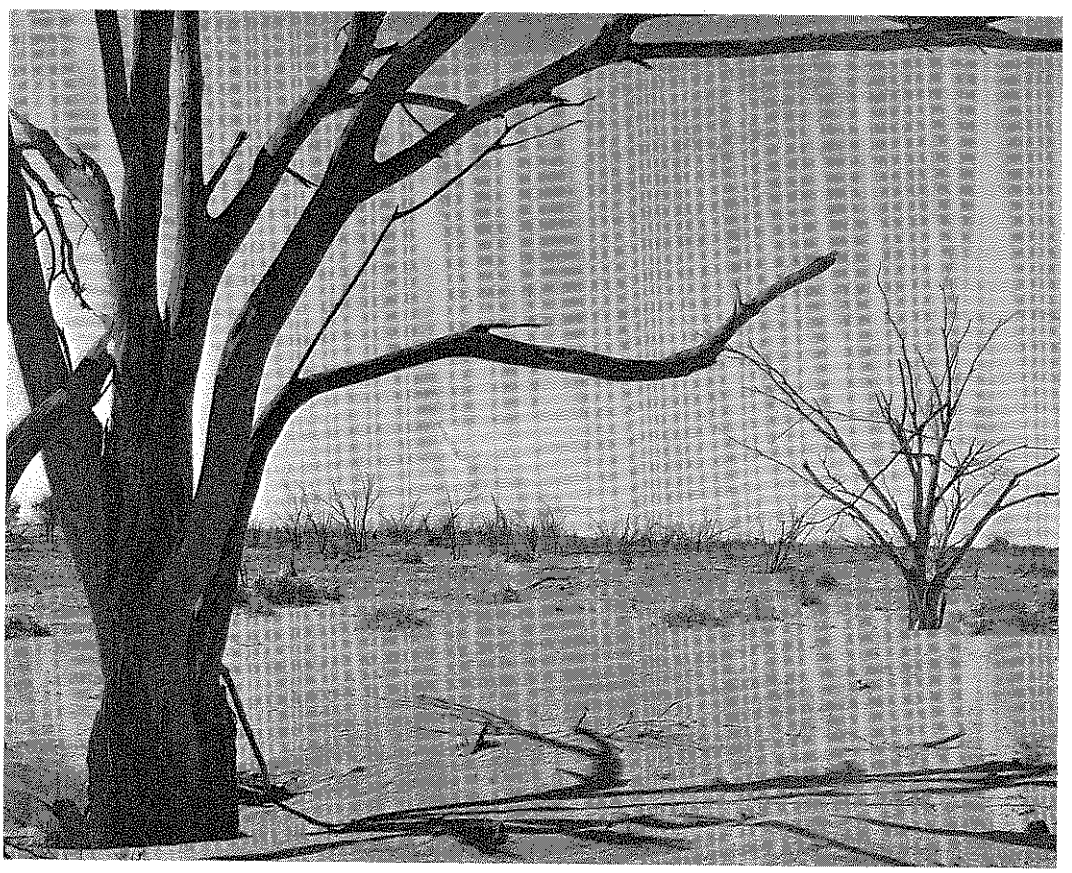


Waterfowl habitat

Waterfowl habitat has been seriously depleted by flood mitigation programmes, swamp drainage and damming of rivers



Beach sand mining—considerable opposition has been raised against this form of mining



Destruction of habitat in western New South Wales by overstocking and drought

The Mountain pigmy possum—believed extinct until 'rediscovered' in 1966

(e) that some plant species are completely eliminated by mining. It is frequently claimed that certain species of wildflowers in particular do not regenerate in areas which have been mined.

(f) that exotic plant species are frequently used to revegetate mined areas and that some of the perennial exotics which are used will invade and destroy native plant communities and proliferate to pest proportions.

(g) that mining operations, by providing access to hitherto inaccessible areas, increase the likelihood of other forms of development, particularly land subdivision, which in turn tends to promote the destruction of natural conditions and reduce the chances of retaining areas for nature conservation purposes.

(h) that mining operations are unattractive. In some areas which have been subject to extensive remining over a long period, mining operations have become a semi-permanent feature of the landscape.

(i) that mining destroys the inherent scenic attractions of the natural landscape, particularly by removing timber cover and flattening the landforms leaving, initially, sandy wastes and, eventually, an unnaturally uniform and monotonous landscape, entirely lacking the variety and visual interest of the original and devoid of tree shade or shelter.

120. Beach mining as it has developed into an important industry has tended to become controlled by a few major companies operating on an increasingly large scale. Advances in technology and rising prices, together with larger scale operations, have made the mining of progressively lower grades of mineral economic. If present trends continue, areas containing as low as 0.1 per cent mineral may eventually be economically viable. Representatives of the Rutile and Zircon Development Association claimed that the implementation of too stringent restoration regulations on the mineral sands industry would place an unmanageable financial burden on it and lead to increased prices of rutile and zircon and encourage the development of alternative products.

121. Rehabilitation of mined areas is a condition of leases issued to mining companies which are also required to provide bonds as guarantees that they will carry out this work satisfactorily.

122. Two major types of restoration are used, one for frontal dunes and one for so-called 'back' areas. In the case of frontal dunes, the dune pattern is reestablished along the original contours although the angle of the forward slope is reduced to minimise erosion. It is then planted with species such as spinifex grasses, pig face, goats foot and marram grasses. After planting, the area is normally covered with brush to allow establishment of the new growth and prevent erosion. Behind the crest of frontal dunes where some topsoil exists, a cover crop of, for example, sorghum or rye, is often planted to provide protection for self-germinating native species.

123. In back areas which may be several miles from the coast, with the existence of topsoil, the vegetation on surrounding unmined areas and freedom from wind erosion, establishment is usually quite rapid. A cover crop is usually planted after mining and additional native plant seeds introduced.

124. Once the initial stabilisation has been achieved, additional native species are commonly introduced and mining companies are expected to maintain responsibility in their areas until effective rehabilitation, satisfactory to the mining departments involved, has been achieved.

125. Beach sand mining destroys naturally evolved conditions, landform and plant and animal communities which cannot be fully recreated. Restoration and vegetation measures in practice cannot economically reinstate sand slopes as steep as those which may occur naturally, nor stabilise bare sand formations in the variety of shapes found in nature, nor reproduce native forests.

126. The evidence available suggests that vegetation of mined areas will, within a few years, revert to a condition superficially similar to that which existed before mining. There is general agreement that climax plant communities such as mature hardwood forest, if regenerated at all after mining, would take a very long time, possibly several hundred years, to do so, and that some specialised forms such as rainforest, once destroyed, would almost certainly not reappear.

127. Some evidence of a general nature was given of the effect of other forms of coastal land development on wildlife habitat. It was suggested that unplanned land development in coastal areas would eventually lead to the destruction of all habitats occurring on the coast and have widespread effects on adjacent marine areas. Effective land use planning and reservation of coastal areas were seen as necessary by many witnesses.

128. The Committee recommends:

that before further coastal areas are subjected to sand mining and land development environmental surveys be carried out to ascertain the impact of such development on conservation.

MARINE AREAS AND THE GREAT BARRIER REEF

129. The Committee has noted that little interest has been shown in Australia in the need for and value of marine national parks. The conservation of marine life and of its habitat is seen as a neglected area of great importance and value. New South Wales aims to establish a number of marine national parks, but the marine environment of the greatest extent and interest is clearly the Great Barrier Reef.

The Importance of the Great Barrier Reef

130. The Great Barrier Reef is regarded as of particular importance for scientific, aesthetic and recreational reasons. As with any marine area on the continental shelf, it is vulnerable to pollution resulting from coastal industrial development and tourism. The survival of individual marine invertebrates is not regarded as a serious problem at this stage but alterations are taking place in the Reef's ecology and the existing balance is being significantly altered. The rise in the number of the Crown of Thorns starfish is seen as a possible example of this and changes are probably occurring as a result of overharvesting of dugongs, turtles and fish in the area.

131. The Reef consists of a very productive stable ecosystem and a great number of sub-systems. The reefs represent a biological phenomenon of great significance

and are an important example of a marine mature community whose study should provide answers to questions related to stability and diversity.

132. In addition, the fauna and flora of the reefs are diverse and their productivity could be of importance to the community in terms of a future source of pharmaceutical products and food.

133. The beauty of the reefs and their geographic location have established them as one of Australia's most valuable tourist assets. However, too little is known about the components of the biological system and the effects that disturbance or exploitation of the reefs may have, not only on the area immediately affected but also on adjacent areas. Tourist development could, without adequate safeguards, lead to the destruction of features of the Reef which make it a tourist attraction. To establish such safeguards, more basic research is required.

134. Science has not yet acquired sufficient data to allow a complete understanding of the fauna, flora and genesis of the reefs. There is insufficient knowledge of the hydrology, climatology and other physical factors affecting the reefs.

135. While the Great Barrier Reef for many years has been appreciated as a major biological phenomenon and a prime example of a mature marine community, there is a shortage of published works which could provide answers to questions related to its stability and diversity.

136. The Committee notes the establishment of the Institute of Marine Science and the biological research work being carried out at the James Cook University, and recommends:

(a) that existing programmes of biological research related to the Great Barrier Reef be provided with funds by the Commonwealth Government appropriate to the urgency of the study;

(b) that a programme of conservation for the Great Barrier Reef be established, based on information so far available, but capable of adaptation as further research is completed.

137. The Committee accepts that the Great Barrief Reef will remain one of Australia's great natural attractions and recommends:

(a) that the Great Barrier Reef be set aside as a marine national park and made secure against mineral exploration or exploitation;

(b) that the development of tourist facilities within the proposed Great Barrier Reef marine national park be permitted only on a restricted basis;

(c) that the development of tourist facilities within the proposed Great Barrier Reef marine national park be regulated to ensure that they are compatible with the natural surroundings;

(d) that immediate attention be given to the present problems arising from waste disposal in the Great Barrier Reef area and appropriate planning commenced to deal with future problems of such waste disposal.

FORESTRY AUTHORITY CONTROLLED AREAS

138. It is estimated that some 75 million acres of native forest are under the control of forestry authorities in the States and Territories.

139. These areas provide very substantial wildlife habitat and the Committee believes it important that management of these areas give consideration to the needs of wildlife populations.

140. Forest resources provide such benefits as timber and forest products, protection of catchments from erosion and excess run-off, forage for grazing of stock, public recreation and preservation of natural forest environment.

141. All forestry authorities from whom the Committee took evidence were fully aware of the value of native forest as wildlife habitat. However, in no State or Territory have comprehensive and detailed scientific studies been made of the value of native forest to fauna conservation. Wildlife officers, to date, have not been employed by State forestry authorities, although a number of States are considering such appointments.

142. In general terms, the authorities' management of forest lands is directed towards the production of native timber. Such activity requires the management of native forests through logging, burning, timber stand improvement and planting. While these management operations basically represent a manipulation of natural ecological processes in the forest, in general they do not alter the suitability of the forest as wildlife habitat. Some portion of the forest, however, may be made unsuitable as habitat for some forms of wildlife.

Management of Native Forest

143. Fire is regarded as the most important and valuable tool of forest management. The most common use of fire is as a means of clearing the forest floor of litter, undergrowth and logging debris so that regeneration of the more desirable species can take place. Fire is a feature of the forest environment that also existed under natural conditions and some plant species, in fact, require fire in order to regenerate.

144. Controlled burning is used to protect forests from wildfire. It is carried out during periods of negligible fire danger. Controlled burning requires low intensity slow burning to remove most of the light litter.

145. Such burning obviously has an effect on wildlife but its pattern is such that most animals can readily escape from the slow fire. In any event the Committee believes that since fire is a factor of the natural environment, the use of periodic and controlled burning is much less likely to have an adverse effect on wildlife than severe natural wildfire at longer intervals.

146. The use of aerial ignition in controlled burning has been criticised in some quarters. The Committee takes the view that this method, providing it is carried out under suitable conditions, is an acceptable management process.

147. A number of animals, both native and introduced, are locally or generally regarded as pests in forestry management. The most important of these pests is the rabbit, especially in the case of radiata pine plantations. The standard means of rabbit control is aerial baiting with the poison 1080.

148. Macropods such as the Eastern grey kangaroo and some wallabies, cause serious damage to seedlings, in both natural and exotic plantations. Cockatoos, parrots, wombats and bush rats also have adverse effects in some plantations.

149. The two most contentious issues involving forestry controlled areas are their use for the woodchip industry and the alienation of native forest for exotic species of pine and other softwoods.

150. It is estimated that at present Australia uses annually about 600 million cu ft of timber. Total timber production amounts to only about 400 million cu ft yearly and the balance is imported. The cost of these imports in 1971 was $290m.

151. The only feasible way of reducing Australian dependence on overseas supplies of timber is to increase greatly the planting of exotic conifers which are capable of very much higher yields than native species. Species such as radiata pine show growth rates in excess of 250 cu ft per acre per year averaged over a rotation of about 45 years. In native species growth rates of 20 cu ft per acre per year are considered good.

152. One measure that has been adopted to overcome this deficit is a joint Commonwealth-State programme aimed at establishing an additional 3 million acres of high quality softwood by the year 2000. There already exists in Australia some 18 million acres of conifer forest, mostly in the form of cypress pine.

153. The establishment of coniferous plantations involves the clearing of existing vegetation although in some cases belts of native timber are left adjacent to roads and in inaccessible areas.

154. Exotic plantations lead to the development of ecosystems quite different from those which occur naturally. These plantation ecosystems support a limited variety of species and have been termed ecological deserts.

155. The Committee found that while pine plantations do not preserve representative examples of native wildlife, they do develop a fauna of their own. Some native animals adapt to the extent that Brush tail possums, for instance, are commonly regarded as pests. Many macropods are found in mature conifer plantations.

156. The Committee believes that establishment of pine plantations to supplement native timber production is desirable but believes Crown lands have sometimes been selected for planting without adequate consideration being given to their value for wildlife conservation. It therefore recommends:

(a) that serious consideration be given to converting suitable uneconomic previously forested farmland to coniferous forest rather than clearing additional native forest for this purpose;

(b) that before further native forest is cleared for the establishment of coniferous forest surveys be carried out to assess the value of such areas for wildlife conservation.

The Woodchip Industry

157. The woodchip industry presents a significantly different situation from that of conifer planting in that woodchip production is primarily intended for the overseas market.

158. Woodchipping involves the progressive clearing and chipping of areas of native forest on a continuing basis. Silvicultural treatment following clearing may lead to a change to commercially more attractive native species or exotic pines.

159. The native forests are valuable areas for wildlife conservation and human recreation. It is possible that their value for these purposes may be greater than their value for wood production. The Committee notes that the woodchip industry causes the loss of diverse natural forest conditions.

160. The Committee recommends:

that before further native forest is set aside for woodchip purposes surveys be carried out to assess the value of such areas for wildlife conservation.

PRIVATE LAND

161. The other class of land, apart from national parks and reserves and forestry areas, which is of importance to wildlife conservation is privately owned land. This may be existing developed land or relatively unaltered natural vegetation.

162. Representatives of farming and grazing organisations who appeared before the Committee stated without exception that they supported the conservation of wildlife. In some circumstances it is clear that native animals, and particularly the larger kangaroos, compete with stock for feed and do need to be controlled. However, in general, it seems that privately owned developed land provides useful, although much altered, wildlife habitat for a number of species.

163. A great deal of goodwill obviously exists on the part of rural interests and a particularly important part can be played by them in regard to such matters as the restoration of natural cover in fenced-off areas and waterfowl breeding on dams.

164. Many landowners have requested or agreed to their holdings being proclaimed as sanctuaries. The Committee is aware of the limitations of these areas in terms of security of tenure and the varying interests of owners. It believes they are of value for wildlife conservation so long as their status and supplementary role is understood.

165. The issue of clearing virgin land for agricultural and other purposes is one to which there has been frequent reference. An example of the scale on which land has been alienated is provided in Western Australia where between 1950 and 1959 a total of over 22 million acres of Crown Land was released for agricultural purposes.

166. Similarly in the Queensland Brigalow country approximately 8 million of a total 12 million acres have been cleared for agricultural development.

167. The point was made that in many areas where land was being cleared, agricultural prospects were marginal or else the intended product was already in a state of oversupply and such development would only have the effect of exacerbating existing primary industry surpluses.

168. The Committee's view is that not only in the interests of wildlife conservation but in conservation generally, encouragement should not be given to the clearing of new areas of land, but that, rather, greater technology should be applied to increasing production from the already vast amount of land available for agricultural use.

169. The Committee recommends:

that before further areas of Crown land are released for agricultural development surveys be carried out to assess the value of such areas for wildlife conservation and their viability for agricultural production.

170. A great deal of criticism was made of the adverse effect on conservation of Section 75 (1.) (*b*) of the *Income Tax Assessment Act* 1936-1972, under which a tax deduction is allowed for expenditure on 'the destruction and removal of timber, scrub or undergrowth indigenous to the land'.

171. Continuation of this concession was opposed on the grounds:

(a) that the section encourages unnecesarily the destruction of habitat with a consequential deleterious effect on flora and fauna;

(b) that there is no need, in view of the trend in world levels of prices for primary products to increase rural production on what, in any case, is marginal land;

(c) that a considerable amount of the clearing is done by absentee private or corporate investors primarily to obtain taxation benefits as an offset against professional income or company earnings.

172. Many witnesses believed that a solution to the problem could be found through limiting the concession to *bona fide* primary producers and much time was taken up by witnesses with criticism of 'Collins Street' and 'Pitt Street' farmers. The attempt to devise a formula to define who was *bona fide* was discussed at length. Whilst concern that some people are using the concession as a taxation loophole is justified, in the Committee's view the main criteria should be whether or not the clearing is a *bona fide* use of funds in terms of national land use objectives.

173. Other witnesses regarded continuation of the concession as a negative approach and, as a positive alternative, suggested that concessions should be given to primary producers who preserved a percentage of their holdings for conservation purposes. Mr Vincent Serventy, a prominent conservationist, pointed to the need for taxation concessions not only for preserving existing habitat but also for recreating suitable wildlife habitat such as waterfowl breeding grounds, nesting boxes and regrowth of flora.

174. Other witnesses advocated tax concessions to farmers who fence off sections of their property to allow natural regeneration or who undertake active native tree planting schemes on their land, and to persons or companies who purchase natural areas and hand them to the State authorities for management.

175. Whilst there may be merit in these suggestions for a new tax concession to encourage conservation, this does not necessarily solve the problem of the existing concession.

176. There may be some support from primary producers for a change to Section 75 (1.) (*b*). The *South Australian Dairymen's Journal* of September-October 1969, in an article 'The World Dairy Crisis', called for the removal of the relevant section of the Act, commenting:

> 'This sub-section, which allows as a tax deduction expenditure on "the destruction and removal of timber, scrub or undergrowth indigenous to the land" has been

responsible for much premature, unwise and unprofitable development, and has contributed to surplus problems in other primary industries than dairying. Its retention cannot be justified on economic grounds as the increase in value resulting from clearing is itself sufficient reward, but it is the chief attraction to the "Rundle Street farmer" and its overall effect has been to price undeveloped land out of the reach of primary producers who rely on their holdings for their livelihood.'

(p. 25)

177. The Committee would agree that Section 75 (1.) (*b*) does encourage unnecessary and undesirable land clearing but believes it would be difficult to devise an equitable formula limiting the concession to cases where the land involved is more valuable for agriculture than for wildlife conservation. Assessment of the relative merits of maintaining or clearing any given piece of land requires more information than is currently available. When each State has an inventory of its lands and a land use authority it should be possible to define the areas for which the concession should apply. In the meantime the Committee believes that there is no need for more land to be cleared without proper investigation first being made. It therefore recommends:

(a) that consideration be given to amending Section 75 (1). (*b*) of the *Income Tax Assessment Act* 19361972, so that only areas designated by land use authorities (*vide* recommendation 3) in the States and Territories shall qualify for taxation concessions for the purpose of land clearing;

(b) that the feasibility of concessions for the preservation of habitat be investigated together with concessions for land donated for conservation purposes.

178. The Committee is mindful that a reversal of the taxation concession principle would pose a problem where land which has already benefited under Section 75 (1.) (*b*) might be reconverted for conservation purposes, and any provision for taxation benefits for the latter purposes should not allow landowners to receive a second benefit.

CONCLUSIONS RELATING TO NATIONAL PARKS AND RESERVES

179. The Committee, in view of all the information provided to it and referred to in this chapter, concludes that the establishment of adequate and secure national parks and reserves is the measure which will contribute most to wildlife conservation.

180. The Committee recommends:

(a) that a national policy be initiated aimed at acquiring such portion of the total land area of each State and Territory in the form of secure national parks and reserves as will ensure that all habitat types will be preserved;

(b) that the Commonwealth Government take immediate steps to acquire such portion of the land under its direct control in the Northern Territory and Australian Capital Territory in the form of secure national parks and reserves as will ensure that all habitat types will be preserved;

(c) that grants be provided to the States under Section 96[1] of the Constitution to enable them to acquire areas of wildlife habitat which are of national significance. The Commonwealth wildlife authority (*vide* recommendation 30) should be the body responsible for assessing requests from the States for financial assistance for the acquisition of such land.

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[1] Section 96 makes provision for the Commonwealth Parliament to grant financial assistance to any State on such terms and conditions as the Parliament thinks fit.

V. Term of Reference *(c)*

'(c) The effects of pollution and the widespread use of pesticides on wildlife population.'

GENERAL

181. Pesticides may be defined as chemicals used for the control or eradication of plants, animals or insects posing a nuisance to man because they compete with or prey on domesticated plants and animals, destroy stored food or transmit human disease. Thus, in the following discussion, the Committee has considered herbicides, insecticides, fungicides and other chemical formulations used in the control or eradication of pests, under the general heading of pesticides.

182. In recent years, growing public attention has been paid to the effects of pesticides as part of a greater sensitivity by many sections of the community to the fundamental questions raised by the continuing and accelerating pace of man's modification of his total environment.

183. It is being recognised that there is an urgent need for the study of ecosystems and the intricate relationships which exist between the component plants, animals, biota and soils so that reasonable predictions of the effects of man's activities can be made and costly mistakes avoided. The Committee has been told many times that in considering wildlife conservation it would be a mistake to view the question on the basis of individual threatened species. Rather, it should look at the relationships existing within ecosystems. It is in this context that concern has been expressed about the effect on wildlife populations of the use of pesticides.

184. The Committee is aware of opposing views on the danger to wildlife through the use of pesticides. Mr E. M. Rathus, Director of Industrial Medicine, Department of Health, Brisbane says:

> 'Biologists have shown that very few of the "kills" attributed to pesticides are substantiated.'

and that:

> 'deer and other wildlife are more plentiful in the United States of America than before the advent of modern pesticides.'[1]

185. Mr J. T. Snelson, Pesticides Co-ordinator, Department of Primary Industry, in an address entitled 'The Commonwealth Government's View', stated that:

> 'The results which have so far come to hand . . . show little evidence of pesticide pollution.'

and:

> 'since pollution from pesticides can be measured, identified and reduced, the combined efforts of the chemical industry, agriculturalists and municipal authorities will enable this problem to be handled with comparative ease.'

186. Other writers, however, have claimed that pesticides have polluted the entire world. They have pointed to wildlife 'kills', but place more emphasis on the lack of knowledge of the long term effect of pesticide residues which exist on a world wide

symposium, University of Queensland, 5 June 1970. The Pesticide Problem, p. 6.

RATHUS, E. M. *Pesticides—People and Public Health.* A paper to a chemical society

scale, and on the effects of sub-lethal doses of pesticides on the reproductive capacity of wildlife and more particularly, fish.

187. Kenneth Mellanby in his book 'Pesticides and Pollution' says:

> 'Most of the residues are so low that their discovery is a credit to the chemist rather than a menace to wildlife. Nevertheless, residues at a toxic level are found, commonly in raptorial birds, not infrequently in other species. The general level of contamination is high enough to warrant concern, particularly as concentration of a persistent chemical is always possible . . . For pesticides we should be concerned about any general increase in pollution even if this does not necessarily damage particular individuals.'[1]

188. Professor S. C. Birch of the Zoology Department, University of Sydney also took a cautious view in his minority report in the Academy of Science Report on 'The Use of DDT in Australia'. Professor Birch, while agreeing with information in the Report, states:

> 'The inference of the Committee is that on the basis of lack of evidence of deleterious effects of DDT in Australia and of long-term effects of DDT on man, the use of DDT be continued. However, I place more importance in making my judgment on:
>
> (a) the ample evidence of the deleterious effects of DDT on non-target organisms in other countries. Lack of evidence of such effects in Australia may well be due to lack of information on the subject;
>
> (b) the widespread presence of DDT in human tissues in people all over the world including Australia, the evidence that DDT affects microsomal activity in vertebrates at all levels, and the lack of evidence on the long-term effects of such dosage in man.
>
> On the basis of (a) and (b) particularly, I do not believe it is wise to advocate the continual use of the persistent insecticide DDT in Australia. Instead, I recommend the phasing out of the use of DDT in Australia and replacement with alternative methods of control even though the cost in the short-term may be considerably greater.'[2]

189. The Committee is aware of a general lack of data on which to assess the effects of pesticides on wildlife and therefore recommends:

> **that research be undertaken to obtain information on the effects of pesticides on non-target organisms, the extent of pesticide residues in wildlife, and the effects of these residues through toxicological and biological studies on wildlife. Urgent consultation should take place between Federal and State authorities to determine the most appropriate means of achieving this recommendation.**

190. In considering the effect of the use of pesticides on wildlife, the main factors to be considered are: one, the dangers of non-specific pesticides; two, the toxicity of pesticides, where toxicity refers to the ability of the chemical to cause poisoning when administered in adequate quantity through specified routes,[3] and, three, the persistence of pesticides, where persistence refers to its degree of chemical stability and the consequent maintenance of its lethal power.[4]

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1 MELLANBY, KENNETH. *Pesticides and Pollution.* Fontana, London, 1969. p. 192.

2 Australian Academy of Science. *The Use of DDT in Australia.* February 1972. p. 46.

3 This definition comes from: SNELSON, J. T. *An Introduction to Agricultural Chemicals.* Pesticides Branch, Department of Primary Industry, P.B. 140.

4 This definition comes from the Report of the Committee of Enquiry appointed by the Honourable the Premier of Victoria to enquire into the Effects of Pesticides, February 1966.

191. Non-target animals may be killed by direct contact with pesticides in the areas where they are used. Misuse or unwise application may exacerbate the problem. Numerous witnesses expressed concern in this regard over the widespread use of 1080 in rabbit or dingo control.

192. 1080 was mentioned to the Committee as an example of a non-specific pesticide whose use has resulted in losses of both non-target mammals and birds. It is true that many species show high tolerance levels to 1080. The Committee has been told that 1080 does not accumulate in the body but is metabolised by or excreted from the body in three or four days.

193. The Committee was also told that secondary 'kills' from 1080 poisoning were regular if not numerous; carnivores being affected after eating poisoned rabbits following a 1080 spreading.

194. It was suggested to the Committee that selective pesticides, effective against a particular pest, will be developed only slowly. Selective pesticides by their nature have only a small market. Companies developing new pesticides need to sell large volumes of these products to recover development costs. These companies stand to make better profits from 'broad spectrum' pesticides which may be used against a large number of pests.

195. While pesticides may kill non-target species, most are biodegradable, breaking down to harmless substances in a few hours, days or weeks. The Committee is concerned with pesticide persistence and the sub-lethal effects of pesticides on wildlife. The Committee accepts the view that the increasing level of pesticide residues in wildlife could have significant long-term effects. This problem occurs only with persistent pesticides such as DDT and dieldrin.

196. Mr A. Dunbavin Butcher, Director of the Victorian Fisheries and Wildlife Department, says:

> 'The sub-lethal effects of toxic chemicals may apply to vigour without which an animal is unable to perform its necessary functions satisfactorily; they may apply to behaviour, which among other things, may make an animal more subject to predation; they may affect growth and they may affect reproduction both in respect to the ability of adult males to reproduce and to the ability of young animals to survive. Viviparous fish may abort.
>
> The use of pesticides may bring about an imbalance of natural populations and, in this concept, the sub-lethal effects of pesticides need not be confined to the animals directly involved, since the reaction of the same individuals may influence the ecology of the whole population.'[1]

197. Pesticides of the persistent category include chlorinated hydrocarbons, arsenic and a number of herbicides. DDT, a persistent pesticide, has a half life of 10 years (this means that 10 years after application it is 50 per cent decomposed, after 20 years 75 per cent, after 30 years 87 per cent, and so on). Some of the other persistent pesticides used widely are Dieldrin, BHC, Lindane, Chlordane, Endrin, Aldrin, Heptachlor, Edorulfan, TDE, Toxaphene, Strychnine, Arsenic, 1080, 2,4,5-T, 2,3,6-TBA, the substituted ureas and Pictoram, together with some of the S-triagines.

[1] BUTCHER, A. DUNBAVIN, 'Wildlife Hazards from the Use of Pesticides', *The Australian Journal of Pharmacy*. 30 November 1965. pp. S105-109.

198. With regard to persistence, the Victorian Committee of Enquiry reported:

> 'Almost every difficult problem arising from the use of pesticides would become less difficult with less persistent materials. These problems range from the development of resistence by pests to that of deciding what to do with unwanted empty containers. For this reason persistence is at least as important a characteristic as is toxicity. Highly toxic non-persistent pesticides can be used for the purpose for which they were designed with the least possible ill-effect to non-target species or danger to public health. Much less toxic but highly persistent materials are the means of increasingly polluting the environment in which man must live.'[1]

199. The Committee is aware of the argument surrounding the banning of certain pesticides and that the development of alternatives could be costly. It also recognises that any legislative action should be based on sound research. The Committee was told, however, that there has been a gradual phasing out of non-specific and persistent pesticides.

200. The United States Government's Environmental Protection Agency in June 1972 announced a ban on the use of DDT for virtually all purposes. This ban is to become effective on 31 December 1972 and was brought about because it was decided that the continued use of DDT on agricultural crops was unacceptable and its dangers outweighed any benefits. Currently in Australia the registered and recommended uses of DDT are under review. These uses have been reviewed four times in the last three years and a complete and detailed review is expected in October 1972. The National Health and Medical Research Council has already recommended to the States that DDT should be phased out as suitable alternatives become available. Bearing in mind that most use of DDT in Australia is on cotton and tobacco crops, evidence was given to the Committee that methyl parathion is a suitable alternative to DDT. It has been used for many years, has a very short life and when exposed to the atmosphere is rapidly degraded. It is also very effective in controlling insects and is used on cotton crops. Evidence emphasised, however, that a major problem with the use of methyl parathion is that it is highly toxic and so carries a marked risk for persons handling it.

201. The Committee recommends:

(a) that authorities responsible for the control and registration of the use of pesticides be charged with the phasing out of all non-specific and persistent pesticides as soon as suitable alternatives become available;

(b) that limitations be placed on the use of DDT similar to those imposed in the United States of America;

(c) that stricter controls governing the aerial application of pesticides, including 1080, be introduced.

202. A particular hazard to wildlife is the concentration of persistent pesticides in food chains. Predatory birds and fish are most vulnerable. The Committee was told that invertebrates are more susceptible to persistent pesticides than vertebrates. Fish are the most sensitive of the vertebrates because slow excretion through the gills allows a greater accumulation of chemicals. Birds are more

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[1] Report of the Committee of Enquiry appointed by the Honourable the Premier of Victoria to enquire into the Effects of Pesticides, February 1966.

sensitive than mammals, which seem to have better developed detoxifying mechanisms. Reptiles lie between fish and birds on the susceptibility scale.

203. Continued toxicity of persistent pesticides after spraying constitutes a potential hazard to fauna. It results in pesticide residues being spread throughout the environment. The presence of persistent pesticides in soil produces a whole range of problems.

204. The Committee stresses that this again is an area of which very little is known and a great deal of further research is needed. Overseas research indicates that continual spraying with persistent pesticides has a deleterious effect on soil populations and consequently on soil structure.

205. After consideration, the Committee regards as justified, the growing public concern over continuing environmental pollution with persistent toxic chemicals. This disquiet is largely the fear of the unknown for it should be stressed that there is insufficient evidence to show conclusively whether pesticides have long-term harmful effects on humans.

206. There is however circumstantial evidence to show that persistent and non-specific toxic pesticides may have a long-term depressing effect on wildlife populations.

PEST MANAGEMENT

207. The concept of pest management involves combinations of all existing methods of control to maintain pest populations below the levels causing economic and ecological injury. It makes use of biological controls, insect attractants and repellants, sex sterilants to reduce reproduction rates, the breeding of more resistant strains of plants and animals, and, of course, pesticides.

208. The approach is based on the recognition that eradication of a particular pest is an unreal goal. The ecological niche left by that species may be filled by some other, which, in turn, perhaps through sheer numbers alone, becomes a pest. Pest management offers the best long-term approach to pest control and as such has the endorsement of this Committee.

209. The Committee believes that there should be increased emphasis on an ecological approach to pest control to minimise the dangers to non-target species.

210. Methods of pest control other than chemical provide little opportunity for profits. Therefore it is difficult to interest private enterprise in these investigations. Consequently this work falls mainly upon government agencies and academic institutions. The funds that Governments can deploy for this range of work appear to be inadequate compared with that expended by chemical companies devoted to the development of chemical pesticides. The Committee believes that more emphasis should be placed on research into non-chemical means of pest control.

211. When the representatives of Ciba-Geigy Australia Limited appeared before the Committee, they spelt out what should, in their opinion, be the role of government agencies:

(a) Registration requirements which evolve continually, and can be a major factor towards a preponderance of non-persistent pesticides with low hazard against wildlife and fish;

(b) Monitoring the environment, wildlife and fish for pesticide levels (such work on humans and rural produce is already assumed);

(c) Obtaining scientifically valid information on the short and long-term effects of pesticides on wildlife and fish populations;

(d) Establishing and exercising appropriate controls based upon (b) and (c);

(e) Research into and promotion of integrated pest control (which includes non-pesticide procedures).

212. The Committee accepts that (a) and (b) will fall wholly upon Governments, but cannot emphasise enough that the pesticide manufacturers should accept some responsibility in (c) and (e), investigating long-term effects of pesticides on wildlife and researching integrated pest control. It would be totally irresponsible for manufacturers to expect to continue making profits from products whose long-term effects may be harmful and for them to reject requests to assist in ascertaining these long-term effects if any. The Committee believes it would be in the manufacturers' own best interests, from the point of view of their public images, to co-operate with government agencies in research into long-term effects of their products.

213. The Committee realises that Australia represents a comparatively small market for the international pesticide manufacturers and is mindful of Ciba-Geigy's submission that:

> 'Short of a complete ban, the quickest way to prevent the future entry of valuable new pesticides into Australia is to insist on comprehensive and in depth wildlife tests, as no company will be prepared to foot the bill'.

The Ciba-Geigy witnesses expressed the same view about tests to determine long-term effects. They argued that these were risks which were more than balanced by the benefits.

214. The Committee was encouraged that Ciba-Geigy saw the role of their industry as producing:

(a) pesticides more specific to target species;

(b) pesticides less inherently toxic to non-target species;

(c) less persistent pesticides;

(d) pesticides with lower hazard in use;

(e) more effective formulations (hence less pesticide used);

(f) better application techniques (hence less pesticide used).

REGISTRATION OF PESTICIDES

215. The registration of pesticides falls mainly within the jurisdiction of the States, apart from the Commonwealth Territories. The Committee was told that all States have effective legislation requiring pesticides to be registered prior to sale. It was claimed that all State authorities require applicants for registration to have regard to the possible effects of their product on wildlife.

216. The Commonwealth and the States have jointly developed, through the Australian Agricultural Council, procedures for the clearance of pesticides. Before any pesticide is registered, it must have a clearance from either the Technical Committee on Agricultural Chemicals or the Technical Committee on Veterinary

Drugs.[1] Both of these Committees are serviced by the Pesticides Branch of the Commonwealth Department of Primary Industry. The application for a clearance is made by the manufacturer, marketer or distributor of a new chemical where a new chemical is defined as any chemical product which has not previously been registered for a particular use.

217. The responsibilities of the Technical Committees include:

(a) The evaluation of the use of pesticides in Australia;

(b) An assessment of the agricultural, ecological and wildlife hazards associated with such use;

(c) The recommendation of precautions in accordance with good agricultural practices;

(d) The fixing of withholding periods appropriate to specific applications.

218. The Committee was told that with a staff of about eight, the Technical Committees review about 200 submissions a year. The Committee considers that the Technical Committees serve a co-ordinating function which leads to a degree of uniformity with respect to pesticide registration in Australia. It points out that the evaluations of the Committees are not made on the basis of original research but rather on the basis of data submitted by the Company introducing the pesticide. Mr B. B. Brett, Executive Officer of the Agricultural and Veterinary Chemicals Association of Australia told the Committee that the responsibility of government in this area is to consider and evaluate data and, if necessary, to ask for more data. The attention of the Committee was drawn to the fact that there could be unforeseen effects of pesticides on many species of our unique flora and fauna because most testing and the initial use of pesticides takes place overseas.

219. The Committee recommends:

(a) that the Pesticides Branch of the Department of Primary Industry sponsor original research into pesticides with an emphasis on the effects of pesticides on Australian wildlife;

(b) that the Technical Committees on Agriculture and Veterinary Drugs have their responsibilities expanded to allow them to investigate the effects on wildlife of pesticides already in use as well as new ones.

STATISTICS OF PESTICIDE USE

220. The Committee was told by witnesses that statistics relating to pesticide use were inadequate. The Commonwealth Bureau of Census and Statistics does provide some information in its 'Manufacturing Industries No. 3 Chemicals, Drugs and Medicines' but the latest figures available at the time of the Committee's consideration of its report are for 1967-68.

221. Both the Agricultural and Veterinary Chemicals Association of Australia and the Pesticides Branch of the Department of Primary Industry consider they are hampered by the lack of statistics.

[1] See Appendix V for a description of the Pesticides Branch of the Department of Primary Industry and the Co-ordinating Committee on Pesticides and its functional Sub-Committees.

222. The Committee recommends:

that representatives of the Australian Veterinary Chemicals Association and the Department of Primary Industry make submissions to the Commonwealth Statistician indicating their statistical needs and that the Commonwealth Statistician establish series to meet these needs.

EDUCATION ON THE USE OF PESTICIDES

223. The Committee sees as most important that pesticides should be applied only when necessary and then in the smallest quantity needed to accomplish the purpose. In this respect, label instructions should be followed most carefully. The Department of Primary Industry and the State departments of agriculture should use every means in their power to educate primary producers in this respect.

224. Education programmes are undertaken to inform users of the dangers of pesticides. The Committee recommends:

that a national programme be established to educate pesticide users of their responsibility to the environment generally and wildlife in particular.

In this regard, the Committee commends the establishment of 'A Code of Practice in the Handling and Use of Pesticides' foreshadowed in Document P.B. 162, Pesticides Branch, Department of Primary Industry, Canberra, January 1972.

THE HOME GARDENER

225. Home gardeners provide a large market for pesticides. Unfortunately some people use these pesticides in higher concentration and amounts than is necessary for the proper effect.

226. The Committee recommends:

that regulations governing packaging of pesticides for use in home gardens be reviewed with the aim of minimising the dangers caused by over use.

VI. Term of Reference *(d)*

'(*d*) The effect on the population of kangaroos of the trade in meat and hides and the effect of other industrial exploitation on wildlife.'

GENERAL

227. Commercial exploitation of fauna has been widely criticised on a number of grounds, perhaps the most widespread being a moral objection to commercialising the killing of native animals and the belief that large scale exploitation must threaten the existence of the species concerned. However, the Committee accepts the principle that there is no reason why some animals cannot be harvested providing the operation is based on sound biological principles.

COMMERCIAL EXPLOITATION OF KANGAROOS

228. At present, the most significant commercial operation is based on kangaroos. National and international concern has been expressed that the present form of harvesting must inevitably lead to the extinction of the exploited species.

229. In view of the widespread concern expressed at commercial exploitation of kangaroos, the Committee decided to present to Parliament a thorough and objective consideration of all the issues involved in this aspect of the Inquiry. The Committee presented an interim report in November 1971.

230. The report confined itself to the species being commercially exploited, namely the larger kangaroo species:

Red kangaroo	(*Megaleia rufa*)
Eastern grey kangaroo	(*Macropus giganteus*)
Western grey kangaroo	(*Macropus fuliginosus*)
Euro	(*Macropus robustus*)

and to a lesser extent a number of wallabies including the Whiptail, Brush, Swamp, Sandy, Bennetts and Rufous.

231. The Committee's conclusions 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 harvesting, or from any combination of these 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.
2. That the interests of the kangaroo industry should be subservient to both the needs of conservation and the needs of the primary producer, and should be controlled in such a way by the relevant fauna authorities as to meet these needs rather than to guarantee a regular supply to the industry.
3. That a nationwide census of kangaroo numbers at any one time is impossible, from both a practical and an economic point of view. A number of methods of estimating kangaroo numbers exists but each

method is confirmed to a specific set of circumstances. The margins of error for each can be very large and no accurate method of census-taking exists.

4. That because of conflicting evidence concerning safe levels of harvesting of kangaroos, the Committee considers that until further research has been undertaken, estimates made by biologists are more likely to safeguard the larger macropod species.

5. That knowledge of methods of managing and controlling kangaroo populations is far from adequate. Research is urgently needed to establish optimum management procedures and control measures.

6. That in view of its acceptance of the scientific opinion that no large species of kangaroo is at present under threat of extinction the Committee see no immediate need for a nationwide closed season on kangaroo harvesting.

7. That the imposition of a Commonwealth ban on the export of kangaroo products would not of itself ensure the conservation of kangaroos. Reduction of numbers would still be necessary. If not carried out by the industry this would need to be done by property owners, or by State wildlife authorities at public expense.

8. That the responsibility for the control of kangaroo populations should remain with the States. There would appear to be great advantage, however, in more uniform State policies, even though evidence showed that the management needs of the kangaroo population varied greatly from State to State.

9. That in any State, Commonwealth or joint State-Commonwealth policy on kangaroos, the question of conservation or preservation should be determined in favour of conservation.

10. That the basic justification for the kangaroo industry's continued existence is that kangaroos are, at certain times and in some places, sufficiently numerous to be regarded as pests and that it is justifiable to permit reduction of their numbers. This being the case, the greatest possible use should be made of those destroyed.

11. That due to habitat change, the spread of settlement and the operation of commercial harvesting, the kangaroo has in many areas become visually extinct.

12. That the clearing of land, the provision of watering points and the introduction of stock, has led to an overall increase in the numbers of the larger macropods. However, the Committee is of the opinion that rural development has led to the extinction of some small species of macropods and the near extinction of others. The Committee believes that too little interest is shown in these species.

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.

14. That the claim by the kangaroo industry that its harvesting activities are self-regulatory and ensure the continued existence of the kangaroo does not stand up to scrutiny; particularly in areas where part-time shooters predominate.

15. That areas where overharvesting appears to be occurring should be zoned and spelled until trends in the local kangaroo population can be assessed.

16. That much confusion exists about the degree of competition between kangaroos and domestic stock for feed. Wildlife scientists made it clear that in good conditions kangaroos and sheep can co-exist as their diets overlap to the extent of only about 40 per cent. Unfortunately many conservationists have extended this finding to all conditions. The Committee accepts that complaints by pastoralists and graziers of the effect of kangaroos on pastures have some justification. In adverse conditions competition increases for scarce fodder resources. It is most serious when kangaroos eat out pastures being spelled for stock.

17. That evidence concerning damage to fences and fouling of water sources covered a wide range of opinion. Pastoralists and graziers were not unanimous in claiming that damage to fences was a serious problem. Kangaroos pass through wire strand fences without causing much damage, but they can cause considerable damage to netting fences by attempting to force through them. Damage to watering points can be serious where kangaroos damage troughs or foul ground water.

18. That more information on the movement of kangaroos is necessary as few investigations have been made of kangaroo mobility. Witnesses stated that during drought kangaroos tended to concentrate on available water and fodder resources, but that after rain they dispersed. The Committee was unable to obtain firm evidence of how far the animals travel and to what areas.

19. That Commonwealth and State authorities cannot certify kangaroo meat as fit for human consumption, as the relevant regulations provide that all such meat must be from animals killed under supervision in approved abattoirs and processed at the point of killing. Criticism of the Commonwealth Department of Primary Industry concerning its supposed unwillingness to certify kangaroo meat for export for human consumption is unjust, because the Department must certify exports in terms of the regulations of importing countries. The present method of killing and processing cannot meet these requirements.

20. That the growth of the pet food industry has resulted in a higher level of kangaroo harvesting. However, suggestions that the present growth rate of the industry will result in the extinction of the kangaroo are open to question.

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.

22. That despite the conflicting evidence concerning the feasibility of kangaroo farming, the Committee sees value in further studies being carried out in this field. The Committee believes ventures of this type provide opportunities for biological study of the kangaroo, and for determining the correct balance for economic co-existence of kangaroos and domestic stock on properties.

23. That the kangaroo is basically a nocturnal animal. The claim by tourist agencies and members of the public that the difficulty of sighting kangaroos in their natural habitat is solely a result of over-harvesting is an oversimplification.

24. That large areas of land should be set aside as national parks and reserves for kangaroos and other native fauna. While evidence was given to the Committee suggesting that some land, at present uneconomic in terms of agricultural production, could be so utilised, the Committee believes that additional criteria should be used in assessing the suitability of any land to be set aside for this purpose.

25. That the tourist potential of reserves for kangaroos is of great importance. Projections by the Australian Tourist Commission indicate that earnings from tourism could approach $300m a year in 1975. An important attraction to tourists from overseas is Australia's unique native fauna, particularly the kangaroo. Adverse publicity overseas concerning the commercial exploitation of native fauna, could have an effect on potential tourist development.

26. That unnecessary obstacles are imposed on the export of live kangaroos and other native fauna to approved overseas zoos. Alteration of the provision requiring that approval for export shall only be given to A class Australian zoos which have zoo-bred fauna surplus to their needs, should be considered.

27. That, due to overseas demand and the present structure of the industry, local manufacturers of kangaroo products appear to be uncertain of the future availability of the type and quantity of skins they require. The Committee believes that local needs should have priority.

232. No information which has been provided to the Committee since publication of its Interim Report has indicated that the conclusions reached at that time were incorrect.

233. These conclusions led the Committee to recommend:

(a) that controls over the harvesting of kangaroos must at all times rest with governments.

(b) that the Commonwealth Government should approach the State Governments with a view to obtaining greater uniformity of laws relating to the taking of kangaroos;

(c) 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 licences 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;**

(d) **that Customs regulations relating to the export of live fauna should be liberalised to allow kangaroos to be collected and reared by Australian zoos for export to approved overseas zoos;**

(e) **that regulations controlling the export of kangaroo skins should be administered to ensure that local requirements by Australian manufacturers are adequately met;**

(f) **that the Commonwealth Government offer financial assistance to the States for**

(i) **the acquisition of land for the creation of national parks and wildlife reserves for kangaroos and other native fauna.**

(ii) **research into the biology and ecology of kangaroo species.**

(iii) **the provision of increased staff for management, inspection and control of kangaroo and other wildlife populations;**

(g) **that recommendations concerning action suggested to State Governments be referred to the Fauna Authorities Conference;**

(h) **that recommendations made to State Governments be implemented by the Commonwealth Government in its own Territories.**

234. The Committee concluded that there was a need for more research into the biology and ecology of kangaroo species and other native fauna by the appropriate State and Commonwealth authorities.

235. The Committee also believed that full implementation of its recommendations would ensure that the kangaroo industry became a tool of conservation management and that this combined with the establishment of large reserves would ensure the long-term survival of the larger species while making reasonable provision for the needs of the farmer and the grazier.

Other Macropods

236. Evidence was given that there are a number of kangaroo species which are seriously threatened and in urgent need of conservation and protection. These were said to include the Parma wallaby (*Macropus parma*), the Toolache wallaby (*Macropus greyi*), the Eastern hare wallaby (*Lagorchestes leporides*), and

Lesueur's rat kangaroo (*Bettongia lesueuri*). These are presumably the less resilient species because they have not been commercially hunted, at least in recent times. An example of the level of decline is given by Lesueur's rat kangaroo which is today known with certainty only from two small islands but which once ranged from Shark Bay (in Western Australia) to the Great Dividing Range (in eastern Australia) over an area of more than a million square miles.

237. Because of exploitation of their habitats for pastoral purposes and competition from sheep, introduced rabbits and other vermin, many small kangaroos have been reduced almost, if not actually, to extinction. At the same time, the introduction of the sheep, and the widespread conversion of the original habitat into grazing land, has actually benefited the larger species of kangaroos, including the Red kangaroo, the Eastern and Western Grey kangaroo, and the Euro in some areas. Some of the smaller species are found in gullies and other quite small areas of unimproved land in high productivity pastoral districts. Certainly the smaller species, such as those listed above, appear to require the security of conservation in adequately safeguarded areas of natural vegetation.

THE COMMERCIAL EXPLOITATION OF CROCODILES

238. Considerable concern has been expressed to the Committee over the threat to the continued survival of the two crocodile species existing in northern Australia.

239. The two species concerned are the Saltwater (or Estuarine) crocodile (*Crocodylus porosus*) and the Freshwater crocodile (*Crocodylus johnsoni*).

240. The Saltwater crocodile typically inhabits estuaries along the northern coasts of Western Australia, Northern Territory and Queensland, although individuals of the species can be found at a considerable distance from the sea. The skin of this species is highly valued and current values are approximately $3.00 per belly inch. In Western Australia the species is completely protected. In the Northern Territory hunting is permitted under licence. There is no protection in Queensland.

241. It is probably not accurate to label the species as endangered. However, evidence was given that the number of saltwater crocodiles has been declining for a considerable time. It was suggested that the rate of decline has increased very greatly over the last 20 years as a result of overexploitation.

242. The Committee commends the work being carried out by Dr Bustard on the farming of saltwater crocodiles and believes that farming offers the best long-term solution to both the survival of the species and the continuation of a profitable industry. The work being carried out by Dr Bustard with the aid of Commonwealth finance, could form the basis of large scale crocodile farming.

243. The Committee is aware that extensive crocodile farming research is being carried out by the Department of Agriculture, Stock and Fisheries in Papua New Guinea. Full interchange of information between those responsible for both projects would be desirable.

244. The Committee recommends:

that the Commonwealth convene a meeting of the Fauna Authorities Conference with the aim of introducing more uniform controls on the

killing of and trade in the Saltwater crocodile in the States and Territory involved.

245. The Freshwater crocodile is confined to Australia and inhabits the freshwater river systems and billabongs of the north. Due to relatively poor skin, until recently it has not been in great demand. However, the decline in numbers of the saltwater species and the development of new processes for treating skins, have led to increased demand. Western Australia gave full protection to the species as far back as 1950, and the Northern Territory Administration introduced protection in 1964. However, Queensland to date has not done so and the Committee has been advised that poaching is taking place in both Western Australia and the Northern Territory of crocodile skins for legal sale in Queensland.

246. The species is now regarded as quite rare and many witnesses indicated their belief that the continued survival of the freshwater species is threatened.

247. In view of the evidence submitted, the Committee believes that complete protection is required at least for the present. The Committee recommends:

(a) that the Commonwealth Government convene a meeting of the Fauna Authorities Conference with the aim of having trade in Freshwater crocodile skins or products prohibited for the time being;

(b) that Customs regulations be amended to prohibit the export of the skin or any product made from the Freshwater crocodile.

ILLEGAL TRAFFICKING IN BIRDS

248. A serious problem exists of trafficking in rare and protected Australian birds, particularly parrots.

249. Prevention of such exploitation is confronted with the following problems:

(a) detecting illegal traders.

(b) distinguishing between birds raised in captivity and birds taken in the wild state.

(c) preventing the interstate movement of captive birds under Section 92 of the Constitution.

(d) differing and unco-ordinated State policy and legislation on the subject.

250. The principal problem arises from the existence of aviary stocks of birds. Many of the parrot species now protected were until relatively recently, freely and legally trapped for sale. Widespread trapping is regarded as a major reason why some of the species are now threatened, although destruction of habitat, drought, fire, disease and predators, particularly feral cats, have all played their part in reduction of numbers. Probably some of the species have never existed in large numbers, making them particularly vulnerable.

251. The Commonwealth, through the Department of Customs and Excise controls the export of Australian native animals and birds. The detection of illegal exports, in any form, is a difficult task and it is unlikely that all smugglers are, or ever will be, detected and apprehended. The Department of Customs and Excise has launched some 50 successful prosecutions since 1966. Evidence given to the Committee indicated that attempts to smuggle rare parrots from Australia

will continue due to the high rewards available to successful smugglers—examples of prices in Europe of up to $5,000 or more per pair were cited. A copy of one West German dealer's price list, provided to the Committee by one of the State authorities, showed prices ranging from $1,600 to $2,500 per pair for the rarer Australian parrot species.

252. Some witnesses stated that birds are flown out of northern areas of Australia by light aircraft to Timor and possibly Papua New Guinea.

253. In view of the difficulties of the prevention and detection of illegal trafficking in birds, some suggestions were made by State authorities for relaxation of the more rigid export regulations. This, it was believed, could have the effect of diverting the pressure on rare and threatened species to other species which exist in large numbers—in some cases in pest proportions. For example, the galah, which is an attractive aviary bird, cannot be exported under the present *Customs and Excise (Prohibited Exports) Regulations,* although the bird is a declared vermin species in some parts of Australia.

254. The Hon. T. L. Lewis, MLA, New South Wales Minister for Lands, suggested that if trading were allowed to approved overseas organisations, the need for smuggling may be eliminated. This move would lighten the load on the Department of Customs and Excise and State wildlife authorities. Mr A. M. Olsen, Chairman of an Australian Fauna Authorities Conference Sub-Committee, set up to consider whether birds could be readily and properly exported, indicated that there is a feeling that there should be some relaxation of export restrictions to take the pressure off rarer species. In this context, it was suggested that approval be given by fauna authorities for the export of galahs, swans, and some of the more common birds.

255. The Committee sees some merit in this proposal although it is not convinced that smuggling of the rarer species would cease, particularly as these species are in demand not merely as birds for direct sale but also as sources of new blood for existing aviary bred birds.

256. Apart from smuggling of birds out of Australia, there is also the concurrent problem of trafficking in birds in Australia. The rarer parrot species are all protected in States of origin and trafficking from those States is illegal. However, prevention and detection is difficult. The Committee sees a solution to this problem as being the introduction of uniform regulations for all the States and mainland Territories, prohibiting the keeping of native endangered species in captivity.

257. The Committee therefore recommends:

(a) that Customs regulations be amended to allow for the export of the more common aviary birds;

(b) that the Commonwealth and States enact uniform legislation to prohibit the keeping of rare and endangered bird species, whether aviary bred or not;

(c) that the Commonwealth seek international agreements for the protection of proclaimed rare and endangered bird species by a prohibition of their being held in captivity except in approved zoological gardens.

THE COMMERCIAL EXPLOITATION OF OTHER SPECIES

258. Several other instances of commercial exploitation of wildlife were brought to the attention of the Committee but none of these species appears to be under threat.

259. Green turtles have been reduced in numbers but are now protected in Queensland and in the Northern Territory, although not in Western Australia. CSIRO research has indicated that, if properly managed, the green turtle could be harvested on a permanent renewable basis. The Committee accepts this view.

260. The Short tailed shearwater, or Mutton bird, which migrates annually to the northern hemisphere, is harvested extensively in Bass Strait, but is in no danger of extinction. The harvesting is controlled by the Tasmanian Government and this particular industry was cited frequently in evidence as an excellent example of well-controlled exploitation of a renewable resource.

261. Some possum species are exploited for their skins but evidence indicated that their numbers are being maintained. CSIRO believes that changes due to pastoral and agricultural development have improved the habitat of these species, enabling them to maintain their numbers.

262. Finally, the Committee was advised in Western Australia that attempts are being made to farm emus, in a fashion similar to the way in which ostriches are being farmed in Africa. Emus are farmed for their skins which are tanned into a strong, fine leather, with feathers and meat as by-products. Although this appears to be contradictory since bounties are being paid on wild emus killed in some areas of the State, the skin of wild emus is unsuitable for use. Some selective inter-breeding is necessary in order to obtain skins of suitable quality.

VII. Term of Reference *(e)*

'(*e*) The need for international and interstate agreements for the effective conservation of migratory animals.'

GENERAL

263. The Committee received little evidence which specifically related to this term of reference although a large number of witnesses stated that wildlife does not recognise State boundaries and that it is illogical for different laws to apply to its conservation or exploitation in different areas. The point was made that for any migratory or nomadic species of which a substantial proportion of the population crosses State or national boundaries, the effectiveness of conservation measures taken in one State or country can be undermined by inadequate measures taken elsewhere.

264. The Committee accepts the validity of this view but also recognises that in the Australian situation it is generally accepted that the constitutional power in relation to wildlife rests with the States.

265. The Committee also recognises that different circumstances do exist in the various States and that total uniformity of legislation is not necessarily desirable. There may be benefits in the several different approaches adopted by the States in relation to all aspects of wildlife, in that such different approaches and innovations allow evaluation and comparison of different methods.

266. The Committee further believes that since interstate agreements requiring uniformity of legislation will require the support of all State Governments this may lead to the introduction of legislation acceptable to the least progressive State.

267. The Committee is not aware of any migratory Australian mammal whose effective conservation depends on interstate agreement or common legislation. In general terms witnesses supported the aim of greater uniformity, particularly in relation to species which are regarded as pests.

MIGRATORY BIRDS

268. CSIRO indicated that there are some 530 species of land and freshwater birds in Australia of which 34% are migratory or nomadic.

269. Waterfowl are seen as the migratory group of greatest significance for Australia. The Magpie goose, Cape Barren goose, Freckled duck, Pink-eared duck, Wood duck and Musk duck are all restricted to this continent; the remaining 13 species occur elsewhere.

270. Some of these species form the basis for game shooting in Australia and it is generally accepted that waterfowl numbers are declining as a result principally of habitat loss brought about by swamp drainage, flood mitigation programmes and the like.

271. The Committee is aware that a Committee of the Fauna Authorities Conference concerned with waterfowl has been established but believes further action is necessary.

272. The Committee sees great value in formal agreements being drawn up between the States and Territories to establish common restrictions and controls relating to exploitation. It is even more important that efforts be made to ensure that waterfowl habitat is not destroyed when flood mitigation and drainage programmes are instituted.

273. Some evidence was given of the extent of other forms of migration classified into those involved in trans-equatorial movements, which include some 66 species; in trans-Tasman movements, which include four species; and in what have been termed trans-Southern Ocean movements, which include 19 species of sea birds regularly migrating between Antarctica and Australia. The only species migrating between Australia and any overseas country which was referred to in evidence as being in need of international agreement for its conservation was the Australian (or Japanese) snipe. The bird is fully protected in New South Wales but is hunted in other Australian States. It breeds in Japan and migrates each (Australian) summer to this country.

274. In order to ensure the survival of this species, the Committee believes both international and interstate agreement is necessary. It may be possible for it to remain a game bird but the level of cropping in each State or Nation should be determined by such an agreement.

International Agreements for Migratory Birds

275. Obvious difficulties arise in relation to international agreements in view of the large number of migratory species involved. The Committee regards it as part of Australia's international responsibility to ensure not only that action is being taken in this country but also to demonstrate our concern internationally through the establishment of agreements with other countries.

276. The Committee therefore, as a first step, recommends:

that Australia seek unilateral agreements with the Governments of Papua New Guinea, New Zealand and Japan to conventions for the protection of all birds species which, in the course of their migration, traverse parts of these countries and Australia.

ENDANGERED SPECIES LEGISLATION

277. In 1969 the United States Government introduced an Act aimed, amongst other things, at preventing the importation of endangered species of fish or wild-life into the United States. The endangered species legislation required the United States Secretary of the Interior to develop a list of species which are in danger of world wide extinction and to prohibit their importation and the importation of products made from them into the United States.

278. The legislation which indicates the concern of the United States in wildlife conservation on a global basis is seen by the Committee as being most valuable.

279. The United States list of endangered species[1] numbers 285 species, of which 45 are Australian.

280. The adoption by Australia of the United States list of endangered species would, among other things, prevent the importation into this country of products

[1] The United States list of Endangered Species is included at Appendix VI.

of the major whale species useful to man, those of the Baleen group. The whales are widely regarded as endangered species and it appears improper that Australia does not accept its international conservation responsibilities by refusing to import whale meat which is used in pet food manufacture. The Committee recognises that Australia acting alone would be unlikely to have any great effect on levels of exploitation. However, action by Australia would demonstrate concern and provide moral persuasion to other countries.

281. The Committee believes that enactment of endangered species legislation would encourage the development of international conventions aimed at world wide conservation of all endangered species.

282. The Committee recommends:

that Australia enact legislation to prevent the importation of endangered species of mammals, birds and reptiles or any products made from them, and that, for the present, the list of endangered species adopted by the United States serve as a basis for legislation by Australia.

283. The Committee acknowledges that some provision should exist for the importation of endangered species for scientific, zoological and educational purposes.

VIII. Term of Reference *(f)*

'(*f*) The threat presented to wildlife by the large numbers of domestic animals gone wild, particularly in Northern Australia.'

GENERAL

284. The effect of feral animals, that is to say domestic animals gone wild, is nationwide although their impact varies. The animals which can be classed as feral include cats, dogs, buffalo, cattle, goats, pigs, camels, donkeys and horses. There was some confusion in the evidence as to which animals can be classed as feral. A number of witnesses referred to species as being feral which in fact are exotic or introduced types. These included rabbits, dingos, foxes, deer, non-native rats, cane-toads, birds such as starlings and Indian mynahs, and bees.

285. Evidence was given that the feral species constituting the most serious threat to native fauna and flora are the cat which is distributed throughout Australia, the buffalo in the Northern Territory, the goat and the donkey.

FERAL CATS

286. Although feral cats cause great concern to wildlife conservationists, the evidence showed a wide range of opinion about the damage they cause. Many witnesses regarded the feral cat as a significant predator on small marsupials and ground-nesting birds, but no quantitative evidence could be produced to show the species affected, the extent of their reduction in numbers or whether the threat was increasing or decreasing.

287. The evidence indicated, however, that feral cats occur throughout Australia. They have even been seen in the Simpson Desert and the Great Sandy Desert. Their numbers are believed to have increased considerably in the Northern Territory over the past ten years. All State wildlife authorities considered feral cats to be a serious problem.

288. Feral cats, unlike native fauna are not always entirely dependent on natural food sources. An additional factor which probably increases feral cat numbers is the practice of dumping unwanted cats and kittens in bushland.

289. Witnesses from the Western Australian Department of Fisheries and Fauna and Dr A. E. Newsome of CSIRO expressed the view that the major damage from feral cats may have already occurred and an ecological balance may have been struck. The view was also put that the role of the cat may not have been entirely negative as by predation on young rabbits it may have exercised some control over rabbit population numbers.

290. Shooting, poisoning, trapping, infection with transferable disease, or sterilising agents have all been mentioned as possible means of control, but no method is seen as a solution. Mr Butcher stated that shooting is the only means of eradication and that officers of his department are instructed to kill on sight. Mr C. N. Collard of Leonora, Western Australia, pointed out that at the Ayers Rock-Mount Olga National Park in the Northern Territory, a relatively remote area, the resident ranger shot 180 cats in a little over two years.

291. On the basis of the evidence given, the Committee, while recognising the universal concern in Australia about the effect of feral cats on native wildlife, is unable to see any effective solution to the problem of their control or eradication. At the present time virtually no research has been carried out. Dr D. F. McMichael, Director of the National Parks and Wildlife Service of New South Wales, told the Committee that research on the biology of feral cats and dogs had been recently commenced but as yet had not produced useful results. The Fourth Ministerial Conference on National Parks, held in 1971, recommended to the Commonwealth Government that CSIRO be asked to co-operate in a research programme aimed at the eradication or control of exotic animals, including the feral cat, in national parks. This recommendation had not been accepted as CSIRO does not have resources available for the task.

292. The Committee recommends:

(a) that CSIRO co-operate with the States in a research programme into the biology of feral cats;

(b) that cats living in the wild be regarded in all areas as vermin.

BUFFALOES

293. The buffalo was introduced in small numbers into the Northern Territory between 1824 and 1849. The animal has adapted readily to the specialised environment and the present population is estimated by the Northern Territory Administration to be between 150,000 and 200,000.

294. The animal now represents a dilemma in that it is a valuable economic resource but has adverse effects on the habitat of many native species. The control of the buffalo has proved difficult due to conflicts between the interests of pastoralists, tourist operators and conservation authorities.

295. Economically the buffalo is of increasing value and attempts are being made to develop a buffalo meat industry based on domestication of buffalo herds. The meat is suitable for human consumption and the objective of the industry is to supply export meat markets mainly in Asia.[1]

296. The tourist industry has an interest in retention of the buffalo as it is an important attraction for both sight-seeing tourists and hunters. However, buffaloes have a marked effect on wildlife environment in the Territory because they compete with native wildlife for food and destroy habitat. Feeding and breeding grounds for waterfowl in particular have been affected by buffaloes. Dr B. Hart of the Northern Territory Administration stated that billabongs and water holes in the Woolwonga Sanctuary in the Northern Territory, formerly covered by reeds and large-leafed water lillies, are now almost denuded. Evidence was given that destruction of the plants by buffaloes has contributed to the reduction in numbers of waterfowl and also of fish and other aquatic life.

297. It was stated that in coastal areas buffaloes have formed erosion pads over low dunes adjacent to beaches, allowing saltwater to enter freshwater swamps thus killing all vegetation. Some 60 square miles in the Mary River area are believed to have been affected in this way.

[1] In 1970-71 Australian exports of chilled or frozen buffalo meat totalled 761,336 lbs valued at $209,000. This total represents only about 0.06 per cent of both total weight and total value of Australian meat exports.

298. The Committee recognises that buffaloes present an important tourist attraction and a potentially valuable economic resource.

299. The Committee recommends:

(a) that large game reserves for buffaloes be established for the benefit of hunters and tourists;

(b) that outside the proposed game reserves a policy of control and domestication of buffaloes should be pursued.

FERAL GOATS

300. Feral goats have not been surveyed or studied so no quantitative measure of their effect on wildlife is available.

301. Nevertheless the Committee recognises from the evidence that goats can have a deleterious effect on the habitat of some native species. Emphasis was given in the evidence to the destructive effects of goats on vegetation.

302. South Australia appears to have the greatest problem with feral goats. Mr A. M. Olsen, Director of Fisheries and Fauna Conservation in South Australia, stated that goats do a tremendous amount of damage in parts of the Flinders Ranges. Other witnesses made the same statement with reference to other parts of South Australia. The seriousness of the goat problem is emphasised by the fact that they do best in relatively inaccessible country where it would normally have been expected for the natural habitat to be relatively unaltered and thus of particular significance for wildlife conservation.

303. Dr McMichael noted a problem in New South Wales where 'there are an enormous number of goats in the Western Division area, particularly in the rugged country'. In both South Australia and New South Wales thousands are shot annually but with no noticeable effect on numbers.

304. In other States goats are less of a problem but control is still necessary. They are not considered a problem in the Northern Territory as environmental factors appear to limit their numbers.

305. Goats are easily controlled in accessible areas as they are herded quite easily and can then be transported to abbatoirs for slaughtering.[1] However, their eradication in inaccessible country is very difficult as the only effective means of destroying them is by shooting. If water points are accessible they can be trapped. Water can be poisoned but this has the disadvantage that it is not selective and non-target species may also be killed. The Committee considers this practice to be most unsatisfactory. Farmers and graziers attempt to control numbers on their properties and in South Australia the fauna department has arranged for members of the Sporting Shooters' Association to assist in feral goat destruction in particular areas.

306. The Committee recommends:

that CSIRO co-operate with the States in research into the biology of feral goats.

[1] *In 1970-71 Australian exports of chilled or frozen goat meat totalled 2,001,118 lbs, valued* at $371,000.

OTHER FERAL ANIMALS

307. The evidence on other feral animals such as dogs, pigs, donkeys, camels and horses was given in very general terms. Little quantitative data was available, and only general conclusions may be drawn.

308. The feral pig often causes considerable damage to habitat by rooting up plant life. The Committee saw some examples of severe damage of this kind in various parts of Australia. The pig is also a disease carrier. However, as with the goat, eradication or control would be difficult as shooting appears to be the only practical method of killing pigs.

309. Donkeys and camels are found mainly in parts of the Northern Territory and Western Australia. They cause a variety of damage, for example eating out habitat and damaging the soil surface. The donkey exists in thousands in some parts of northern Australia but camel numbers are not great by comparison. Instances were cited of 15,000 donkeys being killed on one station between 1961 and 1964, and 7,000 in one year on another station. Dr Newsome noted that in 1960 they were more numerous than cattle on Victoria River Station, necessitating a management policy to shoot them out.

GENERAL CONCLUSIONS

310. No methods of elimination or effective control of feral species, except for the buffalo, appear to exist.

311. As little quantitative data exists on the effects of feral animals in Australia, the Committee recommends:

that an intensive research programme be undertaken into the threat presented to wildlife by the large numbers of domestic animals gone wild.

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IX. Term of Reference *(g)*

'(g) The need for a Commonwealth wildlife conservation authority.'

GENERAL

312. The Committee received considerable evidence on this term of reference although it was clear that in most cases detailed consideration of the issues involved had not been made. The principal issues which the Committee sought to resolve were, whether there is a valid case for the creation of a Commonwealth authority and, if so, the functions it should have and the way in which it should be organised.

313. Many witnesses simply supported the idea of a Commonwealth wildlife authority as sound but could offer no real justification for it, and did not offer any ideas about organisation and functions.[1] Some witnesses overlooked the constitutional position and believed that the Commonwealth could arbitrarily assume powers over the whole field of conservation. The Resolution of Appointment, in fact, charges the Committee with the responsibility to

> '. . . recognise the control in these matters exercised by the States and seek their co-operation in all relevant aspects'.

314. Nevertheless many of the witnesses recognised either explicitly or implicitly, that a constitutional problem does exist, and based their submissions accordingly. In these cases the role of the Commonwealth was seen mainly as an agency for co-ordination and financial support, working through existing State departments, authorities and the universities. These bodies were seen to have the knowledge, experience and skill in conservation matters but to lack the necessary backing both to expand the range of their work and to undertake research in greater depth. Where this approach was taken, submissions indicated areas in which the Commonwealth could provide support rather than setting out roles and functions.

315. The main contentions of witnesses who advocated a Commonwealth wildlife authority were that:

(a) Australian flora and fauna do not recognise State boundaries.

(b) Flora and fauna are a national heritage and should be the subject of a single national policy and not of a number of overlapping or conflicting States' policies.

(c) A need exists for national control over the commercial exploitation of wildlife.

(d) Wildlife conservation is part of a much larger national ecological problem in Australia, embracing optimum resource allocation, environmental and pollution control, and the quality of life, as well as conservation of wildlife and the provision of adequate national parks and recreation facilities.

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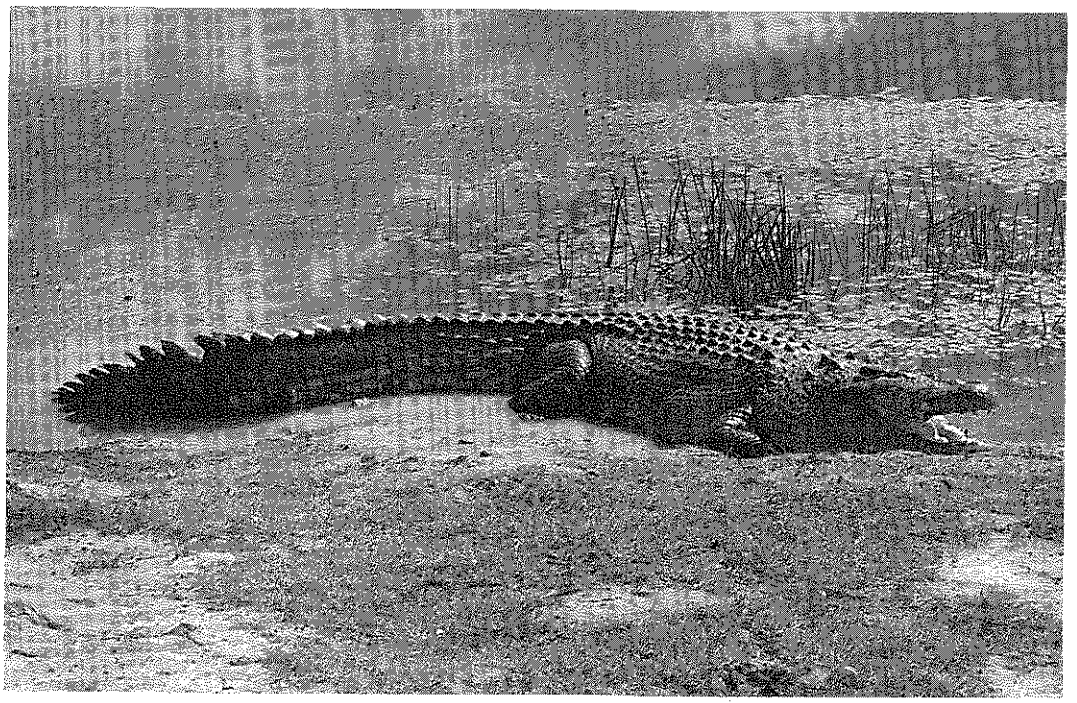
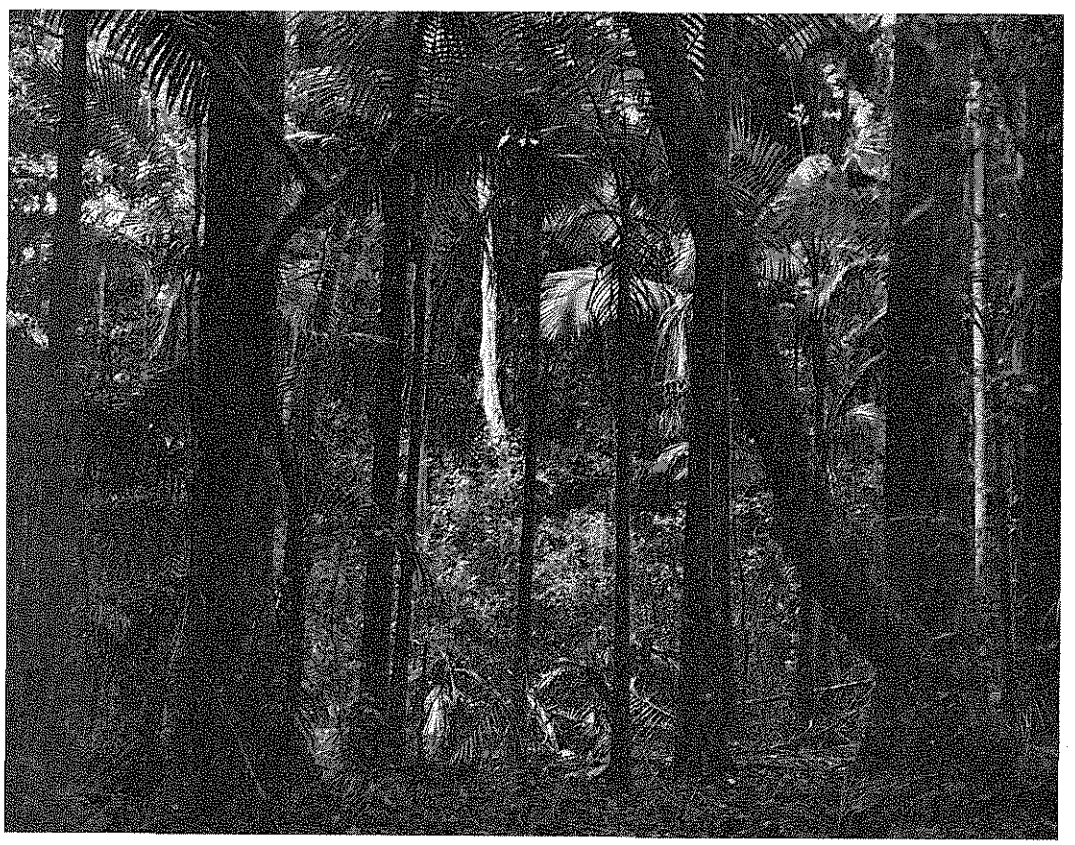
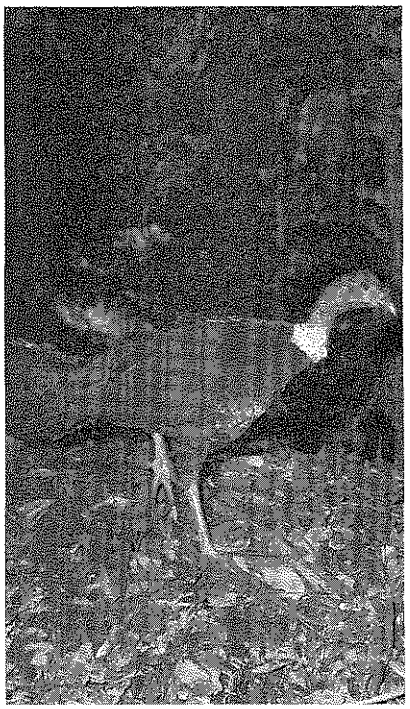
[1] At the time the Committee was established and the bulk of submissions were received, the Department of the Environment, Aborigines and the Arts had not been created. The Committee is aware that had this Department existed at that time the submissions on this term of reference may have had a different emphasis.



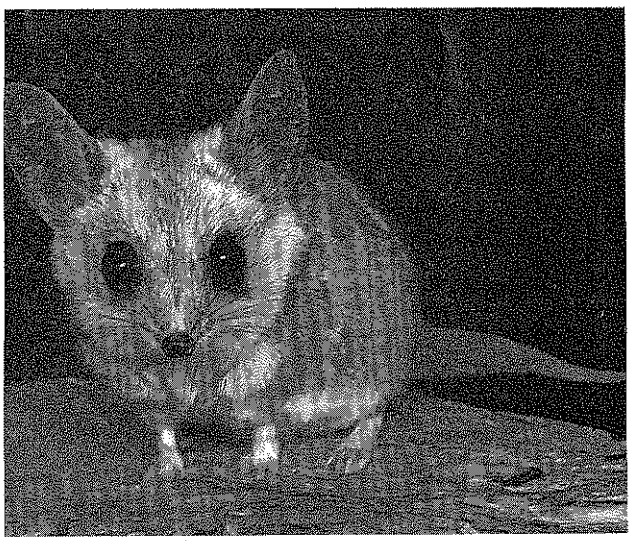
The Saltwater crocodile—its numbers have been seriously depleted through overharvesting



Sub-tropical rainforest—Mt Warning State Park, New South Wales



Scrub turkey



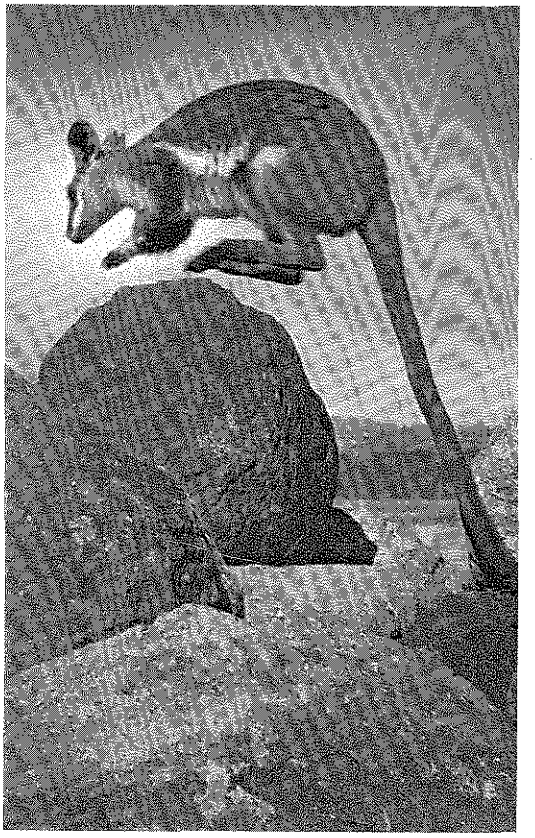
Fat-tailed marsupial mouse

Sugar glider

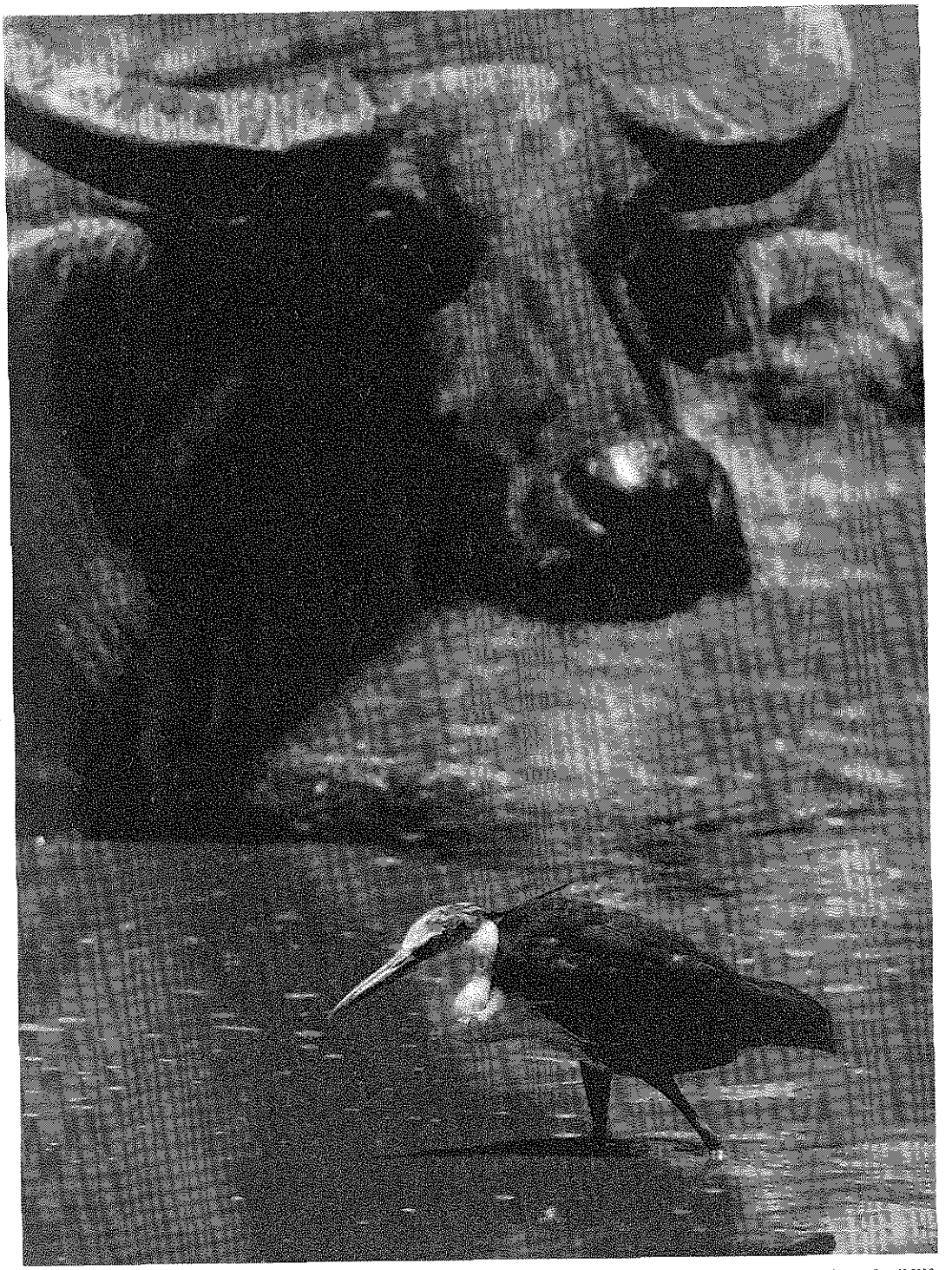
Ring-tailed possum

Northern brush-tailed possum

Wedge tailed eagle—previously believed a serious predator on lambs



Yellow footed rock wallaby



Buffaloes introduced into the Northern Territory in the 19th Century have caused widespread destruction of wildlife habitat—particularly that of waterfowl

316. These propositions were usually expressed as general principles. Most witnesses recognised that the State departments and authorities and the universities are doing a sound job, but saw a lack of resources and co-ordination as a major problem.

317. A number of reasons were advanced against a centralised executive authority. Mr Butcher envisaged problems for the Commonwealth in direct management of national parks and wildlife in the States:

> 'Management means being a landlord and the Commonwealth's role is limited in this respect'.

Mr R. G. Lyons, Director of the National Parks Commission of South Australia, emphasised the same problem:

> 'Since the States control land for national parks and land is the prime requisite it is difficult to see how the Commonwealth could take over as the States would be unlikely to abrogate their lands on a large scale'.

The various State wildlife authorities could see no merit or advantage in transferring control to the Commonwealth, particularly as some said the Commonwealth's conservation record in its own Territories has been poor.

318. Some witnesses held the view that a remote and sole central authority would be too far removed from practicalities in a field where there is a wide and diverse range of problems at the local level. Professor A. R. Main, Professor of Zoology at the University of Western Australia, spoke against an overriding authority that may become a juggernaut, and saw the role of the Commonwealth as being the undertaking of tasks beyond the capacity of the States, together with adding to the resources of the States. Considerable emphasis was given to the existence of a wide range of knowledge and experience in the various State departments and authorities and other institutions. The opinion was that the optimum policy would be to reinforce and expand existing resources rather than create new structures.

319. The evidence suggested a co-ordinated approach by the Commonwealth and the States, with the former providing finance and research support, and with the latter carrying out most of their present functions but on a more extensive and more intensive scale.

320. The form of organisation most commonly proposed was a Commonwealth-States Council, Secretariat or Commission, with a co-ordinating function. The view was expressed widely that a body of this type, backed by Commonwealth funds, would be able to achieve a high degree of uniformity of policy and optimum allocation of resources.

321. The Committee believes that this reinforcing function should be vested in a strong Commonwealth authority as there are a number of requirements which the Commonwealth should carry out for and on behalf of the States. Additionally there is a clear need for the Commonwealth to set its own house in order by transferring national parks and wildlife conservation functions, at present fragmented throughout Commonwealth departments and the Territories' administrations, to such a body.

322. Differing opinions were expressed about the role of the CSIRO Division of Wildlife Research in the event of the Commonwealth establishing a wildlife conservation authority. Some witnesses advocated that an expanded Division of Wildlife

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Research should be developed as the basis of the authority. A number of expert witnesses in State authorities similar to the Division and in the universities expressed some concern that if this occurred the Wildlife Division's research function could be overshadowed by the policy and administration functions of such a wildlife authority.

323. The Committee's view is that any Commonwealth wildlife authority should make the maximum use of existing resources and expertise. It also believes that any Commonwealth wildlife authority should have a strong research capability. For both these reasons it believes the Division of Wildlife Research should be incorporated in any proposed authority.

324. The Committee believes that any proposed Commonwealth authority should work with the States on a joint-responsibility basis and that there should be a policy committee or council consisting of representatives of the Commonwealth, the States and other appropriate institutions to advise on overall policy. Such a council should be representative of both government and wildlife scientists. There is clear need for expert advice from biologists, zoologists and botanists.

325. The Committee envisages a wide range of functions which it believes should properly be undertaken by a Commonwealth body, either because they are of national importance rather than limited to a particular State, or because they are beyond State capabilities.

326. The Committee believes that the logical location for such an expanded Commonwealth scientific, policy and administrative section is within the Environment Division of the Department of the Environment, Aborigines and the Arts.

327. The Committee therefore recommends:

(a) that the Commonwealth establish a wildlife conservation authority and that the CSIRO Division of Wildlife Research be incorporated within the authority. The authority should also incorporate a biological survey (*vide* recommendation 1);

(b) that the role of the proposed Commonwealth wildlife conservation authority include:

(i) responsibility for national parks and for wildlife conservation policy in Commonwealth Territories.

(ii) administration of international agreements on migratory and endangered species;

(c) that the role of the proposed Commonwealth wildlife conservation authority in co-operation with the States include;

(i) initiating and sponsoring national and regional surveys of national park requirements and wildlife populations.

(ii) undertaking research into major problems of conservation beyond State resources.

(iii) establishing guidelines for a co-ordinated approach to conservation, bearing in mind the impact resulting from the usage of natural resources.

(iv) developing uniform policies towards the commercial exploitation of wildlife.

(v) **fostering education on conservation matters, including the establishment of field study centres, through grants to the States for these purposes.**

(vi) **establishing and financing a national institution, for and on behalf of the States and the Commonwealth, to train rangers, wardens and park managers in the management of parks and reserves.**

(vii) **monitoring the status of endangered species.**

(viii) **collating financial requirements of the Commonwealth and the States, and making recommendations to the Commonwealth Government on the optimum levels of financial allocations for conservation.**

X. Miscellaneous Issues

CONTROL OVER FIREARMS

328. In evidence a number of witnesses expressed concern about indiscriminate killing of wildlife by vandal shooters. There was strong criticism of annual drives such as the Avoca wallaby shoot in Tasmania. Concern was also expressed about another category of shooters: migrants who shoot animals and birds for food, although it is recognised that migrants are not given sufficient information about protected, rare or threatened species.

329. No quantitative evidence is available to determine the level of destruction of native fauna caused by the vandal shooter. Accordingly, suggestions to counter indiscriminate shooting called for preventative rather than curative measures and for greater control over the sale and use of firearms. It was suggested there be a requirement for purchasers of firearms to satisfy the authorities of their ability to properly handle these weapons and to identify rare or protected fauna.

330. Opinion was divided as to the best method of firearm control—licensing the weapon or licensing the shooter. Licensing weapons would ensure that ownership would be known but would be insufficient as a control as the weapons may be loaned or borrowed. The alternative would mean the licensed shooters would be known but registers of firearms would be incomplete. Neither suggestion therefore is a complete answer to firearms control. Some States licence both the shooter and his weapons, the licence showing the number and type of firearms owned and their serial numbers. This system achieves effective control in theory but works in practice only if all firearms presently owned are registered. Other States have insufficient control or none at all. A number of witnesses who advocated stricter controls of firearms also suggested that ammunition should be sold only to holders of firearms licences.

331. However, stricter controls over firearms, together with the need to pass identification of species tests, will not necessarily curb the indiscriminate shooter, who lacks the dedication and sense of responsibility of the club sporting shooter who operates within a code of ethics laid down by the various associations. The Committee recognises that indiscriminate shooting puts additional pressure on threatened native species. The Committee favours stricter controls, but recognises that the way to reduce irresponsible shooting is to apprehend offenders. This would be an impossible task without greatly increasing the numbers of local police, rangers and wardens.

332. Another suggestion of firearms control of benefit to conservation would be an excise on firearms and ammunition. The revenue raised could be used for the conservation and management of wildlife resources. The strongest advocates of such an excise were the organised sporting shooting groups. Mr R. P. Steele of the Sporting Shooters' Association of Australia (Victorian Division) advised the Committee that his branch had presented a submission to the Victorian Government seeking the licensing of all shooters for the purpose of raising money for essential wildlife research and management projects. Mr S. R. Fulloon of the Townsville Branch of the Association said that hunters would be willing to pay

for their sport through licence fees and other taxes provided the money collected is spent on fauna conservation and management.

333. The value of financial levies on arms and ammunition (and also on other forms of hunting and fishing equipment) is borne out by the example provided by the United States of America, where a comprehensive Federal-State conservation and management programme for hunters and fishermen is financed largely by taxes levied on sales of equipment. Dr E. L. Kozicky, a world authority on game management, who is employed by the Olin Corporation, outlined the United States practice under the *Pittman-Robertson Federal Aid in Wildlife Restoration Act* 1937, in the case of guns and ammunition, of levying the excise at the point of manufacture. All the moneys collected are allocated back to the States on the basis of a formula related to the land area and the number of hunting licences in each particular State. The funds available are, in fact, greater than the excise collected as the States are required to provide 25% of the funds for each project, and the other 75% is provided by the excise levy.

334. All moneys collected are maintained in a separate fund by the U.S. Treasury and must be used for federally approved wildlife restoration projects. The projects fall into four general classes:

(a) Land purchased for wildlife.
(b) Land development for wildlife.
(c) Investigations and surveys to improve administration of wildlife resources.
(d) Co-ordination of projects necessary to the efficient management of wildlife resources.

335. The Committee recognises that the size of the firearm-owning population of Australia is not large enough for an excise on firearms and ammunition to provide sufficient funds to cover the development of a similar range of projects in Australia. Nevertheless, a proportion of the financial resources required for conservation could be raised in this way.

336. The Committee therefore recommends:

that the Commonwealth levy an excise on firearms and ammunition. All such moneys raised should be specifically devoted to wildlife conservation, and a formula devised for its equitable allocation between the Commonwealth and the States.

FUNDS FOR CONSERVATION

337. From the evidence it is apparent to the Committee that conservation in Australia requires an injection of funds, although the Committee has made no attempt to estimate the total requirement. Financial resources for conservation have been far from adequate and have derived almost entirely from State governments, which have carried out conservation work as best they could from their revenues. It is obvious to the Committee that much more of the community's resources must be allocated to conservation.

338. However, the Committee also believes that the general public should be given the opportunity to become financially committed to wildlife conservation. Mention has been made of the willingness of organised shooting associations

to contribute to conservation and wildlife management. This attitude, of course, is related to one specific area, but the Committee believes that avenues should be open to the public for support of conservation in general. The Committee recommends:

> **that consideration be given by the Commonwealth Government to the introduction of a system of special subscription bonds to finance conservation projects.**

The Committee believes that there would be a favourable response by the public to the floating of interest-bearing Conservation Bonds, similar to bond issues for general revenue purposes.

339. The strength of bond issues of this type would be that funds would be raised for a specific purpose with which the public could identify. Their issue would indicate positive action by governments on conservation problems, and less of an inroad would be made into other revenue resources.

FIELD STUDY CENTRES

340. Field study centres may be described by the definition given in the Australian Conservation Foundation's publication *Establishing Field Studies Centres in Australia:*

> 'Field studies comprise those aspects of biology and earth sciences which require observation and experimental work out of doors. The simplest form of field work is the collection of material (rocks and fossils, soil and water samples, plant and animal specimens) to be taken back to a laboratory for further studies and analysis, but more important is the study of the ecology of organisms and communities in relation to their environment under natural or near-natural field conditions. *Field studies centres* have been set up to facilitate this type of education in the United States, Britain, several European countries, and elsewhere (for example, Uganda). They are designed to stimulate interest and provide instruction in the out-door aspects of geology, botany, zoology, geography, archaeology and related subjects, including studies of landscape and local history.
>
> They supplement the work of schools, universities and adult education centres, and have an important part to play in renewing the interest of people who live and work in urban or suburban surroundings in their rural countryside, its natural resources and the problems of conservation.'

341. A number of centres for field studies exist in Australia, mainly private foundations, and a number are used regularly by school authorities for classes for primary and secondary students. However, there is a need in the present climate of environmental and conservation concern in Australia for the development and use of such centres as an essential element in the educational system. This is not to suggest that field study centres should be completely absorbed into, and confined to, the formal school system. There is a need for public education in the widest sense, and field study centres should be part of the overall structure of conservation embracing national parks, wildlife reserves, pollution control and the quality of life. However, the inclusion of field studies in the formal education system is fundamental to a positive long-term approach to environmental problems.

342. In the United States, Britain and in European countries, field study centres and field study programmes are well established, although the types of centres and programmes vary. Mr Fredine outlined to the Committee the broad principles

followed in the United States where Federal, State and private programmes are being used increasingly to give youth a sense of environmental awareness, although the programmes are not confined to young people.

343. The United States National Parks Service operates two parallel programmes —the National Environmental Educational Development (NEED) programme and the National Environmental Study Areas (NESA) programme which aim at developing attitudes believed to be desirable for future generations with respect to appreciation of the environment and the desire to protect its qualities. Under these programmes national parks and wildlife refuges are used as outdoor laboratories and classrooms. Environmental topics are being studied in their natural context and not under a rigid school curriculum system based on academic subjects. It is noted that many schools, secondary ones in particular, are setting up school study centres in natural surroundings, and these should not be forgotten in any support that is given. The Committee endorses this approach.

344. In England a number of residential field study centres exist in various localities, strategically situated in relation to ecological or geographical areas. These centres cater not only for direct studies by young people from the primary and secondary education sectors, but also for tertiary students. They serve also as training centres for practising or potential teachers. Some centres have been established in African countries but the main emphasis in these centres is directed to the conservation of game animals.

345. Environmental interpretation ranges over a number of fields of study, including biology, botany, geography, geology, zoology and environmental specialities, and the types of field studies themselves vary. A number of submissions included suggestions for more comprehensive conservation education programmes aimed at all levels and age groups in the community. The Committee would emphasise that a system of field study centres geared to the education system is not the sole or complete answer to the need for conservation education.

346. The Gould League of Bird Lovers has worked through schools for most of this century. Schools in many localities use facilities of existing centres, sanctuaries or reserves, or engage in particular environmental programmes such as INSPECT or local anti-pollution campaigns. In Victoria the whole curriculum for fourth year secondary school social studies is devoted to conservation and curricula in other States are developing along similar lines.

347. However, most of the programmes of this type are confined either to areas where suitable study centres exist, or to the curricula for particular years or to particular projects. The basic result of the development and use of field study centres on a national scale is that conservation studies could be a continuous programme through primary, secondary, tertiary and adult education, thus providing education in depth. Education in depth is a major requirement, particularly as concern for conservation and the environment on the present scale is a recent development. Professor C. Manwell, Professor of Zoology at the University of Adelaide, in advocating greater use of studies in field laboratories noted that the greater concern with these problems is found in the younger generations which are creating a demand for proper study facilities. Professor Manwell considered that the need for such facilities now is a reflection of a generation gap, part of

which may be the consequence of lack of concern by older generations for environmental matters. This in turn could be a reason for much of the environmental deterioration which has already taken place. Much of the current demand for greater environmental education facilities could be met by field study centres, which should also include marine science studies.

348. The Australian Conservation Foundation advocates strongly the establishment of such centres and of an Australian Field Studies Council consisting of—

> '. . . representatives of the Commonwealth and State education Departments, the independent schools, the universities, the Australian Conservation Foundation, the Australian Council for Adult Education, and perhaps the National Youth Council of Australia, or similar appropriate body.'

Further recommendations by the Foundation advocate Commonwealth financial grants and Crown land grants for centres by the State Governments, as well as assistance from the general public. This would be in the form of financial assistance, grants in aid, materials, labour and professional advice. Other witnesses advocated a similar approach, particularly the need for Commonwealth finance, as the financial requirements to establish such a system would be beyond the capacity of the States.

349. The Committee supports the concept of field study centres and recommends:

> **that the proposed Commonwealth wildlife conservation authority (*vide* recommendation 30) prepare detailed proposals for Commonwealth involvement in a scheme for field study centres.**

EXPORT OF FAUNA

350. The Committee has made reference elsewhere in this Report to the export of kangaroos and some bird species. It believes that, in view of expert evidence provided to it, reconsideration should be given to the whole issue of live fauna exports.

351. The Committee accepts that it is a proper function of major overseas zoos to display representative species of Australian animals and believes that the measures of control over native fauna exports should recognise that a demand to display such fauna exists in overseas zoos. The Australian Tourist Commission, in a submission to the Committee, suggested that the display of Australian fauna in high standard zoos overseas could play an important indirect role in encouraging tourism.

352. The Department of Customs and Excise assesses the suitability of overseas zoos to receive fauna by applying four tests.

(a) Whether it is a public zoo.

(b) Whether it is suitably equipped to house Australian fauna under proper conditions.

(c) Whether an assurance can be given that the recipient zoo does not engage in commercial trading in fauna.

(d) Whether animals approved for export are surplus stock of an approved Australian zoo and have not been purchased or trapped to meet export orders.

353. The Commonwealth imposes a complete ban on the export of the Lyre bird, platypus and koala.

354. As a matter of practice the bodies recognised by the Department of Customs and Excise as qualified to export native fauna are the 'A Class' zoos, such as the Perth, Adelaide, Sydney and Melbourne Zoos.

355. Fauna for export purposes is divided into the absolutely prohibited species (Lyre bird, platypus and koala) and the remainder which range in status from possibly extinct to pest species. The effect is that species regarded as quite common, for example the Red kangaroo, can only be exported on the same basis as the extremely rare species such as the Yellow-footed rock wallaby. In both instances export will only be permitted for surplus stocks from an approved zoo.

356. The Committee therefore recommends:

that the controls placed on the export of fauna be liberalised by permitting the export to approved overseas zoos of species which are designated as unprotected, pests or vermin by a State fauna authority.

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XI. Wildlife Conservation in Australian Overseas Territories

NORFOLK ISLAND

357. The Committee visited Norfolk Island from 6-8 December 1970, made on site inspections and held discussions with local conservation groups, Councillors and the Administrator. Professor J. S. Turner, Professor of Botany at the University of Melbourne, accompanied the Committee in an advisory role.

358. The visit was prompted by evidence to the Committee that Norfolk Island provides a text book example in microcosm, of the broad and complex problems of conservation including the preservation of wildlife.

359. Norfolk Island has an area of only some 8,000 acres but gives an impression of far greater size and diversity than this. The Island contains 174 species of native plants and a large number of introduced species. There are only 3 native animals: a bat; a gecko; and a turtle; while large numbers of European rats and feral cats exist. Fifty-five species of birds are native to the Island.

360. The view of an Australian Conservation Foundation study by Professor Turner, Mr C. Smithers and Dr R. Hoogland, was that to ensure the survival of all native species the establishment of a nature reserve or national park of about 500 acres within an existing reserve of some 1,000 acres, at Mt Pitt, was necessary.

361. The Committee found that while there was widespread support for the establishment of the national park by no means all the islanders were in favour of it.

362. There was some conflict because the existing reserve is still used for grazing of cattle and other stock. This prevents regeneration of the Norfolk Island pine and other species. Timber cutting and the associated established tracks have adverse effects on native flora and fauna in the reserve.

363. The point was raised that there are a growing number of tourists visiting the island and that a national park would prove a great attraction to them. It would also be of benefit to scientists interested in the unique features of Norfolk Island wildlife. The Committee would warn that with the limited area of such a reserve care should be taken that the number of tourists visiting the reserve does not exceed a level which may cause a deterioration.

364. The existing reserve contains a relatively large area of coastline and a national park would ensure that unplanned development did not take place. This would preserve the coastal area in perpetuity for the island people.

365. Councillors expressed the view that establishment and staffing of a national park would require funds beyond the resources of the island. Because of the extent of grazing by domestic animals in the existing reserve the cost of fencing would be an essential but expensive requirement.

366. The Committee concludes that the establishment of a national park in the Mt Pitt Reserve is desirable and believes that the Commonwealth should provide funds for the purpose.

367. Adjacent to Norfolk Island is Phillip Island which illustrates the effect of feral animals and overgrazing on a restricted ecosystem. Once fertile, it is now almost bare rock with only a few pockets of soil and some slight vegetation supporting a small number of rabbits.

PAPUA NEW GUINEA

368. The Committee visited Papua New Guinea between 17-23 July 1972, during which time extensive discussions were held in Port Moresby, Mt Hagen, Daru, Morehead, Hoskins and Baiyer River and other centres. On site inspections were made of areas of the Territory significant as wildlife habitat or proposed as national parks. The Committee found that wildlife conservation was an extremely important and relevant issue throughout Papua New Guinea chiefly because of the importance of a number of species as sources of food, and as an important aspect of the village economy in some areas.

369. The Committee recognises that wildlife conservation and control of public lands are matters entirely under the control of the Papua New Guinea Government. Prior to making this visit the Committee received the approval of Mr Okuk, the Minister for Agriculture, Stock and Fisheries. The visit was intended largely to indicate the Committee's interest and concern in wildlife conservation issues not only in Australia but also in other areas where Australia presently has administrative responsibilities.

370. While the following comments are offered therefore only as observations, the Committee sees merit in Australia providing funds and technical expertise specifically for wildlife conservation in Papua New Guinea if it is the wish of that country's Government.

The Present Situation

371. The Minister for Agriculture has legislative and administrative responsibility for wildlife conservation. This includes protection, management and research functions. The Minister for Lands and the Environment is responsible for the establishment and maintenance of national parks.

372. The Committee observed that throughout Papua New Guinea a much closer contact between people and wildlife exists than is the case in Australia. This is due to the relatively unaltered wildlife and habitat and the relevance of wildlife to village life.

373. The Committee was frequently advised that a major problem in wildlife conservation is the lack of land available for the establishment of national parks or wildlife reserves due to some 96% of the total land area being held under customary ownership.

374. The traditional attachment to land is seen as a fundamental part of village life, as is the dependence on wildlife. Wildlife has been a source of food and a form of exchange, adornment, and some weapons and implements.

375. Traditionally a form of conservation was practised at village level to curtail hunting of some species and to restrict the gathering of birds' eggs when the need arose.

376. The Committee was informed that the industrial development taking place in Papua New Guinea is leading to habitat destruction. Population growth has also led to increasing demands on wildlife resources as a food source. Commercialisation of the traffic in bird of paradise plumes and other forms of wildlife which are sold at markets in the developing urban areas is adding to the pressures.

377. The introduction and widespread use of shotguns by villagers is seen by many people as a major reason for the decline in wildlife populations.

378. The Committee became aware of very great concern in a number of areas about the disappearance of wildlife. Many local people are still dependent on wildlife either materially for food or spiritually. Some indigines expressed the wish that their land be used specifically for wildlife conservation while preserving their right of traditional usage.

Specific issues arising during the Committee's inspections

379. *Bird of Paradise.* The Bird of Paradise has been adopted by Papua New Guinea as the national emblem and undoubtedly is the form of wildlife for which the country is best known. In the highlands of Papua New Guinea the people have traditionally made use of the plumes of the Bird of Paradise for ceremonial purposes and in their village economy.

380. In recent years the harvest has increased very greatly. The main factors involved are the increased demand and better access by hunters, both indigenous and expatriate, with shotguns.

381. Because of an increasing and more mobile population and a lessening of tribal conflict there is a major internal trade in plumes. Far reaching trade routes, the use of modern shotguns and even the aeroplane facilitate commercial harvesting of the plumes.

382. Due to the clearing of forests by indigenous gardeners there has always been destruction of specialised mountain habitat suitable for certain species of the Bird of Paradise. In recent years this has been accelerated by the construction of roads, forest development and timber extraction. Several species are threatened by this diminishing of habitat.

383. According to the law of the Territory, Birds of Paradise may be hunted only by native people using traditional weapons for traditional purposes. However, with the introduction of sophisticated business methods and facilities, indigenous traders have commercialised the trade in plumes. This is regarded as the greatest threat to the continued supply of plumes of the common Birds of Paradise and the continued existence of certain rarer species.

384. The Committee was told a programme of research, enforcement and habitat reservation is being initiated and that a system of conservation areas for the Birds of Paradise is being considered where traditional hunting may continue but where commercial trading will be prohibited. The view was expressed that difficulty would be experienced in enforcing such a programme.

385. *Megapodes.* Megapodes are large-footed mound-building birds. They are of particular importance in some parts of Papua New Guinea, their eggs being widely used as a source of food by village people. Concern was expressed to the Committee during its visit to New Britain that numbers had declined greatly.

386. The reasons advanced for this were overhunting and overharvesting, and the disappearance of habitat as a result of oilpalm and other agricultural development. Claims were also made that Europeans had overharvested the nesting grounds.

387. One of the important factors to emerge was that even in areas subject to extensive economic development it is still necessary for areas to be retained for wildlife resources within reasonable distance of villages.

388. *Crocodiles.* Both the Saltwater and Freshwater crocodile occur in Papua New Guinea and the rise and decline in the trade of their skins was cited as an example of a potentially valuable element of the indigenous cash economy being severely affected by overexploitation.

389. Crocodile hunting occurs most significantly in the Fly and Sepik river systems and is chiefly carried out by local village people, although in the past expatriate hunters were the dominant factor.

390. In 1958 crocodile exports from Papua New Guinea were valued at $140 thousand. This rose to a peak in 1966 of over $1 million. By 1970 it had declined to $452 thousand.

391. The Committee was informed that while crocodiles in Papua New Guinea are not seen as facing extinction, their numbers have declined greatly.

392. In view of the importance that the crocodile skin industry could have for village economies, and in order to reestablish the industry, the Administration has introduced protective measures.

393. The method adopted has been to ban trading in cocodile skins over 20 inches in belly width, corresponding to a crocodile length of 6-8 feet. This effectively protects breeding crocodiles although there is no ban on killing as such. Some suggestions were made that illegal trafficking in crocodile skins to Australia is taking place.

394. The Wildlife Ecology Section of the Department of Agriculture, Stock and Fisheries is investigating the possibilities of crocodile farming.

395. Conservation of crocodiles is regarded as important to local people as crocodiles provide a source of income, and an attraction to tourists. The Committee commends the efforts to conserve them.

396. *Deer.* A large number of Rusa deer exist in the Western District of Papua New Guinea. These derived from animals released in West Irian from Java.

397. Aerial surveys have indicated densities of over 50 per square mile and research work is being carried out to assess the potential value of deer as a source of food for village people.

Conclusions

398. The Committee in conclusion would restate its view that wildlife conservation is very much a major issue among many local village people because of their wish to ensure the continued survival of species required for food and other purposes.

399. The Committee believes that the Australian Government should provide financial assistance for continued research into the ecology of wildlife and its

conservation and that consideration be given to an agreement between Australia and Papua New Guinea for the conservation of migratory birds moving between the two countries.

CHRISTMAS ISLAND

400. Evidence was given of a number of conservation problems on Christmas Island. Christmas Island is a single uplifted island with a central plateau about 800 feet high. The island was settled at the end of the last century in order to mine phosphate. The mining involves clearing the primaeval rainforest leaving a landscape of barren limestone pinnacles behind. There has been no attempt made to revegetate the worked out mines.

401. Two bird species endemic to the island, the Abbott's booby and the Christmas Island imperial pigeon, are in serious danger of extinction because they depend on tall emergent rainforest trees for nesting. These and some other native species will gradually disappear as more and more of the island is cleared for mining.

402. The Committee believes that sufficient of Christmas Island's natural vegetation should be preserved as will ensure the survival of the endangered species.

XII. Some General Observations on the Inquiry

403. Perhaps the most basic question confronting the Committee when responding to its terms of reference was to consider the question of why conservation of wildlife and habitat which supports it is desirable or necessary. Except in the case of the commercially exploited and game species, wildlife has no economic value except in attracting tourists.

404. However, it is clear that wildlife conservation cannot be looked at in isolation from all the other needs of man and should be practiced in the context of scientific, demographic, cultural, social and economic objectives.

405. It was suggested to the Committee that wildlife conservation is of particular importance because its status and relative importance in any country is an indication of the condition of the human environment. It was also suggested that the effective conservation of man implies the necessity for effective conservation of his environment, one aspect of which is wildlife conservation.

406. Conservation of wildlife is obviously dependent on availability of suitable habitat which in turn requires a knowledge of available land.

407. Land is a dynamic system involving an interplay of the features which comprise it. The nature of the features, including the geology, geography, topography, soil, vegetation and fauna, etc., give character to the land and this has been derived by an interaction between the features over a long period of time.

408. There has been a great tendency in Australia and other countries to emphasise only what might be called the productive aspects of land use. As man has developed, his power to change the land has become greater, his ability to change it quickly has become greater, and as a result changes made are more dramatic and can be more far reaching than previously.

409. Any imposition by man on this system must create change. Wildlife conservation requires maintenance to the greatest extent possible of the natural state of those systems in which native species are one of the significant features.

410. The Committee in the course of its inquiry has become aware of the generally fragmented knowledge of wildlife conservation and matters of the environment generally.

411. It has also realised the extent of environment concern in relation to a wide range of issues not falling within the terms of reference of this Committee.

412. The Committee believes that the Parliament should have a continuing and direct involvement in matters of environmental concern. The Committee therefore recommends:

> **that a Standing Committee of the House of Representatives be established in the new Parliament with powers to inquire into matters of environmental and conservation concern referred to it by the House.**

E. M. C. Fox
Chairman

October 1972

APPENDIX I

LIST OF WITNESSES

ALDEN, Mr A. C. M., Industrial Officer, United Graziers' Association of Queensland.
ALLEN, Mr A. C., Assistant Secretary for Lands, Victoria.
ATKINSON, Mr B. G., General Manager, Australian Tourist Commission.

BAFFSKY, Mr H., Managing Director, Booma Products Limited, Five Dock, New South Wales.
BAILLIE, Mr J. R., Marketing Director, Winchester Australia Pty Ltd.
BAINES, Mr C. C., President, Save the Kangaroo Committee, Queensland; and Vice-President, Fraser Island Defence Organisation, Queensland.
BARTHOLOMAI, Mr A., Director, Museum of Queensland.
BATES, Mr V. W., Council Member, Kangaroo Industries Association of Australia.
BAUR, Mr G. N., Senior Silviculture Research Officer, Forestry Commission of New South Wales.
BENTLEY, Mr A. R., Vice-President, Australian Deerhunters' Association.
BESWICK, Mr G. H., Chairman of Directors, Natural Areas Limited, Sydney.
BIRLEY, Dr E. J. W., President, Save the Kangaroo Committee, Victoria.
BLACKWELL, Mrs M. I., Committee Member, Wildflower Society of Western Australia.
BONYTHON, Mr C. W., President, Nature Conservation Society of South Australia.
BOWEN, Mr B. K., Director of Fisheries and Fauna, Western Australia.
BRADBURY, Mr J. W., Advertising and Sales Promotion Manager, Winchester Australia Pty Ltd.
BREEDEN, Mr R. A., Member, Vasse Conservation Committee; and President, Busselton Wildlife Club, Western Australia.
BRERETON, Professor J. le G., Associate Professor of Zoology, University of New England, New South Wales.
BRETT, Mr B. B., Executive Officer, Agricultural and Veterinary Chemicals Association of Australia.
BRISSENDEN, Mr R. F., President, The South Coast Committee, New South Wales.
BROOKMAN, The Hon. D. N., Member of the Legislative Assembly, South Australia.
BROWN, Mr R. F., Honorary Secretary, South Australian Ornithological Association.
BRYDEN, Dr W., Director, Tasmanian Museum.
BURBIDGE, Dr A. A., Senior Research Officer, Department of Fisheries and Fauna, Western Australia.
BURBIDGE, Dr N. T., Past President, National Parks Association, Australian Capital Territory.
BURRILL, Mr J. N. P., Manager, Rutile and Zircon Development Association Limited, Queensland.
BURT, Mr F. S., Grazier, Carnarvon, Western Australia.
BURTON, Professor J. R., Professor and Head of School of Natural Resources, University of New England, New South Wales.
BUTCHER, Mr A. D., Director, Fisheries and Wildlife Department, Victoria.
BUTLER, Mr W. H., Naturalist, Wanneroo Wild Flower Nursery, Western Australia.
BUTT, Mrs A. H., Frank Daniel Butt Memorial Foundation, Queensland.
BUTT, Mr E. A., Frank Daniel Butt Memorial Foundation, Queensland.

CARMODY, Mr R. J., Assistant Comptroller-General, Department of Customs and Excise, Canberra.
CLARK, Mr G. S., Secretary, Canberra Ornithologists' Group.
CLARK, Mr S. S., Plant Ecologist, The Australian Museum, Sydney.
COLLARD, Mr C. N., Leonora, Western Australia.
CORRELL, Mr R. L., Senior Demonstrator in Botany, James Cook University, Queensland.
COSTIN, Dr A. B., Assistant Chief, Division of Plant Industries, CSIRO.
CROMPTON, Mr A. W., President, Kangaroo Industries Association of Australia.
CULLEN, Mr A. F., Assistant Secretary for Mines, Victoria.
CURTIS, Mr H. S., Officer in Charge, National Parks Section, Forestry Department, Queensland.

DAHL, Professor E., Professor of Botany, Agricultural College of Norway; and Visiting Fellow, Department of Biogeography and Geomorphology, Research School of Pacific Studies, Australian National University, Canberra.
DAVIS, Mr C. H. C., Assistant Secretary, Lands Administration Branch, Lands Division, Department of the Interior, Canberra.
DAY, Dr M. F. C., Executive Member, CSIRO.
DELL, Mr J., Secretary, Western Australian Naturalists' Club.
DIXON, Mr D. McS., Kingscote, Kangaroo Island, South Australia.

DOOHAN, Mr J. J., Treasurer, Graziers' Association of New South Wales.
DORWARD, Dr D. F., Secretary, Australian National Section, International Council for Bird Preservation.
DOW, Dr D. D., Queensland Ornithological Society.
DOWNES, Mr R. G., Chairman, Land Utilisation Advisory Council, Victoria.
DUNK, Mr W. P., Chief Irrigation Officer, State Rivers and Water Supply Commission, Victoria.
DUNPHY, Mr M., Honorary Secretary, The Colong Committee, New South Wales.

EALEY, Dr E. H. M., Senior Lecturer in Zoology, Monash University, Victoria.
EDGERLEY, Mr M. W., Director of Forests, Lands Division, Department of the Interior, Canberra.
ELDRIDGE, Mr S. F., President, Tasmanian Conservation Trust; and Vice President, Science Teachers' Federation of Tasmania.
ELLIOTT, Mr M., Biologist, Lands Division, Department of the Interior, Canberra.
ELLYARD, Dr P. W., Committee Member, Society for Social Responsibility in Science (Australian Capital Territory).
EPPLE, Mr L. V., Brisbane.
EVERSON, Dr R. G., Head of the Department of Biology and Environmental Science, Queensland Institute of Technology.

FENNER, Professor F., Chairman, Fauna and Flora Committee; and Chairman, Standing Committee on National Parks and Conservation, Australian Academy of Science, Canberra.
FERGUSON, Mr B. M., Director, S & J Ferguson Pty Ltd, Homebush, New South Wales.
FESL, Mrs E., Honorary Secretary, Save the Kangaroo Committee, Victoria.
FRANKEL, Sir OTTO, Member, Society for Social Responsibility in Science (Australian Capital Territory).
FREDINE, Mr C. G., Chief of Division of International Affairs, National Parks Service, Department of the Interior, United States of America.
FRITH, Dr H. J., Chief of Division of Wildlife Research, CSIRO.
FULLOON, Mr S. R., Conservation Officer, Sporting Shooters' Association of Australia (Townsville).

GARTRELL, Mr G., Representative, Cave Exploration Group of South Australia.
GASKING, Mr W. R., Curator, Cleland National Park, South Australia.
GILBERT, Dr J. M., Silviculturist, Tasmanian Forests Commission.
GILLIES, Miss A. J., Honorary Secretary, Queensland Naturalists' Club.
GILMOUR, Mr J. R., Former President, Roma Branch, United Graziers' Association of Queensland.
GOLDBERG, Mr C. A., Highett, Victoria.
GOODE, Mr D. W., Vice Chairman, Landscape Planning Commission, International Union for Conservation of Nature and Natural Resources.
GOODING, Mr C. D., Officer in Charge, Vermin Control, Agriculture Protection Board, Western Australia.
GOTHE, Mr J. M., First Assistant Secretary, Department of Trade and Industry, Canberra.
GRAHAM, Mr A. W., University of Queensland Spelaeological Society.
GREGORY, Dr G. C., Kingscote, Kangaroo Island, South Australia.
GRIFFIN, Dr W. J., Convenor, Pesticides Committee, Wildlife Preservation Society of Queensland.
GRIFFITHS, Alderman O. K., Chairman, Town Common Advisory Committee, Townsville City Council.
GUILER, Dr E. R., Department of Zoology, University of Tasmania.

HAMERSLEY, Mrs M. J., Past President, Wildflower Society of Western Australia.
HART, Dr B., Director of Animal Industry and Agriculture, and Statutory Chief Inspector of Wildlife, Northern Territory Administration.
HART, Dr R. J., Section Head, Animal Health, Agricultural Chemicals Division, Ciba-Geigy Australia Limited.
HART, Mr S. B., Director of Planning, State Planning Office of South Australia.
HEAN, Mrs B. M., Member, Lake Pedder Action Committee, Tasmania.
HEINSOHN, Dr G. E., Lecturer in Zoology, James Cook University, Queensland.
HELTON, Mr G., Managing Director, General Wool and Skin Co. Pty Ltd, Brisbane.
HEMSLEY, Mr J. H., Curator of Wildlife, Animals and Birds Protection Board, Tasmania.
HENDERSON, Mr A. G., Managing Director, Australian Koala Bear Manufacturing Company, Botany, New South Wales.
HENRY, Miss J. H., President, National Parks Association, Australian Capital Territory.

HIGGS, Mr H. J., First Assistant Secretary, Office of the Environment, Department of the Environment, Aborigines and the Arts, Canberra.
HOGG, Dr D. McC., Council Member, Federation of Victorian Walking Clubs.
HOWARD, Mr F. J. A., Managing Director, H. Morella Pty Ltd, St Peters, New South Wales.
HUMFRESS, Mr M. E., Director, M. E. Humfress and Co., Ascot, Queensland.
HUMPHREYS, Mrs E. M., Minute Secretary, Wildflower Society of Western Australia.

INGLIS, Dr W. G., Director, South Australian Museum.

JACKSON, Professor W. D., Professor of Botany, University of Tasmania.
JAMES, Dr C. T., Representative, The Field Naturalists' Society of South Australia.
JANES, Mr B. S., Research and Development Manager, Agricultural Chemicals Division, Ciba-Geigy Australia Limited.
JARROTT, Mr J. K., Honorary Secretary, National Parks Association of Queensland.
JENKINS, Mr C. F. H., Acting President, National Parks Board, Western Australia.
JOHNSON, Professor B., Professor of Zoology, University of Tasmania.
JONES, Mrs F. M., Member, Kangaroo Protection Committee, New South Wales.
JONES, Dr R., Member, Lake Pedder Action Committee, Tasmania.

KARTZOFF, Mr M. E., Alderman, Ku-ring-gai Municipal Council, New South Wales.
KENNEDY, Mrs B. E. B., Honorary Secretary, Townsville and District Natural History and Wildlife Preservation Society.
KENNEDY, Mr D. K., President, Townsville and District Natural History and Wildlife Preservation Society.
KENNINGS, Mr A. C. H., Municipal Health Surveyor, Municipality of Ku-ring-gai, New South Wales.
KINCADE, Mr K. F., President, Australian Deerhunters' Association.
KNIGHT, Dr J. O., Councillor, Western Australia Naturalists' Club.
KNOWLES, Miss V. M., Honorary Secretary, The National Trust of Western Australia.
KOZICKY, Dr E. L., Director of Conservation, Winchester-Western Division, Olin Corporation, Illinois, United States of America.

LEE-STEERE, Mr E. H., President, Pastoralists' and Graziers' Association of Western Australia.
LEWIS, The Hon. T. L., MLA, Minister for Lands, New South Wales.
LINDBERG, Mr B. C., President, Western Australian Naturalists' Club.
LITTLEJOHN, Dr M. J., Reader in Ecology, Department of Zoology, University of Melbourne.
LIVANES, Mr T., Miranda, New South Wales.
LONG, Mr J. L., Research Technician, Agriculture Protection Board, Western Australia.
LOTHIAN, Mr J. A., Unley, South Australia.
LUCKMAN, Mrs J. S., Representative, The Hobart Walking Club.
LYONS, Mr R. G., Director, National Parks Commission, South Australia.

MCBRYDE, Mr R. J., Glen Osmond, South Australia.
MACFARLANE, Mr J. D., First Assistant Secretary, Export Inspection Division, Department of Primary Industry, Canberra.
MCKINNEY, Mrs J. A. W., President, The Wildlife Preservation Society of Queensland.
MCMICHAEL, Dr D. F., Director, New South Wales National Parks and Wildlife Services.

MACRAE, Mr E. G., Chairman, Animals and Birds Protection Board, Tasmania.

MAIN, Professor A. R., Professor of Zoology, University of Western Australia; and Member, Western Australian Wildlife Authority.
MANWELL, Professor C., Professor of Zoology, University of Adelaide.
MARKS, Dr E. N., Convenor, Conservation Committee, Australian Entomological Society.
MARTIN, Professor P. G., Professor of Botany, University of Adelaide.
MATHER, Dr P., Honorary Secretary, Great Barrier Reef Committee, Queensland.
MATHEW, Mr J. A., Assistant Town Planner, Townsville City Council.
MATHEWS, Mr G. R., Conservation Officer, Sporting Shooters' Association of Australia (Queensland).
MILES, Mr R. E., Publicity Officer, The South Coast Committee, New South Wales.
MILLS, Mrs M., Member, The Colong Committee, New South Wales.
MILTON, Mrs A. M., Conondale, Queensland.
MOLLISON, Mr B. C., Biologist, South Hobart.
MOORE, Dr B., Section Head, Chemistry Section, Agricultural Chemicals Division, Ciba-Geigy Australia Limited.
MOSLEY, Dr J. G., Assistant Director, Australian Conservation Foundation.
MOULDS, Dr F. R., Director, Forests Commission of Victoria.
MULVIHILL, Senator J. A.

NEWLAND, Mr B. C., Chairman, Roadside Vegetation Sub-Committee of the Fisheries and Fauna Advisory Committee, South Australia.
NEWSOME, Dr A. E., Canberra.

O'BRIEN, Mr E. J., Chief Chemist, Department of Agriculture, Victoria.
O'FARRELL, Mr R., Department of Agriculture, Western Australia.
O'GRADY, Mr W. S., Gordonvale, Queensland.
O'MALLEY, Mr J. E., Maroubra, New South Wales.

OLIVER, Mr A. J., Research Officer in Charge of Mammals and Birds, Agriculture Protection Board, Western Australia.
OLSEN, Mr A. M., Director of Fisheries and Fauna Conservation, South Australia.
ORRELL, Mr J., Smithfield, Queensland.

PAWLOWSKI, Mr R. R., Oxford Park, Queensland.
PETERS, Mr D. E., Committee Member, Canberra Ornithologists' Group.
PIESSE, Mr R. D., Director, Australian Conservation Foundation.
POOLE, Mr A. O., Information Officer, Department of Lands, Surveys and Immigration, Western Australia.
POPHAM, Mr L. R., President, Sporting Shooters' Association of Australia (Townsville).
PRINCE, Mr R. I. T., Research Officer, Marsupials, Department of Fisheries and Fauna, Western Australia.
PROUDLOCK, Mr B. W., Member, Lake Pedder Action Committee, Tasmania.
PROWSE, Mr L. J., Managing Director, Luv Pet Foods Pty Ltd, Rozelle, New South Wales.

QUINLAN, Mr E., Honorary Secretary, Federation of Victorian Walking Clubs.

RECHER, Dr H. F., Head of Department of Environmental Studies, The Australian Museum, Sydney.
RIDE, Dr W. D. L., Director, Western Australian Museum.
RIGGETT, Mr T. L., Senior Research Officer, Department of Fisheries and Fauna, Western Australia.
RITCHIE, Mr J. A., Officer in Charge, Noxious Weed Control, Agriculture Protection Board, Western Australia.
ROBERTSON, Mr D. R., Toowong, Queensland.
ROBERTSON, Mr J. F., Secretary, Gosford District Wildlife Conservation Society, New South Wales.
ROFF, Mr C. R. R., Chief Fauna Officer, Department of Primary Industries, Queensland.
ROLFE, Mrs H. A., Economist, Australian Wool and Meat Producers' Federation.

SANSOM, Mr A. H., Office of Communications, Department of the Interior, United States of America.
SCOTT, Mr K., Fig Tree Pocket, Queensland.
SCOWCROFT, Dr W. R., Member, Society for Social Responsibility in Science (Australian Capital Territory).
SERVENTY, Mr V. N., President, The Wildlife Preservation Society of Australia.
SHARMAN, Professor G. B., Professor and Head of the School of Biological Sciences, Macquarie University, New South Wales.
SHOOBRIDGE, Mr D. W., Director of Parks and Gardens, Lands Division, Department of the Interior, Canberra.
SLATYER, Professor R. O., President, Ecological Society of Australia.
SLOAN, Dr W M., District Health Inspector, Department of Health, Victoria.
SMITH, Dr L. H., Director of National Parks, Victoria.
SMYTH, Dr M., Vice President, Nature Conservation Society of South Australia.
SNELSON, Mr J. T., Pesticides Co-ordinator, Department of Primary Industry, Canberra.
SPRIGG, Mr R. C., Chairman of Directors, Arkaroola Pty Ltd, South Australia.
SPRINGETT, Dr B. P., Member, Landscape and Conservation Committee, National Trust of Western Australia.
STEAD, Mrs T. Y., Vice President, David G. Stead Memorial Wildlife Research Foundation of Australia; and Vice President, Wildlife Preservation Society of Australia.
STEANE, Mr R. W., Honorary Secretary, Phillip Island Promotion Association, Victoria.
STEEL, Mr W. S., Assistant Director, New South Wales National Parks and Wildlife Service.
STEELE, Mr R. P., Secretary, Sporting Shooters' Association of Australia (Victoria).
STEWART, Mr D. W. R., Deputy Conservator of Forests, Western Australia.
STEWART, Mr G. A., Chief of Division of Land Research, CSIRO.
STRAHAN, Mr R., Director, Taronga Zoological Park Trust, New South Wales.
STROM, Mr A. A., President, David G. Stead Memorial Wildlife Research Foundation of Australia.

TALBOT, Dr F. H., Director, The Australian Museum, Sydney.
TAYLOR, Mrs G., President, Victorian National Parks Association.
TAYLOR, Mr P. G., Committee Member, Australian Deerhunters' Association.
TEEDE, Mr B., Kangaroo Chiller Box Operator, Carnarvon, Western Australia.
THOMAS, Mr G. R., Director, J. Harris Pty Ltd, Eastlakes, New South Wales.
THOMAS, Mr I. M., Member, Native Preservation Committee, and Council Member, National Trust of South Australia.
THOMAS, Mr J., Park Superintendent, Townsville City Council.
THOMPSON, Mr T. D., President, Retail Pet Foods Association, New South Wales.
THOMSON, Mrs F. M., Member, Gosford District Wildlife Conservation Society, New South Wales.
TOMLINSON, Mr A. R., Chief Executive Officer, Agriculture Protection Board, Western Australia.
TURNER, Professor J. S., Professor of Botany and Plant Physiology, University of Melbourne.
TYLER, Dr P. A., Botanist, Department of Botany, University of Tasmania.

VANDERMARK, Mr E., Honorary Secretary, The South Coast Committee, New South Wales.

WAINWRIGHT, Mr J., Professional Kangaroo Shooter, Carnarvon, Western Australia.
WALL, Mr L. E., Representative, Tasmanian Field Naturalists' Club.
WALTER, Mr D. A., General Manager, Arkaroola Pty Ltd, South Australia.
WANLISS, Dr M. B., Secretary, Native Fauna Conservation Society, Victoria.
WASHINGTON, Mr G. W., Tourist Development Manager, Australian Tourist Commission.
WATSON, Mr J. E., Secretary/Treasurer, Vasse Conservation Committee, Western Australia.
WEATHERLEY, Mr W. L., Representative, Monash University Conservation Society, Victoria.
WEBB, Dr L. J., Ecologist, Wildlife Preservation Society of Queensland.
WEBB, Professor M. J., Member, Landscape and Conservation Committee, and Council Member, National Trust of Western Australia.
WHEELER, Mr R., Honorary Secretary, The Bird Observers' Club, Victoria.
WILLAN, Mr L., Vice-Chairman, Nature Conservation Council of New South Wales.
WILLIAMS, Mr C. R., Member, Gosford District Wildlife Conservation Society, New South Wales.
WILSON, Miss M. F., Honorary Treasurer, Kangaroo Protection Committee, New South Wales.
WINTER, Mr J. W., Executive Member, The Wildlife Preservation Society of Queensland.
WITTWER, Mr E., Vice-President, Wildflower Society of Western Australia.

APPENDIX II

Reference Material and Selected Exhibits

(i) **Books**

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APPENDIX III

THE COMMONWEALTH OF AUSTRALIA

AUSTRALIAN INSTITUTE OF ANATOMY AGREEMENT ACT 1924-1933.*

An Act to approve an Agreement made between the Commonwealth of Australia and William Colin MacKenzie and for other purposes.

BE it enacted by the King's Most Excellent Majesty, the Senate, and the House of Representatives of the Commonwealth of Australia, as follows:—

Short title.
Short title amended; No. 32, 1918, s. 2.

1. This Act may be cited as the *Australian Institute of Anatomy Agreement Act* 1924-1933.*

Australian Institute of Anatomy.
Sub-section (1.) amended by No. 44, 1931, s. 2.
Sub-section (2.) amended by No. 44, 1931, s. 2.

2.—(1.) There shall be an Australian Institute of Anatomy.

(2.) The Institute shall consist of the specimens and animals referred to in clause one of the Agreement contained in the Schedule to this Act and of such other specimens and animals as the Minister, from time to time, directs shall be included in the Institute.

Amended by No. 44, 1931, s. 2.

(3.) The Institute shall be housed and kept at such place as the Minister, from time to time, directs.

Approval of Agreement.

3. The Agreement made between the Commonwealth of Australia and William Colin MacKenzie (a copy of which Agreement is set forth in the Schedule to this Act) is approved.

Agreements in relation to donations.
Added by No. 12, 1933, s. 2.

4. The Treasurer may enter into an Agreement in regard to any sum of money which may be contributed for any purpose connected with the Australian Institute of Anatomy, and may appoint one or more trustees to secure the accomplishment of the purpose.

* The *Australian Institute of Anatomy Agreement Act* 1924–1933 comprises the *Zoological Museum Agreement Act* 1924, as amended. Particulars of the Principal Act and of the amending Acts are set out in the following table:—

Act.	Year and Number.	Date of Assent.	Date of Commencement.
Zoological Museum Agreement Act 1924	1924, No. 49	20th October, 1924 ..	20th October, 1924
Australian Institute of Anatomy Agreement Act 1931	1931, No. 44	29th October, 1931 ..	29th October, 1931
Australian Institute of Anatomy Agreement Act 1933	1933, No. 12	24th July, 1933 ..	24th July, 1933

THE SCHEDULE.*

THIS INDENTURE made the second day of August One thousand nine hundred and twenty-four BETWEEN THE COMMONWEALTH OF AUSTRALIA (hereinafter referred to as "the Commonwealth") and WILLIAM COLIN MACKENZIE of 612 St. Kilda-road Melbourne in the State of Victoria Doctor of Medicine (hereinafter called "the donor")

Whereas the donor has during many years acquired from time to time and brought together a large number of specimens of the fauna of Australia which collection is now housed in the premises of the donor situated at 612 St. Kilda-road Melbourne in the said State

And whereas the donor has also brought together a number of Australian animals which animals (with the exception of one Tasmanian Tiger or Wolf now housed at the Zoological Gardens at Melbourne aforesaid) are held in captivity by the donor on certain land at Healesville in the said State occupied by the donor by permission of the State of Victoria

And whereas the donor is desirous that the said specimens and animals shall be and remain available for the use of the Commonwealth for purposes of reference and scientific research and shall form the nucleus of a National Museum of Australian Zoology

And whereas the donor is desirous of serving the Commonwealth as Director of the said Museum and the Commonwealth has agreed to appoint the donor as Director aforesaid

NOW THIS INDENTURE WITNESSETH—

1. That in consideration of the premises the donor hereby gives assigns transfers and conveys to the Commonwealth all his right title and interest in and to—

(*a*) the said specimens which said specimens are more particularly described in the book intituled "The Catalogue of the National Museum of Australian Zoology" (which said book is intended to form part and parcel of these presents and has been attested for the purposes of identification by the parties executing these presents);

(*b*) the said animals including the Tasmanian Tiger or Wolf aforesaid; and

(*c*) all buildings fixtures and other erections erected affixed or set up to or upon the said land at Healesville aforesaid

to hold the same to the Commonwealth absolutely.

2. The donor covenants for himself his executors and administrators that until the transfer of the said specimens and animals to the Territory for the Seat of Government of the Commonwealth or until the expiration of three years from the date hereof whichever event shall first happen the donor shall—

(*a*) safely house and exhibit the said specimens at his premises at 612 St. Kilda-road aforesaid or at other premises approved for that purpose

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* The Agreement set out in this Schedule was varied by a further Agreement which was ratified and approved by section 3 of the *Australian Institute of Anatomy Act* 1931. A copy of the varyi Agreement is set out hereunder:—

THIS INDENTURE made the sixteenth day of August One thousand nine hundred and twenty-eight between THE COMMONWEALTH OF AUSTRALIA and WILLIAM COLIN MACKENZIE of 612 St. Kilda Road Melbourne in the State of Victoria. Doctor of Medicine.

WHEREAS this Agreement is supplemental to an Indenture (herinafter referred to as "The Principal Agreement") made the second day of August One thousand nine hundred and twenty-four between the parties hereto and is intended to be annexed thereto AND WHEREAS the parties hereto desire to vary the terms of the Principal Agreement in manner hereinafter appearing—

NOW THIS INDENTURE WITNESSETH—

1. The Principal Agreement is varied in the manner following that is to say—

(*a*) For the words "Minister of State for Home and Territories of the Commonwealth" and "the said Minister" wherever appearing in the body of the Principal Agreement there shall be read the words "the Minister for the time being administering the *Zoological Museum Agreement Act* 1924 and any Act amending or in substitution for the same";

(*b*) For the words "National Museum of Australian Zoology" and "said Museum" wherever appearing in the Principal Agreement whall be read the words "Australian Institute of Anatomy":

2. Subject only to the variations herin contained the Principal Agreement shall remain in full force and effect.

IN WITNESS WHEREOF the Minister of State for Health of the Commonwealth for and on behalf of the Commonwealth and the said William Colin MacKenzie have hereunto set their hands and seals the day and year first above written.

SIGNED SEALED AND DELIVERED by the Honorable Sir Neville Reginald Howse, V.C., K.C.B., K.C.M.G., for and on behalf of the Commonwealth in the presence of— } NEVILLE HOWSE (L.S.)

J. H. L. CUMPSTON

SIGNED SEALED AND DELIVERED by the said William Colin MacKenzie in the presence of— } WM. COLIN MACKENZIE (L.S.)

J. H. L. CUMPSTON

by the Minister of State for Home and Territories of the Commonwealth free of rent or other charges to the Commonwealth;

(*b*) at the expense of the donor safely keep and properly maintain or cause to be safely kept and properly maintained the said ainimals at the places at which same are now respectively confined.

3. The Commonwealth covenants with the donor as follows:—

(*a*) That until the happening of the event mentioned in Clause 2 of this Agreement which shall first happen the expense of keeping and maintaining the said specimens (other than the expense to be borne by the donor as aforesaid) shall be borne by the Commonwealth; and

(*b*) That after the happening of the event mentioned in Clause 2 of this Agreement which shall first happen the whole of the expense of keeping and maintaining the said specimens and the said animals shall be borne by the Commonwealth.

4. The Commonwealth undertakes that it will reserve in the Territory for the Seat of Government of the Commonwealth a site or sites in its opinion suitable for the purposes of the said Museum and will after the transfer of the Seat of Government of the Commonwealth to the said Territory construct at its own expense such buildings and other enclosures as in its opinion are necessary or desirable for the accommodation of the said Museum.

5. The expenses of transporting the said specimens and animals from the premises in which the same are now respectively kept to the said site or sites shall be borne by the Commonwealth.

6. The Commonwealth covenants with the donor that the Commonwealth shall appoint and shall (so long as the donor shall be physically and mentally capable of performing and shall to the best of his ability duly and faithfully perform the duties from time to time allotted to him by the said Minister) retain the donor as Director of the said Museum with the title of Professor of Comparative Anatomy.

7. The donor covenants with the Commonwealth that he will to the best of his ability duly and faithfully perform the duties alloted to him as Director of the said Museum by the said Minister and will at all times permit to the extent to which he may be so required by the said Minister inspection by any person or persons of the said specimens and animals.

8. The Commonwealth agrees to pay to the donor so long as he is performing the duties of Director of the said Museum such allowance for personal expenses incurred by him in connexion with the said Museum as may from time to time be determined by the said Minister but not being less in any case than an allowance at the rate of Six hundred pounds per annum.

9. It is mutually covenanted and declared by and between the parties hereto—

(*a*) That although the specimens and animals are hereby transferred and given to the Commonwealth for the purpose of forming the nucleus of a National Museum of Australian Zoology the said specimens and animals are the property of the Commonwealth absolutely and may be dealt with by the Commonwealth from time to time in such manner as it in its absolute discretion may determine;

(*b*) That this Agreement shall have no force or effect and shall not be binding on the Commonwealth unless and until it is approved by the Parliament of the Commonwealth.

In witness whereof the Minister of State for Home and Territories of the Commonwealth for and on behalf of the Commonwealth and the said William Colin MacKenzie have hereunto set their hands and seals the day and year first hereinbefore written.

Signed sealed and delivered by the Right Honorable George Foster Pearce P.C. the Minister of State for Home and Territories of the Commonwealth for and on behalf of the Commonwealth in the presence of— G. F. PEARCE. (L.S.)

J. F. MURPHY.

Signed sealed and delivered by the said William Colin MacKenzie in the presence of— WM. COLIN MACKENZIE. (L.S.)

L. E. VAIL, Solicitor, Melbourne.

APPENDIX IV

THE PARK AND RESERVE POSITION IN AUSTRALIA (AT 30 JUNE 1972)

The reserves have been divided into Groups A, B, C and D to try to indicate broadly comparable classes throughout Australia. The chief criteria used for the classification are objectives, control, and security of tenure. Although the importance of management is recognised it is too complex a matter to use as a criteria. The criteria used for each class is as follows:

A. Public reserve. Objective is maintenance of the natural state for wildlife and flora conservation; conditions and opportunities for recreation, science and education; control is by central conservation organisations, any change in the status or security of tenure of the reserves requires consent of Parliament.

B. As with A but the status or security of tenure of the reserves can be changed by the Minister or Department responsible for them.

C. Public reserve, sanctuary, or Aboriginal reserve controlled or partly controlled by government or local government body other than those concerned with wildlife conservation.

D. Reserves or sanctuaries on private land.

State/Territory	Type of Park or Reserve	Number of Units	Area (acres)	Percentage of State/ Territory (discrepencies) due to rounding)
New South Wales	A. 1. National and State Parks .	31	2,818,251	1.42
	2. Nature Reserves . . .	84	581,669	0.29
	3. Game Reserves . .	2	6,192	0.00
	4. Flora Reserves (on Crown land) (Forestry Act)	16	13,196	0.01
			TOTAL 3,419,308	1.73
	B. Forest Preserves . .	88	19,838	0.01
	D. 1. Game Reserves (private land)	20	311,107	0.16
	2. Wildlife Refuges (private land)	299	3,150,299	1.59
Victoria . .	A. National Parks . .	24	507,248	0.90
	B. 1. Wildlife Reserves . .	35	130,730	0.23
	2. Areas set aside under S.50 of Forestry Act	100	91,216	0.16
	C. Sanctuaries on public land (except those in other categories already included)	70	105,646	0.19
Queensland .	A. National Parks . .	284	2,563,225	0.60
	B. 1. Fauna Reserves . . .	2	73,980	0.02
	2. Other Fauna Sanctuaries under sole control of the Department of Primary Industry	3	21,577	0.01
	3. Fisheries Habitat Reserves	12	About 70,000	0.02

State/Territory	Type of Park or Reserve	Number of Units	Area (acres)	Percentage of State/ Territory (discrepencies due to rounding)
Queensland—*cont.*	C. 1. Sanctuaries on Public Land (except in other categories)	94	642,555	0.15
	2. All Islands . . .	Not known	Not known	..
	3. State Forests . . .	459	7,717,570	1.81
	D. 1. Sanctuaries on Private Land	191	5,537,251	1.30
	2. Sanctuaries—Atherton Tablelands, Brisbane, Nambour–Gympie, Toowoomba districts (complex tenure)	4	5,650,423	1.32
Western Australia	A. 1. 'A' Reserves vested in National Parks Board of W.A.	Mixed tenure *see* below	3,409,258	0.55
	2. 'A' Reserves vested in Western Australia Wildlife Authority and Minister of Fisheries and Fauna	65	9,454,537 (plus 3 unsurveyed groups of islands)	1.51
			TOTAL 12,863,795	2.06
	B. 1. Other Reserves vested in National Parks Board of W.A.	..	200,581	0.03
	Total number of areas controlled by National Parks Board	56	..	..
	2. Other Reserves vested in Western Australia Wildlife Authority and Minister of Fisheries and Fauna	182	1,750,476	0.28
	C. Other fauna sanctuaries (dual control with other bodies)	157	1,341,083 includes 17 'A' class reserves)	0.21
South Australia .	A. 1. National Parks . .	8	439,478	0.18
	2. Conservation Parks .	126	8,329,400	3.42
	3. Recreation Parks . .	15	6,177	..
	4. Game Reserves . .	6	33,228	0.01
			TOTAL 8,808,283	3.62
	B. 1. Natural Forest Reserves .	7	3,698	..
	2. Aquatic Reserves . .	6	4,230	..
	C. Sanctuaries on Public Land (except other categories)	*See* below	303,782	0.12
	D. Sanctuaries on Private Land	*See* below	1,888,150	0.78
	Total Number of Sanctuaries	145		

State/Territory	Type of Park or Reserve	Number of Units	Area (acres)	Percentage of State/ Territory (discrepencies) due to rounding)
Tasmania . .	A. State Reserves . .	85	1,050,442	6.22
	C. Conservation Areas on Public Land (including some minor private areas)	56	1,258,268	7.45
	D. Conservation Areas on Private Land (including some minor public areas)	18	12,943	0.08
NorthernTerritory	A. 1. Reserves under control of N.T. Reserves Board	38	569,000	0.17
	2. Sanctuaries under control of Chief Inspector of Wildlife	2	9,747,200	2.93
			TOTAL 10,316,200	3.10
	C. 1. Sanctuaries under control of Director of Wildlife	3	1,404,800	0.42
	2. *Wildlife Protected Areas* within Aboriginal Reserves	*14*	68,773,817	*20.65*
	D. Wildlife Protected Areas on Private Land	5	38,462	0.01
Australian Capital Territory	B. Public Parks and Recreation Reserves	3	35,080	5.84
Australia . .	TOTAL GROUP A . .	..	39,524,745	2.08

APPENDIX V

THE PESTICIDES BRANCH OF THE DEPARTMENT OF PRIMARY INDUSTRY

The Co-ordinating Committee on Pesticides and Its Functional Sub-Committees

The States have a constitutional responsibility for matters relating to agriculture. The Pesticides Branch of the Department of Primary Industry which was established in 1967, acts as a central authority for the co-ordination and stimulation of Australian activities associated with the usage of pesticides.

The functions of the Pesticides Branch are as follows:

1. Commonwealth policy on pesticide problems as they affect the production and marketing of Australian food products including co-operation and liaison with State Departments on agricultural practices relevant to the protection of Australian marketing interests.
2. Initiation of projects and collation of information to ensure effective Australian participation in the activities of F.A.O. and the FAO/WHO Codex Alimentarius Commission on the establishment of tolerances for pesticide residues.
3. Examination of trends in Australia and overseas developments with implications for Australian export industries, preparation of reports and recommendations on matters involving joint Commonwealth-State action for consideration by the Australian Agricultural Council.
4. Servicing of Commonwealth/State Committees in the pesticide field established by the Australian Agricultural Council or other authority.
5. Liaison and co-operation with Committees of the National Health and Medical Research Council concerned with pesticide residues in food, the scheduling and labelling of pesticides, and the occupational health aspects of pesticides.
6. Provision of a central information service for obtaining and distributing information on pesticides from overseas and Australian sources.
7. Organise and stimulate investigational and research work arising out of the preceding functions.
8. Liaison with Commonwealth and State Health Departments generally.
9. Encourage the establishment of representative inter-departmental committees in States and Territories of the Commonwealth.

Although the Constitution does not allow for a single Federal authority to bring about uniformity in State legislation concerning pesticides, there is a Co-ordinating Committee on Pesticides with three functional sub-committees: The Pesticides Sub-Committee, the Technical Committee on Agricultural Chemicals and the Technical Committee on Veterinary Drugs.

(i) *The Pesticides Sub-Committee*

This Committee is composed of members of the Co-ordinating Committee on Pesticides (who are nine Commonwealth and State Government specialists in nine relevant fields) together with representatives of each State, the Department of Customs and Excise, the Department of the Interior (A.C.T. Branch), the Department of the Interior (N.T. Branch), the Australian Meat Board and the Australian Dairy Produce Board.

The terms of Reference of this Sub-Committee are:

1. To consider problems arising from the use of pesticides in agriculture and animal husbandry;
2. To report on investigations conducted to determine the level, source and fate of residues in agricultural commodities and animal products;
3. To recommend investigational programmes to evaluate pesticide residues in primary produce;

4. To advise Co-ordinating Committee on matters concerning the use, registration and effect of pesticides, stock feeds and stock medicines in the field of residues, resistance and adverse side effects.

(ii) *The Technical Committee on Agriculture*

This Committee consists of senior officers representing each State and the National Health and Medical Research Council under the Chairmanship of the Department of Primary Industry.

The Northern Territory and Papua New Guinea do not have their own registration authority and do not have corporate membership but they provide corresponding members who receive all information circulated to the Committee and are free to comment on any matters which may be of particular interest to them.

The recommendations of the Committee are usually applied by the States.

The responsibilities of the Technical Committee on Agricultural Chemicals are:

1. To receive submissions and to consider all proposals for the use of new chemicals;
2. To evaluate possible implications of such use in Australia;
3. To evaluate the agricultural and ecological hazards and to recommend precautions in accordance with good agricultural practices and to fix withholding periods appropriate to specific applications;
4. To refer to National Health and Medical Research Council Committees, where appropriate, data for determination of:
   (a) poison schedule classification
   (b) acceptable residue tolerance in specific commodities;
5. To make recommendations to State authorities in respect to the registration of agricultural chemicals.

(iii) *Technical Committee on Veterinary Drugs*

This Committee consists of senior officers representing each State and the National Health and Medical Research Council under the Chairmanship of the Department of Primary Industry. Its responsibilities are:

1. To make recommendations as to what should be added and to what levels, to stock feeds;
2. To receive submissions and to consider proposals for the use of new feed additives and new stock medicines such as dips, sprays, dusts and anthelmintics for the mass medication of farm animals including poultry;
3. To evaluate the possible implications of such use in Australia;
4. To evaluate hazards to operators, livestock and consumers of animal products, to recommend precautions in accordance with good husbandry and good agricultural practice and to recommend withholding periods appropriate to specific applications;
5. To refer to National Health and Medical Research Council Committees, where appropriate, date for recommendation of:
   (a) poison schedule classification
   (b) acceptable residue tolerance in animal products;
6. To make recommendations to State authorities in respect to registration of veterinary drugs.

APPENDIX VI

U.S. LIST OF ENDANGERED FOREIGN FISH AND WILDLIFE

The list of endangered foreign fish and wildlife has been compiled from data supplied by international conservation organizations, foreign fish and wildlife agencies, individual scientists, and trade sources. If a candidate species is not listed, it may be because it is not endangered throughout its range or because there is insufficient evidence to warrant its inclusion on the list at this time. The list is under continual review. Factual data are welcome and should be submitted. The "Where found" column is a general guide to the native countries or regions where the named animals are found. It is not intended to be definitive. The use of a trinominal (third name) in the Scientific Name indicates there are one or more subspecies of the animal which are not endangered.

MAMMALS

Common name	Scientific name	Where found
Southern planigale	*Planigale tenuirostris*	Australia.
Little planigale	*Planigale subtilissima*	Do.
Dibbler	*Antechinus apicalis*	Do.
Large desert marsupial-mouse	*Sminthopsis psammophila*	Do.
Long tailed marsupial-mouse	*Sminthopsis longicaudata*	Do.
Eastern jerboa-marsupial	*Antechinomys laniger*	Do.
Tasmanian tiger	*Thylacinus cynocephalus*	Do.
Rusty numbat	*Myrmecobius fasciatus rufus*	Do.
Barred bandicoot	*Perameles bougainville*	Do.
Rabbit-bandicoot	*Macrotis lagotis*	Do.
Lesser rabbit-bandicoot	*Macrotis leucura*	Do.
Pig-footed bandicoot	*Chaeropus ecaudatus*	Do.
Mountain pigmy-possum	*Burramys parvus*	Do.
Scaly-tailed possum	*Wyulda squamicaudata*	Do.
Barnard's wombat	*Lasiorhinus barnardi*	Do.
Brush-tailed rat-kangaroo	*Bettongia penicillata*	Do.
Lesueur's rat-kangaroo	*Bettongia lesueur*	Do.
Queensland rat-kangaroo	*Bettongia tropica*	Do.
Plain rat-kangaroo	*Caloprymnus campastris*	Do.
Banded hare-wallaby	*Lagostrophus fasciatus*	Do.
Western hare-wallaby	*Lagochectes hirsutus*	Do.
Bridled nail-tail wallaby	*Onychogalea frenata*	Do.
Crescent nail-tail wallaby	*Onychogalea lunata*	Do.
Parma wallaby	*Macropus parma*	Do.
Cuban solenodon	*Atopogale cubana*	Cuba.
Haitian solenodon	*Solenodon paradoxus*	Dominican Republic.
Lemurs—all species	Lemuridae, all members of the genera *Lemur, Hapalemur, Lepilemur, Cheirogaleus, Microcebus, Phaner.*	Madagascar and Comoro Islands.
Indris, sifakas, avahis—all species	Indriidae, all members of the genera *Indri, Avahi, Propithecus.*	Do.
Aye-aye	*Daubentonia madagascariensis.*	Madagascar.
Spider monkey	*Ateles geoffroyi frontatus*	Costa Rica, Nicaragua.
Do	*Ateles geoffroyi panamensis*	Costa Rica, Panama.
Red-backed squirrel monkey	*Saimiri oerstedii (Saimiri sciureus oerstedii)*	Do.
Woolly spider monkey	*Brachyteles arachnoides*	Brazil.
White-nosed saki	*Chiropotes albinasus*	Do.
Uakari—all species	*Cacajao* spp	Peru, Colombia, Venezuela, Brazil, Ecuador.

Common name	Scientific name	Where found
Goeldi's marmoset	*Callimico goeldii*	Brazil, Colombia, Ecuador, Peru.
Golden-rumped tamarin, golden-headed tamarin, golden lion marmoset	*Leontideus* spp	Brazil.
Lion-tailed macaque	*Macaca silenus*	India.
Tana River mangabey	*Cercocebus galeritus galeritus*	Kenya.
Douc langur	*Pygathrix nemaeus*	Indochina (Hainan Island), China.
Pagi Island langur	*Simias concolor*	Indonesia.
Red colobus	*Colobus badius rufomitratus*	Kenya.
Zanzibar red colobus	*Colobus badius kirkii*	Zanzibar (Tanzania).
Kloss' gibbon	*Hylobates klossi*	Indonesia.
Pileated gibbon	*Hylobates pileatus*	Laos, Thailand, Cambodia
Orangutan	*Pongo pygmaeus*	Indonesia, Malaysia, Brunei.
Gorilla	*Gorilla gorilla*	Central and Western Africa.
Brazilian three-toed sloth	*Bradypus torquatus*	Brazil.
Pink fairy armadillo	*Chlamyphorus truncatus*	Argentina.
Volcano rabbit	*Romerolagus diazi*	Mexico.
Mexican prairie dog	*Cynomys mexicanus*	Do.
False water-rat	*Xeromys myoides*	Australia.
New Holland mouse	*Pseudomys novaehollandiae*	Do.
Shark Bay mouse	*Pseudomys praeconis*	Do.
Shortridge's mouse	*Pseudomys shortridgei*	Do.
Smoky mouse	*Pseudomys fumeus*	Do.
Western mouse	*Pseudomys occidentalis*	Do.
Field's mouse	*Pseudomys fieldi*	Do.
Thin-spined porcupine	*Chaetomys subspinosus*	Brazil.
Bowhead whale	*Balaena mysticetus*	Oceanic.
Right whale	*Eubalaena spp*	Do.
Blue whale	*Balaenoptera musculus*	Do.
Sperm whale	*Physeter catodon*	Do.
Finback whale	*Balaenoptera physalus*	Do.
Sei whale	*Balaenoptera borealis*	Do.
Humpback whale	*Megaptera* spp	Do.
Gray whale	*Eschrichtius gibbosus*	Do.
Northern kit fox	*Vulpes velox hebes*	Canada.
Asiatic wild dog	*Cuon alpinus*	U.S.S.R., India (Central and Southeast Asia).
Mexican grizzly bear	*Ursus arctos nelsoni*	Mexico.
Formosan yellow-throated marten	*Martes flavigula chrysospila*	Formosa.
Black-footed ferret	*Mustela nigripes*	United States, Canada.
Cameroun clawless otter	*Paraonyx microdon*	Cameroons.
La Plata otter	*Lutra platensis*	Uruguay, Argentina, Bolivia, Brazil.
Maned wolf	*Chrysocyon brachyurus*	Brazil, Bolivia, Paraguay, Argentina.
Giant otter	*Pteronura brasiliensis*	South America.
Barbary hyaena	*Hyaena hyaena barbara*	Morocco.
Brown hyaena	*Hyaena brunnea*	Southern Africa.
Asiatic cheetah	*Acinonyx jubatus venaticus*	U.S.S.R., Afghanistan, Iran, Pakistan (formerly India, Iraq, and Saudi Arabia).
Spanish lynx	*Felis lynx pardina*	Spain.
Barbary serval	*Felis serval constantina*	Algeria.
Formosan clouded leopard	*Neofelis nebulosa brachyurus*	Formosa.
Asiatic lion	*Panthera leo persica*	India.

Common name	Scientific name	Where found
Sinai leopard	*Panthera pardus jarvisi*	Sinai, Saudi Arabia.
Barbary Leopard	*Panthera pardus panthera*	Morocco, Algeria, Tunisia.
Anatolian leopard	*Panthera pardus tulliana*	Lebanon, Israel, Jordan, Turkey, Syria.
Bali tiger	*Panthera tigris balica*	Bali (Indonesia).
Javan tiger	*Panthera tigris sondaica*	Indonesia.
Caspian tiger	*Panthera tigris virgata*	Russia, Afghanistan, Iran.
Sumatran tiger	*Panthera tigris sumatrae*	Indonesia.
Mediterranean monk seal	*Monachus monachus*	Mediterranean, Northwest African coast, and Black Sea.
Dugong	*Dugong dugon*	East Africa to Ryukyu Islands.
West Indian (Florida) manatee	*Trichechus manatus*	Caribbean, northern South America.
Amazonian manatee	*Trichechus inunguis*	Amazon Basin.
Asian wild ass	*Equus hemionus*	Pakistan, Iran, India, China, Afghanistan, Central Asia.
African wild ass	*Equus asinus*	Ethiopia, Somalia, Sudan.
Mountain tapir	*Tapirus pinchaque*	Colombia, Ecuador, Peru.
Brazilian tapir	*Tapirus terrestris*	Venezuela, Argentina, Brazil, Colombia.
Central American tapir	*Tapirus bairdii*	Southern Mexico to Columbia and Ecuador.
Sumatran rhinoceros	*Didermoceros sumatrensis*	Southeast Asia—East Pakistan to Vietnam to Indonesia, Borneo.
Javan rhinoceros	*Rhinoceros sondaicus*	Indonesia, Burma, Thailand.
Great Indian rhinoceros	*Rhinoceros unicornis*	India, Nepal.
Northern white rhinoceros	*Ceratotherium simum cottoni*	Congo (Kinshasa), Uganda, Sudan, Central African Republic.
Pygmy hog	*Sus salvanius*	India, Nepal, Bhutan, Sikkim.
Vicuna	*Vicugna vicugna*	Peru, Bolivia, Argentina.
Swamp deer	*Cervus duvauceli*	India, Nepal.
Kashmir stag, hangul	*Cervus elaphus hanglu*	Kashmir.
Barbary stag	*Cervus elaphus barbarus*	Tunisia, Algeria.
McNeill's deer	*Cervus elaphus macneilli*	China, Tibet.
Shou	*Cervus elaphus wallichi*	Tibet, Bhutan.
Brow-antlered deer, Eld's deer	*Cervus eldi*	India, Southeast Asia.
Persian fallow deer	*Dama dama mesopotamica*	Iraq, Iran.
Bawean deer	*Helaphus kuhli* (*Cervus kuhli*)	Indonesia.
Marsh deer	*Blastocerus dichotomus*	Argentina, Uruguay, Brazil, Paraguay.
Sonoran pronghorn	*Antilocapra americana sonoriensis*	Mexico, United States.
Black-faced impala	*Aepyceros melampus petersi*	Southwest Africa, Angola.
Swayne's hartebeest	*Alcelaphus buselaphus swaynei*	Ethiopia.
Anoa	*Anoa depressicornis*	Indonesia.
Tamaraw	*Anoa mindorensis*	Philippines.
Wood bison	*Bison bison athabascae*	Canada.
Seladang (gaur)	*Bos gaurus*	India, Southeast Asia, East Pakistan.
Wild yak	*Bos grunniens mutus*	Tibet, India.
Kouprey	*Bos sauveli*	Cambodia.
Banteng	*Bibos banteng*	Southeast Asia.
Pyrenean ibex	*Capra pyrenaica pyrenaica*	Spain.
Walia ibex	*Capra walie*	Ethiopia.
Rio de Oro dama gazelle	*Gazella dama lozanoi*	Spanish Sahara.
Mhorr gazelle	*Gazella dama mhorr*	Morocco.

Common name	Scientific name	Where found
Moroccan dorcas gazelle	*Gazella dorcas massaesyla*	Morocco, Algeria.
Cuvier's gazelle	*Gazella cuvieri*	Morocco, Tunisia.
Slender-horned gazelle, Rhim, Loder's gazelle	*Gazella leptoceros*	Sudan, Algeria, Egypt, Libya.
Black lechwe	*Kobus leche smithemani*	Zambia.
Arabian Oryx	*Oryx leucoryx*	Arabian Peninsula.
Clark's gazelle, dibatag	*Ammordoreas clarkii*	Somalia, Ethiopia.

BIRDS

Galapagos penguin	*Spheniscus mendiculus*	Galapagos.
Arabian ostrich	*Struthio camelus syriacus*	Jordan or Saudi Arabia.
West African ostrich	*Struthio camelus spatzi*	Spanish Sahara.
Darwin's rhea	*Pterocnemia pennata*	Argentina, Peru, Uruguay, Bolivia.
Atitlan grebe	*Podilymbus gigas*	Guatemala.
Short-tailed albatross	*Diomedea albatrus*	Japan.
Cahow	*Pterodroma cahow*	Bermuda.
Brown pelican	*Pelecanus occidentalis*	Mexico, United States, Panama, Puerto Rico, etc.
Chinese egret	*Egretta eulophotes*	China, Korea.
Oriental white stork	*Ciconia ciconia boyciana*	Japan, Korea, China, U.S.S.R.
Japanese crested ibis	*Nipponia nippon*	Japan, Korea, U.S.S.R., China.
Aleutian Canada goose	*Branta canadensis leucopareia*	Japan, United States.
White-winged wood duck	*Cairina scutulata*	India, Thailand, Malaysia, Burma, Indonesia (to include Java).
American peregrine falcon	*Falco peregrinus anatum*	Canada, United States, Mexico.
Arctic peregrine falcon	*Falco peregrinus tundrius*	Do.
Christmas Island goshawk	*Accipiter fasciatus natalis*	Christmas Island (Indian Ocean).
Anjouan Island sparrow hawk	*Accipiter francesii pusillus*	Comoro Islands.
Galapagos hawk	*Buteo galapagoensis*	Galapagos.
Monkey-eating eagle	*Pithecophaga jefferyi*	Philippines.
Spanish imperial eagle	*Aquila heliaca adalberti*	Spain, Morocco, Algeria.
Grenada hook-billed kite	*Chondrohierax uncinatus mirus*	Grenada (West Indies).
Cuba hook-billed kite	*Chondrohierax wilsonii*	Cuba.
Andean condor	*Vultur gryphus*	Colombia to Chile, Argentina.
Seychelles kestrel	*Falco araea*	Seychelles.
Mauritius kestrel	*Falco punctatus*	Mauritius.
Horned guan	*Oreophasis derbianus*	Guatemala, Mexico.
Trinidad white-headed curassow	*Pipile pipile pipile*	Trinidad.
Red-billed curassow	*Crax blumenbachii*	Brazil.
La Perouse's megapode	*Megapodius la perouse*	Palau, Marianas.
Maleo	*Macrocephalon maleo*	Celebes (Indonesia).
Masked bobwhite	*Colinus virginianus ridgwayi*	United States, Mexico.
White-eared pheasant	*Crossoptilon crossoptilon*	China, Tibet, India.
Brown-eared pheasant	*Crossoptilon mantchuricum*	China.
Chinese monal	*Lophophorus lhuysii*	Do.
Sclater's monal	*Lophophorus sclateri*	China, Burma, India.
Edward's pheasant	*Lophura edwardsi*	South Vietnam.
Imperial pheasant	*Lophura imperialis*	Vietnam.
Swinhoe's pheasant	*Lophura swinhoii*	Formosa.
Papawan peacock pheasant	*Polyplectron emphanum*	Philippines.
Mikado pheasant	*Syrmaticus mikado*	Formosa.
Bar-tailed pheasant	*Syrmaticus humiae*	Burma, China.
Blyth's tragopan	*Tragopan blythii*	Burma, China, India.
Cabot's tragopan	*Tragopan caboti*	China.

Common name	Scientific name	Where found
Western tragopan	*Tragopan melanocephalus*	India, West Pakistan.
Whooping crane	*Grus americana*	Canada, United States.
Japanese crane	*Grus japonensis*	Japan, China, Korea, U.S.S.R.
Siberian white crane	*Grus leucogeranus*	Siberia to India.
Hooded crane	*Grus monachus*	Japan, U.S.S.R.
Auckland Island rail	*Rallus pectoralis muelleri*	New Zealand.
Kagu	*Rhynochetos jubatus*	New Caledonia.
Great Indian bustard	*Choriotis nigericeps*	India, Pakistan.
New Zealand shore plover	*Thinornis novae-seelandiae*	New Zealand.
Eskimo curlew	*Numenius borealis*	Canada to Argentina.
Audouin's gull	*Larus audouinii*	Mediterranean.
California least tern	*Sterna albifrons browni*	Mexico, United States.
Cloven-feathered dove	*Drepanoptila holosericea*	New Caledonia.
Chatham Island pigeon	*Hemiphaga novaeseelandiae chathamensis*	New Zealand.
Azores wood pigeon	*Columba palumbus azorica*	Azores.
Grenada dove	*Leptotila wellsi*	Grenada (West Indies).
Palau ground dove	*Gallicolumba canifrons*	Palau Islands (Marianas).
Ochre-marked parakeet	*Pyrrhura cruentata*	Brazil.
Kakapo	*Strigops habroptilus*	New Zealand.
Red-browed parrot	*Amazona rhodocorytha*	Brazil.
Bahamas parrot	*Amazona leucocephala bahamensis*	Bahamas.
St Vincent parrot	*Amazona guildingii*	St Vincent (West Indies).
St Lucia parrot	*Amazona versicolor*	St Lucia (West Indies).
Imperial parrot	*Amazona imperialis*	Dominica (West Indies).
Night parrot	*Geopsittacus occidentalis*	Australia.
Turquoise parakeet	*Neophema pulchella*	Do.
Orange-bellied parrot	*Neophema chrysogaster*	Do.
Scarlet-chested parrot	*Neophema splendida*	Do.
Beautiful parakeet	*Psephotus pulcherrimus*	Do.
Paradise parakeet	*Psephotus chrysopterygius*	Do.
Forbes' parakeet	*Cyanoramphus auriceps forbesi*	New Zealand.
Mauritius ring-necked parakeet	*Psittacula krameri echo*	Mauritius.
Thicked-billed parrot	*Rhynchopsitta pachyrhyncha*	Mexico, United States.
Red-faced malkoha	*Phaenicophaeus pyrrhocephalus*	Ceylon.
Seychelles owl	*Otus insularis*	Seychelles.
Palau owl	*Otus podargina*	Palau Islands.
Mrs Morden's owlet	*Otus ireneae*	Kenya.
Anjouan scops owl	*Otus rutilus capnodes*	Comoro Islands.
Long-tailed ground roller	*Uratelornis chimaera*	Madagascar.
Imperial woodpecker	*Campephilus imperialis*	Mexico.
Ivory-billed woodpecker	*Campephilus principalis*	Cuba, United States.
Tristram's woodpecker	*Dryocopus javensis richardsi*	Korea.
Euler's flycatcher	*Empidonax euleri johnstonei*	Grenada, West Indies.
New Zealand bush wren	*Xenicus longipes*	New Zealand.
Noisy scrub-bird	*Atrichornis clamosus*	Australia.
Ponape Mountain starling	*Aplonis pelzelni*	Ponape Island (Carolines).
Rothschild's starling	*Leucopsar rothschildi*	Bali (Indonesia).
Kokako	*Callaeas cinerea*	New Zealand.
Piopio	*Turnagra capensis*	Reunion Island.
Reunion cuckoo shrike	*Coquus newtoni*	Do.
Mauritius cuckoo shrike	*Coquus typicus*	Mauritius.
Guadeloupe house wren	*Troglodytes aedon guadeloupensis*	Guadeloupe (West Indies).
St. Lucia wren	*Troglodytes aedon mesoleucus*	St. Lucia, West Indies.
Martinique brown trembler	*Cinclocerthia ruficauda gutturalis*	Martinique (West Indies).
White-breasted thrasher	*Ramphocinclus brachyurus*	Martinque, St. Lucia.
Mauritius olivaceous bulbul	*Hypsipetes borbonicus olivaceus*	Mauritius.

BIRDS—*continued*

Common name	Scientific name	Where found
Cebu black shama	*Copsychus niger cebuensis*	Philippines.
Seychelles magpie-robin	*Copsychus seychellarum*	Seychelles.
Western whipbird	*Psophodes nigrogularis*	Australia.
Western bristlebird	*Dasyornis brachypterus longirostris*	Do.
Eyrean grass-wren	*Amytornis goyderi*	Do.
Palau fantail	*Rhipidura lepida*	Palau.
White-necked rock-fowl	*Picathartes gymnocephalus*	Togo to Sierra Leone.
Grey-necked rock-fowl	*Picathartes oreas*	Cameroon.
Reed warbler	*Acrocephalus luscinia*	Marianas Islands.
Rodriguez warbler	*Bebrornis rodericanus*	Rodriguez Island (Indian Ocean).
Seychelles warbler	*Bebrornis sechellensis*	Seychelles.
Scarlet-breasted robin	*Petroica multicolor multicolor*	Norfolk Island (Australia).
Chatham Island robin	*Petroica traversi*	New Zealand.
Tahiti flycatcher	*Pomarea nigra nigra*	Tahiti.
Tinian monarch	*Monarcha takatsukasae*	Tinian Island (Marianas).
Helmeted honeyeater	*Meliphaga cassidix*	Australia.
Seychelles black flycatcher	*Terpsiphone corvina*	Seychelles.
Seychelles white-eye	*Zosterops modestus*	Do.
Ponape great white-eye	*Rukia sanfordi*	Ponape (Carolines).
Semper's warbler	*Leucopeza semperi*	St. Lucia (West Indies).
Bachman's warbler	*Vermivora bachmanii*	Cuba, United States.
Barbados yellow warbler	*Dendroica petechia petechia*	Barbados (West Indies).
Kirtland's warbler	*Dendroica kirtlandii*	Bahamas, United States.
Seychelles fody	*Foudia sechellarum*	Seychelles.
Sao Miguel bullfinch	*Pyrrhula pyrrhula murina*	Azores.
Slender-billed grackle	*Cassidix palustris*	Mexico.

AMPHIBIANS AND REPTILES

Common name	Scientific name	Where found
Israel painted frog	*Discoglossus nigriventer*	Israel.
Stephen Island frog	*Leiopelma hamiltoni*	New Zealand.
River terrapin, tuntong	*Batagur baska*	Burma, India, Indonesia, Malaysia, Pakistan.
Galapagos tortoise	*Testudo elephantopus*	Calapagos (Eduador).
Madagascar radiated tortoise	*Testudo radiata*	Madagascar.
Hawksbill turtle	*Eretmochelys imbricata*	Tropical seas.
Leatherback turtle	*Dermochelys coriacea*	Tropical and temperate seas.
Atlantic ridley turtle	*Lepidochelys kempii*	Mexico.
South American river turtle	*Podocnemis expansa*	Orinoco and Amazon River Basins.
Do	*Podocenemis unifilis*	Do.
Short-necked or swamp tortoise	*Pseudemydura umbrina*	Australia.
Yacare	*Caiman yacare*	Bolivia, Argentina, Peru, Brazil.
Orinoco crocodile	*Crocodylus intermedius*	Orinoco River drainage.
Cuban crocodile	*Crocodylus rhombifer*	Cuba.
Morelet's crocodile	*Crocodylus moreletii*	Mexico, British Honduras, Guatemala.
Nile crocodile	*Crocodile niloticus*	Africa.
Gavial	*Gavialis gangeticus*	Pakistan.
Round Island day gecko	*Phelsuma guentheri*	Mauritius.
Day gecko	*Phelsuma newtoni*	Do.
Barrington land lizard	*Conolophus pallidus*	Galapagos.
Tuatara	*Sphenodon punctatus*	New Zealand.
Jamaica boa	*Epicrates subflavus*	Jamaica.
Anegada ground iguana	*Cyclura pinguis*	Anegada Island.

FISH

Common name	Scientific name	Where found
Ala balik	*Salmo platycephalus*	Turkey.
Cicek	*Acanthorutilus handlirschi*	Do.
Miyako tanago	*Tanakia tanago*	Japan.
Ayumodoki	*Hymenophysa curta*	Do.
Mexican blindcat	*Prietella phreatophila*	Mexico.
Nekogigi	*Coreobagrus ichikawai*	Japan.
Giant catfish	*Pangasianodon gigas*	Thailand.
Catfish	*Pangasius sanitwongsei*	Do.

MOLLUSK

Mollusk	*Papustyla pulcherrina*	Manus Island (Admiralty Island).